

Network Standard

NETWORK

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NS127 LOW VOLTAGE CABLE JOINTS AND TERMINATIONS



ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with the making of cable joints and terminations on low voltage cables, and is for reference by field, technical and engineering staff.

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Where this Standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

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Notes: 1. Compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the Work Health and Safety Regulation 2017 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 Integrated Support Requirements for Ausgrid Network Assets.

2. Where the procedural requirements of this document conflict with contestable project procedures, the contestable project procedures shall take precedent for the whole project or part thereof which is classified as contestable. Any external contact with Ausgrid for contestable works projects is to be made via the Ausgrid officer responsible for facilitating the contestable project. The Contestable Ausgrid officer will liaise with Ausgrid internal departments and specialists as necessary to fulfil the requirements of this Standard. All other technical aspects of this document which are not procedural in nature shall apply to contestable works projects.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

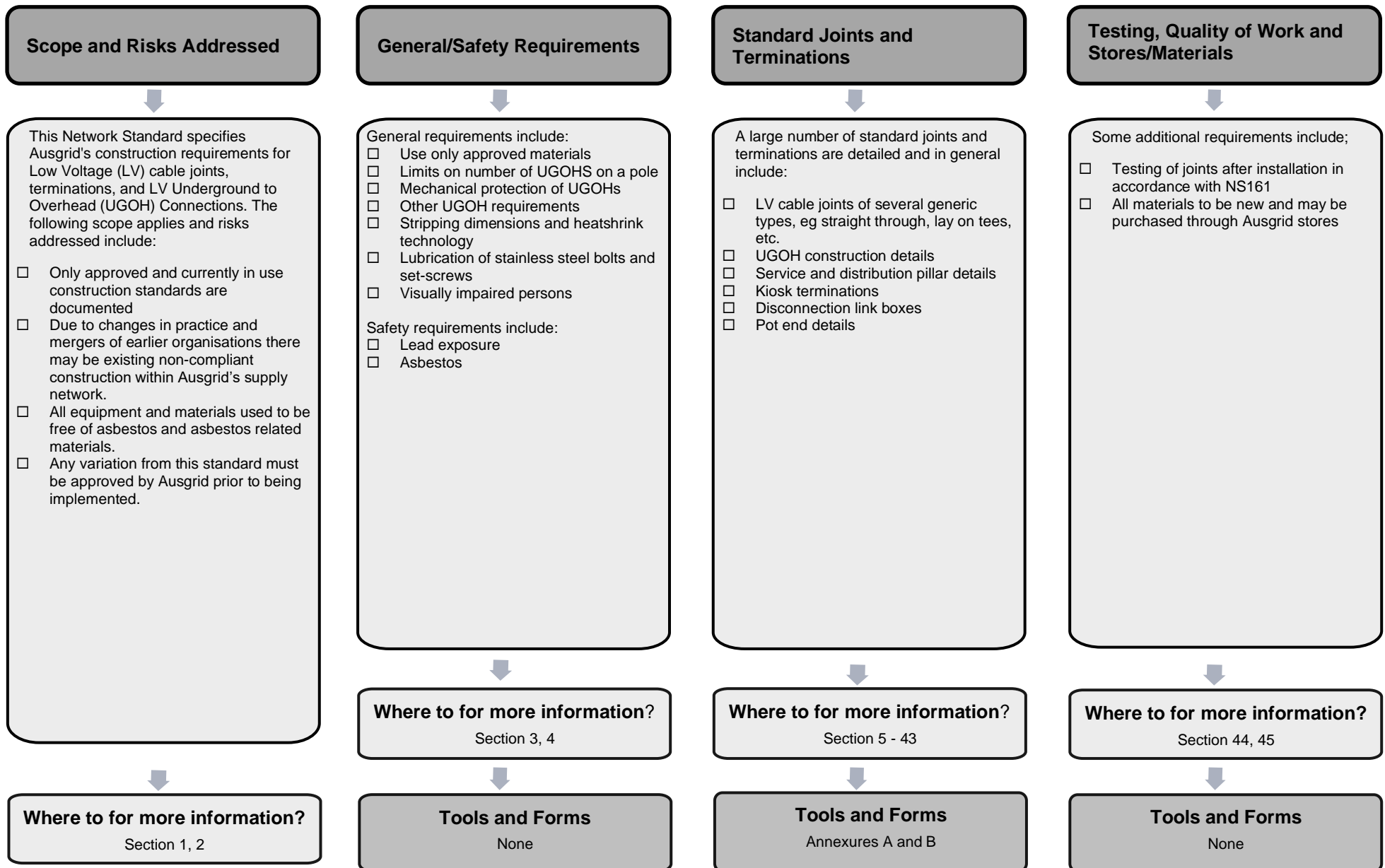
KEYPOINTS

This Standard has a summary of content labelled "KEYPOINTS FOR THIS STANDARD". The inclusion or omission of items in this summary does not signify any specific importance or criticality to the items described. It is meant to simply provide the reader with a quick assessment of some of the major issues addressed by the Standard. To fully appreciate the content and the requirements of the Standard it must be read in its entirety.

AMENDMENTS TO THIS STANDARD

Where there are changes to this Standard from the previously approved version, any previous shading is removed and the newly affected paragraphs are shaded with a grey background. Where the document changes exceed 25% of the document content, any grey background in the document is to be removed and the following words should be shown below the title block on the right hand side of the page in bold and italic, for example, Supersedes – document details (for example, "Supersedes Document Type (Category) Document No. Amendment No.").

KEY POINTS OF THIS STANDARD



Network Standard NS127 Low Voltage Cable Joints and Terminations

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1.0 PURPOSE

This Network Standard specifies Ausgrid's construction requirements for Low Voltage (LV) cable joints, terminations and LV Underground to Overhead (UGOH) Connections.

2.0 SCOPE

Although there are many types of LV joints, terminations, and UGOH connections on Ausgrid's reticulation system, only the approved construction standards currently in use are detailed in this document. Construction details for joints, terminations, and UGOH connections which are not covered in this standard should be sought from Ausgrid as required.

3.0 GENERAL REQUIREMENTS

3.1 Approved products

The specifications contained in this standard provide Ausgrid's stockcode numbers for all approved components. Alternative components must not be used unless specifically approved by Ausgrid. Refer to Clause 47.0.

3.2 Private equipment

Ausgrid does not specify the requirements for the physical installation of private pits or pillars. Private pits and pillars must be installed in accordance with the requirements of AS/NZS 3000 and the Service and Installation Rules of NSW.

Joints between Ausgrid's service cable and consumer's mains must be made using an approved jointing kit as per this standard.

Where the Ausgrid cable terminates in the customer's service protection device, pit or pillar the equipment shall be selected in accordance with the requirements of AS/NZS3000.

3.3 Service Cables

Service cable specifications are according to Table 3.1.

Table 3.1 - Service cables

Cross-sectional area (mm²)	Cable Description	Stockcode
16	Circular, stranded, copper conductor, two core cable	174565
16	Circular, stranded, copper conductor, four core cable	148668
25	Circular, stranded, copper conductor, four core cable	H109462
50	Circular, stranded, copper conductor, four core cable	149112

Refer to the Approved Material List (AML) for service cables including single core cables.

3.4 Total number of Service UGOH connections on an Ausgrid pole

Refer to the Service and Installation Rules of NSW (Clause 2.10.4) for details of the maximum number of underground to overhead services that can be attached to an Ausgrid pole, provided the placement requirements of Clause of this Network Standard are met.

3.5 Mechanical Protection of UGOHs

3.5.1 Customer (underground service) UGOHs

Refer to Section 2 of the Service and Installation Rules of NSW. The required mechanical protection of Customer UGOH cables between 2500mm above groundline and 300mm below groundline should be tubular or 'U' section construction with no side flanges (side securing tabs are

permitted) to minimise the surface area of the pole that is covered and help prevent unauthorised climbing.

The following non-metallic UGOH cover is approved for use as mechanical protection of Customer LV UGOH cables:

Ausgrid Stockcode	Description
184570	KIT, UGOH COVER, NON-METALLIC, 60MM SUITABLE FOR COVERING SERVICE & STREETLIGHT CABLE UP TO 35MM OVERALL DIAMETER.

If the mechanical protection used on Customer LV UGOH cables is metallic, the metallic protection cover shall be made of galvanised steel and shall be bonded to the neutral of the LV overhead mains as illustrated in Figure 3.1, in accordance with NS116.

Mechanical protection shall be of non-metallic material for Customer LV UGOH cables installed on poles supporting an earth down lead that is part of a HV earthing system.

Mechanical protection between 2000mm below the lowest set of overhead conductors and the top of the pole must be of non-metallic (non-conductive) material.

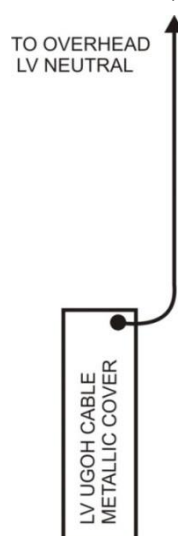


Figure 3.1 – Metallic UGOH Cover Bonded to Neutral

3.5.2 LV Network UGOHs

The required mechanical protection of LV Network UGOH cables between 3000mm above groundline and 300mm below groundline should be of 'U' section construction with no side flanges (side securing tabs are permitted) to minimise the surface area of the pole that is covered and help prevent unauthorised climbing.

The following non-metallic UGOH cover is approved for use as mechanical protection of LV Network UGOH cables:

Ausgrid Stockcode	Description
184571	KIT, UGOH COVER, NON-METALLIC, 90MM SUITABLE FOR COVERING LV DISTRIBUTOR CABLE UP TO 60MM OVERALL DIAMETER.

If the mechanical protection used on LV Network UGOH cables is metallic, the metallic protection cover shall be made of galvanised steel and shall be bonded to the neutral of the LV overhead mains as illustrated in Figure 3.1, in accordance with NS116.

Mechanical protection shall be of non-metallic material for LV Network UGOH cables installed on poles supporting an earth down lead that is part of a HV earthing system.

Mechanical protection between 2000mm below the lowest set of overhead conductors and the top of the pole must be of non-metallic (non-conductive) material.

3.5.3 Existing LV UGOH covers

If a metallic LV UGOH cable cover needs to be replaced and a non-metallic LV UGOH cable cover is used, any existing bonding between the metallic LV UGOH cable cover to the O/H LV neutral shall be removed. If this requires removal of an Insulation Piercing Connector (IPC) from the LV ABC mains, the residual holes must be carefully sealed with vinyl-backed mastic tape (Ausgrid Stockcode 69807) to restore the insulation and prevent moisture ingress.

3.5.4 Cable Connection Bond for Metallic Covers

If a metallic LV UGOH cable cover is used, the metallic cable cover shall be bonded to the neutral of either the bare overhead mains or LV ABC. The figure below shows the detail of the connection at the metallic cable cover.

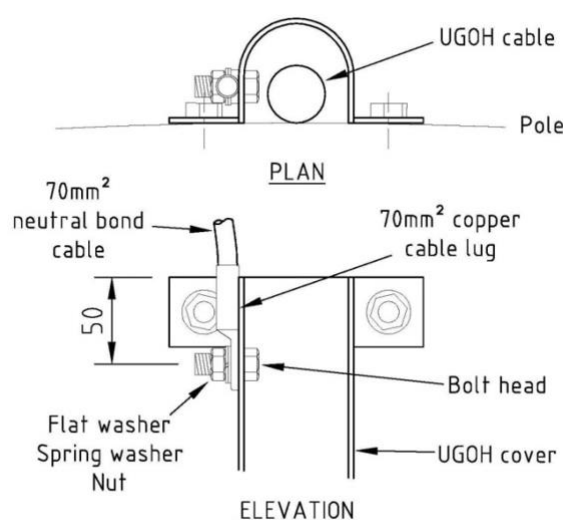


Figure 3.2 – Neutral Connection Bond to the Metallic Cover

If the metallic UGOH cover has a drilled hole in the cover (approximately 50mm from top of the cover) to fix the 70mm² lug (stockcode H95851), using stainless steel M12 nut, spring washer, flat washer and M12 x 20mm bolt, connect the neutral bond as shown above. Bolt head must be inside the cover to avoid damage to the UGOH cable.

If there is no hole on the metallic cover, drill a hole of 13mm diameter 50mm from the top of the cover and reapply cold galvanising paint (stockcode 176055). Then, connect the neutral bonding cable as per above. Drilling of the hole shall be carried out before the UGOH cover is installed on the pole to avoid any damages to the UGOH cable.

To drill a hole for the neutral bonding connection in an existing LV UGOH metallic cover installed on a pole, the metallic cover shall be removed from the pole prior to drilling. This is to prevent any damage to the LV UGOH cable.

It is recommended to install the neutral bond cable to the metallic cover before installing the cover on the pole to avoid any damage to the UGOH cable.

A 70 mm² copper insulated cable (stockcode 60111) must be used to bond the LV UGOH cover to the neutral. The following three tables show the methods and Ausgrid stock codes which can be used to connect the 70 mm² copper bonding cable to the OH neutral conductor. Each table shows the different OH conductor type (LV ABC, bare aluminium and bare copper).

The 70mm² neutral bond cable (where no HV UGOH exists) must be separately saddled straight up the pole using 12mm Galvanised double sided saddles (stockcode 176494) held in place using self-drilling timber screws type 17 10G x 30mm (stockcode 184996) not more than 600mm apart. Non-metallic mechanical protection (PVC Cover Strip stockcode 157552) should be placed within 2m below of the LV mains or streetlight wire.

Table 3.2 – Method to connect the bonding cable to LV ABC mains:

LV ABC	25 mm ²	95 mm ²	150 mm ²
Connector	See Note 1 below	IPC Stock Code: 176580	IPC Stock Code: 148387

Notes:

1. Insulation Piercing Connector (IPC) details: Sicame Australia Pty Ltd (Part No. TTD301XFA) or Preformed Line Products Australia (Part No. D-K445).
2. Install two IPCs when connecting the bonding cable to LV ABC mains.
3. Make sure that the PVC insulated bonding cable is new when connecting to the LV ABC mains using IPCs. If it is old and hard, it may prevent the teeth of the IPC connector making a sound electrical connection and cause the connection to fail.

Table 3.3 – Method to connect the bonding cable to bare aluminium mains:

Bare Aluminium	5.5 – 14 mm diameter	6.5 – 15.5 mm diameter
Connector	Bimetallic PG Clamp Stock Code: H88013	Bimetallic PG Clamp Stock Code: 176491

Table 3.4 – Method to connect the bonding cable to bare copper mains:

Bare Copper	Up to 70mm ²	70 - 95 mm ²	95 - 185 mm ²
Connector	Split Bolt Natural Stock Code: 61374	Split Bolt Natural Stock Code: 61358	Split Bolt Natural Stock Code: 59139

4. Install two Split bolts when connecting the bonding cable to bare copper mains.
5. Bare overhead mains must be cleaned by application of a scratch brush to remove oxide components before any electrical connection is made.

3.5.5 UGOHs on Ausgrid poles

UGOHs on Ausgrid poles are to be placed so that the danger of vehicle impact is minimised. Consideration must be given to both nearside traffic flow and any adjacent driveway traffic. Where UGOHs are to be placed on concrete poles they are to be secured to the pole by stainless steel bands. No holes are to be drilled in concrete poles.

UGOHs will be spaced at ground level so that there is 50mm clearance between the outside edge of their mechanical protection and any adjacent UGOH (to enable easy installation and pole inspection). UGOHs on wood poles must be grouped at ground level so that one side of the pole, in its neutral axis, is free of any obstruction that may prevent the installation of any future steel splint. This is to be achieved by keeping an area free of obstructions that is one third of the circumference of the pole in size and by ensuring that the cable does not cross over onto the side of a wood pole that is reserved for future pole splinting until they reach a height of 4m above ground level.

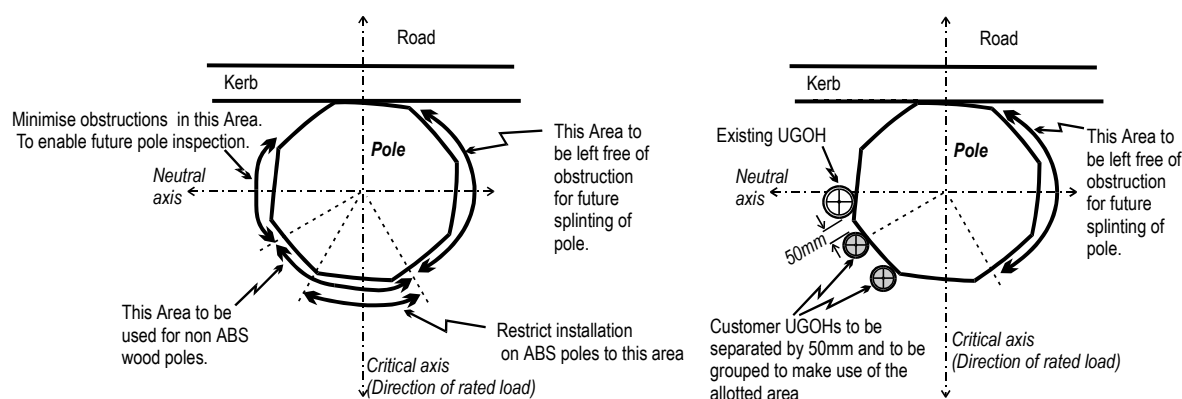


Figure 3.3 – LV UGOH Location on Ausgrid Poles

Where no LV Network UGOH exists on the pole the first Customer UGOH will be placed on the footpath side of the pole (or critical axis) in the allotted area. Where an LV Network UGOH exists on a pole, the first Customer UGOH to be installed will be put adjacent to the LV network UGOH. See the above figure.

All customers UGOHs on poles that include High Voltage construction, except ABS poles, are to be connected on the non-climbing side of the pole.

3.5.6 Sub-transmission poles and UGOHs

Refer to NS260 for details.

3.6 UGOHs on air break switch (ABS) poles

Groundline placement of UGOHs on Air Break Switch (ABS) poles shall be in accordance with Figure 3.3. However when above 4m from ground line the cable must transfer to the side of the pole that is opposite the ABS down rod and handle arrangement (connection to the overhead mains must be done on the side of the pole that is opposite the down rod).

3.7 UGOHs on substation poles (PTs)

Only Service UGOHs are to be installed on these poles, in accordance with Service and Installation Rules of NSW (Clause 2.10.4) and must not exceed 70mm². They must be installed on the non-climbing side of the pole (leaving the climbing side of the pole free for future splinting and unrestricted climbing).

3.8 Service UGOHs in excess of 200 amps

Supplies to services greater than 200 amps will be via a distribution pillar installed in the footway, where site conditions allow it, to facilitate future service connections. The installation of the pillar and its connection to the network will be done at a cost to the customer that is equal to the additional cost that the customer would have had to pay to extend the service up the pole. All further underground services will be connected at the pillar.

3.9 Phase and neutral/earth connectors

The cable connectors specified in this standard are either of the compression type or the mechanical type. Connectors must be installed strictly in accordance with their manufacturers' installation instructions. Compression type connectors shall be installed using the correct dies, and number and position of crimps. Mechanical connectors must be installed using the correct tools and sequence of fastening.

Installed connectors shall maintain the load current carrying capacity of the jointed cores in the case of phase conductors, and the earth fault current carrying capacity in the case of neutral/earth conductors.

3.10 Jointing and termination requirements

The following requirements must be satisfied when constructing low voltage joints (including pot ends) and terminations:

- All heatshrink components must be kept free of contamination during jointing.
- The components and the prepared cable ends being worked on must be kept free of contamination and must not be damaged during the construction process.
- Cables and cable cores must not be bent tighter than the manufacturers' specified minimum internal bending radii either during the jointing process or after they have been set in position. Completed joints and the first 500 mm of each associated cable must be kept straight when set in position.
- Wire brush the surface of the aluminium conductors prior to inserting them into the connector.
- Joints and terminations shall be constructed in accordance with the installation instructions supplied.
- All components involved in joints and terminations (including cable components) which will come into contact with either mastic tape or adhesive sealants must be thoroughly cleaned and degreased prior to the application of these sealing agents. Cleaning must only be done using a lint-free cloth.
- Heatshrink tubing must be positioned correctly, and properly and evenly shrunk, free of voids and must not be damaged due to overheating. Heatshrink components with adhesive sealant coatings must provide effective sealing against moisture ingress when installed.
- The specified overlapping distances between various heatshrink tubing and cable components must always be adhered to.
- Where polyurethane resin is specified for filling joints, the polyurethane resin shall be used in accordance with the manufacturer's instructions.
- Completed heatshrink joints and terminations must be allowed to cool down before they are subjected to any mechanical load.
- The polyurethane resin in the completed joint must be allowed to set before applying mechanical load to it or energising the joint. This is normally two hours.
- The three active cable cores shall be coloured red, white (or uncoloured) and blue. The neutral core shall be coloured black.
- The completed joint if direct buried, shall be surrounded in soft bedding material up to a depth of 100 mm above the joint. The bedding material must comply with the requirements of NS130.

3.11 Lubrication of stainless steel bolts and set-screws

Before installation of each stainless steel bolt or set-screw, the thread shall be lubricated with specially formulated anti-seize grease containing nickel which is available on Ausgrid stockcode 177212. Equivalent anti-seize grease containing nickel may be used but must first be submitted to Ausgrid for approval. Care shall be exercised to prevent the anti-seize grease from contaminating the interface of the electrical contact surfaces. Any excess of anti-seize grease shall be removed using a clean dry cloth after the bolt or set-screw has been installed.

3.12 Consideration of Visually Impaired Persons

The following requirements are equally applicable for suburban residential, suburban commercial and industrial locations.

3.12.1 Location of Pillars

Designers shall give consideration to visually impaired persons when determining the location of pillars. Where possible, pillars shall be installed outside of pedestrian thoroughfares and within the restrictions specified by NSW Streets Opening Coordination Council, "Guide to Codes and Practices for Streets Opening".

3.12.2 Short Turret Pillars

Pillars with short turrets (365mm total installed height out of ground including the base) shall not be used in pedestrian thoroughfares. Short turrets may create a trip hazard for visually impaired persons in pedestrian thoroughfares.

3.12.3 Contrast against Surrounding Surfaces

The turret and base must provide a strong luminance contrast against surrounding surfaces (minimum 30%). Examples of surrounding surfaces are grassed, paved and concrete footways. During the design phase the colour selection of the turret and base combination shall be considered and discussed with the turret supplier to ensure the strong luminance contrast requirement is met.

Where pillars that have been identified to be a trip hazard for visually impaired pedestrians at night, a white reflective tape 50mm wide (Stockcode 56564) shall be installed 100mm from the top of the turret. This white reflective tape shall cover the entire circumference of the turret and is to be cut into four individual lengths to match the four sides of the turret such that it sits flat on the turret surface.

Surface preparation for affixing the reflective tape is the same method as described in NS148 for attaching asset numbers to HDPE plastic pillars. This process is necessary to ensure the reflective tape sticks well to the pillar turret.

3.12.4 Determining Luminance Contrast

AS1428.1 Appendix B refers specifically to measurements of luminance contrast.

In addition, the following advice has been provided by Vision Australia:

Appendix E within AS1428.4.1 gives you the precise, but complicated, method of measuring luminance contrasts.

Other pragmatic but less accurate, ways include:

- using a lux meter, or
- matching the colours in question with the colours in the "Dulux Colour Atlas" and comparing their Light Reflectance Value (LRV).

Because these methods are not so precise, a higher figure (contrast) should be used. So, for example, instead of 30% luminance contrast, a 40% luminance contrast is to be targeted.

A colorluminator device to allow an easy and precise method of measurement is available at Pathfinder Systems Australia.

3.13 Field recording of network assets

Information regarding the construction, modification, repair, and/or retirement of Ausgrid's network assets must be recorded in accordance with NS100. These records must be submitted to the Data Maintenance team in accordance with NS100.

4.0 SAFETY REQUIREMENTS

4.1 Lead exposure

When working with lead during the cable jointing process, the persons performing the works must comply with the controls in their SWMS and the Work Health and Safety (WHS) Regulation 2017 for working with lead and lead products. Ausgrid workers are to comply with the additional requirements of the controls for lead in the Ausgrid WHS management system. Other workers must comply with any additional controls within their WHS management system. For detailed guidance on lead controls refer to WHS Regulation 2017 Part 7.2 Lead.

Any lead waste from the jointing process must be disposed of through a waste facility licenced to receive Hazardous Waste. For additional guidance on managing hazardous waste refer to NS174C.

4.2 Asbestos

Asbestos has been used within the Ausgrid network and the known locations of asbestos products used in the underground network are listed in the GIS. For Ausgrid workers the asbestos information in the GIS can be accessed via Network Viewer. For other workers the GIS information is available via the designated underground asset information provider. All other identified asbestos products are listed in the Ausgrid Asbestos Register. Ausgrid workers can access the Asbestos Register from their mobile devices or a copy of the site information can be downloaded from the register by their supervisor. For other workers a copy of site information can be obtained from their Ausgrid point of contact for the works.

The requirements for working with asbestos on the Ausgrid network are listed in NS211. Ausgrid workers working with or in the vicinity of Asbestos must comply with the additional requirements for working with asbestos in the Ausgrid WHS management system. Other workers must comply with the controls in their SWMS and the NSW Code of Practice - How to safely remove asbestos.

All materials and equipment used for construction of Ausgrid's assets are to be free from Asbestos and or Asbestos related products. Suppliers are expected to comply with the Work Health and Safety Act 2011 (NSW) together with the Work Health and Safety Regulation 2017 (NSW) and confirm in writing that all products supplied to Ausgrid contain no Asbestos related materials.

5.0 UGOH CONSTRUCTION, MULTICORE SERVICE CABLES (LV1-14)

This specification provides the requirements for constructing a multicore service cable underground-to-overhead (UGOH) connection. An individual UGOH must be erected for each service.

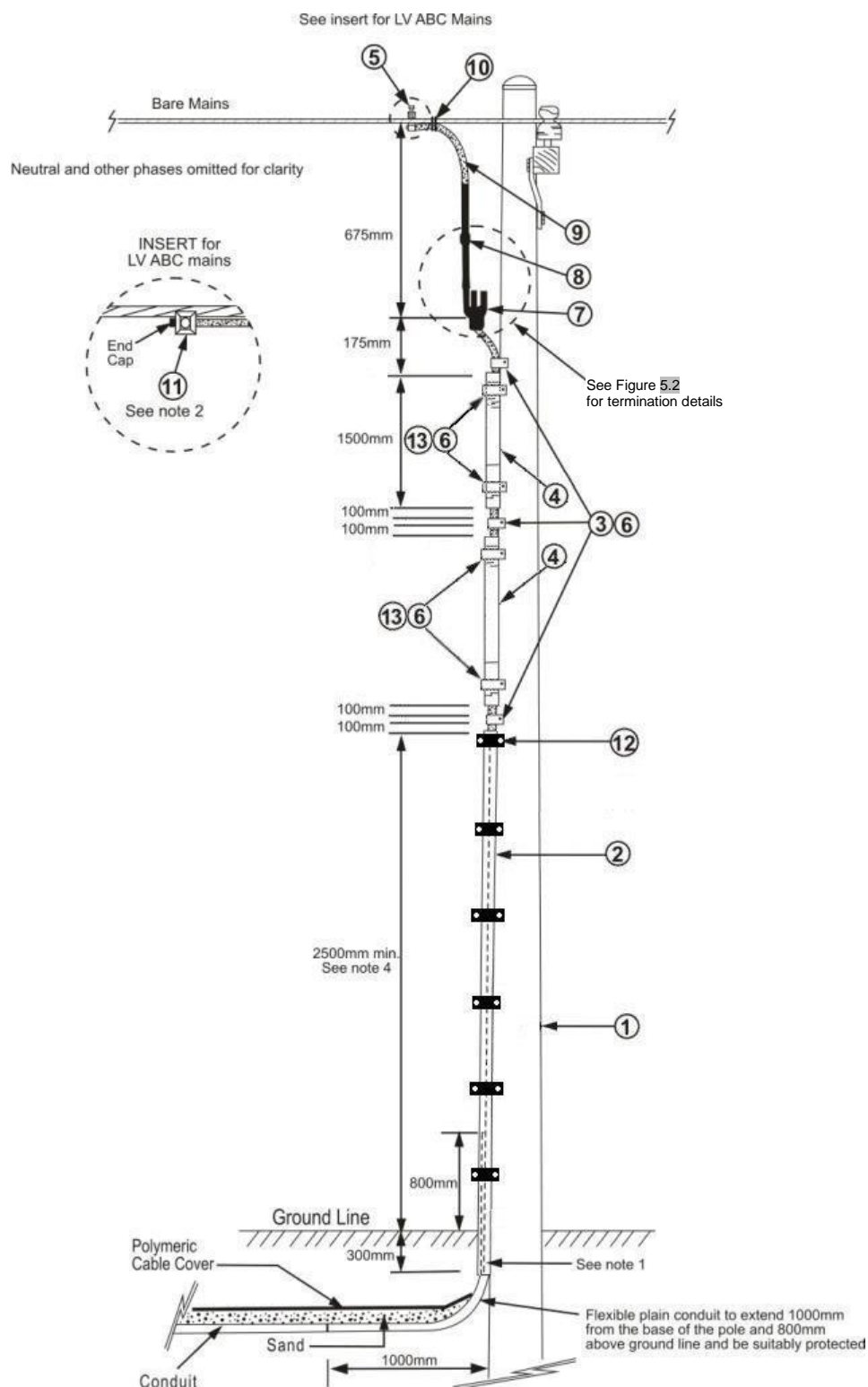


Figure 5.1 – General Arrangement

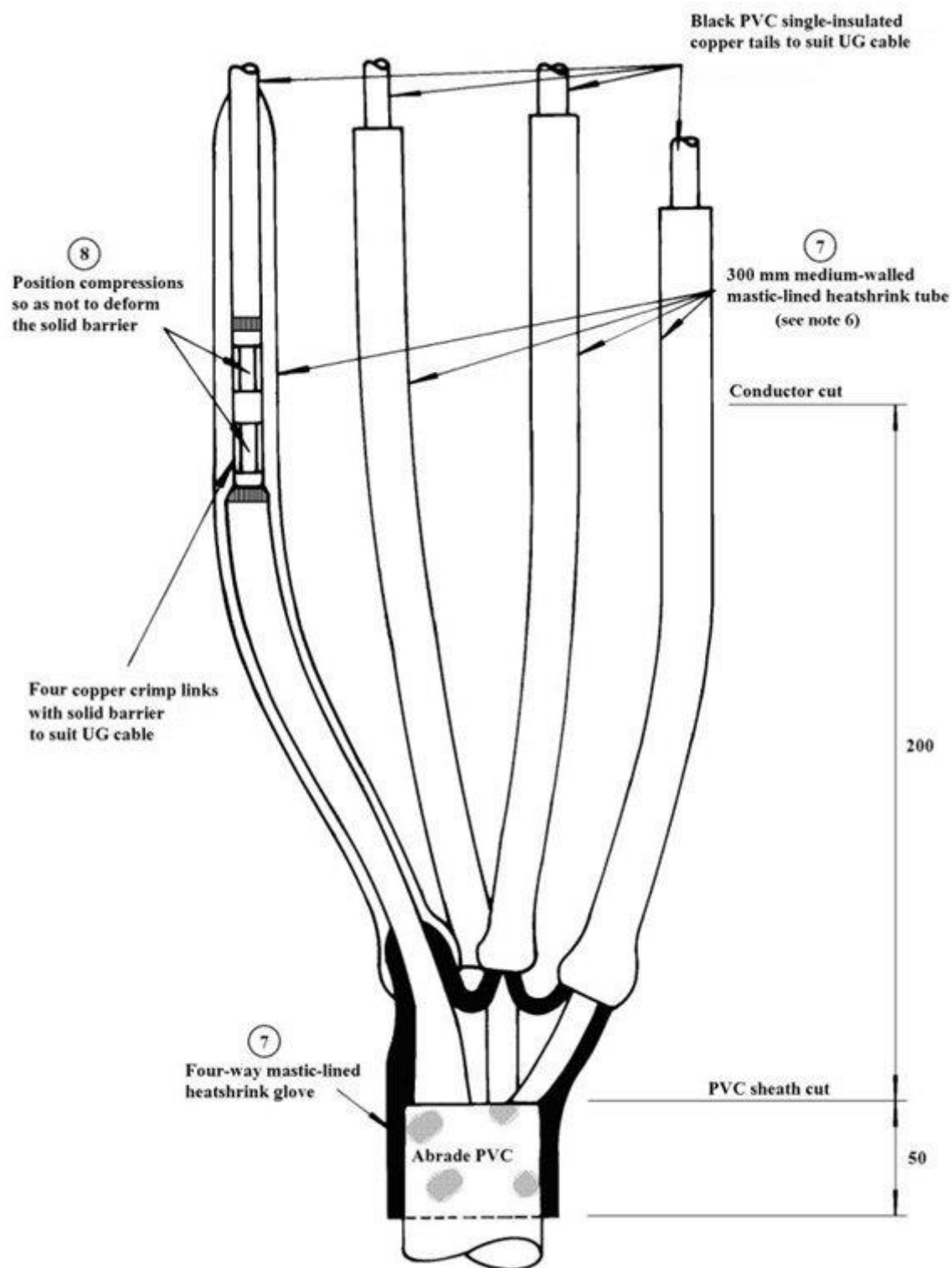


Figure 5.2 – 4 core Cable Termination Details used for illustration purposes, also applicable for 2 core Cable Termination

Table 5.1 – Material list (four core and two core cables)

Item	Description	16 CU2 XQZ Stockcode 174565 1-phase		16 CU4 XQ Z Stockcode 148668 3-phase		25 CU4 XQZ Stockcode H019462 3-phase		50 CU4 XQZ Stockcode 149112 3-phase	
		Qty	Stockcode	Qty	Stockcode	Qty	Stockcode		Stockcode
1	Wood pole	1	–	1	–	1	–	1	–
2	Non-metallic cable cover (note 4)	1	184570	1	184570	1	184570	1	184570
3	Suitable galvanised saddle with nitrile rubber liner (minimum thickness of 3mm) for service cable	As required	–	As required	–	As required	–	As required	–
4	Flexible PVC conduit	As required	–	As required	–	As required	–	As required	–
5	Tap-off connectors:								
	Bare aluminium overhead active conductors:								
	7/2.25 (25mm ²) to 19/3.75 (210mm ²)	1	175051	3	175051	3	175051	NA	NA
	Bare aluminium overhead neutral conductor:								
	7/2.25 (25mm ²) to 19/3.75 (210mm ²)	1 (note 7)	182904	1 (note 7)	182904	1 (note 7)	182904	NA	NA
	Bare copper overhead active conductors:								
	7/1.12 (7mm ²) to 19/2.56 (100mm ²)	1	H109694	3	H109694	3	H109694	3	176580
	Bare copper overhead neutral conductor:								
	7/1.12 (7mm ²) to 19/2.56 (100mm ²)	1 (note 7)	182905	1 (note 7)	182905	1 (note 7)	182905	2 (note 7)	176580
6	Galvanised self drilling timber screw Type 17 12g x 45mm	As required	175567	As required	175567	As required	175567	As required	175567
7	Heatshrink termination kit	1	186769	1	74104	1	74104	1	74229
8	Crimp link	2	90092	4	90092	4	See Note 8	4	57174
9	PVC-covered copper cable (note 5)	As required	179762	As required	179762	As required	H14536	As required	H14594
10	UV stabilised cable tie	As required	179755	As required	179755	As required	179755	As required	170755
11	Insulation piercing connectors (note 2):								
	150mm ² LVABC active	1	143891	3	143891	3	143891	3	179845
	150mm ² LVABC neutral	2 (note 7)	143891	2 (note 7)	143891	2 (note 7)	143891	2 (note 7)	179845
	95mm ² LVABC active	1	73593	3	73593	3	73593	3	179843
	95mm ² LVABC neutral	2 (note 7)	73593	2 (note 7)	73593	2 (note 7)	73593	2 (note 7)	179843

Item	Description	16 CU2 XQZ Stockcode 174565 1-phase		16 CU4 XQ Z Stockcode 148668 3-phase		25 CU4 XQZ Stockcode H019462 3-phase		50 CU4 XQZ Stockcode 149112 3-phase	
		Qty	Stockcode	Qty	Stockcode	Qty	Stockcode		Stockcode
12	Coach screw M12 x 75	12	50468	12	50468	12	50468	12	50468
13	Conduit saddle to suit flexible PVC conduit (Item 4) Refer to note 3	As required	–	As required	–	As required	–	As required	–

Notes:

- 300mm of the cable cover is to be installed below ground line.
- Insulation piercing connectors shall either have a grease filled cap fitted to seal the service cable core ends; or the end of the service cable shall be sealed with UV inhibited heatshrink cap.
- Conduit saddles shall be fitted no more than 1000 mm apart.
- Minimum height of cable cover is 2500mm above ground line.
Refer to Clause of this Network Standard for additional requirements regarding mechanical protection of UGOHs.
- The PVC-covered copper cable shall have a core conductor in which all conductors shall be circular stranded plain annealed copper complying with the requirements of AS1125, and the insulation shall be black V-90, and shall be UV stabilised by the addition of a minimum of 1% carbon black. The insulation thickness shall comply with the requirements of Section 6 of AS/NZ 5000.1 and be marked V-90 UV.
- All heatshrink components are packaged into a single kit. Refer to item 7 for details.
- LV Network service neutral connections shall incorporate two bolt connectors.
- Buy in from TE Connectivity Part No CKB25/25 or from Acculec Power Part No CASB25.
- All measurements are in millimetres (mm) unless marked otherwise.

6.0 UGOH CONSTRUCTION, SINGLE CORE SERVICE CABLES CONNECTIONS (LV1-11)

This specification provides the requirements for constructing a single core service cable underground-to-overhead (UGOH) connection. An individual UGOH must be erected for each service.

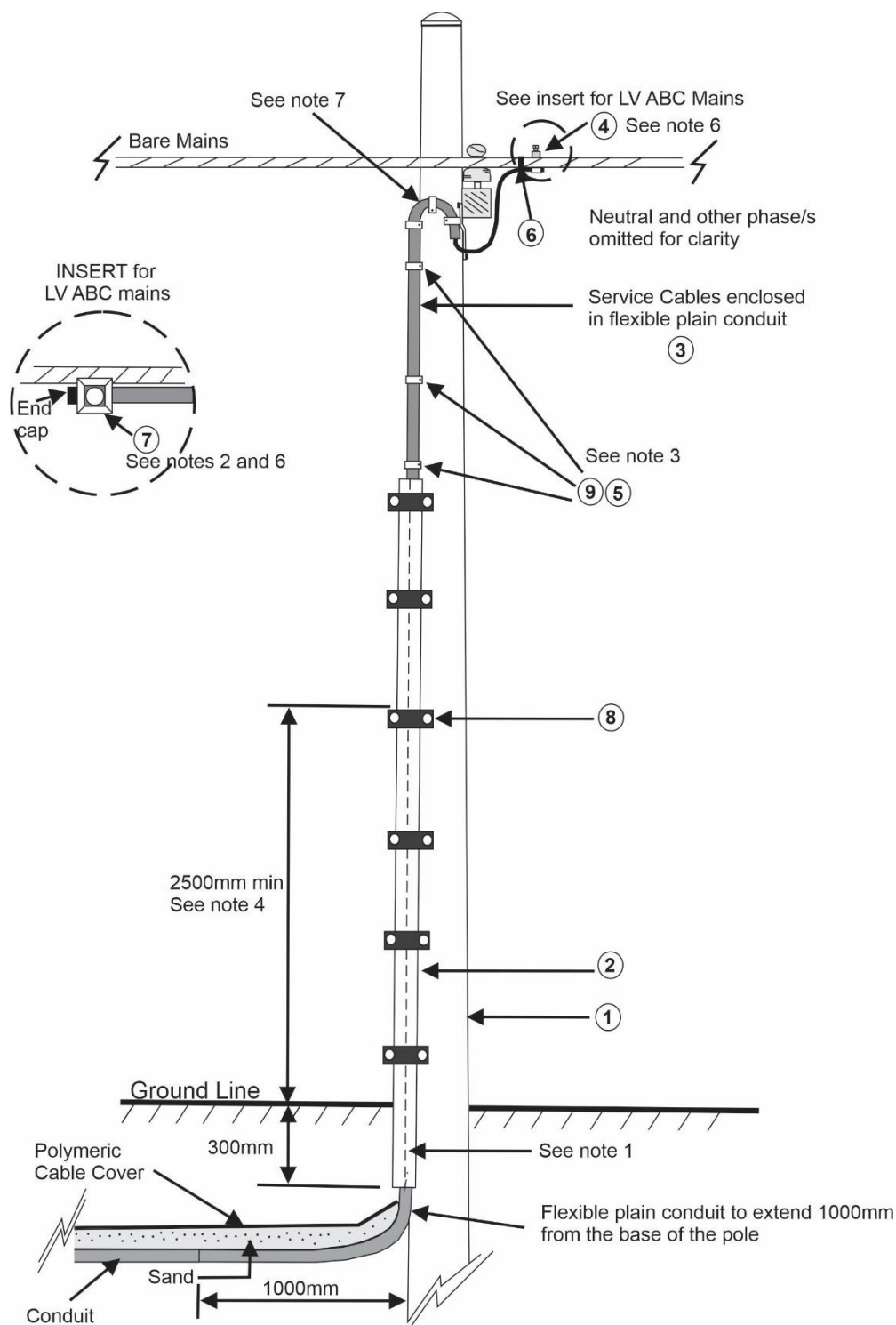


Figure 6.1 General arrangement

Table 6.1 Material list (single-core cables)

Item	Description	16 CU1 XQ Z and 25 CU1 XQ Z			50 CU1 XQ Z (3 –phase Only)	
		Stockcode	Quantity		Stockcode	Quantity
			1-phase	3-phase		
1	Wood pole	–	1		–	1
2	Non-metallic cable cover (note 4)	184570	1		184570	1
3	Flexible PVC conduit	–	As required		–	As required
4	Tap-off connectors:					
	Bare aluminium overhead active conductors:					
	7/2.25 (25mm ²) to 19/3.75 (210mm ²)	175051	1	3	NA	NA
	50-240mm ²				73569	3
	Bare aluminium overhead neutral conductor:					
	7/2.25 (25mm ²) to 19/3.75 (210mm ²)	182904	1 (note 5)	1 (note 5)	NA	NA
	50-240mm ²				73569	1
	Bare copper overhead active conductors:					
	7/1.12 (7mm ²) to 19/2.56 (100mm ²)	H109694	1	3	176580	3
	Bare copper overhead neutral conductor:					
	7/1.12 (7mm ²) to 19/2.56 (100mm ²)	182905	1 (note 5)	1 (note 5)	176580	2 (note 5)
5	Galvanised self drilling timber screw Type 17 12g x 45mm	175567	As required		175567	As required
6	UV stabilised cable tie	179755	As required		179755	As required
7	Insulation piercing connectors (note 2):					
	150mm ² LVABC active	143891	1	3	179845	3
	150mm ² LVABC neutral	143891	2 (note 5)	2 (note 5)	179845	2 (note 5)
	95mm ² LVABC active	73593	1	3	179843	3
	95mm ² LVABC neutral	73593	2 (note 5)	2 (note 5)	179843	2 (note 5)
8	Coach screw M12 x 75	50468	12	12	50468	12
9	Conduit Saddle to suit flexible PVC conduit (Item 3) Refer to note 3	–	As required		–	As required

Notes :

1. 300mm of the cable cover is to be installed below ground line.
2. Insulation piercing connectors shall either have a grease filled cap fitted to seal the service cable core ends; or the end of the service cable shall be sealed with UV inhibited heatshrink cap.
3. Conduit saddles shall be fitted no more than 1000 mm apart.
4. Minimum height of cable cover is 2500mm above ground line.
Refer to Clause of this Network Standard for additional requirements regarding mechanical protection of UGOHs.
5. LV Network service neutral connections shall incorporate two bolt connectors.
6. The cable sheath shall be removed for the length of cable that enters the insulating piercing connector. The cable insulation shall not be removed. There shall be no more than 2mm of exposed insulation between the end of the cable sheath and the insulation piercing connector.
7. The internal diameter of the conduit weather loop shall not be tighter than 2 times the minimum internal bending radius of the cable.
8. All measurements are in millimetres (mm) unless marked otherwise.

7.0 UGOH CONSTRUCTION, BARE OH MAINS TO 240 AL4 XQ Z/SAC, 300 AL4 XQ Z/SAC OR 240 CU4 XQ Z CABLES (LV1-43)

This specification provides the construction requirements for connecting 240mm² or 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC) or 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z) to overhead bare conductors.

Note that for 240 CU4 XQ Z cable, this specification is only valid for Bare OH mains up to a single circuit of 66mm² for copper or 111mm² for aluminium. For any higher rated configuration than this, the Link Box method specified in LV1-7 must be used.

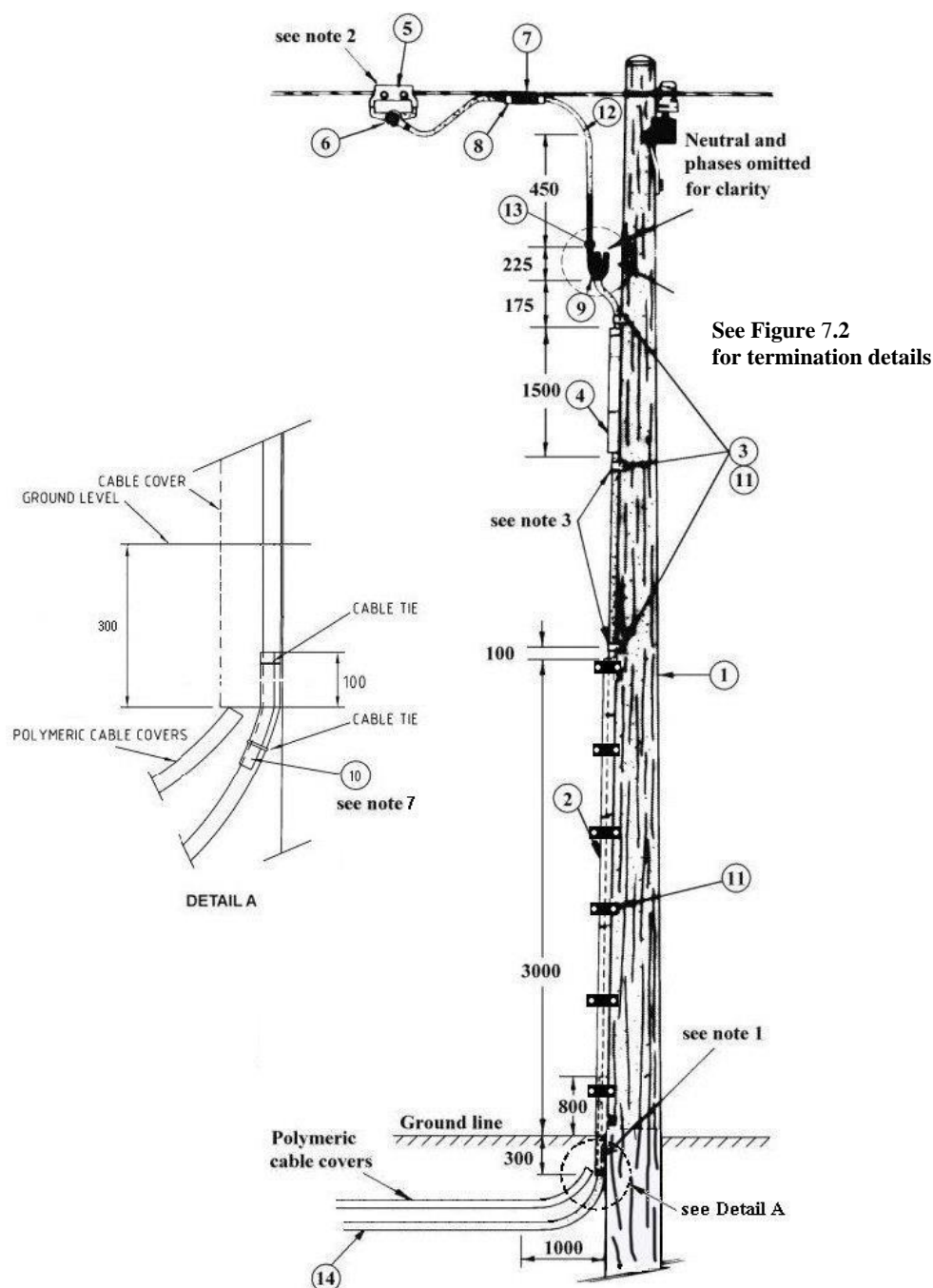


Figure 7.1 – General Arrangement

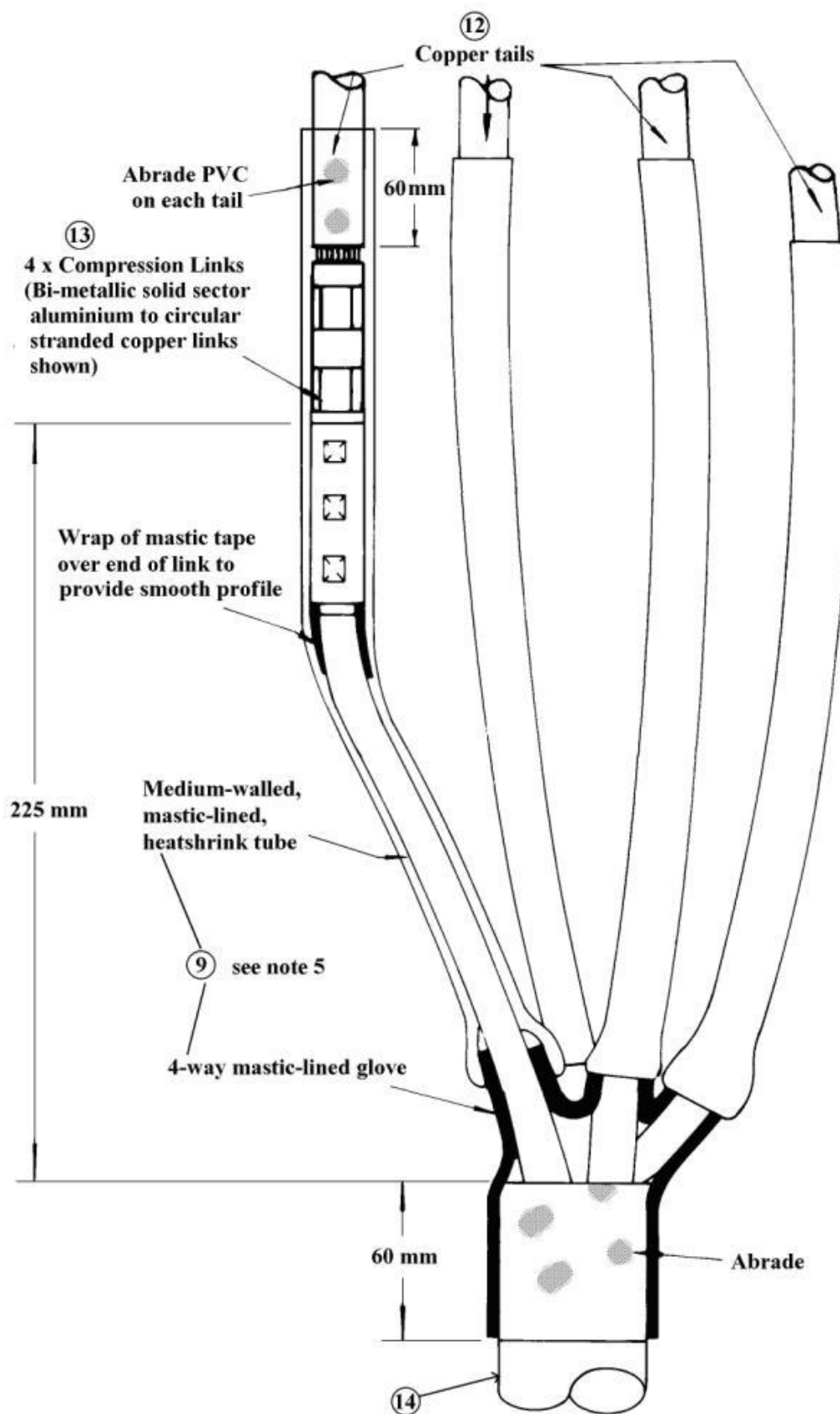


Figure 7.2 – Cable Termination Details

Table 7.1 – Material List

Item	Description	Qty	Stockcode
1	Wood pole	1	–
2	Non-metallic cable cover	1	184571
3	Cable clamp with nitrile rubber lining	As required See Note 3	177651
4	Flexible PVC conduit, 70 mm	1.5 metres	78329
5	Tee clamp:		
	Aluminium overhead conductors:		
	7/3.00 to 19/3.75	4	63263
	Copper overhead conductors:		
	19/1.78 to 19/2.14	4	63297
	19/2.14 to 19/2.52	4	63321
6	Compression lug for:		
	Tee Clamp (Stockcodes 63263 and 63321)	4	179481
	Tee Clamp (Stockcode 63297)	4	179773
7	UV stabilised cable tie	As required	179755
8	Flexible PVC conduit, 32mm	4 x 100 mm lengths	176568
9	Heatshrink termination kit	1	60079
10	Nitrile rubber sheet	200mm x 150mm x 3mm	127225
11	M12 x 50 mm coach screw	As required	50476
12	150mm ² PVC-covered copper cable	As required	61408
13	Compression link for:		
	240 AL4 XQ Z/SAC: Bi-Metallic Link	4	141804
	300 AL4 XQ Z/SAC: Bi-Metallic Link	4	186233
	240 CU4 XQ Z: Copper Link	4	182365
14	Underground cable:		
	240 AL4 XQ Z/SAC underground cable	-	141739
	300 AL4 XQ Z/SAC underground cable	-	185413
	240 CU4 XQ Z underground cable	-	H108589

Notes:

1. 300mm of the cable cover is to be installed below ground line.
2. Bi-metallic tee clamps must be used if the overhead conductors are aluminium.
3. The underground cable must be clamped at intervals not exceeding 1500 mm.
4. Abrade the cable sheath to the dimensions shown on Figure 7.2.
5. All heatshrink components are packaged into a single kit. Refer to Item 9 for details.
6. The 240 CU4 XQ Z cables must be rounded with rounding dies (S/C 182051) before being inserted into the crimp link.

7. Locate the nitrile rubber sheet in between the cable and the cable cover to prevent damage to the cable sheath from the edge of the cover.
8. All measurements are in millimetres (mm) unless marked otherwise.

8.0 UGOH CONSTRUCTION, SINGLE CIRCUIT OF LV ABC TO 240 AL4 XQ Z/SAC OR 300 AL4 XQ Z/SAC CABLES (LV1-70)

This specification provides the construction requirements for connecting 240mm² or 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC) to single circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC).

This method of connection is used where the need to isolate the UGOH is limited, and for the connection of low voltage services.

This UGOH arrangement is not designed for 400 amps refer to the Double Circuit designs of LVABC for 400 amp ratings.

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.

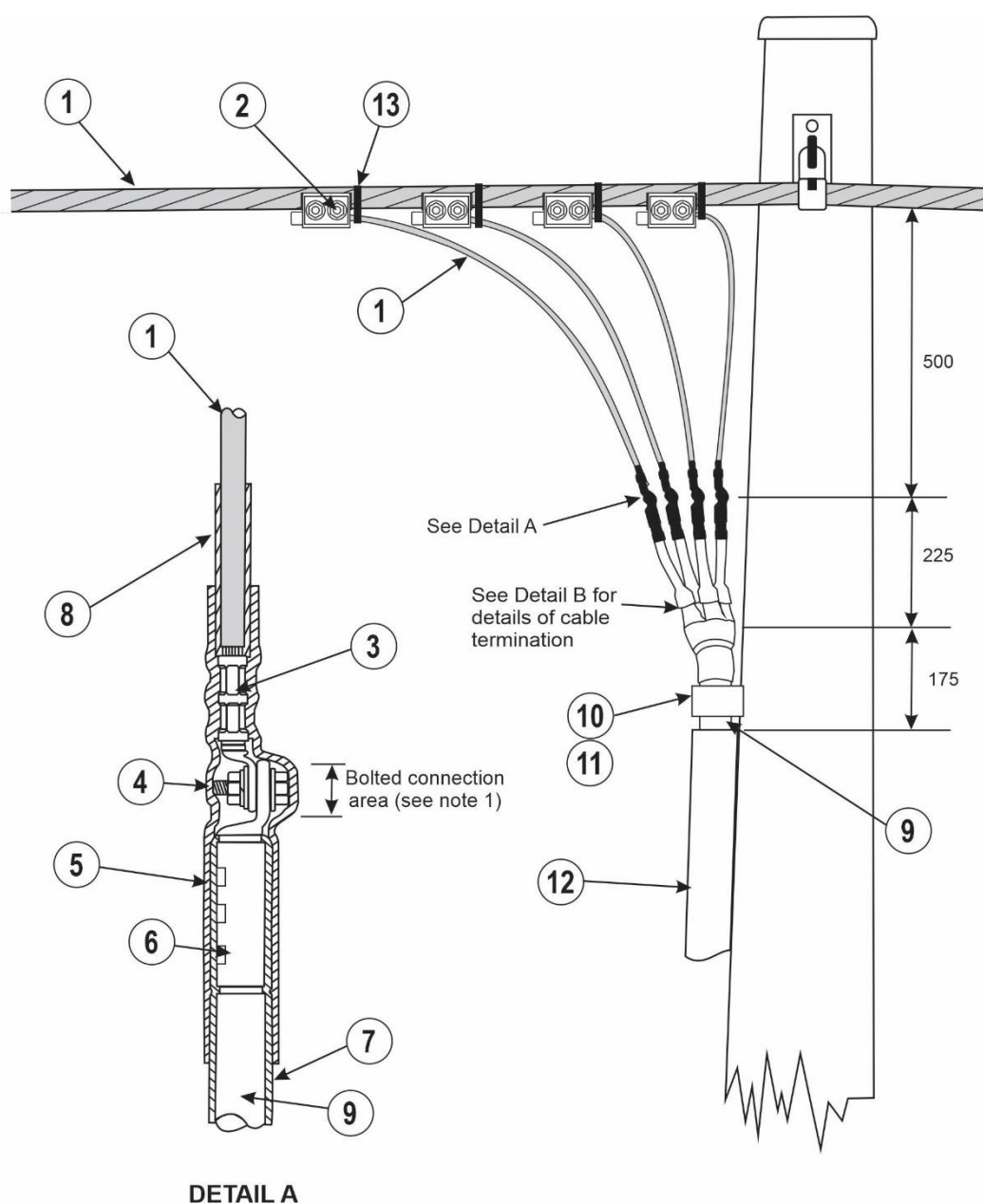


Figure 8.1 – General Arrangement (150mm² LVABC shown)

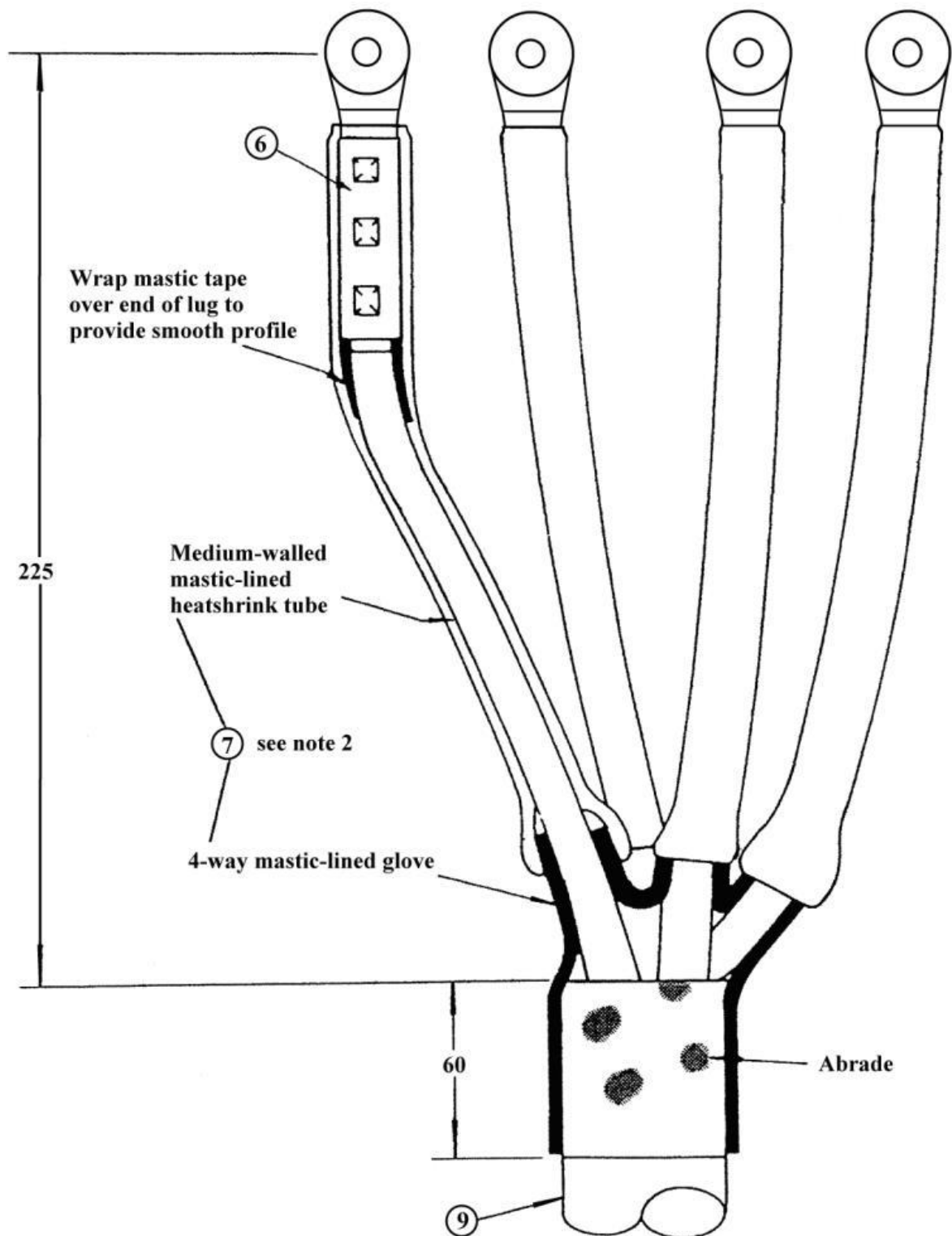


Figure 8.2 – Detail B: Cable Terminations Details

Table 8.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables: 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	M12 x 30 mm stainless steel bolt, nut, 2 flat washers, spring washer	175911
5	Mastic-lined heatshrink sleeve, 4 x 250mm lengths	143776
6	240mm ² bi-metallic compression lug 300mm ² bi-metallic compression lug	141770 186234
7	Heatshrink termination kit	60079
8	Mastic-lined heatshrink sleeve, 4 x 150mm lengths	60186
9	240 AL4 XQ Z/SAC underground cable 300 AL4 XQ Z/SAC underground cable	141739 185413
10	Cable clamp with nitrile rubber lining	177651
11	M12 x 50 mm coach screw	50476
12	Flexible PVC conduit, 70 mm	78329
13	UV stabilised cable tie	59907
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the multicore cable termination are packaged as a single kit. Refer to Item 7 for details.
3. Abrade the cable sheath to the dimensions shown on Figure 8.2.
4. All measurements are in millimetres (mm) unless marked otherwise.

9.0 UGOH CONSTRUCTION, DOUBLE CIRCUIT OF LVABC TO 240 AL4 XQ Z/SAC OR 300 AL4 XQ Z/SAC CABLES (LV1-44)

This specification provides the construction requirements for connecting 240mm² or 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC) to double circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC).

This method of connection is used where the need to isolate the UGOH is limited, and for the connection of low voltage services.

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.

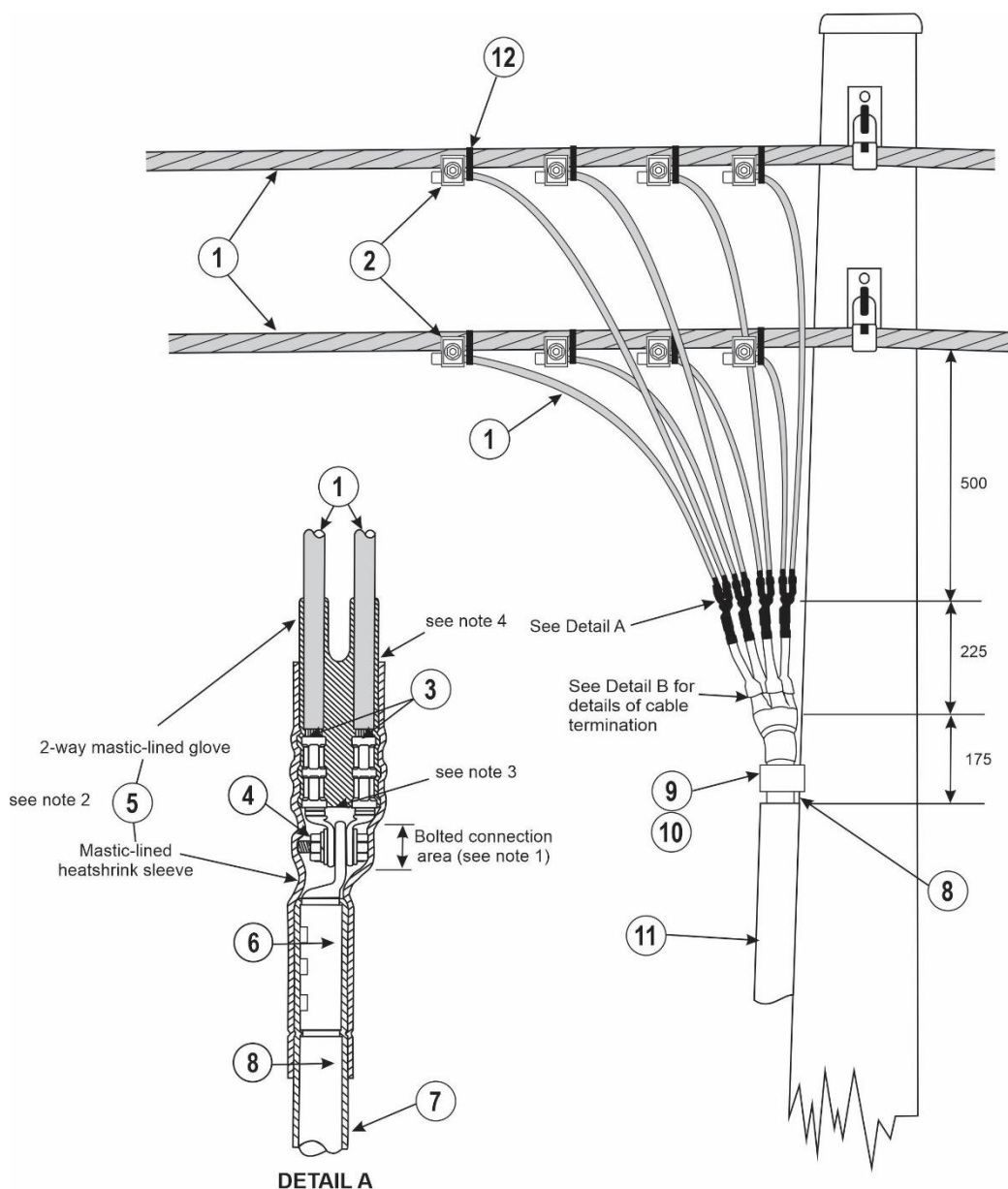


Figure 9.1 – General Arrangement (95mm² LVABC shown)

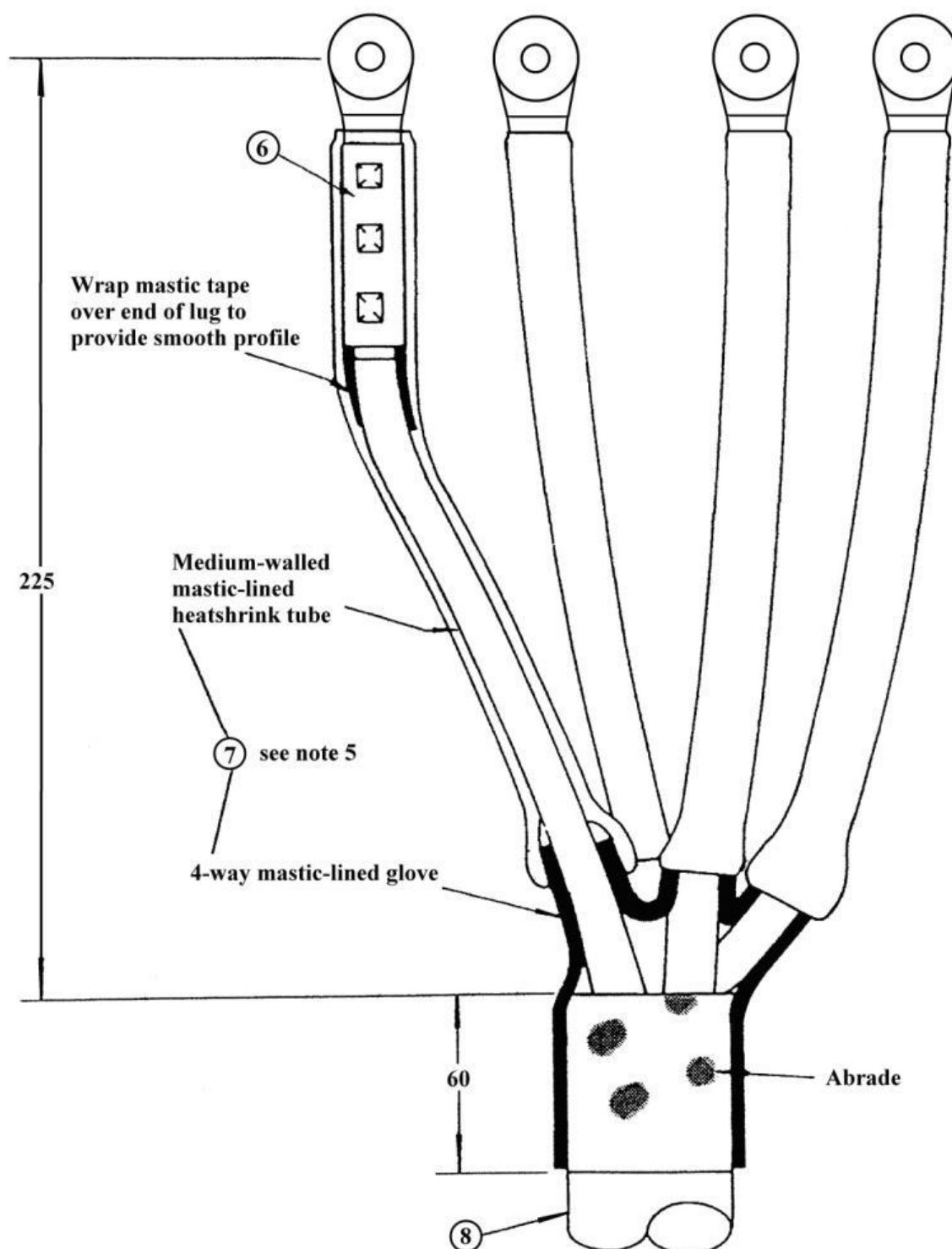


Figure 9.2 – Detail B: Cable Termination Details

Table 9.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables: 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	Bolted connection:	–
	M12 x 35 mm stainless steel bolt	45021
	M12 stainless steel nut	8987
	2 x M12 stainless steel flat washers	49429
	M12 stainless steel spring washer	143859
5	Heatshrink bolted connection kit	90324
6	240mm ² bi-metallic compression lug 300mm ² bi-metallic compression lug	141770 186234
7	Heatshrink termination kit	60079
8	240 AL4 XQ Z/SAC underground cable 300 AL4 XQ Z/SAC underground cable	141739 185413
9	Cable clamp with nitrile rubber lining	177651
10	M12 x 50 mm coach screw	50476
11	Flexible PVC conduit, 70 mm	78329
12	UV stabilised cable tie	59907
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the four core cable.
5. The heatshrink components required for the multicore cable termination are packaged as a single kit. Refer to item 7 for details.
6. Abrade the cable sheath to the dimensions shown on Figure 9.2.
7. All measurements are in millimetres (mm) unless marked otherwise.

10.0 UGOH CONSTRUCTION, SINGLE CIRCUIT OF LVABC TO 240 AL4 XQ Z/SAC OR 300 AL4 XQ Z/SAC CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-71)

This specification provides the construction requirements for connecting 240mm² or 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC) to single circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC) with enclosed fuse switch disconnecter.

This UGOH arrangement is not designed for 400 amps refer to the Double Circuit designs of LVABC for 400 amp ratings.

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.

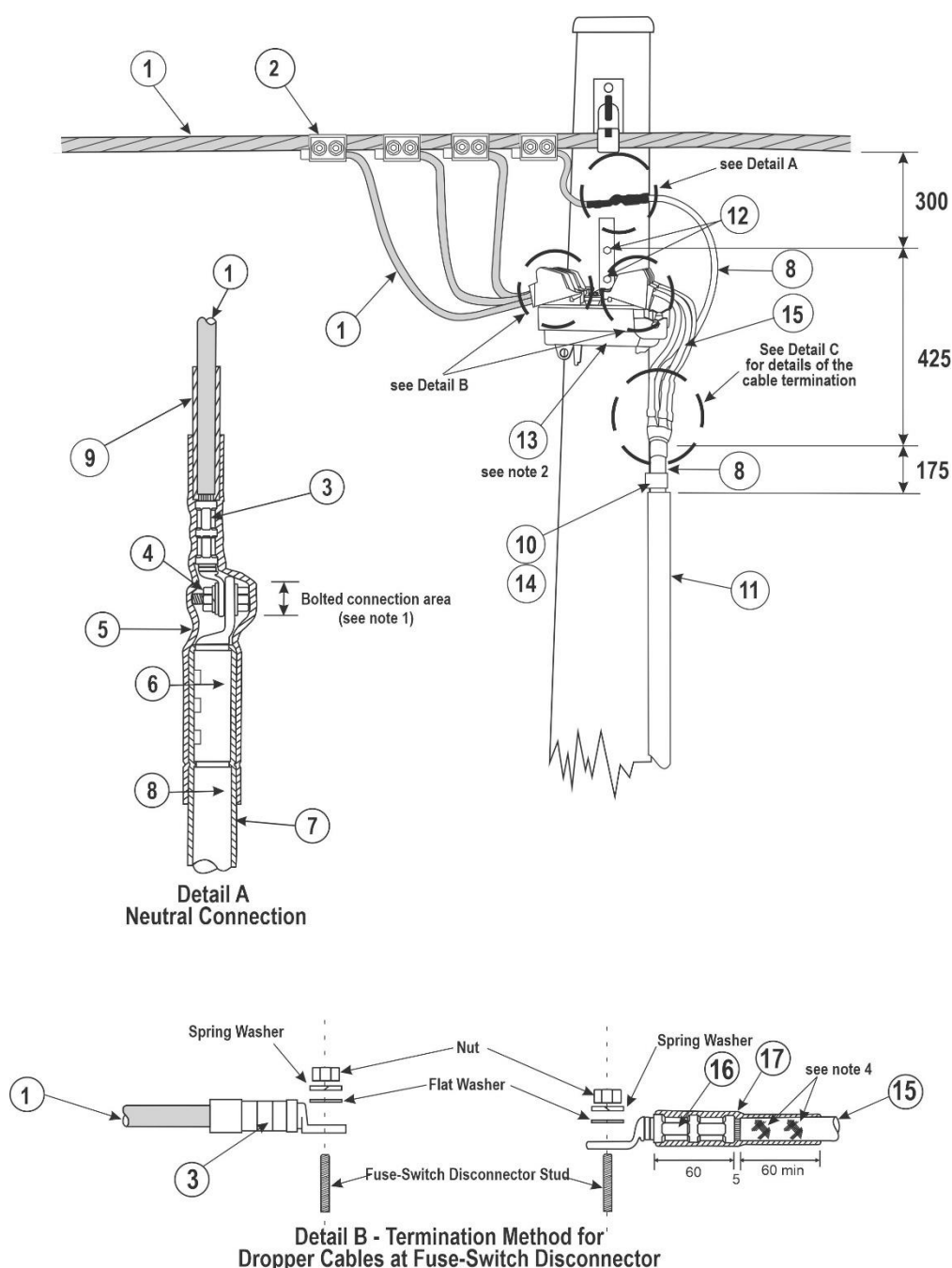


Figure 10.1 – General Arrangement (150mm² LVABC shown)

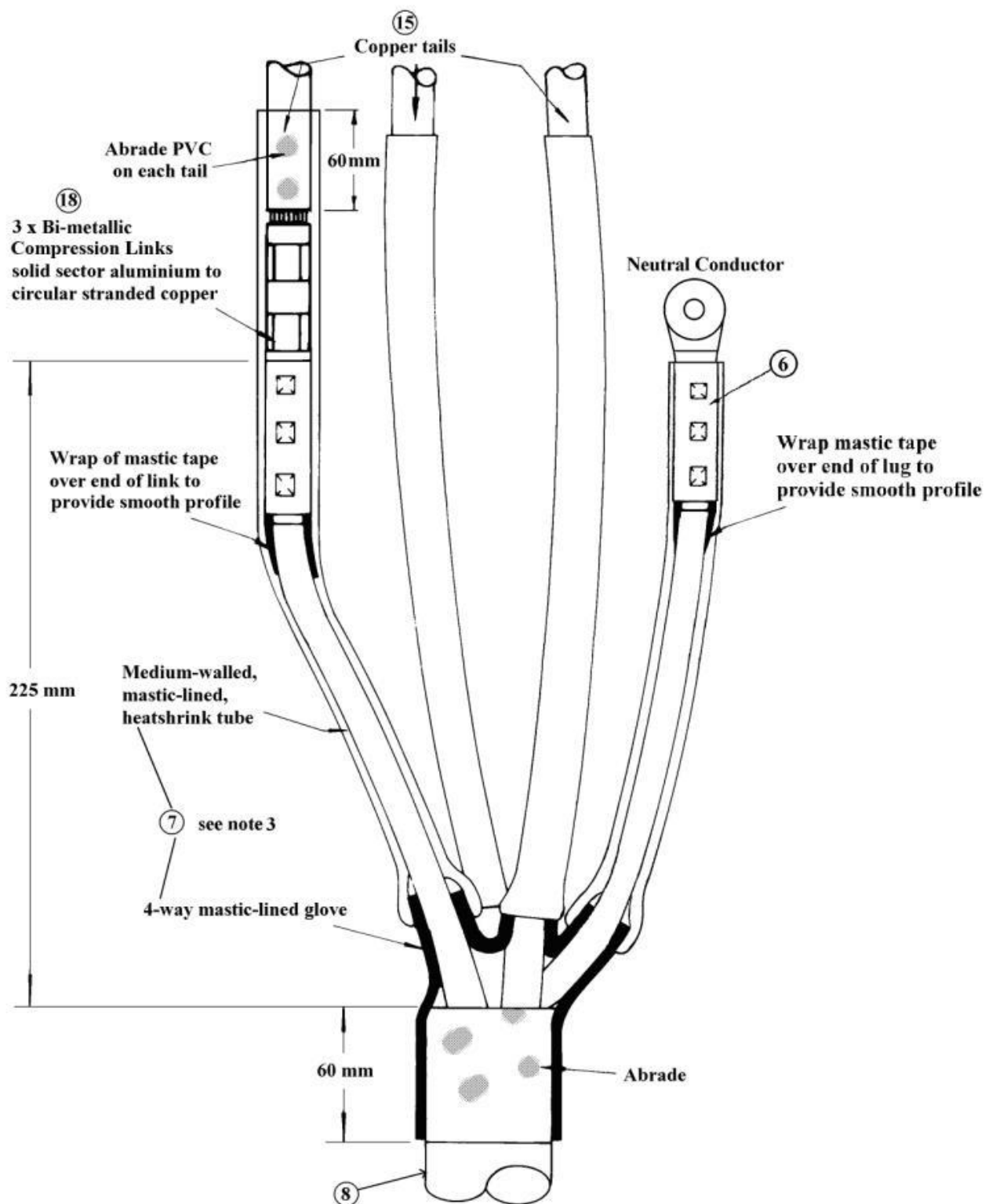


Figure 10.2 – Detail C: Cable Termination Details

Table 10.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	M12 x 30 mm stainless steel bolt, nut 2 flat washers, spring washer	175911
5	Mastic-lined heatshrink sleeve, 250mm long	143776
6	240mm ² bi-metallic compression lug 300mm ² bi-metallic compression lug	141770 186234
7	Heatshrink termination kit	60079
8	240 AL4 XQ Z/SAC underground cable 300 AL4 XQ Z/SAC underground cable	141739 185413
9	Mastic-lined heatshrink sleeve, 150mm long	60186
10	Cable clamp with nitrile rubber lining	177651
11	Flexible PVC conduit, 70 mm	78329
12	M16 x 100 mm coach screw	H40662
13	LV fuse switch disconnecter	185818
14	M12 x 50 mm coach screw	50476
15	150 mm ² PVC-covered copper cable	61408
16	150 mm ² tinned copper compression lug	179773
17	Mastic-lined heatshrink sleeve, 3 x 150 mm lengths	60186
18	240mm ² bi-metallic compression link 300mm ² bi-metallic compression link	141804 186233
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. Refer to NS125 for the installation requirements of the fuse switch disconnecter.
3. The heatshrink components required for the multicore cable termination are packaged as a single kit. Refer to item 7 for details.
4. Abrade the cable sheath to the dimensions shown in General Arrangement and Figure 10.2 – Detail C: Cable Termination Details.
5. All measurements are in millimetres (mm) unless marked otherwise.

11.0 UGOH CONSTRUCTION, DOUBLE CIRCUIT OF LVABC TO 240 AL4 XQ Z/SAC OR 300 AL4 XQ Z/SAC CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-46)

This specification provides the construction requirements for connecting 240mm² or 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC) to double circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC) with enclosed fuse switch disconnecter.

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.

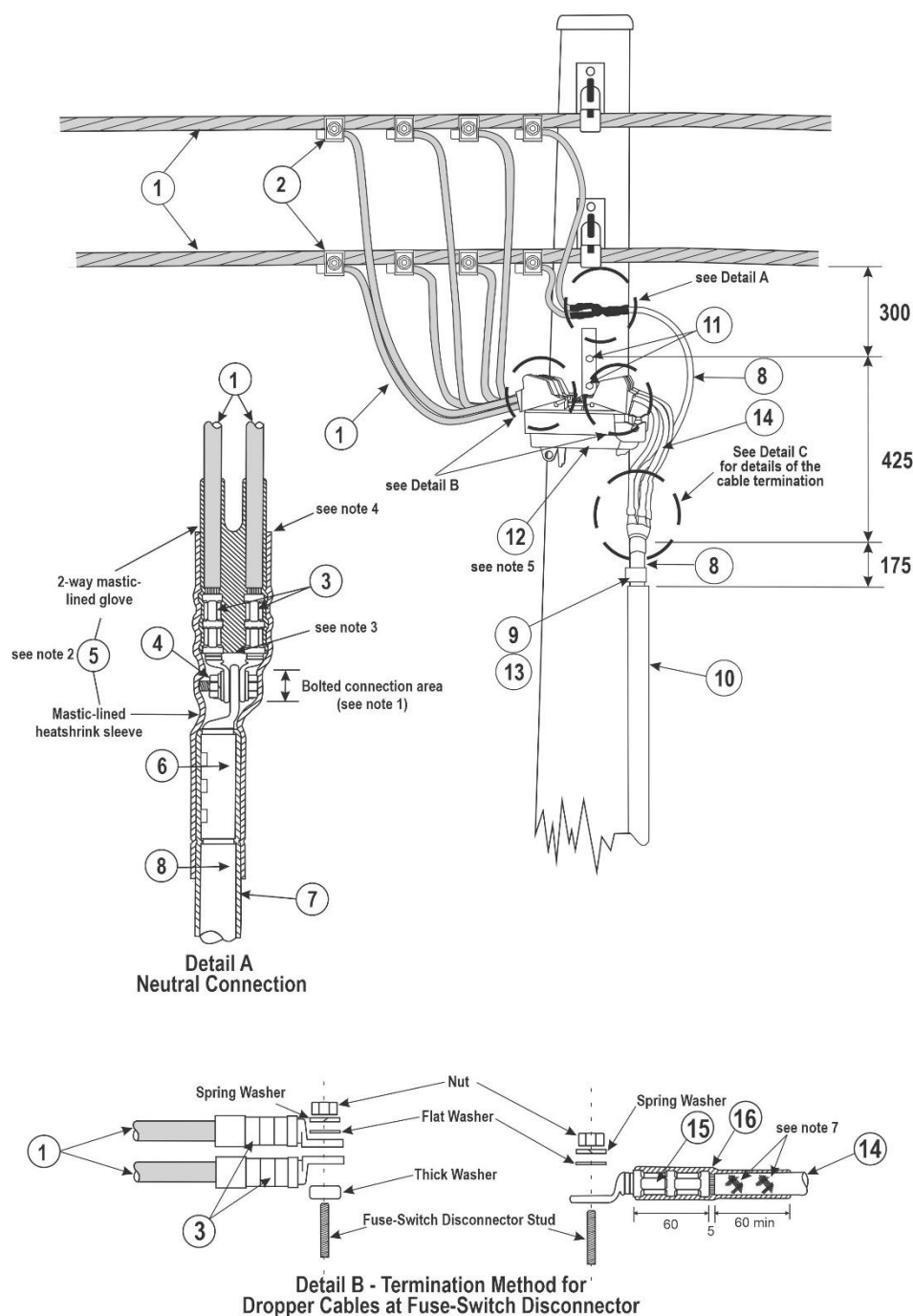


Figure 11.1 – General Arrangement (95mm² LVABC shown)

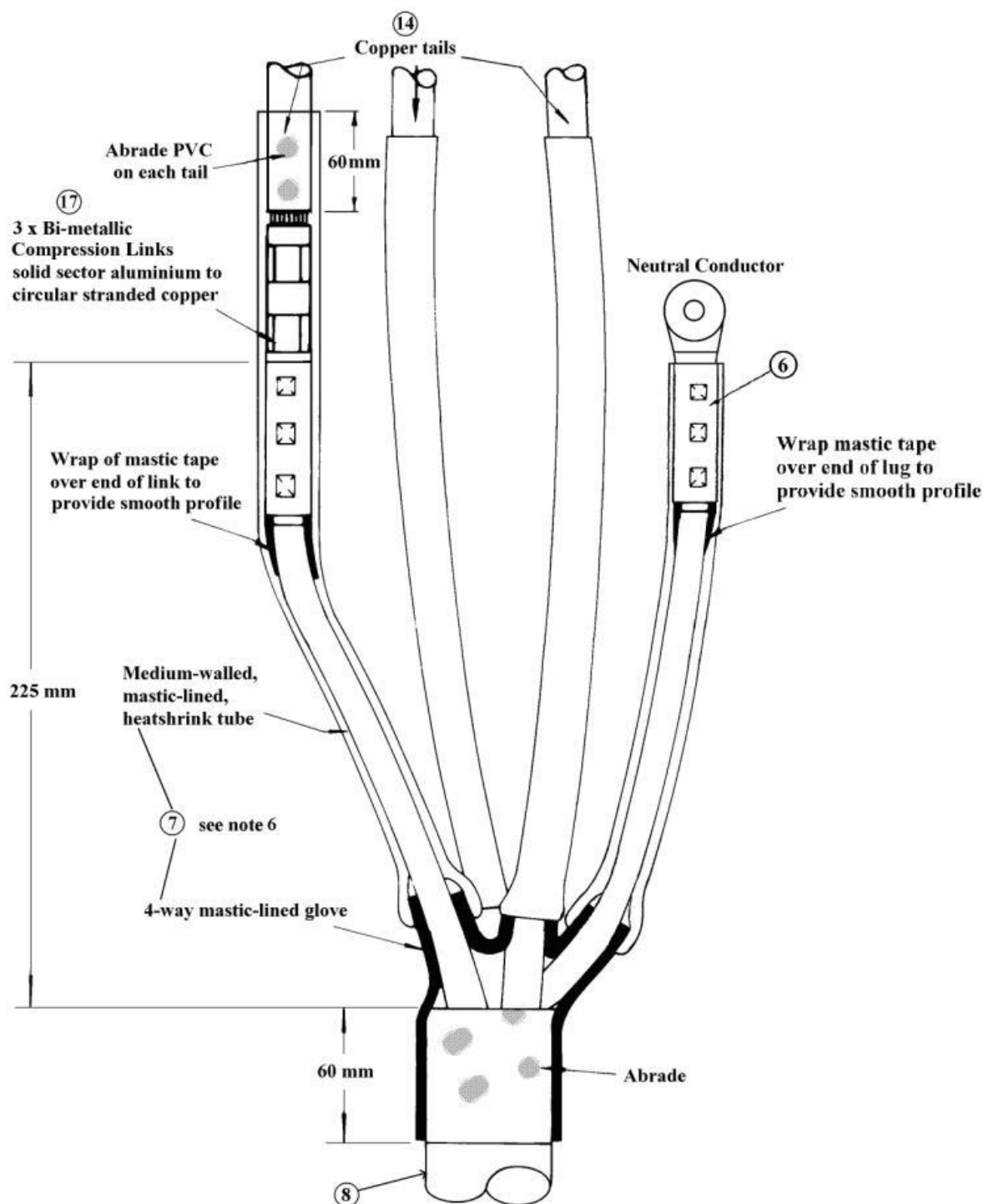


Figure 11.2 – Detail C: Termination Details

Table 11.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	Bolted connection:	
	M12 x 35 mm stainless steel bolt	45021
	M12 stainless steel nut	8987
	2 x M12 stainless steel flat washers	49429
	M12 stainless steel spring washer	143859
5	Heatshrink bolted connection kit	90324
6	240mm ² bi-metallic compression lug 300mm ² bi-metallic compression lug	141770 186234
7	Heatshrink termination kit	60079
8	240 AL4 XQ Z/SAC underground cable 300 AL4 XQ Z/SAC underground cable	141739 185413
9	Cable clamp with nitrile rubber lining	177651
10	Flexible PVC conduit, 70 mm	78329
11	M16 x 100 mm coach screw	H40662
12	LV fuse switch disconnecter	185818
13	M12 x 50 mm coach screw	50476
14	150 mm ² PVC-covered copper cable	61408
15	150 mm ² tinned copper compression lug	179773
16	Mastic-lined heatshrink sleeve, 3 x 150 mm lengths	60186
17	240mm ² bi-metallic compression link 300mm ² bi-metallic compression link	141804 186233
N/A	Fibreglass tape (See Note 1)	69799

Notes:

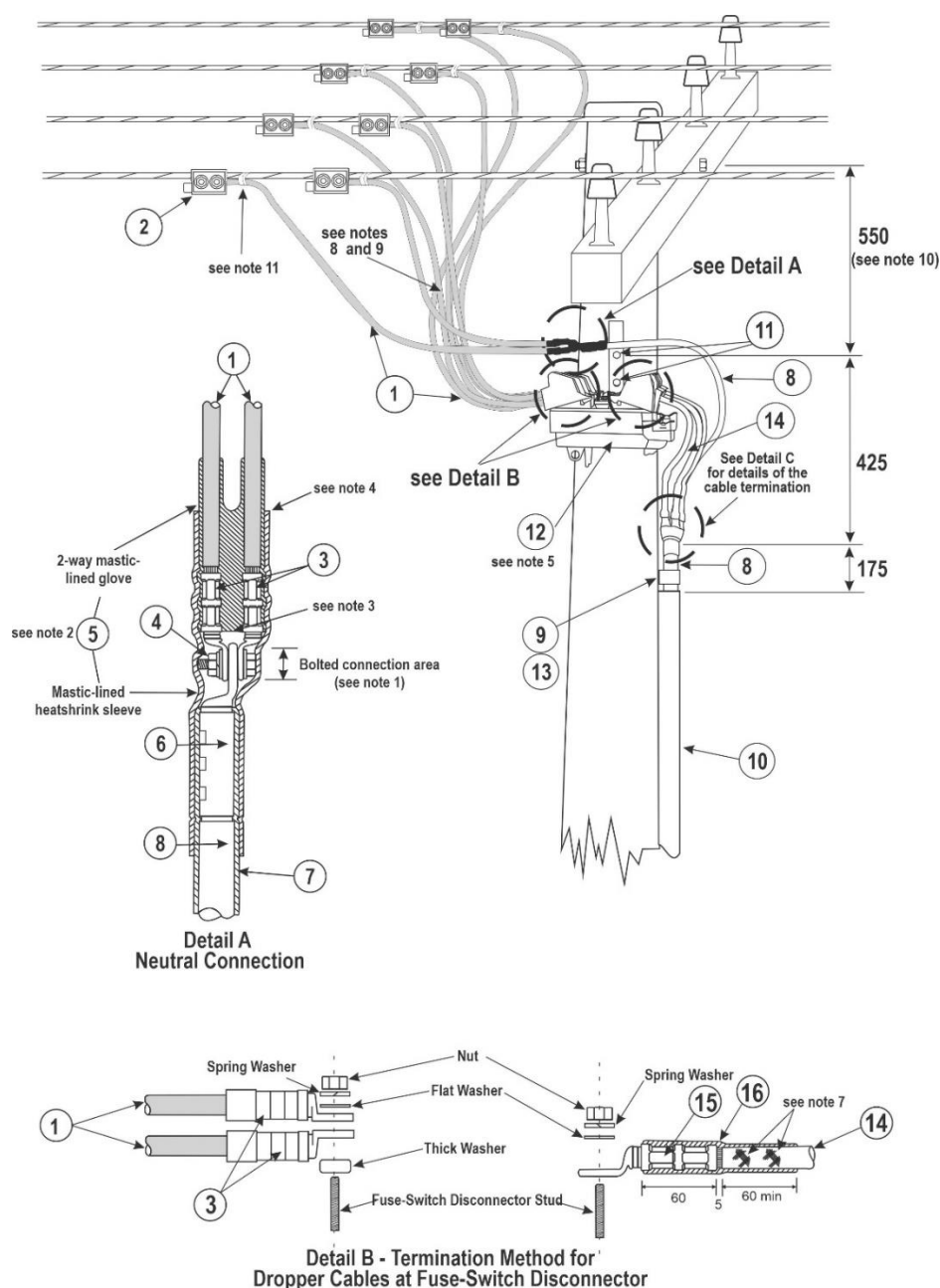
1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the four core cable.
5. Refer to NS125 for the installation requirements of the fuse switch disconnecter.
6. The heatshrink components required for the multicore cable termination are packaged as a single kit. Refer to item 7 for details.
7. Abrade the cable sheath to the dimensions shown in General Arrangement and Figure 11.2 – Detail C: Termination Details.
8. All measurements are in millimetres (mm) unless marked otherwise.

12.0 UGOH CONSTRUCTION, BARE OH MAINS TO 240AL4 XQ Z/SAC OR 300AL4 XQ Z/SAC CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-5)

This specification provides the construction requirements for connecting 240mm² or 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC) to bare overhead mains with enclosed fuse switch disconnector.

This method of construction is primarily used where there is a high likelihood that the Bare OH mains will be upgraded to LV ABC. It is almost identical to LV1-46 except than it connects to Bare OH mains rather than LV ABC and thus requires different Insulation Piercing Connectors

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.



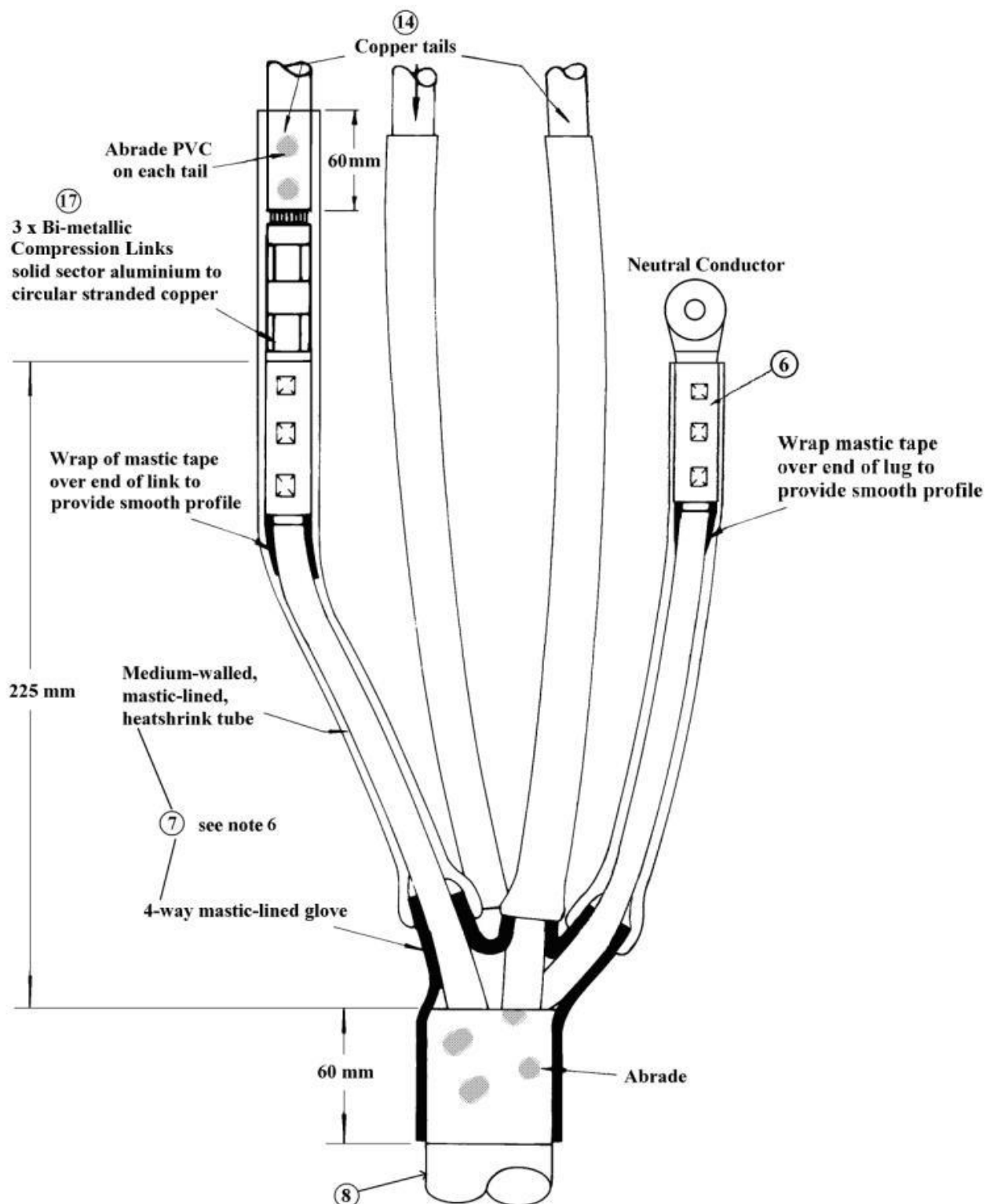


Figure 12.2 – Detail C: Cable Termination Details

Table 12.1 – Material List

Item	Description	Stockcode
1	95 LVABC	67959
2	Insulation piercing connector	
	Aluminium overhead conductors:	
	7/3.00 to 19/3.75	73569
	Copper overhead conductors:	
	7/1.75 to 19/2.75	176580
	19/1.75 to 19/3.00	148387
3	95mm ² pre-insulated bi-metallic compression lug	58743
4	Bolted connection:	
	M12 x 35 mm stainless steel bolt	45021
	M12 stainless steel nut	8987
	2 x M12 stainless steel flat washers	49429
	M12 stainless steel spring washer	143859
5	Heatshrink bolted connection kit	90324
6	240mm ² bi-metallic compression lug 300mm ² bi-metallic compression lug	141770 186234
7	Heatshrink termination kit	60079
8	240 AL4 XQ Z/SAC underground cable 300 AL4 XQ Z/SAC underground cable	141739 185413
9	Cable clamp with nitrile rubber lining	177651
10	Flexible PVC conduit, 70 mm	78329
11	M16 x 100 mm coach screw	H40662
12	LV fuse switch disconnecter	185818
13	M12 x 50 mm coach screw	50476
14	150 mm ² PVC-covered copper cable	61408
15	150 mm ² tinned copper compression lug	179773
16	Mastic-lined heatshrink sleeve, 3 x 150 mm lengths	60186
17	240mm ² bi-metallic compression link 300mm ² bi-metallic compression link	141804 186233
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the four core cable.

5. Refer to NS 125 for the installation requirements of the fuse switch disconnecter.
6. The heatshrink components required for the multicore cable termination are packaged as a single kit. Refer to item 7 for details.
7. Abrade the cable sheath to the dimensions shown in Figures 12.1 and 12.2.
8. Cut the tails of ABC long enough to be transferred over to any 2x95LVABC that is later installed on the pole.
9. If the Bare OH mains are a double circuit (for example, 8x66 HDCU) then connect one set of ABC tails to each circuit. An additional bonding cable is not required. Refer to LV 1-7 for a description of how to connect to the OH mains.
10. The enclosed fuse switch disconnecter should be installed so that it is in the correct position when the bare mains are replaced with LV ABC. The specified dimension of 550mm assumes that the lower circuit of 95ABC will be installed 250mm below the king bolt of the cross-arm, which is then 300mm above the fuse switch disconnecter, which is the correct position as per LV 1-46.
11. A UV resistant cable tie should be used to mechanically connect the ABC tail to the Bare Mains within 150mm of the IPC.
12. All measurements are in millimetres (mm) unless marked otherwise.

13.0 UGOH CONSTRUCTION, OVERHEAD BARE CONDUCTORS TO SINGLE CORE CABLES (LV1-3)

This specification provides the construction requirements for connecting 4 x 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z) to overhead bare conductors.

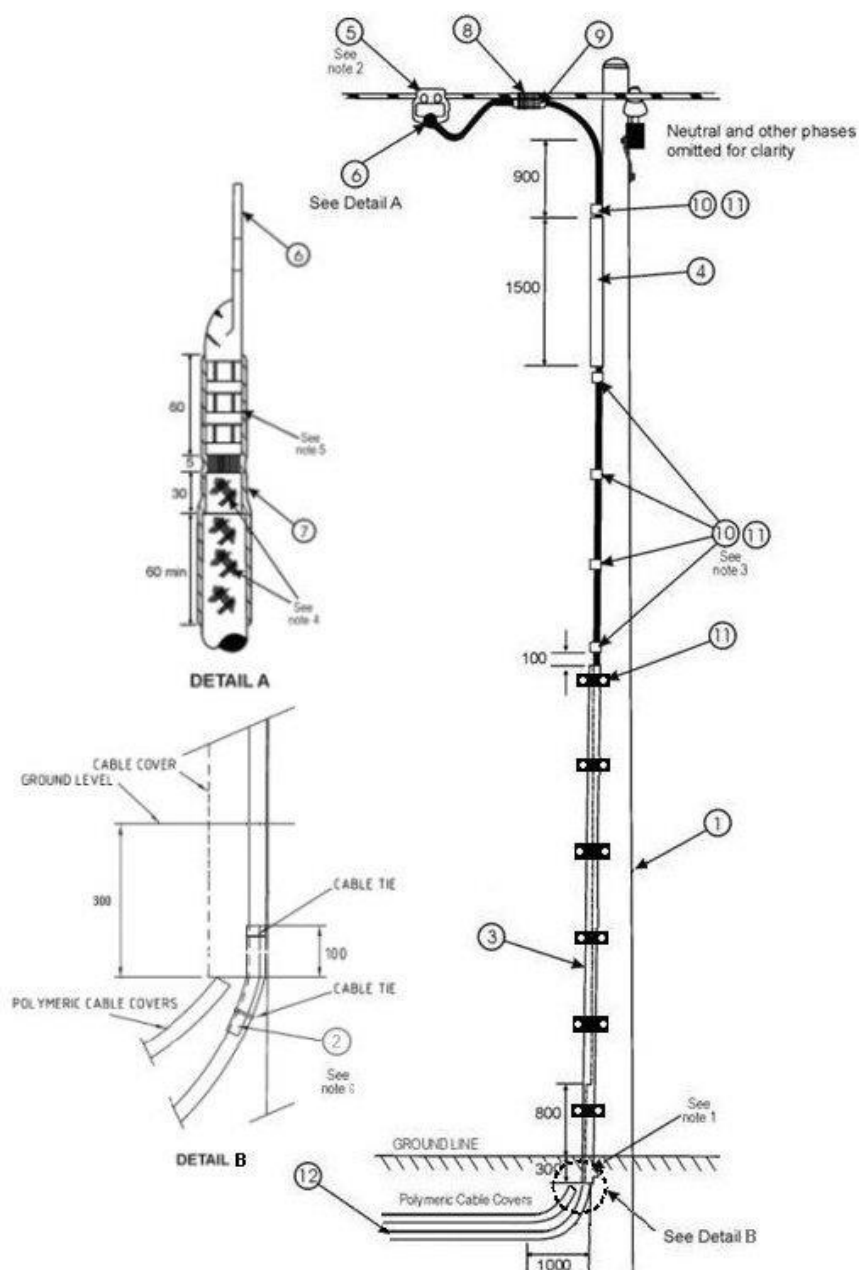


Figure 13.1 – General Arrangement

Table 13.1 – Material List

Item	Description	Quantity	Stockcode
1	Wood pole	1	–
2	Nitrile rubber sheet	200mm x 150mm x 3mm	127225
3	Non-metallic cable cover	1	184571
4	Flexible PVC conduit, 70mm	1.5 metres	78329
5	Tee Clamp:		
	Aluminium overhead conductors:		
	7/3.00 to 19/3.75	4	63263
	Copper overhead conductors:		
	19/1.78 to 19/2.14	4	63297
	19/2.14 to 19/2.52	4	63321
6	185mm ² compression lug for:		
	Tee Clamp (Stockcodes 63263 and 63321)	4	179482
	Tee Clamp (Stockcode 63297)	4	90183
7	Mastic-lined heatshrink sleeve	4 x 200 mm lengths	60186
8	UV stabilised cable tie	As required	179755
9	Flexible PVC conduit, 32mm	4 x 100 mm lengths	176568
10	Cable clamp with nitrile rubber lining	As required See Note 3	177651
11	M12 x 50 mm coach screw	As required	50476
12	185 CU1 XQ Z underground cable	-	61432

Notes:

- 300mm of the cable cover is to be installed below ground line.
- Bi-metallic tee clamps must be used if the overhead conductors are aluminium.
- The underground cables must be clamped at intervals not exceeding 1500 mm.
- Abrade the cable sheath and the cable insulation to the dimensions shown on Figure 13.1.
- Pre-heat the compression lug before placing the heatshrink sleeve over the cable. Shrink the sleeve starting from the cable end. Apply additional heat to the sleeve and the palm of the lug until a bead of mastic appears around the top of the sleeve.
- Locate the nitrile rubber sheet in between the cable and the cable cover to prevent damage to the cable sheath from the edge of the cover.
- All measurements are in millimetres (mm) unless marked otherwise.

14.0 UGOH CONSTRUCTION, SINGLE CIRCUIT OF LVABC TO SINGLE CORE CABLES (LV1-72)

This specification provides the construction requirements for connecting 4 x 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z) to single circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC).

This method of connection is used where the need to isolate the UGOH is limited, and for the connection of low voltage services.

This UGOH arrangement is not designed for 400amps refer to the Double Circuit designs of LVABC for 400amp ratings.

Refer to LV1-3 for general arrangement and stockcodes for items below the top cable clamp.

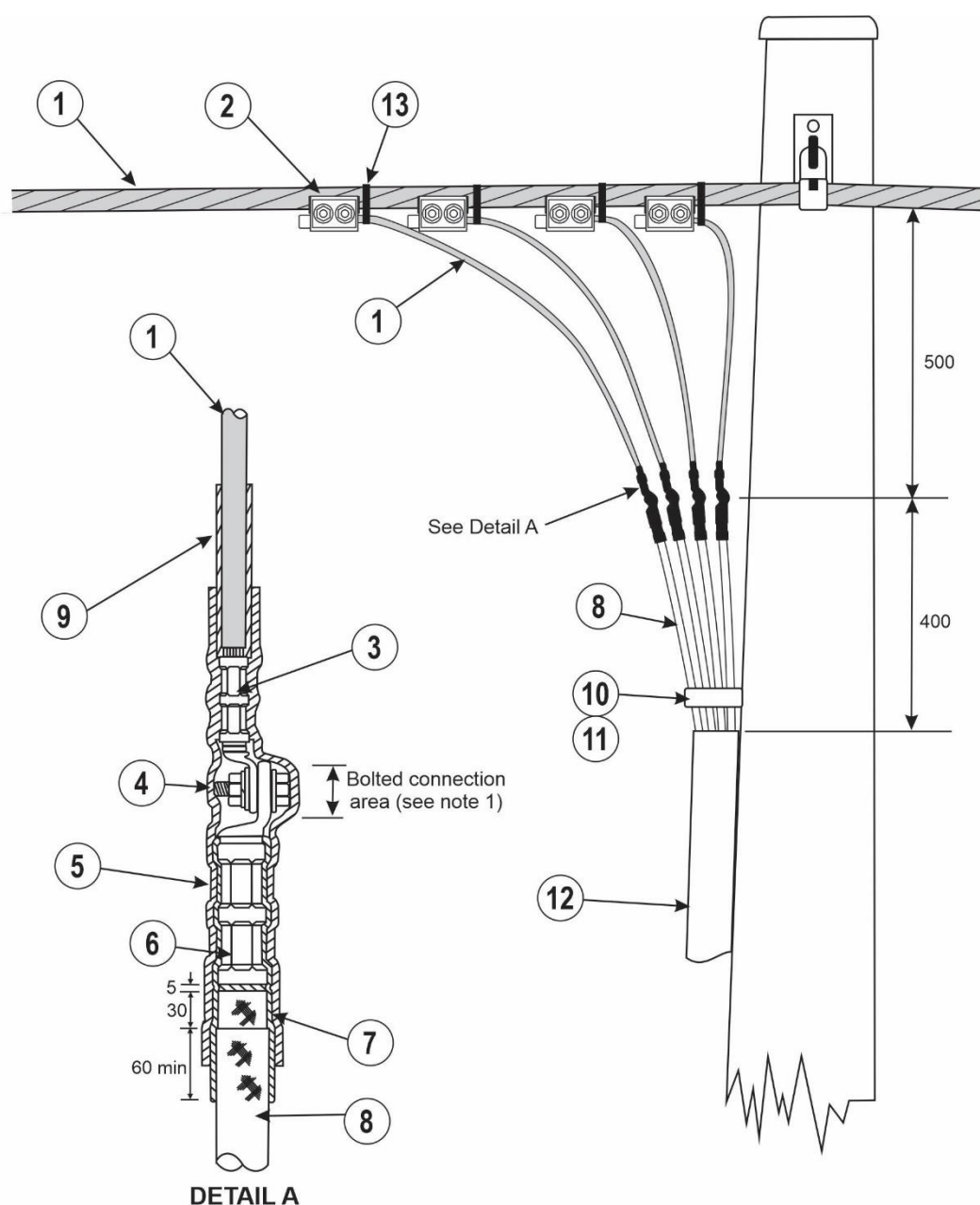


Figure 14.1 – General Arrangement (150mm² LVABC shown)

Table 14.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	M12 x 30 mm stainless steel bolt, nut 2 flat washers, spring washer	175911
5	Mastic-lined heatshrink sleeve, 4 x 250mm lengths	143776
6	185mm ² compression lug	90183
7	Mastic-lined heatshrink sleeve, 4 x 200 mm lengths	60186
8	185 CU1 XQ Z underground cable	61432
9	Mastic-lined heatshrink sleeve, 150mm long	60186
10	Cable clamp with nitrile rubber lining	177651
11	M12 x 50 mm coach screw	50476
12	Flexible PVC conduit, 70 mm	78329
13	UV stabilised cable tie	59907
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. Abrade the cable sheath and the cable insulation to the dimensions shown on Figure 14.1.
3. All measurements are in millimetres (mm) unless marked otherwise.

15.0 UGOH CONSTRUCTION, DOUBLE CIRCUIT OF LVABC TO SINGLE CORE CABLES (LV1-47)

This specification provides the construction requirements for connecting 4 x 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z) to double circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC).

This method of connection is used where the need to isolate the UGOH is limited, and for the connection of low voltage services.

Refer to LV1-3 for general arrangement and stockcodes for items below the top cable clamp.

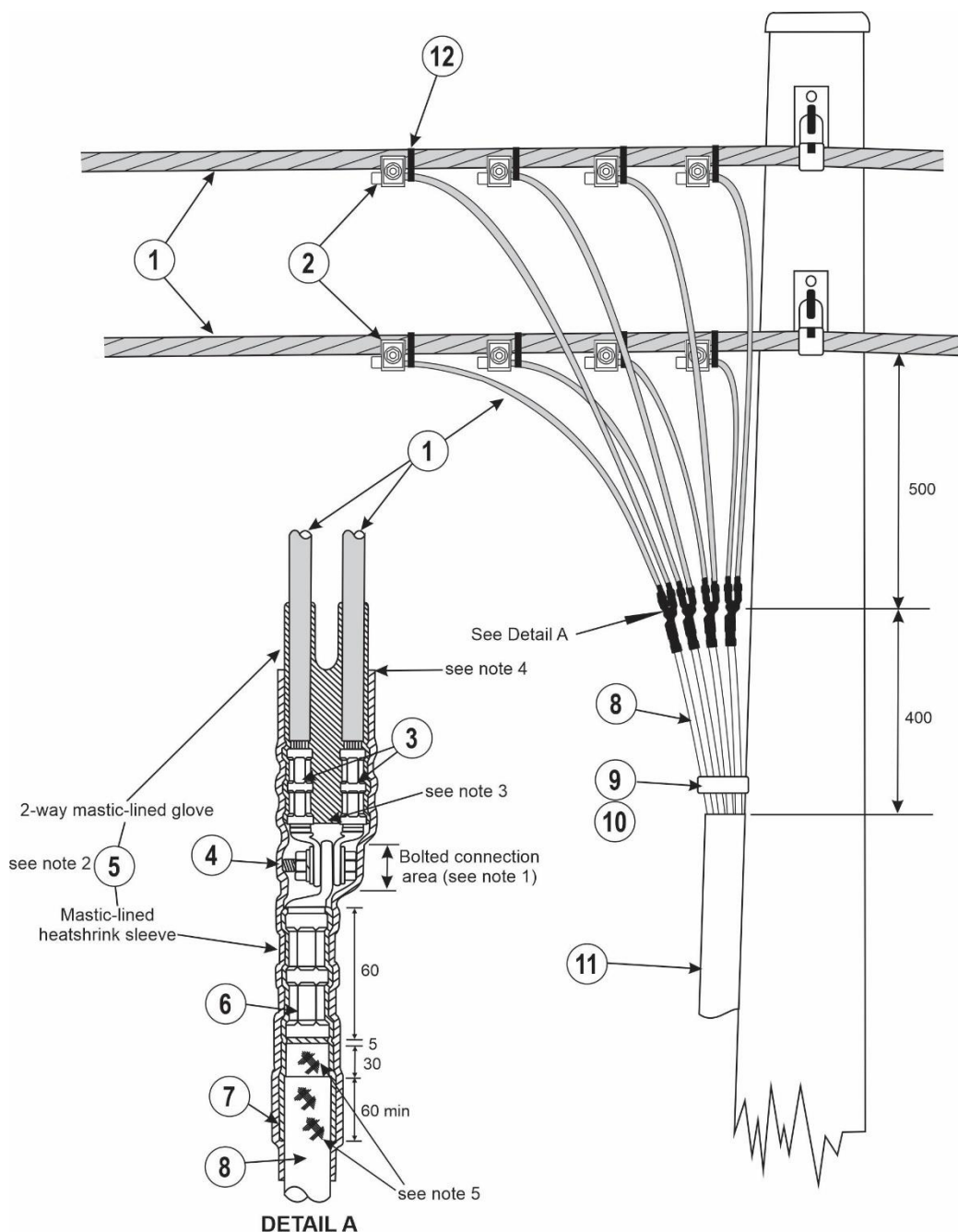


Figure 15.1 – General Arrangement (95mm² LVABC shown)

Table 15.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	M12 x 30 mm stainless steel bolt, nut 2 flat washers, spring washer	175911
5	Heatshrink bolted connection kit	90324
6	185mm ² compression lug	90183
7	Mastic-lined heatshrink sleeve, 4 x 200 mm lengths	60186
8	185 CU1 XQ Z underground cable	61432
9	Cable clamp with nitrile rubber lining	177651
10	M12 x 50 mm coach screw	50476
11	Flexible PVC conduit, 70 mm	78329
12	UV stabilised cable tie	59907
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the single core cable.
5. Abrade the cable sheath and the cable insulation to the dimensions shown on Figure 15.1.
6. All measurements are in millimetres (mm) unless marked otherwise.

16.0 UGOH CONSTRUCTION, SINGLE CIRCUIT OF LVABC TO SINGLE CORE CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-73)

This specification provides the construction requirements for connecting 4 x 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z) to single circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC) with enclosed fuse switch disconnector.

This UGOH arrangement is not designed for 400 amps refer to the Double Circuit designs of LVABC for 400 amp ratings.

Refer to LV1-3 for general arrangement and stockcodes for items below the top cable clamp.

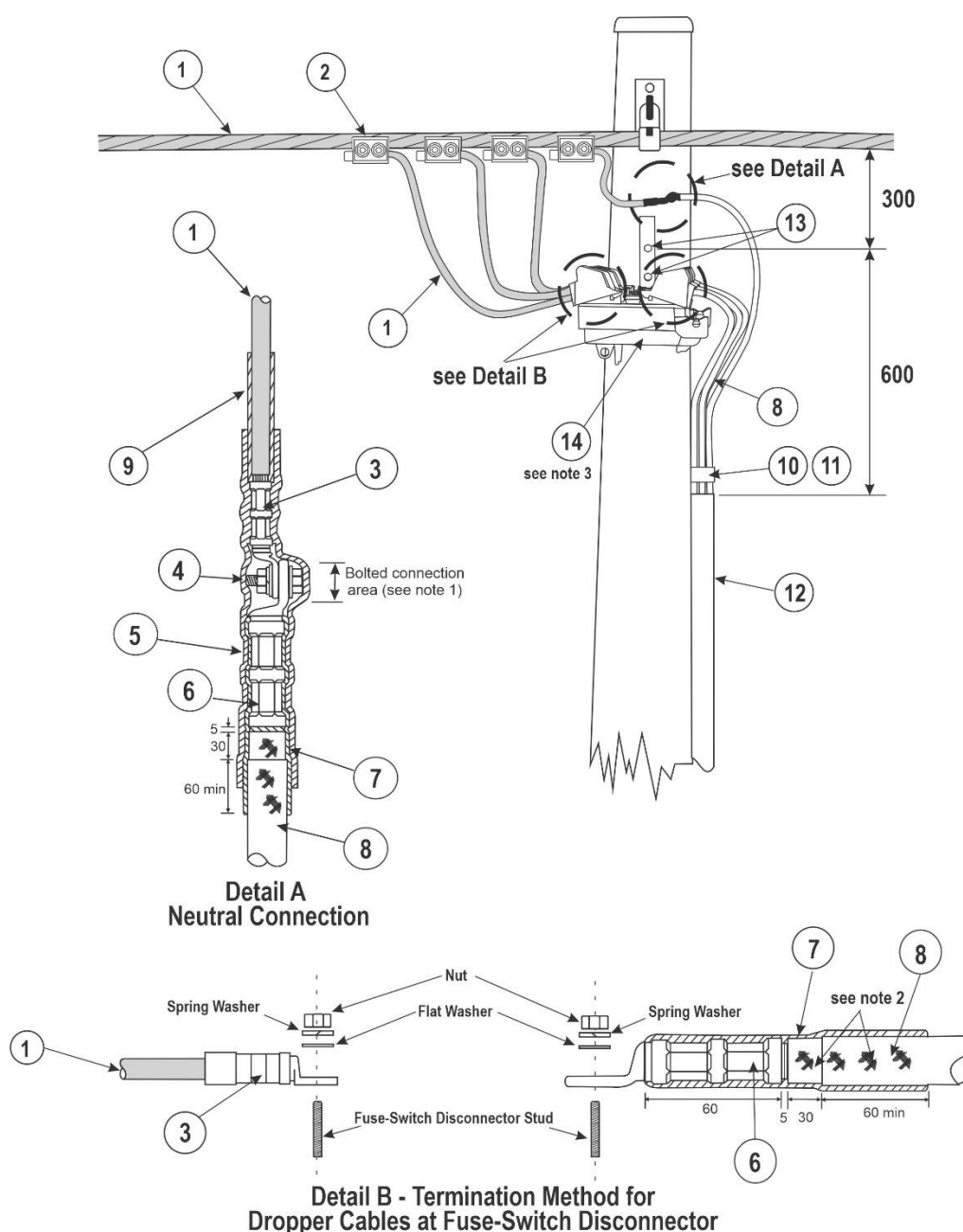


Figure 16.1 – General Arrangement (150mm² LVABC shown)

Table 16.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	M12 x 30 mm stainless steel bolt, nut 2 flat washers, spring washer	175911
5	Mastic-lined heatshrink sleeve, 250mm long	143776
6	185mm ² compression lug	90183
7	Mastic-lined heatshrink sleeve, 4 x 200 mm lengths	60186
8	185 CU1 XQ Z underground cable	61432
9	Mastic-lined heatshrink sleeve, 150mm long	60186
10	Cable clamp with nitrile rubber lining	177651
11	M12 x 50 mm coach screw	50476
12	Flexible PVC conduit, 70 mm	78329
13	M16 x 100mm coach screw	H40662
14	LV fuse switch disconnecter	185818
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. Abrade the cable sheath and the cable insulation to the dimensions shown on Figure 16.1.
3. Refer to NS125 for the installation requirements of the fuse switch disconnecter.
4. All measurements are in millimetres (mm) unless marked otherwise.

17.0 UGOH CONSTRUCTION, DOUBLE CIRCUIT OF LVABC TO SINGLE CORE CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-48)

This specification provides the construction requirements for connecting 4 x 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z) to double circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC) with enclosed fuse switch disconnecter.

Refer to LV1-3 for general arrangement and stockcodes for items below the top cable clamp.

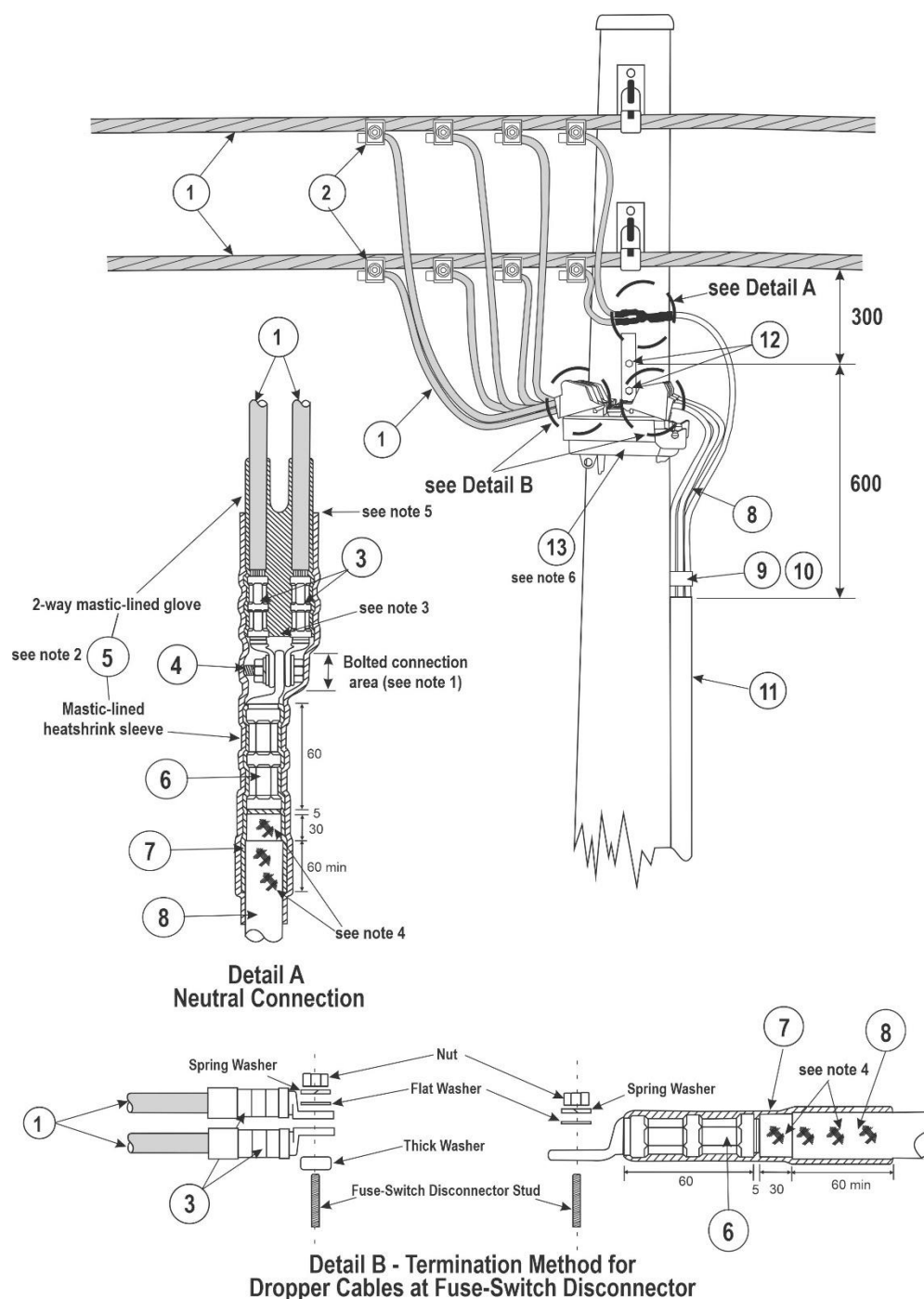


Figure 17.1 – General Arrangement (95mm² LVABC shown)

Table 17.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	M12 x 30 mm stainless steel bolt, nut 2 flat washers, spring washer	175911
5	Heatshrink bolted connection kit	90324
6	185mm ² compression lug	90183
7	Mastic-lined heatshrink sleeve, 4 x 200 mm lengths	60186
8	185 CU1 XQ Z underground cable	61432
9	Cable clamp with nitrile rubber lining	177651
10	M12 x 50 mm coach screw	50476
11	Flexible PVC conduit, 70 mm	78329
12	M16 x 100mm coach screw	H40662
13	LV fuse switch disconnecter	185818
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Abrade the cable sheath and the cable insulation to the dimensions shown on Figure 17.1.
5. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the single core cable.
6. Refer to NS125 for the installation requirements of the fuse switch disconnecter.
7. All measurements are in millimetres (mm) unless marked otherwise.

18.0 UGOH CONSTRUCTION, BARE OH MAINS TO SINGLE CORE CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-6)

This specification provides the construction requirements for connecting 4 x 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z) to bare overhead mains with enclosed fuse switch disconnecter.

This method of construction is primarily used where there is a high likelihood that the Bare OH mains will be upgraded to LV ABC. It is almost identical to LV1-48 other than it connects to Bare OH mains rather than LV ABC and thus requires different Insulation Piercing Connectors.

Refer to LV1-3 for general arrangement and stockcodes for items below the top cable clamp.

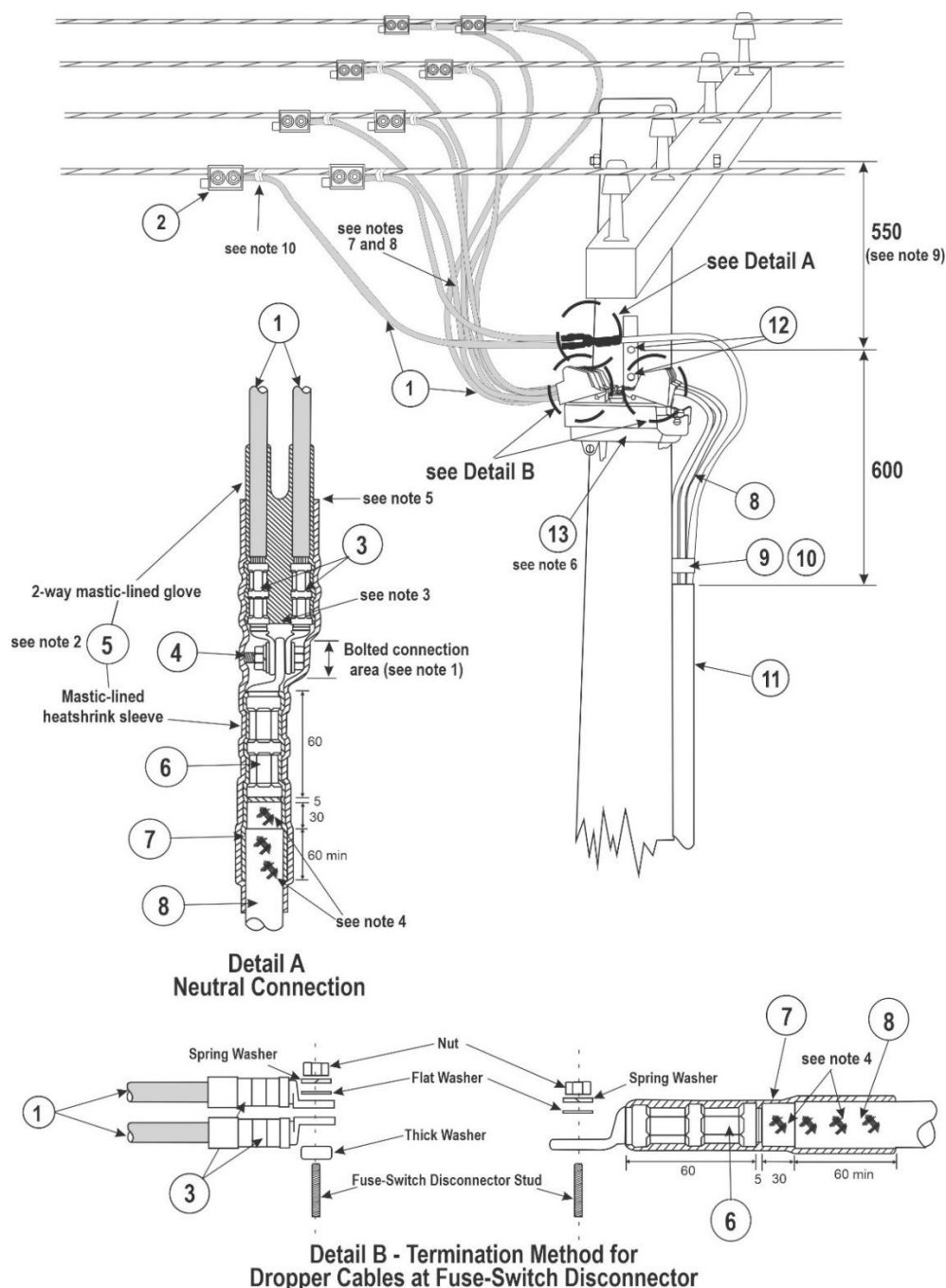


Figure 18.1 – General Arrangement

Table 18.1 – Material List

Item	Description	Stockcode
1	95 LVABC	67959
2	Insulation piercing connector	
	Aluminium overhead conductors:	
	7/3.00 to 19/3.75	73569
	Copper overhead conductors:	
	7/1.75 to 19/2.75	176580
	19/1.75 to 19/3.00	148387
3	95mm ² pre-insulated bi-metallic compression lug	58743
4	M12 x 30 mm stainless steel bolt, nut 2 flat washers, spring washer	175911
5	Heatshrink bolted connection kit	90324
6	185mm ² compression lug	90183
7	Mastic-lined heatshrink sleeve, 4 x 200 mm lengths	60186
8	185 CU1 XQ Z underground cable	61432
9	Cable clamp with nitrile rubber lining	177651
10	M12 x 50 mm coach screw	50476
11	Flexible PVC conduit, 70 mm	78329
12	M16 x 100mm coach screw	H40662
13	LV fuse switch disconnecter	185818
N/A	Fibreglass tape (See Note 1)	69799

Notes:

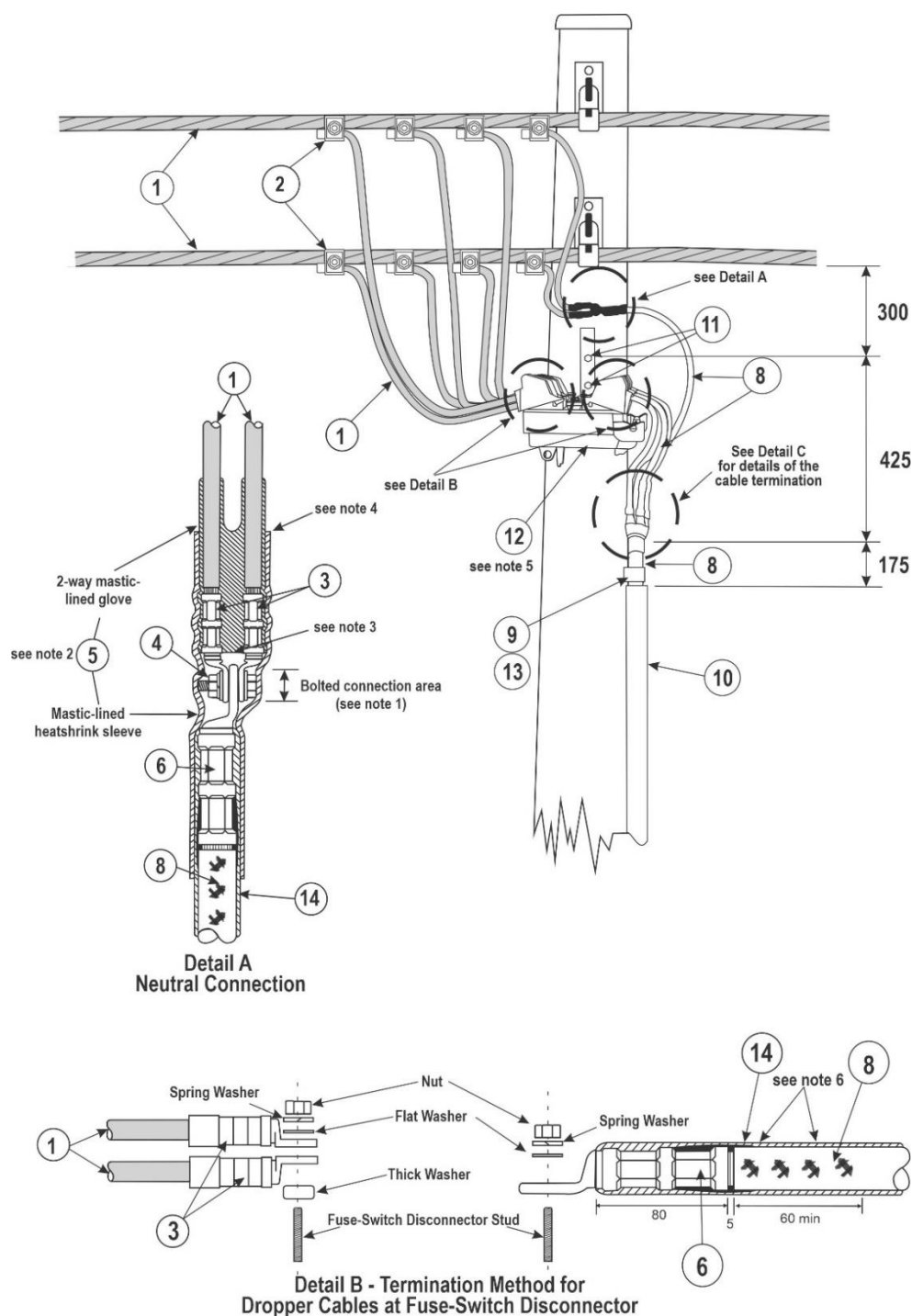
1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Abrade the cable sheath and the cable insulation to the dimensions shown on Figure 18.1.
5. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the single core cable.
6. Refer to NS 125 for the installation requirements of the fuse switch disconnecter.
7. Cut the tails of ABC long enough to be transferred over to any 2x95LVABC that is later installed on the pole.
8. If the Bare OH mains are a double circuit (for example, 8x66 HDCU) then connect one set of ABC tails to each circuit. An additional bonding cable is not required. Refer to LV 1-7 for a description of how to connect to the OH mains.

9. The enclosed fuse switch disconnecter should be installed so that it is in the correct position when the bare mains are replaced with LV ABC. The specified dimension of 550mm assumes that the lower circuit of 95ABC will be installed 250mm below the king bolt of the cross-arm, which is then 300mm above the fuse switch disconnecter, which is the correct position as per LV 1-48.
10. A UV resistant cable tie should be used to mechanically connect the ABC tail to the Bare Mains within 150mm of the IPC.
11. All measurements are in millimetres (mm) unless marked otherwise.

19.0 UGOH CONSTRUCTION, DOUBLE CIRCUIT OF LV ABC TO 240 CU4 XQ Z CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-49)

This specification provides the construction requirements for connecting 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z) to double circuit of either 4 x 95mm² or 4 x 150mm² low voltage aerial bundled cables (LVABC) with enclosed fuse switch disconnecter.

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.



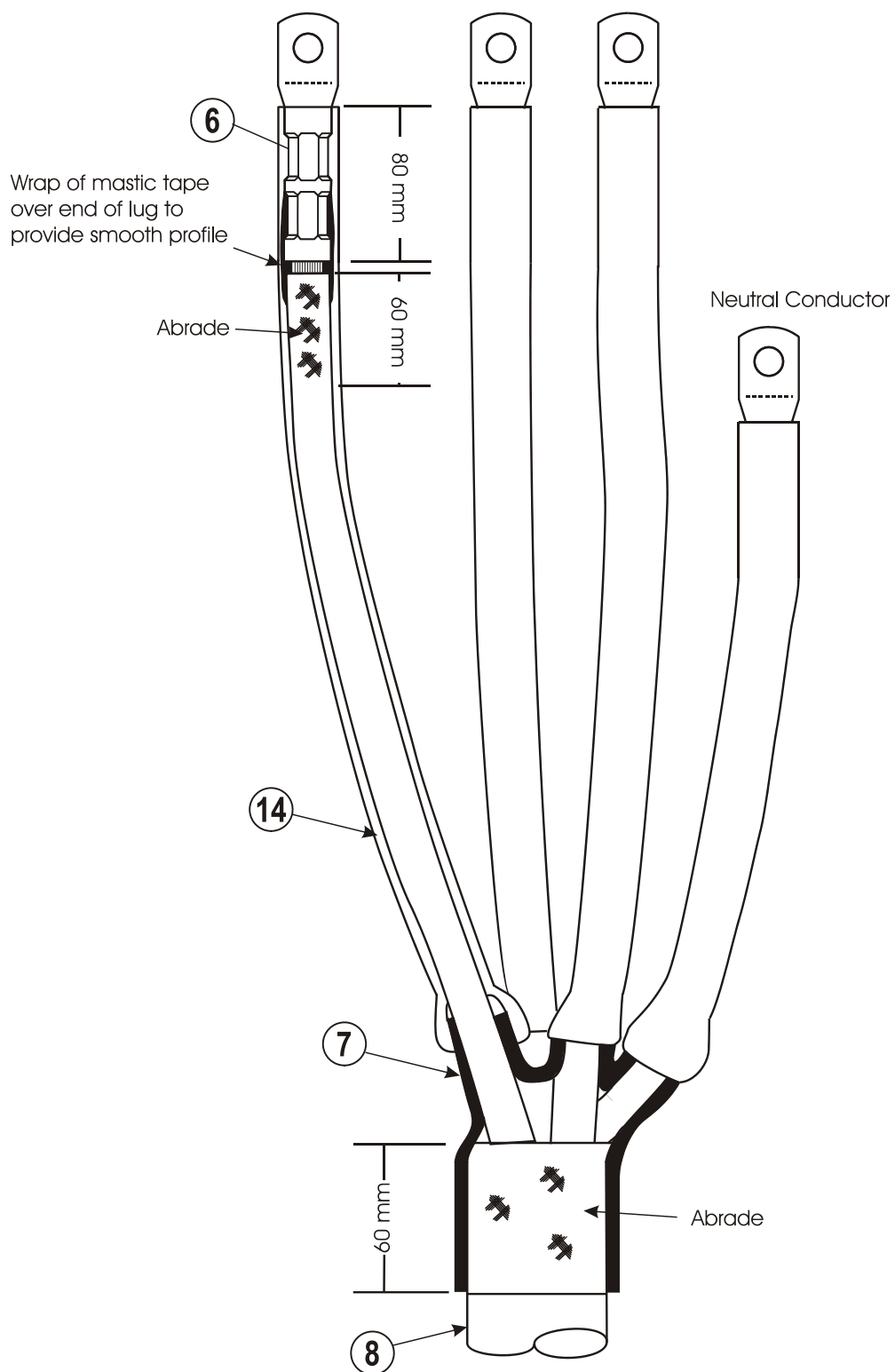


Figure 19.2 – Detail C - Cable Termination Details

Table 19.1 – Material List

Item	Description	Stockcode
1	Low Voltage Aerial Bundled Cables 95mm ² LVABC 150mm ² LVABC	67959 148080
2	Insulation piercing connector: 95mm ² LVABC 150mm ² LVABC	H19104 176591
3	Pre-insulated bi-metallic compression lug: 95mm ² LVABC 150mm ² LVABC	58743 150441
4	Bolted connection:	
	M12 x 35 mm stainless steel bolt	45021
	M12 stainless steel nut	8987
	2 x M12 stainless steel flat washers	49429
	M12 stainless steel spring washer	143859
5	Heatshrink bolted connection kit	90324
6	240mm ² long barrel copper compression lug	See Note 7
7	4-way mastic-lined glove	78527
8	240 CU4 XQ Z underground cable	H108589
9	Cable clamp with nitrile rubber lining	177651
10	Flexible PVC conduit, 70 mm	78329
11	M16 x 100 mm coach screw	H40662
12	LV fuse switch disconnecter	185818
13	M12 x 50 mm coach screw	50476
14	Medium-walled mastic-lined heatshrink tube, 4 x 1200 mm	143776
N/A	Fibreglass tape (See Note 1)	69799

Notes:

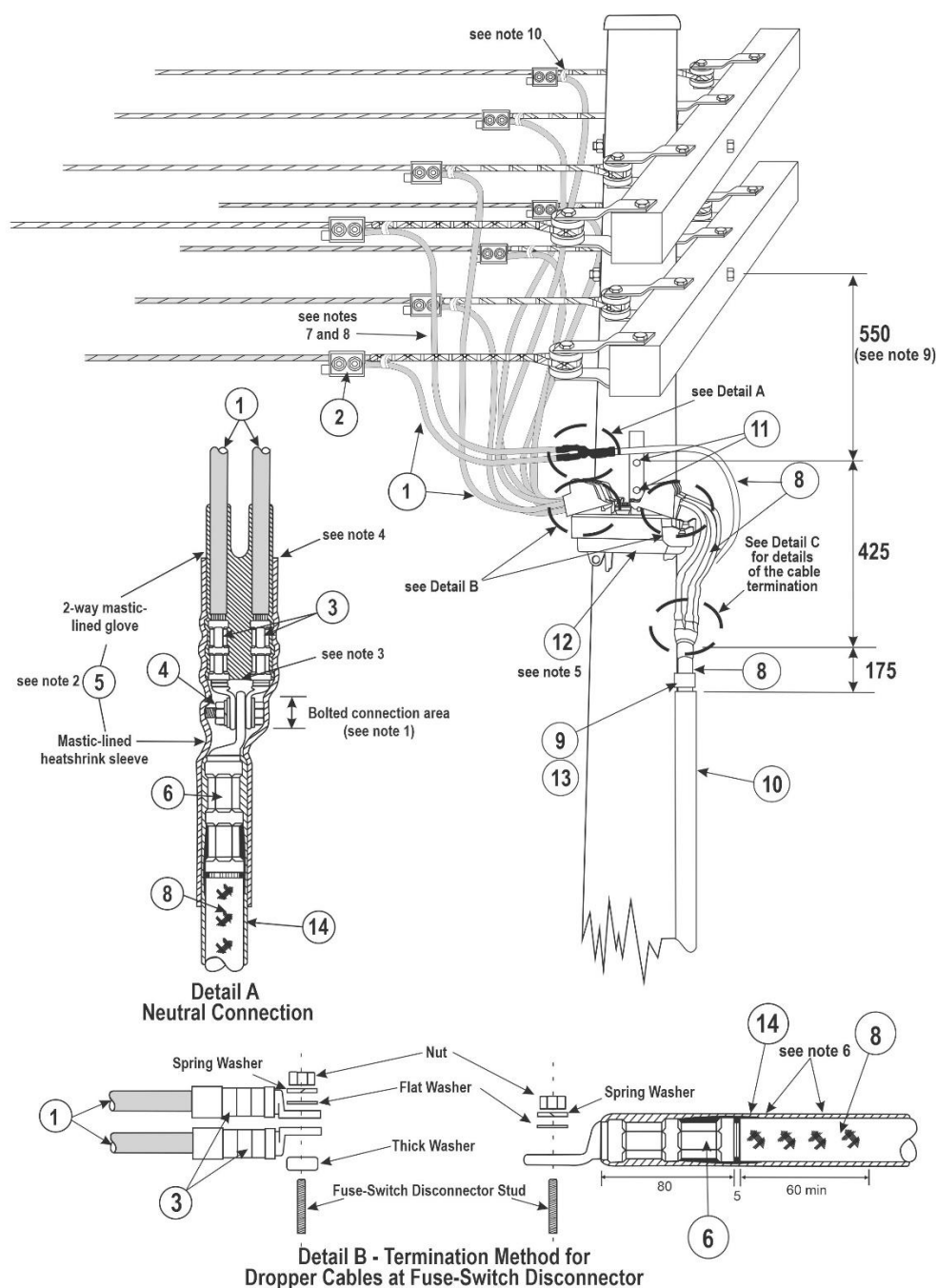
1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the four core cable.
5. Refer to NS 125 for the installation requirements of the fuse switch disconnecter.
6. Abrade the cable sheath to the dimensions shown in Figures 19.1 and 19.2.
7. Buy in from TE Connectivity Part No H16036 or from Acculec Power Part No CAL240LB-12.
8. The conductor of the 240 CU4 XQ Z cables must be rounded with rounding dies (S/C 182051) before being inserted into the crimp lug.
9. All measurements are in millimetres (mm) unless marked otherwise.

20.0 UGOH CONSTRUCTION, DOUBLE CIRCUIT BARE OH MAINS TO 240 CU4 XQ Z CABLES WITH FUSE SWITCH DISCONNECTOR (LV1-7)

This specification provides the construction requirements for connecting 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z) to a double circuit of bare overhead mains with enclosed fuse switch disconnecter.

This method of construction is primarily used where there is a high likelihood that the Bare OH mains will be upgraded to LV ABC. It is almost identical to LV1-49 other than it connects to Bare OH mains rather than LV ABC and thus requires different Insulation Piercing Connectors.

Refer to LV1-43 for general arrangement and stockcodes for items below the top cable clamp.



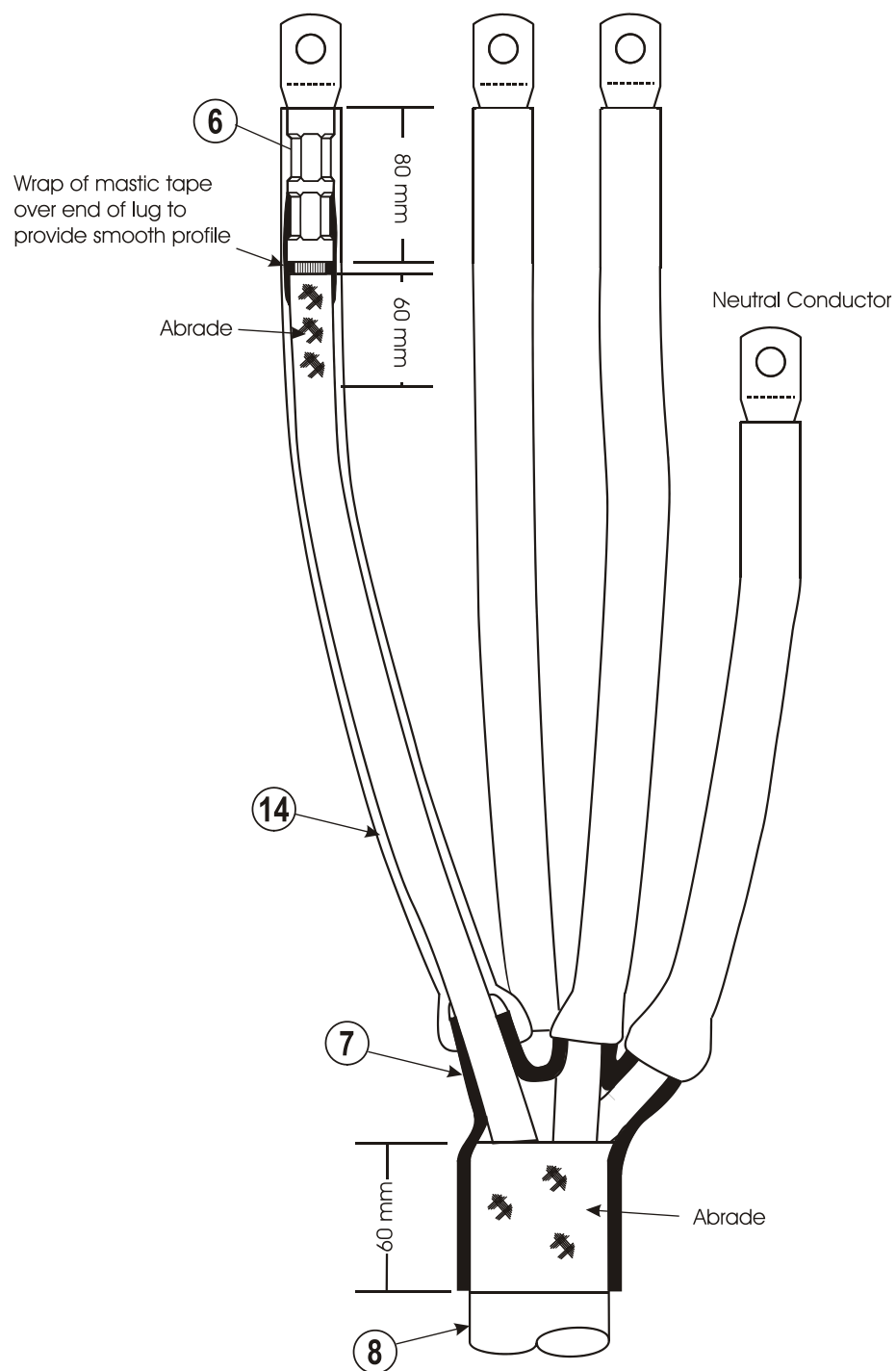


Figure 20.2 – Detail C: Cable Termination Details

Table 20.1 – Material List

Item	Description	Stockcode
1	95 LVABC	67959
2	Insulation piercing connector	
	Aluminium overhead conductors:	
	7/3.00 to 19/3.75	73569
	Copper overhead conductors:	
	19/1.75 to 19/3.00	148387
3	95mm ² pre-insulated bi-metallic compression lug	58743
4	Bolted connection:	
	M12 x 35 mm stainless steel bolt	45021
	M12 stainless steel nut	8987
	2 x M12 stainless steel flat washers	49429
	M12 stainless steel spring washer	143859
5	Heatshrink bolted connection kit	90324
6	240mm ² long barrel copper compression lug	See Note 11
7	4-way mastic-lined glove	78527
8	240 CU4 XQ Z underground cable	H108589
9	Cable clamp with nitrile rubber lining	177651
10	Flexible PVC conduit, 70 mm	78329
11	M16 x 100 mm coach screw	H40662
12	LV fuse switch disconnecter	185818
13	M12 x 50 mm coach screw	50476
14	Medium-walled mastic-lined heatshrink tube, 4 x 1200 mm	143776
N/A	Fibreglass tape (See Note 1)	69799

Notes:

1. Cover the bolted connection area with fibreglass tape to keep it free from any adhesives flowing from item 5.
2. The heatshrink components required for the bolted connection are packaged as a single kit. Refer to item 5 for details.
3. Position the base of the glove body level with the interface between the lug palm and the lug barrel.
4. Position the end of the heatshrink sleeve level with the base of the glove fingers. Shrink the sleeve down starting at the glove fingers and working towards the four core cable.
5. Refer to NS 125 for the installation requirements of the fuse switch disconnecter.
6. Abrade the cable sheath to the dimensions shown in Figures 20.1 and 20.2.
7. Cut the tails of ABC long enough to be transferred over to any 2x95LVABC that is later installed on the pole.

8. If the Bare OH mains are a single circuit (for example, 4x98 HDCU) then connect both set of ABC tails to the circuit. Refer to LV 1-5 for a description of how to connect to the OH mains.
9. The enclosed fuse switch disconnecter should be installed so that it is in the correct position when the bare mains are replaced with LV ABC. The specified dimension of 550mm assumes that the lower circuit of 95ABC will be installed 250mm below the king bolt of the cross-arm, which is then 300mm above the fuse switch disconnecter, which is the correct position as per LV 1-49.
10. A UV resistant cable tie should be used to mechanically connect the ABC tail to the Bare Mains within 150mm of the IPC.
11. Buy in from TE Connectivity Part No H16036 or from Acculec Power Part No CAL240LB-12.
12. The conductor of the 240 CU4 XQ Z cables must be rounded with rounding dies (S/C 182051) before being inserted into the crimp lug.
13. All measurements are in millimetres (mm) unless marked otherwise.

21.0 DISTRIBUTION PILLAR (TWO-WAY) 240 AL4 XQ Z/SAC CABLES (CMPBL2EA)

This specification provides the requirements for constructing a solid two-way Distribution Pillar for 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC).

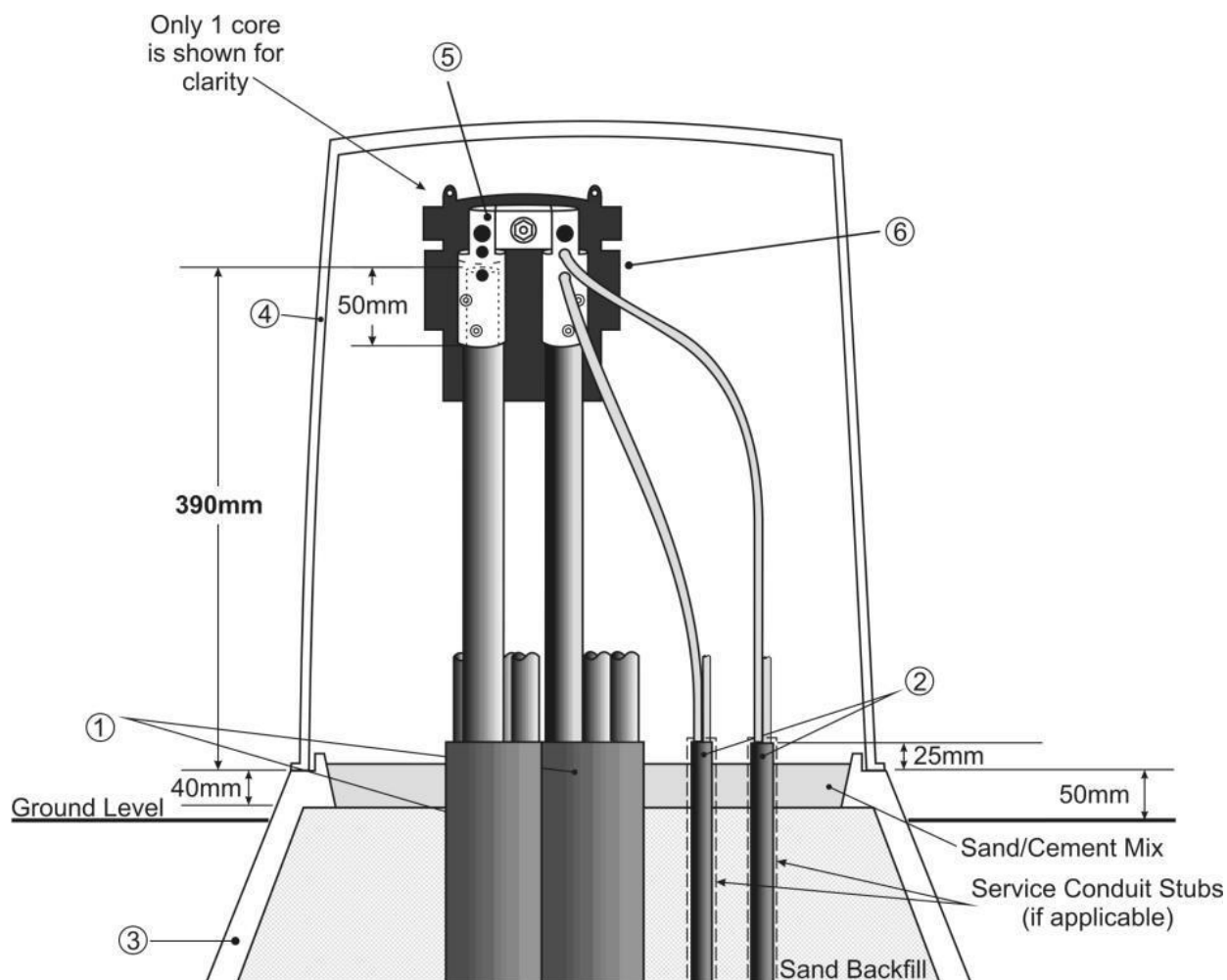


Figure 21.1 – General Arrangement (side view)

Note: The arrangement above is shown with the front half of the lug cover removed to show internal details. Service cables must be installed with lug cover fully assembled. See Figure 21.4 for a fully assembled arrangement.

Table 21.1 – Material List

Item	Description	Material	Quantity	Stockcode
1	Distributor cable	240 AL4 XQ Z/SAC	As required	141739
2	Service cable	Refer to Clause 3.3	As required	—
3	Pillar base	Polyethylene	1	90993
4	Turret (large)	Polyethylene	1	6668
5	Two-way mechanical connector kit with lug covers supplied	CMPBL2EA	1	185411
6	Lug cover			

Notes:

1. Ausgrid will not provide any training for the installation of the Acculec Power URD pillars. Please refer to Business Development Manager at Acculec Power if training is required.
2. Refer to NS130 for the installation requirements of the pillar base.
3. The pillar base is backfilled with sand and has a 40mm deep sand/cement mix (20:1)
4. PVC sheaths of all cables must be terminated 25mm above the surface of the sand/cement mix.
5. Refer to Figure 21.3 for service conduit stub details (if applicable).
6. The top of the pillar base is to be a minimum of 50 mm above the ground level.
7. The cable cores should be cut at a height of 390mm from the top of the pillar base.
8. If it is necessary to remove and reinstall the lug once it is installed; a new lug shall be used. The conductor shall be cut below the indentations and stripped to the required length.
9. The cables shall be centred within the pillar once they are connected.

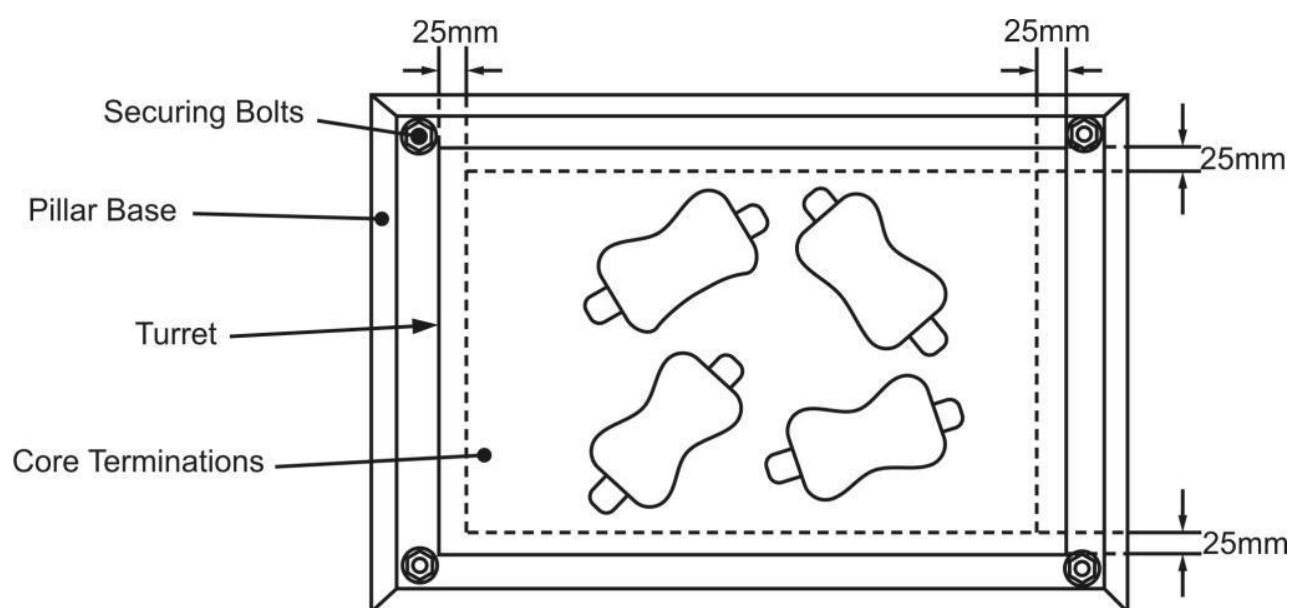


Figure 21.2 – Lug Cover Layout

Notes (cont.):

10. The lug covers shall be arranged so that a minimum of 25mm clearance is maintained between any part of the lug cover and inner edge of the pillar base (Refer to Figure 21.2) allowing the turret to be fitted clear of the lug covers.
11. Fit the turret over the connections and ensure it sits in its correct position with the securing holes aligned without applying any force to the turret. Reposition the cables if necessary.

CAUTION

Incorrect installation of the turret (i.e. using the securing bolts to force it into position) will lead to premature failure.

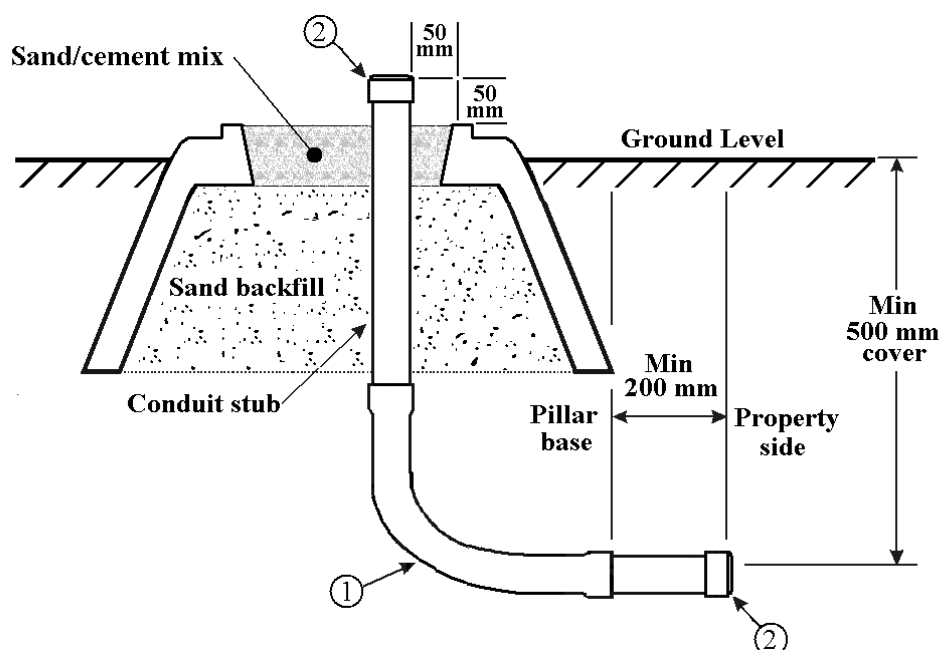


Figure 21.3 – Conduit Stub Details

Table 21.2 – Material List

Item	Description	Material	Stockcode
1	Conduit 90 deg large sweep bends: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	H8545 52415 Clipsal Part No. 247P80EO
2	Conduit cap: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	Clipsal Part No. 262/40EO 179754 Clipsal Part No. 262P80

Notes (cont.):

12. A conduit stub shall be installed in accordance with Figure 21.3 for each cable that has not been initially laid prior to the installation of the pillar noting the following:
- Conduit stubs shall be 40 mm or 50 mm diameter for 100 amp services and 80 mm diameter for 200 amp services and comply with NS130. All services shall be assumed to be 100 amp unless otherwise specified.
 - Only use conduit 90 degree large sweep bends as any sharper angle will impede cable entry.
 - The upper end of the conduit stub shall extend 50 mm above the sand/cement mix and be placed 50 mm clear of the inside edge of the pillar base.
 - The conduit stubs are to extend a minimum of 200 mm outside the footprint of the pillar base on the property side of the pillar and shall be capped at both ends using conduit caps of the appropriate size.
 - The minimum cover for the conduit stub shall be 500 mm.
 - The PVC service cable sheath must be terminated 10mm above the end of the conduit stub.

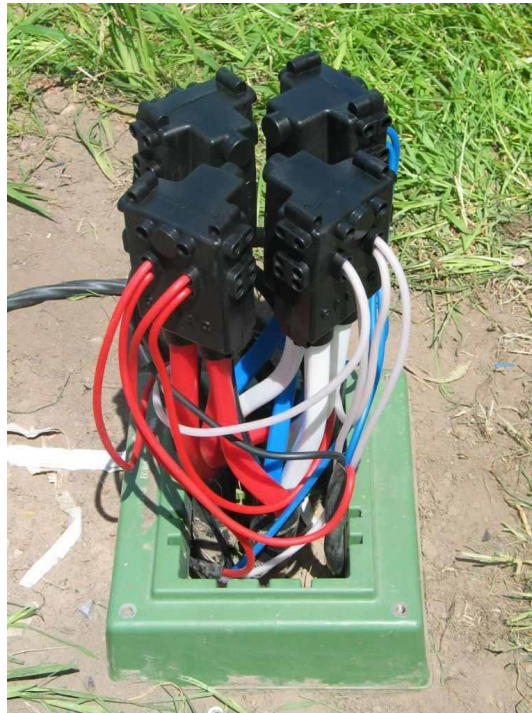


Figure 21.4 – Completed Three Way Pillar with turret removed (two way pillar is similar)

22.0 DISTRIBUTION PILLAR (THREE-WAY) 240 AL4 XQ Z/SAC CABLES (CMPBL3EA)

This specification provides the requirements for constructing a solid three-way Distribution Pillar for 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC).

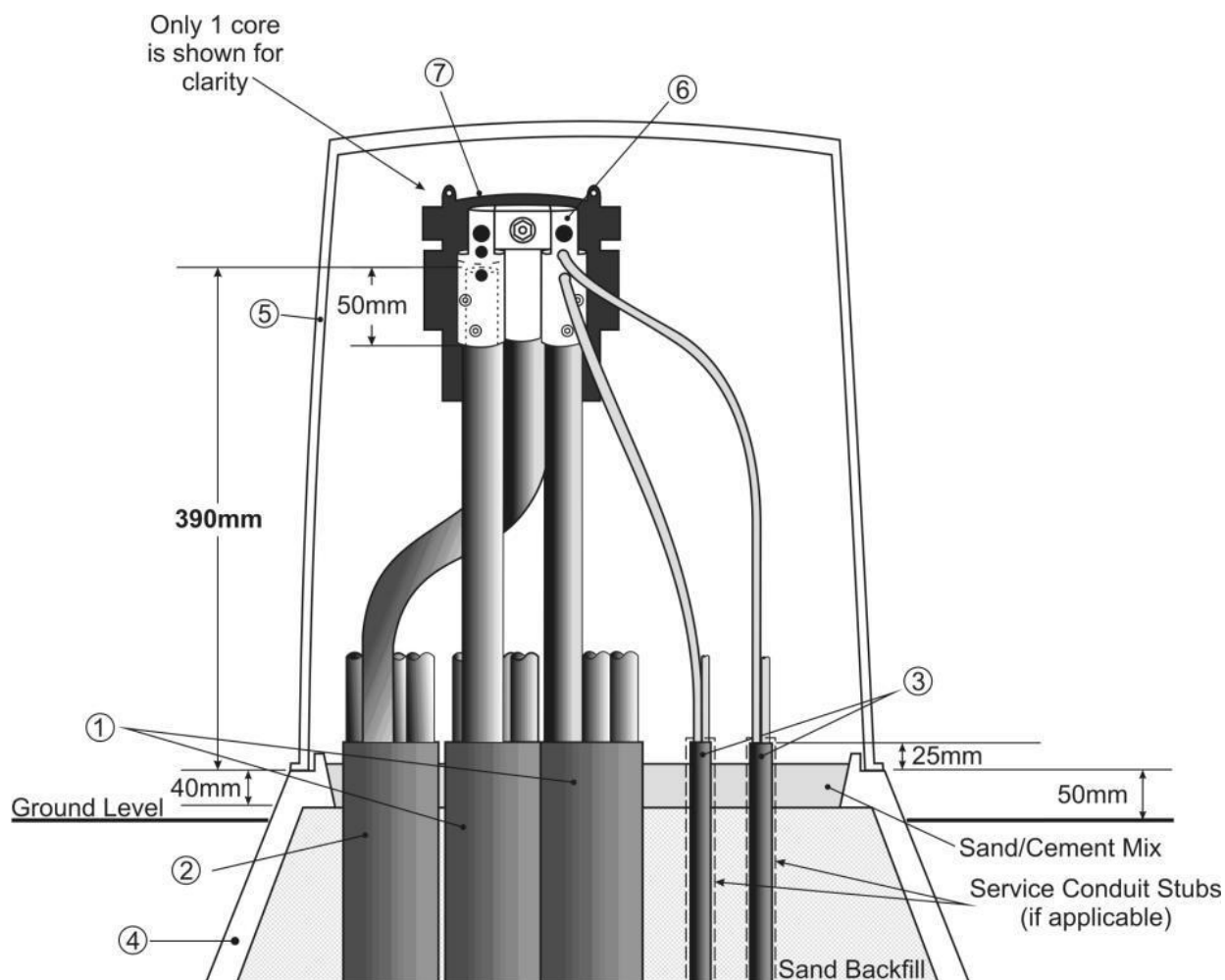


Figure 22.1 – General Arrangement (side view)

Note: The arrangement above is shown with the front half of the lug cover removed to show internal details. Service cables must be installed with lug cover fully assembled. See Figure 22.4 for a fully assembled arrangement.

Table 22.1 – Material List

Item	Description	Material	Quantity	Stockcode
1	Distributor cable	240 AL4 XQ Z/SAC	As required	141739
2	Teed-off distributor cable	240 AL4 XQ Z/SAC	As required	141739
3	Service cable	Refer to Clause 3.3	As required	—
4	Pillar base	Polyethylene	1	90993
5	Turret (large)	Polyethylene	1	6668
6	Three-way mechanical connector kit with lug covers supplied	CMPBL3EA	1	185412
7	Lug cover			

Notes:

1. Ausgrid will not provide any training for the installation of the Acculec Power URD pillars. Please refer to Business Development Manager at Acculec Power if training is required.
2. Refer to NS130 for the installation requirements of the pillar base.
3. The pillar base is backfilled with sand and has a 40mm deep sand/cement mix (20:1)
4. PVC sheaths of all cables must be terminated 25mm above the surface of the sand/cement mix.
5. Refer to Figure 22.3 for service conduit stub details (if applicable).
6. The top of the pillar base is to be a minimum of 50 mm above the ground level.
7. The cable cores should be cut at a height of 390mm from the top of the pillar base.
8. If it is necessary to remove and reinstall the lug once it is installed; a new lug shall be used. The conductor shall be cut below the indentations and stripped to the required length.
9. The cables shall be centred within the pillar once they are connected.

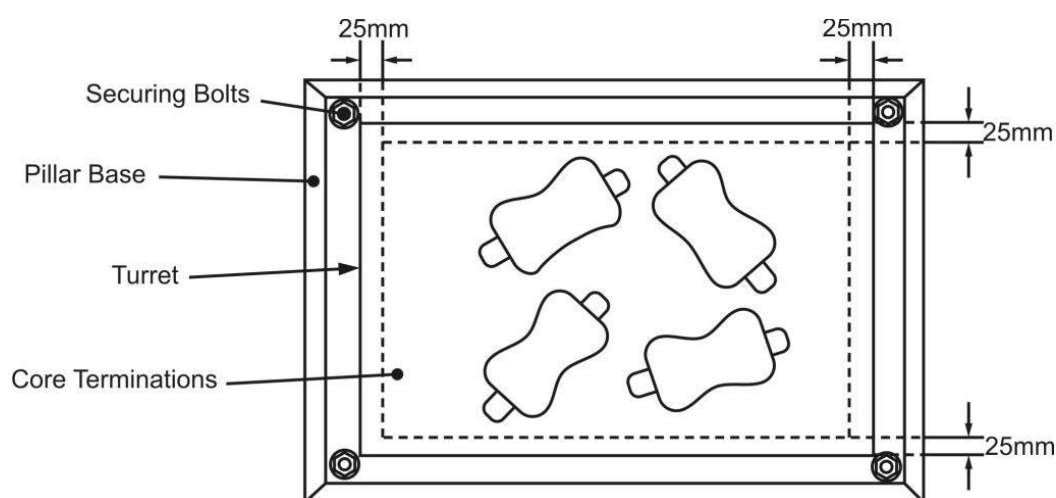
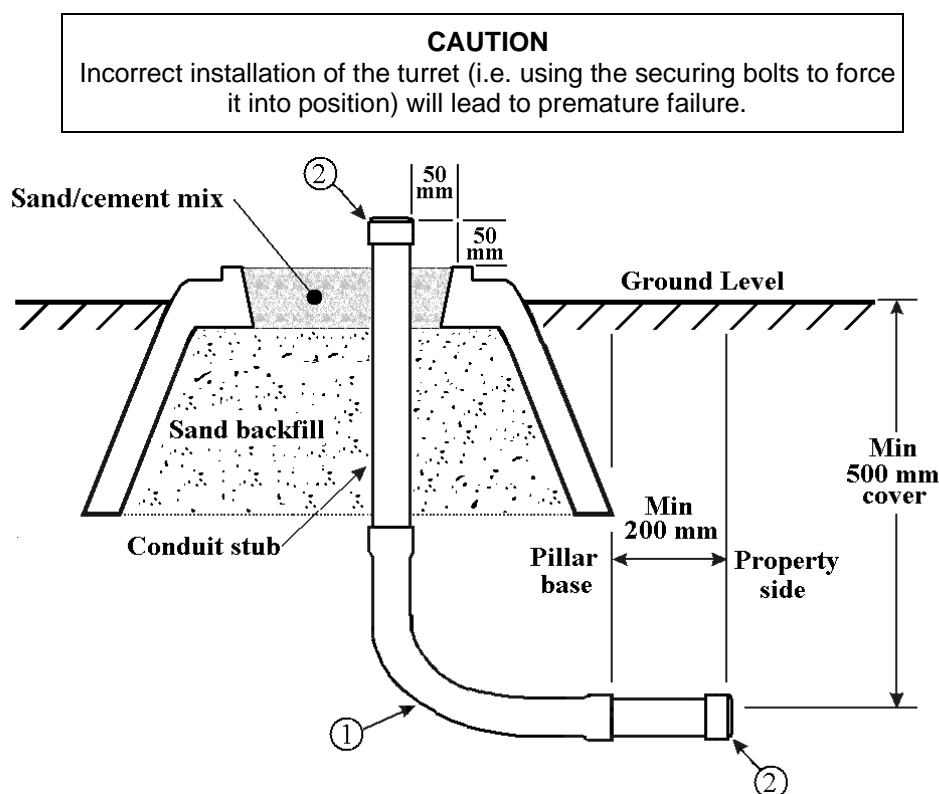


Figure 22.2 – Lug Cover Layout

Notes (cont.):

10. The lug covers shall be arranged so that a minimum of 25mm clearance is maintained between any part of the lug cover and inner edge of the pillar base (Refer to Figure 22.2) allowing the turret to be fitted clear of the lug covers.
11. Fit the turret over the connections and ensure it sits in its correct position with the securing holes aligned without applying any force to the turret. Reposition the cables if necessary.

**Figure 22.3 – Conduit Stub Details****Table 22.2 – Material List**

Item	Description	Material	Stockcode
1	Conduit 90 deg large sweep bends: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	H8545 52415 Clipsal Part No. 247P80EO
2	Conduit cap: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	Clipsal Part No. 262/40EO 179754 Clipsal Part No. 262P80

Notes (cont.):

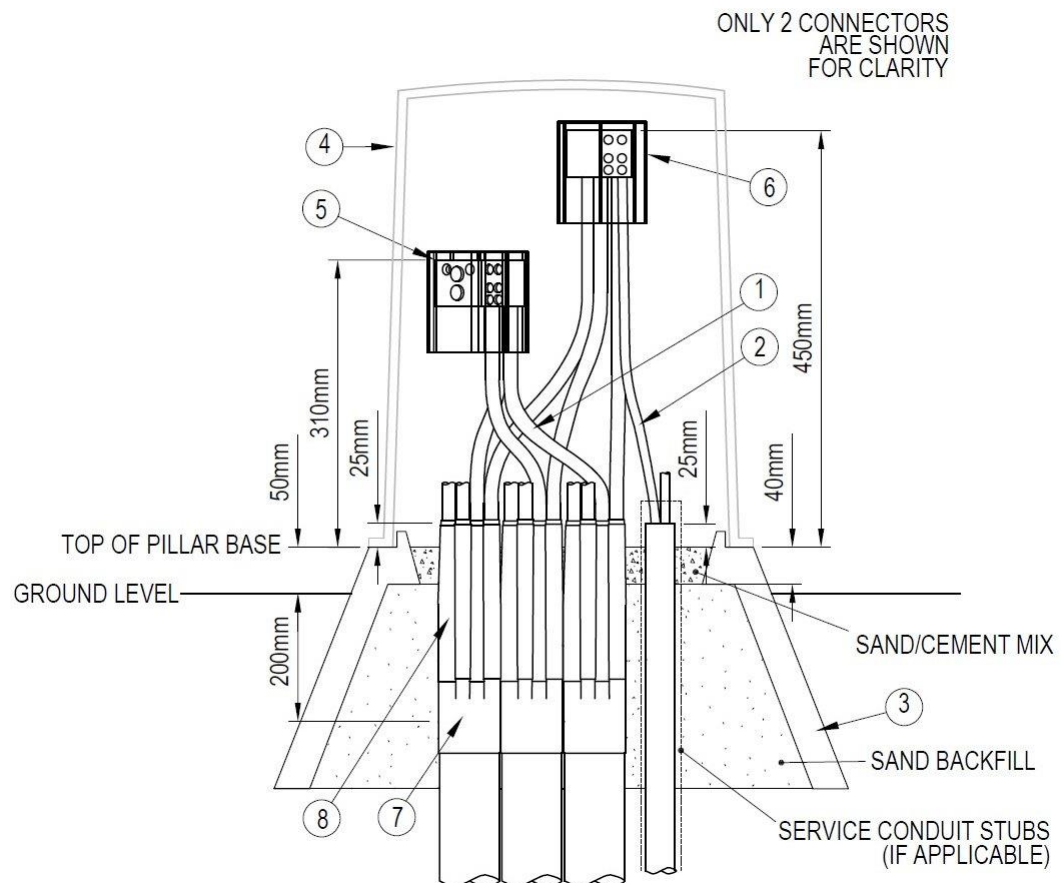
12. A conduit stub shall be installed in accordance with Figure 22.3 for each cable that has not been initially laid prior to the installation of the pillar noting the following:
 - Conduit stubs shall be 40 mm or 50 mm diameter for 100 amp services and 80 mm diameter for 200 amp services and comply with NS130. All services shall be assumed to be 100 amp unless otherwise specified.
 - Only use conduit 90 degree large sweep bends as any sharper angle will impede cable entry.
 - The upper end of the conduit stub shall extend 50 mm above the sand/cement mix and be placed 50 mm clear of the inside edge of the pillar base.
 - The conduit stubs are to extend a minimum of 200 mm outside the footprint of the pillar base on the property side of the pillar and shall be capped at both ends using conduit caps of the appropriate size.
 - The minimum cover for the conduit stub shall be 500 mm.
 - The PVC service cable sheath must be terminated 10mm above the end of the conduit stub.



Figure 22.4 – Completed Three Way Pillar with turret removed

23.0 DISTRIBUTION PILLAR (TWO-WAY OR THREE-WAY) 240 AL4 XQ Z/SAC & 300 AL4 XQ Z/SAC CABLES (LV1-82)

This specification provides the requirements for constructing a solid two-way or three-way Distribution Pillar for 240mm² and 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC & 300 AL4 XQ Z/SAC).



Note: The heatshrink tubing on the distributor cables ends 25mm above the pillar base.

Figure 23.1 - General Arrangement (side view)

Table 23.1 - Material List

Item	Description	Material	Quantity	Stockcode
1	Distributor cable	240 AL4 XQ Z/SAC 300 AL4 XQ Z/SAC	As required	141739 185413
2	Service cable	Refer to Clause 3.3	As required	—
3	Pillar base	Polyethylene	1	90993
4	Turret (large)	Polyethylene	1	6668
5	3-Way bolted block connector integrated with 6 service holes.	Tinned aluminium	1	186235
6	Connector cover	Polycarbonate cover		
7	Heatshrink Insulating Glove, 4-way		1 per Distributor cable	78527
8	Heatshrink Insulating Sleeve, 12.5m Roll		1	60228

Notes:

1. Refer to NS130 for the installation requirements of the pillar base.
2. The pillar base is backfilled with sand and has a 40 mm deep sand/cement mix (20:1).
3. PVC sheaths of all distributor cables must be terminated 200 mm below ground level.
4. Refer to Figure 23.4 for service conduit stub details (if applicable).
5. The top of the pillar base is to be a minimum of 50 mm above the ground level.
6. Up to 6 service cables can be connected in each block - 4x70mm² (max) and 2x50mm² (max).
7. The 3-way bolted block connector (186235) is suitable for both 2-way and 3-way applications.
8. The cables shall be centred within the pillar once they are connected.

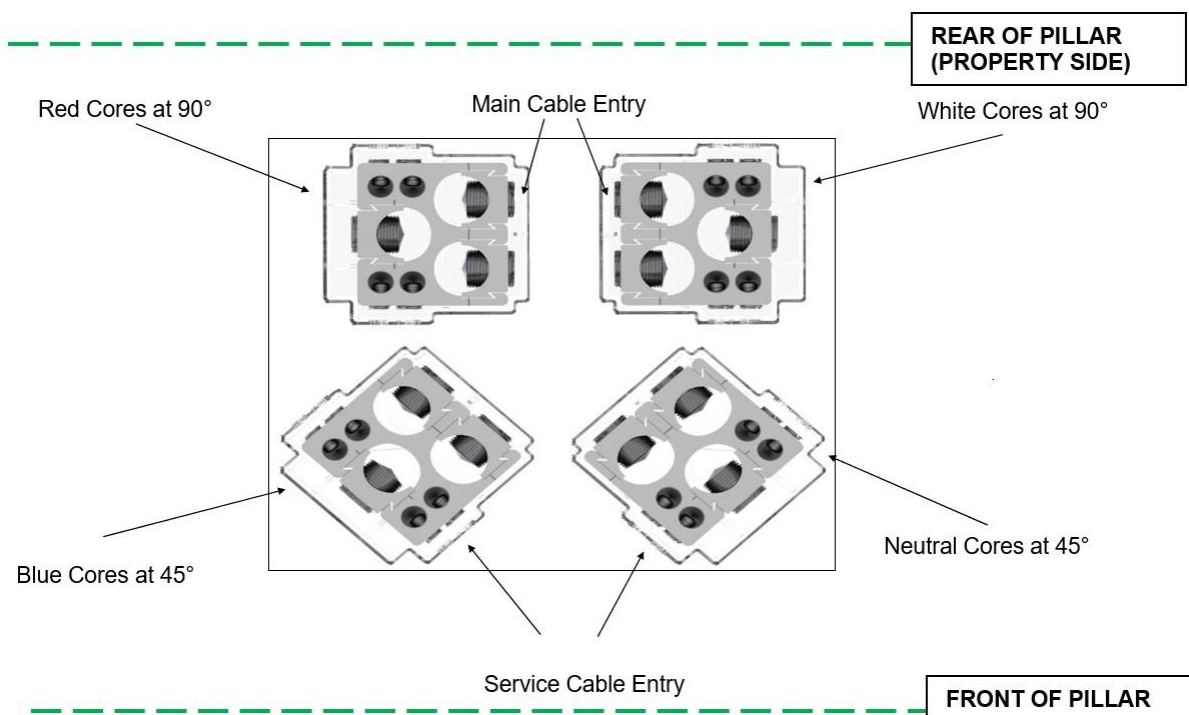


Figure 23.2 - Core Terminal Layout (top view)

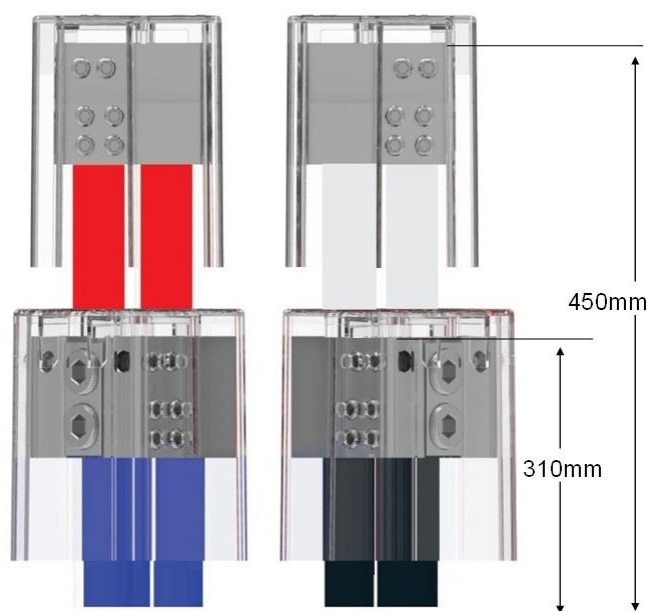


Figure 23.3 - Core Terminal Layout (front view)

Notes (cont.):

9. The core terminals (Refer to Figure 23.2 and Figure 23.3) are staggered with two cores at 450mm and two cores at 310mm from the turret base, allowing the turret to be fitted clear of the core terminals.
10. Fit the turret over the connections and ensure it sits in its correct position with the securing holes aligned without applying any force to the turret. Reposition the cables if necessary.

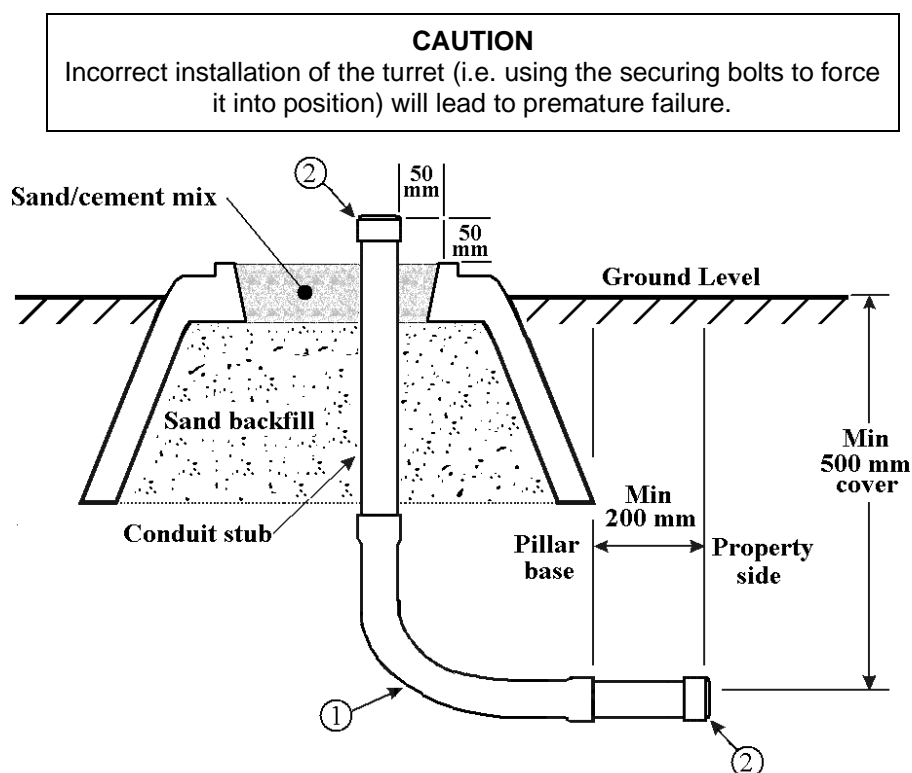


Figure 23.4 - Conduit Stub Details

Table 23.2 - Material List

Item	Description	Material	Stockcode
1	Conduit 90 deg large sweep bends: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	H8545 52415 Clipsal Part No. 247P80EO
2	Conduit cap: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	Clipsal Part No. 262/40EO 179754 Clipsal Part No. 262P80

Notes (cont.):

11. A conduit stub shall be installed in accordance with Figure 23.4 for each cable that has not been initially laid prior to the installation of the pillar noting the following:
 - Conduit stubs shall be 40 mm or 50 mm diameter for 100 amp services and 80 mm diameter for 200 amp services and comply with NS130. All services shall be assumed to be 100 amp unless otherwise specified.
 - Only use conduit 90 degree large sweep bends as any sharper angle will impede cable entry.
 - The upper end of the conduit stub shall extend 50 mm above the sand/cement mix and be placed 50 mm clear of the inside edge of the pillar base.
 - The conduit stubs are to extend a minimum of 200 mm outside the footprint of the pillar base on the property side of the pillar and shall be capped at both ends using conduit caps of the appropriate size.
 - The minimum cover for the conduit stub shall be 500 mm.
 - The PVC service cable sheath must be terminated 10mm above the end of the conduit stub.

24.0 DISTRIBUTION PILLAR (SOLID CONNECTION - LUGGED) (LV1-81)

This specification is the result of merging LV1-35 and LV1-80, and provides the requirements for constructing a solid connection Distribution Pillar for:

- 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z).
- 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z).
- 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC).
- 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (300 AL4 XQ Z/SAC).

Note that if all distributor cables are solid-sector aluminium (240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC), then use arrangement LV1-82, CMPBL2EA or CMPBL3EA as appropriate.

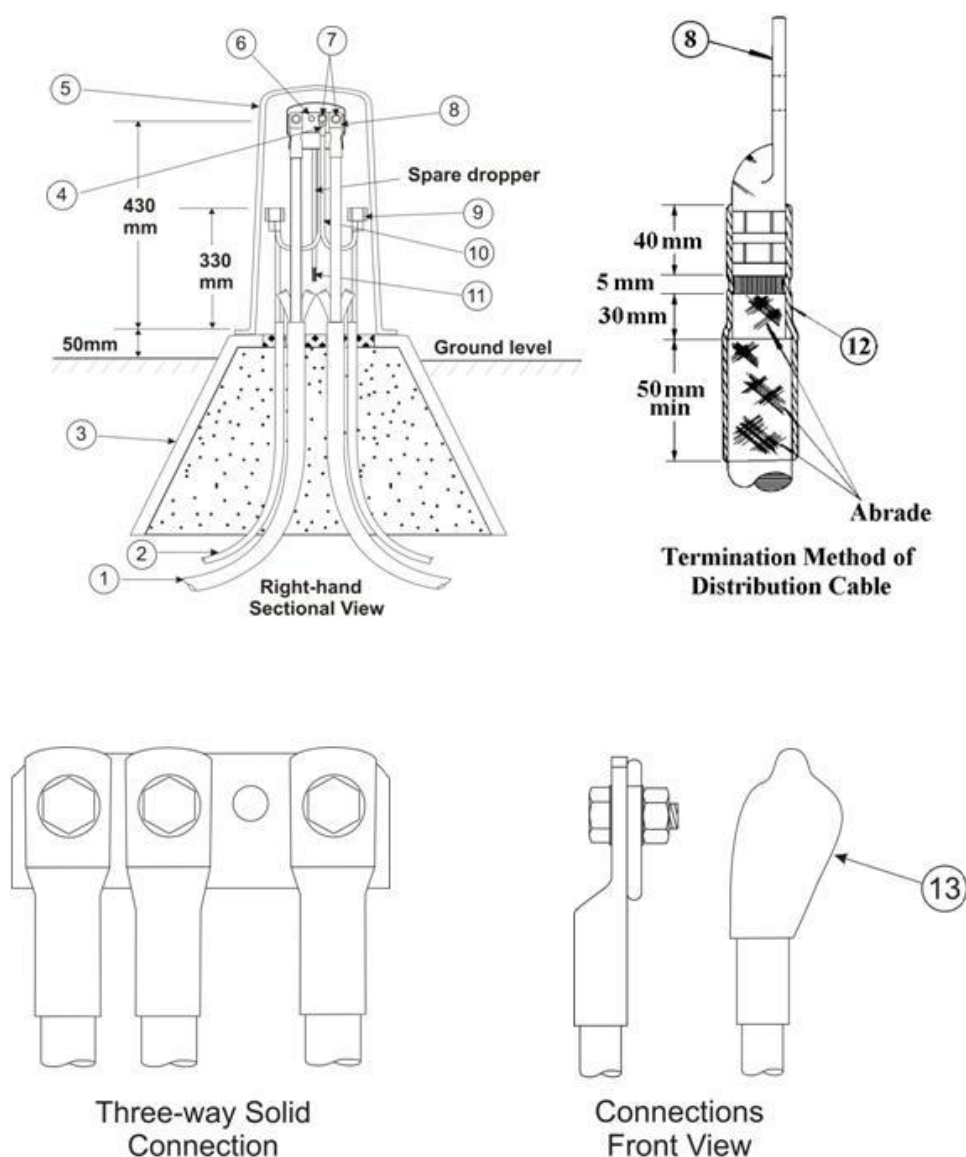


Figure 24.1 - General Arrangement

Table 24.1 - Common Components Independent of Cable Type

Item	Description	Material	Quantity	Stockcode
3	Pillar base	Polyethylene	1	90993
4	M12 Compression lug 50 mm ²	Tinned copper	4	74823
5	Turret (Large)	Polyethylene	1	6668
6	Distributor and service bar	Tinned copper	1	Kit: 143784
9	6 hole service termination block	Tinned brass with clear polycarbonate cover	4	150409
10	Dropper cable (colour-coded cores)	50 CU4 XQ Z	Length as required	149112
11	Heatshrink cap	18/7mm medium-wall, mastic lined	4	176801
13	Heatshrink cap	145/71mm medium-wall, unlined	4	179701

Module A – For 185 CU1 XQ Z**Table 24.1A - Material List**

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	185 CU1 XQ Z/COM/ #COLOUR 185 CU1 XQ Z	As required	151183 61432
2	Service cable	Refer to Clause 3.3	As required	—
7	M12 x 35 mm bolt	Stainless steel	4	45021
	M12 nut	Stainless steel	4	8987
	M12 flat washer	Stainless steel	8	49429
	M12 spring washer	Stainless steel	4	143859
8	185 mm ² compression lug	Tinned copper	4	175532
12	Heatshrink sleeve, 150 mm long	35/12mm medium-wall, mastic lined	4	181351 (available in pack of 16)

Module B – For 240 CU4 XQ Z**Table 24.1B - Material List**

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	240 CU4 XQ Z	As required	H108589
2	Service cable	Refer to Clause 3.3	As required	—
7	M12 x 30 mm bolt, nut, washers	Stainless steel	4	175911 (available in pack of 50)
8	240 mm ² compression lug	Tinned copper	4	175533
12	Heatshrink sleeve, 150 mm long	51/16mm medium-wall, mastic lined	4	143776 (available in 1200mm length)

Module C – For 240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC

Table 24.1C – Material List

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	240 AL4 XQ Z/SAC 300 AL4 XQ Z/SAC	As required	141739 185413
2	Service cable	Refer to Clause 3.3	As required	■
7	M12 x 30 mm bolt, nut, washers	Stainless steel	4	175911 (available in pack of 50)
8	240 mm ² compression lug 300 mm ² compression lug	Bimetal Bimetal	4 4	141770 186234
12	Heatshrink sleeve, 150 mm long	51/16mm medium-wall, mastic lined	4	143776 (available in 1200mm length)

Notes:

1. The conductor of the 240 CU4 XQ Z cables must be rounded with rounding dies (S/C 182051) before being inserted into the crimp lug.
2. Only one service active is to be connected into each hole of the termination block (9). This service terminal block also allows for 70mm² copper compacted conductor to be installed.
3. Only one service neutral is to be connected into each hole of the termination block (9). If additional neutral connections are required another termination block may be connected to the spare dropper cable.
4. Spare dropper cable to be installed on neutral bar only.
5. The hole centres in the distributor and service bar (6) for the distributor cable is to be 430 mm from the top of the pillar base.
6. The top of the service termination block (9) is to be 330 mm from the top of the pillar base.
7. Refer to Figure 24.3 for service conduit stub details (if applicable).

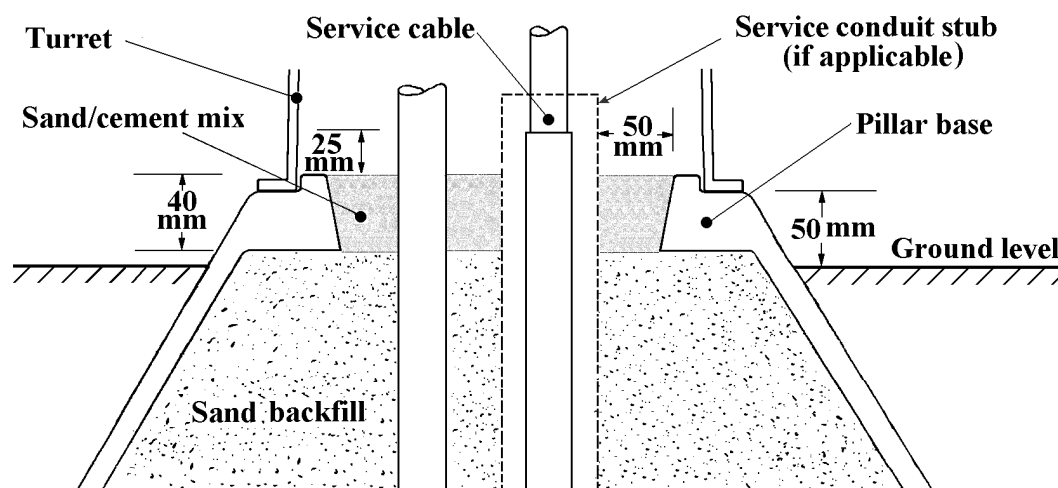
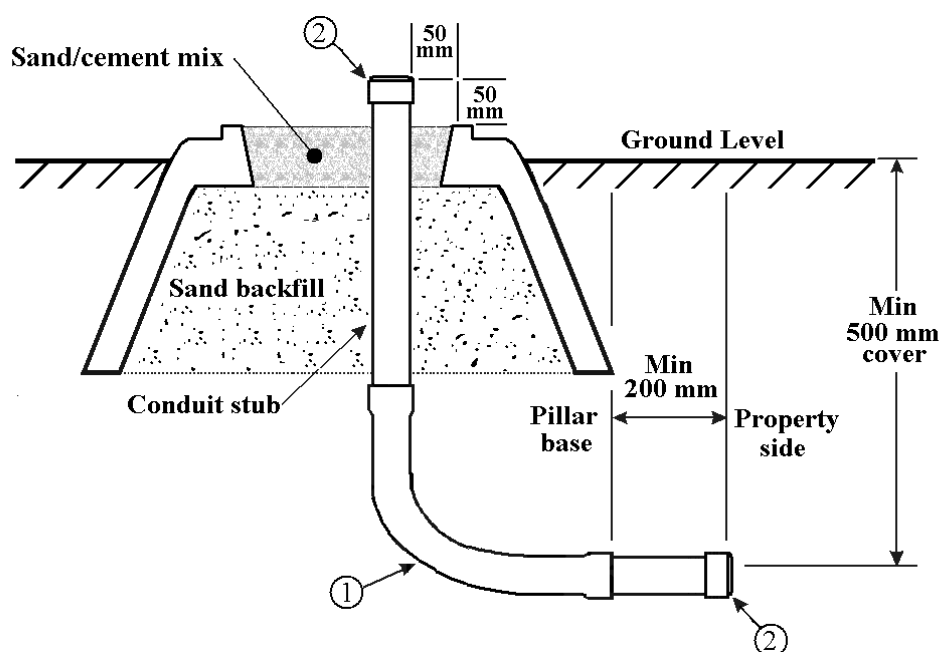


Figure 24.2 - Pillar Base Details

Notes (cont.):

8. Refer to NS130 for the installation requirements of the pillar base.
9. The pillar base is backfilled with sand and has a 40 mm deep sand/cement mix (20:1).
10. PVC sheaths of multicore cables must be terminated 25 mm above the surface of the sand/cement mix.
11. The top of the pillar base is to be a minimum of 50 mm above the ground level.

**Figure 24.3 - Conduit Stub Details****Table 24.2 - Material List**

Item	Description	Material	Quantity	Stockcode
1	Conduit 90 deg large sweep bends: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	1	H8545 52415 Clipsal Part No. 247P80EO
2	Conduit cap: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	2	Clipsal Part No. 262/40EO 179754 Clipsal Part No. 262P80

Notes (cont.):

12. A conduit stub shall be installed in accordance with Figure 24.3 for each cable that has not been initially laid prior to the installation of the pillar noting the following:
 - Conduit stubs shall be 40 mm or 50 mm diameter for 100 amp services and 80 mm diameter for 200 amp services and comply with NS130. All services shall be assumed to be 100 amp unless otherwise specified.
 - Only use conduit 90 degree large sweep bends as any sharper angle will impede cable entry.
 - The upper end of the conduit stub shall extend 50 mm above the sand/cement mix and be placed 50 mm clear of the inside edge of the pillar base.
 - The conduit stubs are to extend a minimum of 200 mm outside the footprint of the pillar base on the property side of the pillar and shall be capped at both ends using conduit caps of the appropriate size.
 - The minimum cover for the conduit stub shall be 500 mm.
 - The PVC service cable sheath must be terminated 10mm above the end of the conduit stub.

25.0 SINGLE LINK DISTRIBUTION PILLAR (LV1-37)

This specification provides the requirements for constructing a Single Link Distribution Pillar for:

- 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z).
- 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z).
- 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC).
- 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (300 AL4 XQ Z/SAC).

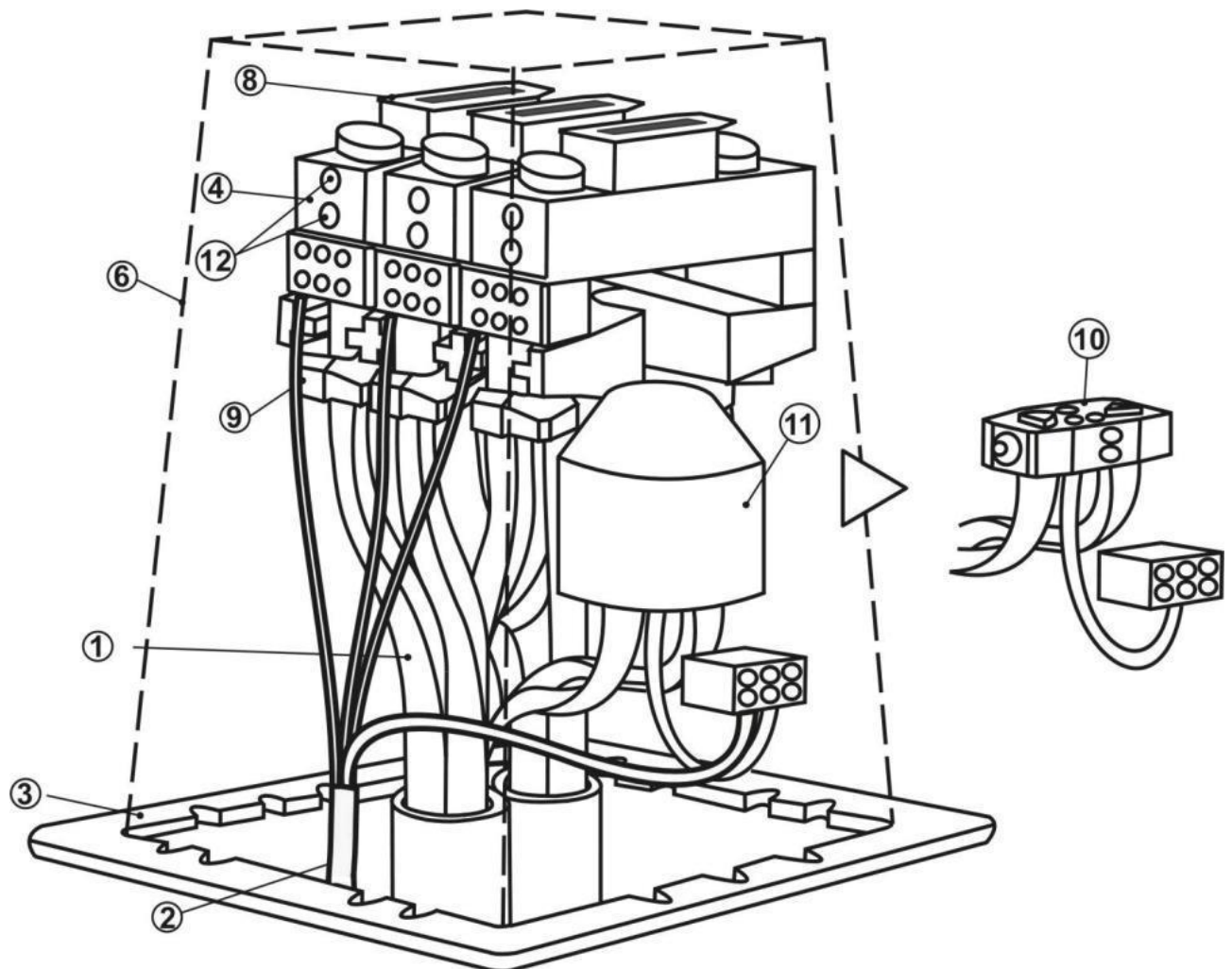


Figure 25.1 - General Arrangement

Table 25.1 - Material List

Item	Description	Material	Stockcode
1	Distributor cable	240 AL4 XQ Z/SAC 300 AL4 XQ Z/SAC 185 CU1 XQ Z/COM /#COLOUR 185 CU1 XQ Z 240 CU4 XQ Z	141739 185413 151183 61432 H108589
2	Service cable	Refer to Clause 3.3	—
3	Pillar base	Polyethylene	90993
4	Link Module incorporating service terminal block (See Note 4)	Tinned brass with polycarbonate cover	See Note 1
5	Activating Links (not shown)	Tinned brass and polycarbonate	See Note 1
6	Turret (Large)	Polyethylene	6668
7	T-shaped Operating Handle (not shown)	Polycarbonate	See Note 1
8	Link Covers	PVC	See Note 1
9	Clamping Base	Polycarbonate	See Note 1
10	Neutral connector complete with 200mm long 50mm ² copper, black XLPE dropper cable and six hole terminal block (See Note 1)		See Note 1
11	Neutral Cover	PVC	See Note 1
12	Grommets for screw holes	Rubber	See Note 1
13	Cable Ties (not shown)	Nylon	See Note 1
**	Link Kit	Various	178071
*	Replacement Activating Links	Tinned brass and polycarbonate	179155
*	Replacement T-shaped Operating Handles	Polycarbonate	179154

Notes:

1. Link kit (including Activating Links and Tee Operating Handle) is available on stockcode 178071. The link kit must be constructed in accordance with the installation instructions supplied.
2. The terminal screws must be tightened with a torque wrench to the tension specified in the following table:

Table 25.2 - Terminal screw torque settings

Cable	Torque (Nm)
240AL Solid Sector	45
300AL Solid Sector	45
185CU Stranded Circular	45
240CU Stranded Sector	50

3. Neutral connections are made using the 6 hole termination block (10). Only one service neutral is to be connected into each hole of the termination block. If additional neutral connections are required another termination block may be connected to the neutral bar.
4. Only one service active is to be connected per hole. The service terminal block also allows for a 70mm² copper compacted conductor in the middle terminal to be installed.
5. The initial designed number of services must not exceed the number specified in NS110 Design and Construction Standard for Underground Residential Subdivisions, i.e. four 100 amp 3-phase services per link pillar. The maximum number of services connected to each side of the pillar shall not exceed:
 - 1 x 200 Amp 3 phase service, or
 - 3 x 100 Amp 3 phase services.

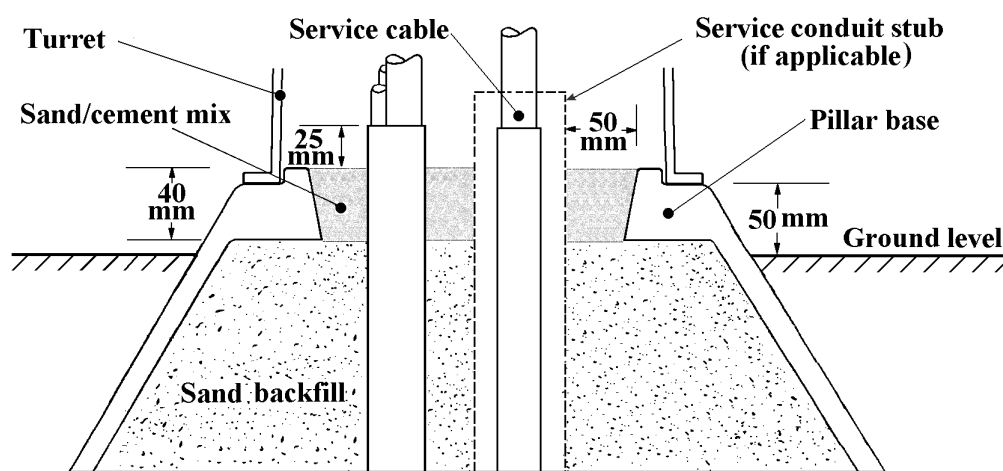


Figure 25.2 - Pillar Base Details

Notes (cont.):

6. Refer to NS130 for the installation requirements of the pillar base.
7. The pillar base is backfilled with sand and has a 40 mm deep sand/cement mix (20:1).
8. PVC sheaths of all cables must be terminated 25 mm above the surface of the sand/cement mix.
9. Refer to Figure 25.3 for service conduit stub details (if applicable).
10. The top of the pillar base is to be a minimum of 50 mm above the ground level.

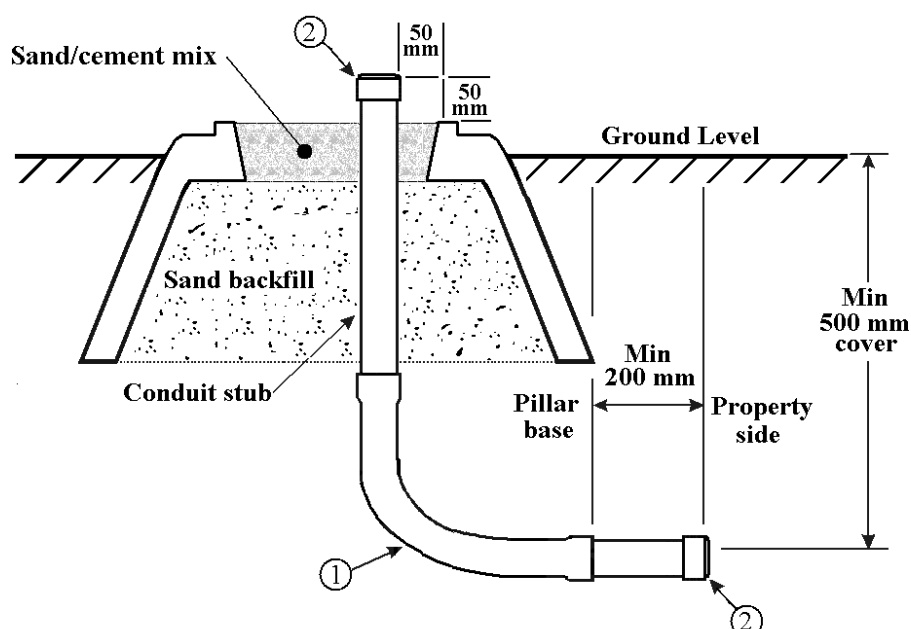


Figure 25.3 - Conduit Stub Details

Table 25.3 - Material List

Item	Description	Material	Stockcode
1	Conduit 90 deg large sweep bends: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	H8545 52415 Clipsal Part No. 247P80EO
2	Conduit cap: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	Clipsal Part No. 262/40EO 179754 Clipsal Part No. 262P80

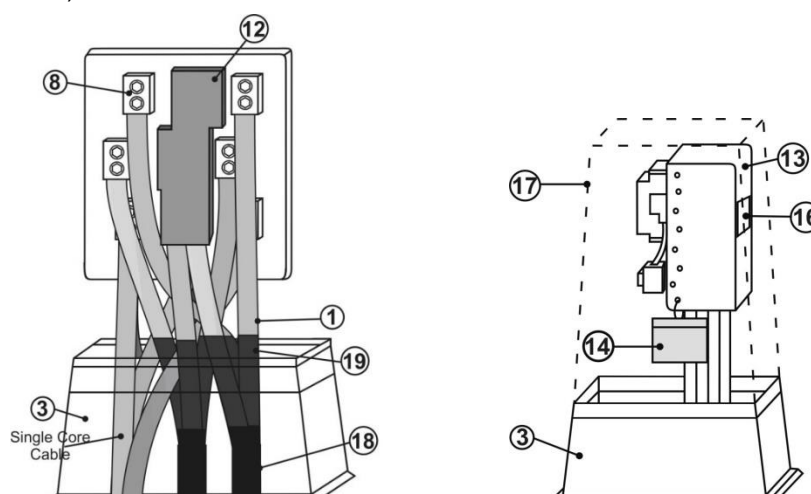
Notes (cont.):

11. Each distribution cable must be terminated into the link modules on the side at which the cable enters the pillar.
12. A conduit stub shall be installed in accordance with Figure 25.3 for each cable that has not been initially laid prior to the installation of the pillar noting the following:
 - Conduit stubs shall be 40 mm or 50 mm diameter for 100 amp services and 80 mm diameter for 200 amp services and comply with NS130. All services shall be assumed to be 100 amp unless otherwise specified.
 - Only use conduit 90 degree large sweep bends as any sharper angle will impede cable entry.
 - The upper end of the conduit stub shall extend 50 mm above the sand/cement mix and be placed 50 mm clear of the inside edge of the pillar base.
 - The conduit stubs are to extend a minimum of 200 mm outside the footprint of the pillar base on the property side of the pillar and shall be capped at both ends using conduit caps of the appropriate size.
 - The minimum cover for the conduit stub shall be 500 mm.
 - The PVC service cable sheath must be terminated 10mm above the end of the conduit stub.

26.0 DOUBLE LINK DISTRIBUTION PILLAR (LV1-60)

This specification provides the requirements for constructing a Double Link Distribution Pillar for:

- 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z).
- 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z).
- 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC).
- 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (300 AL4 XQ Z/SAC).



Note: The heatshrink tubing on the 4-core cable, ends 25mm above the pillar base. The cable sheath of the single core cables end 10mm below the terminals.

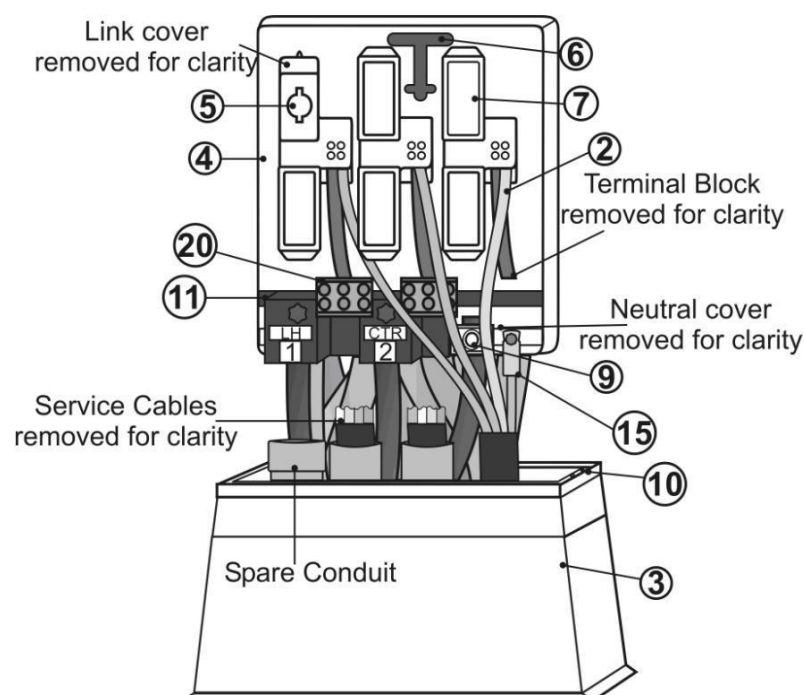


Figure 26.1 – General Arrangement

Table 26.1 - Material List

Item	Description	Material	Stockcode
1	Distributor cable	240 AL4 XQ Z/SAC 300 AL4 XQ Z/SAC 185 CU1 XQ Z/COM /#COLOUR 185 CU1 XQ Z 240 CU4 XQ Z	141739 185413 151183 61432 H108589
2	Service cable	Refer to Clause 3.3	—
3	Pillar base	Polyethylene	180101
4	Link panel assembly with neutral bar and integrated service blocks insulated and 3 three-hole termination blocks for additional services	Tinned Brass with Polycarbonate covers	See Note 1
5	Activating Links	Tinned brass and polycarbonate	See Note 1
6	T-shaped operating handle attached to link panel	Polycarbonate	See Note 1
7	Link Covers	PVC	See Note 1
8	Set of dovetails with two clamping screws	Tinned Brass	See Note 1
9	Set of dovetails with one clamping screw	Tinned Brass	See Note 1
10	Self-tapping screws for securing link panel assembly to pillar base	Stainless Steel	See Note 1
11	Neutral Cover	Polycarbonate	See Note 1
12	Centre Phase Cover	Polycarbonate	See Note 1
13	Panel Assembly Rear Cover	Polycarbonate	See Note 1
14	Plastic Storage Bag for Links	Plastic	See Note 1
15	M8 tinned copper compression lug	16mm ² 50mm ²	176555 57604
16	Distributor Labelling Panel	PVC	See Note 1
17	Turret (Large)	Polyethylene	6668
18	Heatshrink Insulating Glove, 4-way		78527
19	Heatshrink Insulating Sleeve, 12.5m Roll		60228
20	3 hole service termination block (See Note 5)	Tinned brass with clear polycarbonate cover	See Note 1
* *	Link kit	Various	180091
*	Replacement Activating Links	Tinned brass and polycarbonate	179155
*	Replacement T-shaped Operating Handles	Polycarbonate	179154

Notes:

- Link panel kit (including Activating Links and T-shaped Operating Handle) is available on stockcode 180091. The link kit must be constructed in accordance with the installation instructions supplied. An additional labelling requirement for the Hunter Region is to include the link number issued for each link between the distributor numbers on the label, as shown in the example below:
 - To AB-12345 (*this refers to the pillar number connected to distributor no.1*)
LVL-12345 (*this refers to the Low Voltage Link number between distributors 1 & 2*)
 - TO CD-12345 (*this refers to the pillar number connected to distributor no.2*)
LVL-12345 (*this refers to the Low Voltage Link number between distributors 2 & 3*)
 - To EF-12345 (*this refers to the pillar number connected to distributor no.3*)

2. Training in the installation of this link pillar must be completed prior to installing. Training for Ausgrid staff can be arranged by emailing training@ausgrid.com.au. ASPs are to directly contact the supplier of this pillar (TE Connectivity) on email tappat@te.com to arrange training.
3. The terminal screws must be tightened with a torque wrench to the tension specified in the following table:

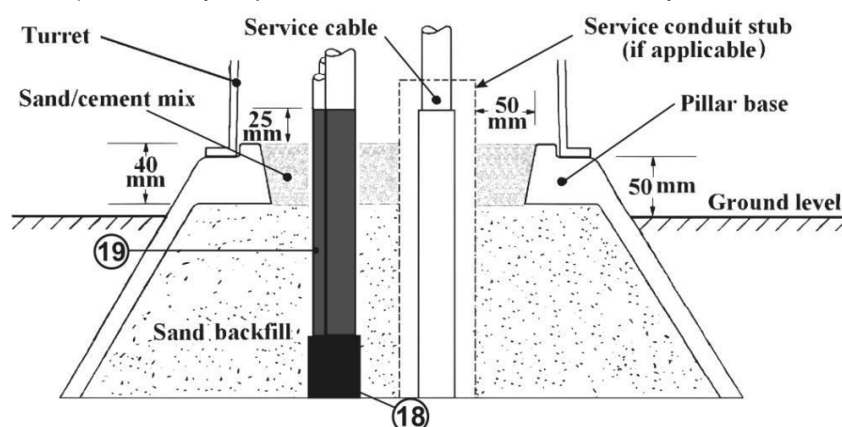
Table 26.2 – Terminal screw torque settings

Cable	Torque (Nm)
240AL Solid Sector	45
300AL Solid Sector	45
185CU Stranded Circular	45
240CU Stranded Sector	50

4. Service neutral connections are made by crimping an M8 compression lug onto the service neutral conductor and terminating it on to the neutral bar. Only one neutral allowed per bolted connection.
5. Only one service active is to be connected per hole. Service actives to be terminated into the service tunnels integrated with the link panel assembly prior to utilising the three-hole termination blocks.
6. The initial designed number of services must not exceed the number specified in NS110 Design and Construction Standard for Underground Residential Subdivisions, i.e. three 100amp 3-phase services. The maximum number of services connected to the pillar shall not exceed:
 - 1 x 200 Amp 3 phase service, or
 - 4 x 100 Amp 3 phase services.

A minimum of one service must be connected when the pillar is being constructed as this will leave sufficient room in the pillar base for three conduit stubs for future services.

If installed in a new development where no services (including three phase street light circuits) are initially required, a maximum of 3 services may be taken from a double link pillar.

**Figure 26.2 – Pillar Base Details****Notes (cont.):**

7. Refer to NS130 for the installation requirements of the pillar base.
8. The pillar base is backfilled with sand and has a 40 mm deep sand/cement mix (20:1).
9. PVC sheaths of all cables must be terminated 25 mm above the surface of the sand/cement mix.

10. Refer to Figure 26.3 for service conduit stub details (if applicable).
11. The top of the pillar base is to be a minimum of 50 mm above the ground level.

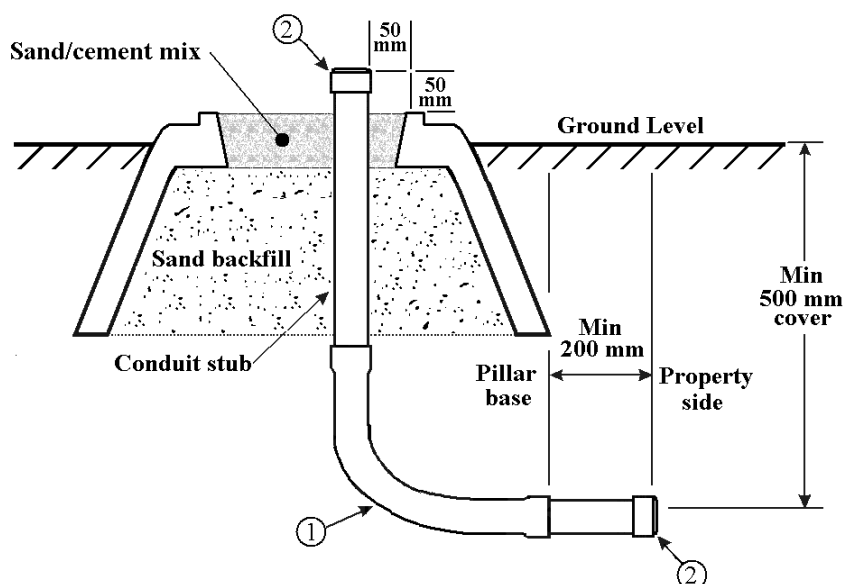


Figure 26.3 – Conduit Stub Details

Table 26.3 – Material List

Item	Description	Material	Stockcode
1	Conduit 90 deg large sweep bends: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	H8545 52415 Clipsal Part No. 247P80EO
2	Conduit cap: 40 mm (100 amp service) 50 mm (100 amp service) 80 mm (200 amp service)	PVC	Clipsal Part No. 262/40EO 179754 Clipsal Part No. 262P80

Notes (cont.):

12. A conduit stub shall be installed in accordance with Figure 26.3 for each cable that has not been initially laid prior to the installation of the pillar noting the following:
 - Conduit stubs shall be 40 mm or 50 mm diameter for 100 amp services and 80mm diameter for 200 amp services and comply with NS130. All services shall be assumed to be 100 amp unless otherwise specified.
 - Only use conduit 90 degree large sweep bends as any sharper angle will impede cable entry.
 - The upper end of the conduit stub shall extend 50 mm above the sand/cement mix and be placed 50 mm clear of the inside edge of the pillar base.
 - The conduit stubs are to extend a minimum of 200 mm outside the footprint of the pillar base on the property side of the pillar and shall be capped at both ends using conduit caps of the appropriate size.
 - The minimum cover for the conduit stub shall be 500 mm.
 - The PVC service cable sheath must be terminated 10mm above the end of the conduit stub.
13. As the distributor cables hold the link panel in place, all three (3) distributor cables must be installed during the construction of this pillar.

27.0 UNDERGROUND SLCP WITHOUT CONTACTOR (LV1-91)

This specification provides the requirements for constructing a pillar-mounted Street Lighting Control Point without a contactor.

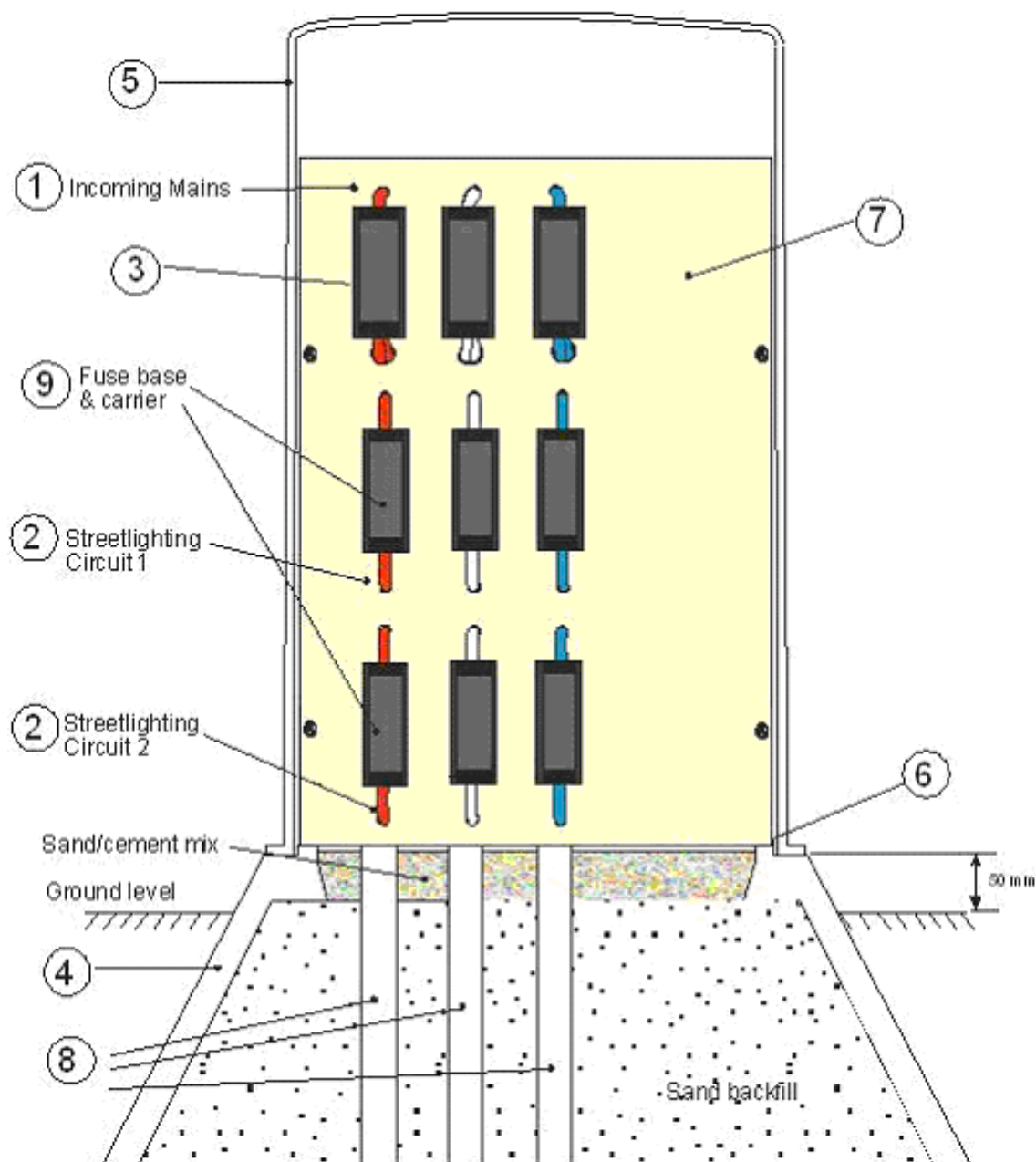


Figure 27.1 – General Arrangement (front view)

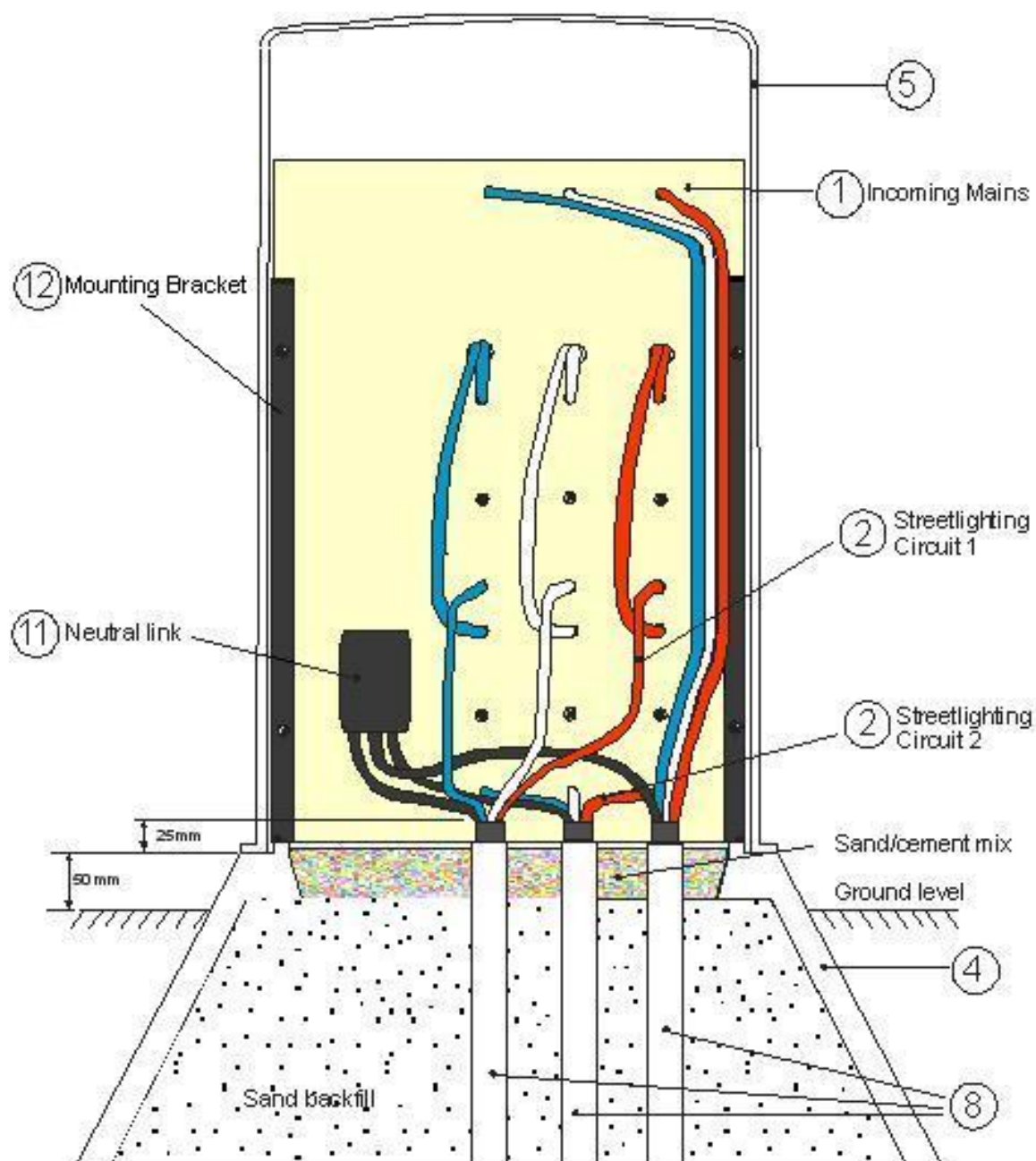


Figure 27.2 – General Arrangement (rear view)

Table 27.1 – Material List

Item	Description	Material	Qty	Stockcode
1	Incoming mains cable	16 Cu4 XQZ	-	148668
2	Streetlighting Cable	16 CU4 XQZ	-	148668
3	Active links	Red Spot RS63BW fitted with a Red Spot RS63CLINK Link.	3	See Note 1
4	Pillar base	Polyethylene	1	90993
5	Turret (large)	Polyethylene	1	6668
6	Screws	Stainless steel, SS304, Self tapping, Pan head, Phillips, 4G x 1".Blackwoods part no. 00292519 To affix the angle-iron bracket to the base behind the panel.	8	-
7	Panel		1	See Note 1
8	Conduit, 50mm	PVC	-	78022
9	Fuse base and carrier	SAFE CLIP SC32BW	6	See Note 1
9a	32A HRC fuses	32A HRC fuses. Offset tab.	6	18960
10	Conduit 90 deg large sweep bend, 50mm	PVC	3	52415
11	Neutral link	Clipsal BPT6	1	See Note 1
12	Angle Iron mounting bracket/s. (1 * Left and 1 * Right)	25mm Galvanised Angle Iron.	2	See Note 1

Notes:

1. Complete panel is available on stockcode 180223.

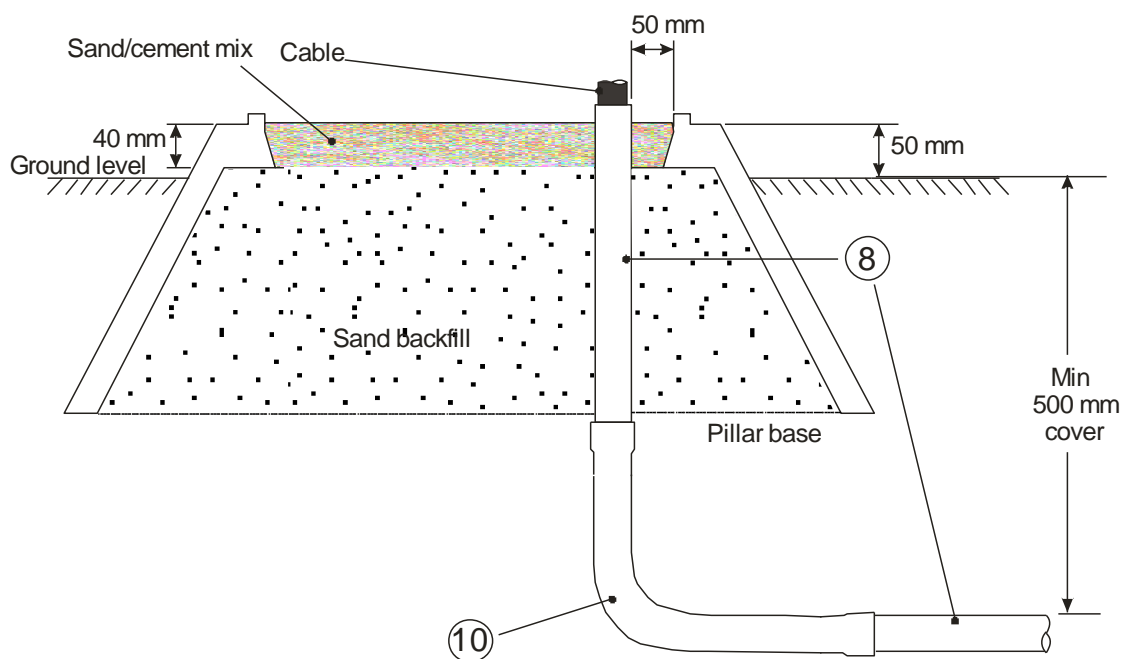


Figure 27.3 – Pillar Base Details

Notes (cont.):

2. Refer to NS130 for the installation requirements of the pillar base.
3. The pillar base is backfilled with sand and has a 40 mm deep sand/cement mix (20:1).
4. PVC sheaths of all cables must be terminated 25 mm above the surface of the sand/cement mix.
5. The top of the pillar base is to be a minimum of 50 mm above the ground level.

28.0 INDOOR TERMINATIONS (LV1-41)

This specification provides the requirements for:

- 185mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (185 CU1 XQ Z).
- 300mm² stranded copper conductor, XLPE insulated, PVC sheathed, single core cables (300 CU1 XQ Z).
- 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z).
- 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240 AL4 XQ Z/SAC).
- 300mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (300 AL4 XQ Z/SAC).

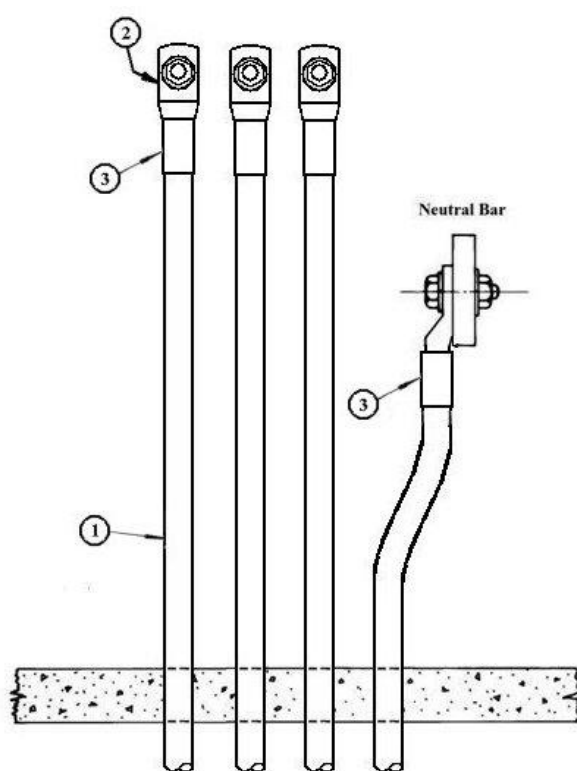
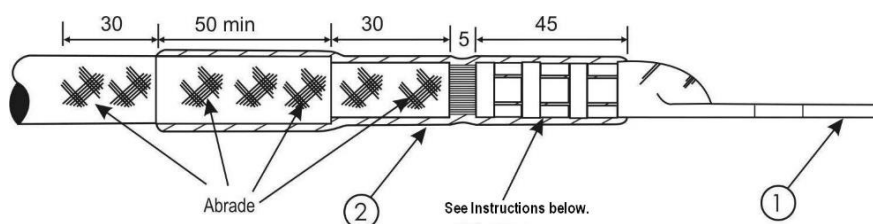


Figure 28.1 – General Arrangement for Single Core Cables



1. Pre-heat the compression lug before placing the heatshrink sleeve over the cable.
2. Shrink the sleeve starting from the cable end.
3. Apply additional heat to the sleeve and the palm of the lug until a bead of mastic appears around the ends of the sleeve.

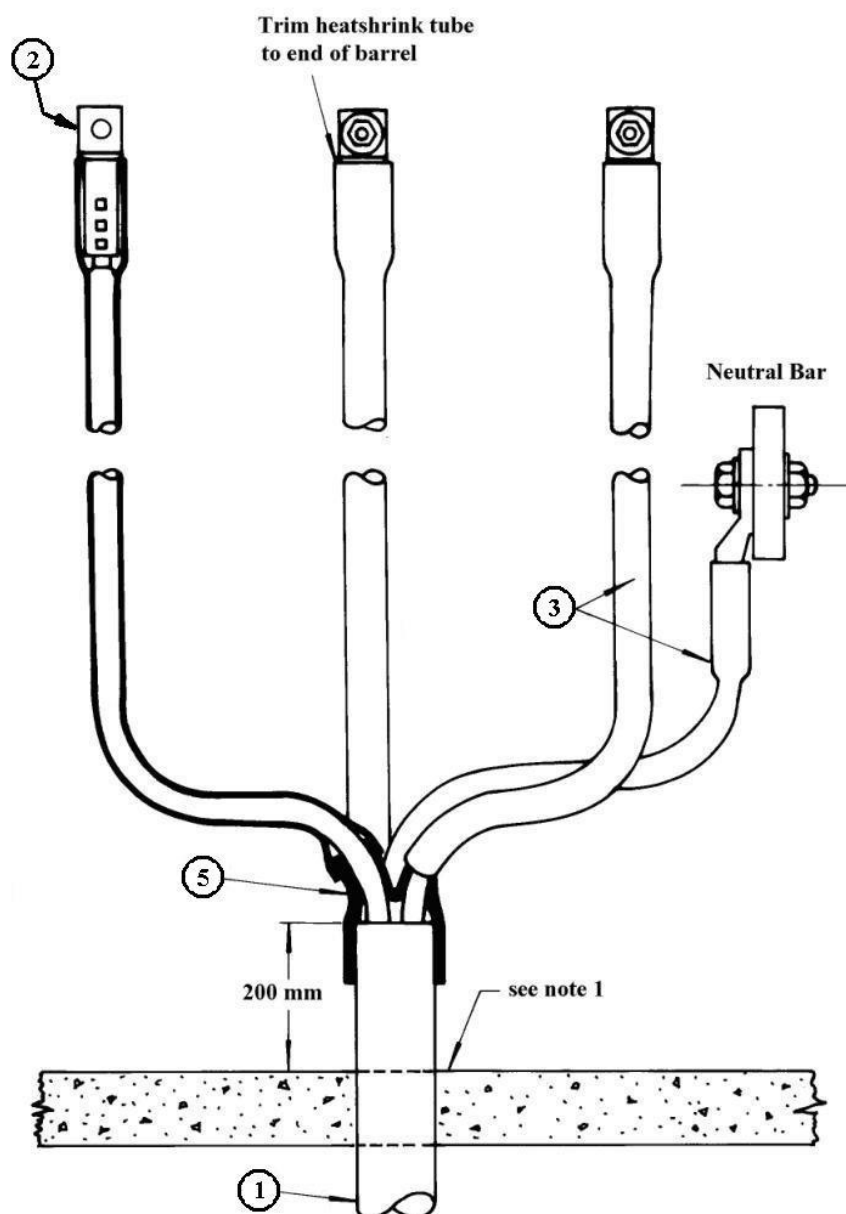
Figure 28.2 – Application of Heatshrink on Single Core Cables

Module A – For 185 CU1 XQ Z**Table 28.1A – Material List**

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	185 CU1 XQ Z/COM/ #COLOUR 185 CU1 XQ Z	As required	151183 61432
2	185 mm ² compression lug	Tinned copper	4	175532
3	Heatshrink sleeve, 150 mm long	35/12mm medium-wall, mastic lined	1	181351 (available in pack of 16)
4	Cable tie (black) 293 x 4.8 mm		1	176497 (available in pack of 100)

Module B – For 300 CU1 XQ Z**Table 28.1B – Material List**

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	300 CU1 XQ Z	As required	14266
2	300 mm ² compression lug	Tinned copper	4	175534
3	Heatshrink sleeve	51/16mm medium-wall, mastic lined (Cut to 150mm lengths)	1	143776 (available in 1200mm length)
4	Cable tie (black) 293 x 4.8 mm		1	176497 (available in pack of 100)

**Figure 28.3 – General Arrangement****Notes:**

1. PVC sheaths of all cables must be terminated 200 mm above ground level.

Module C – For 240 CU4 XQ Z**Table 28.1C – Material List**

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	240 CU4 XQ Z	As required	H108589
2	240 mm ² compression lug	Tinned copper	4	175533
3	Heatshrink sleeve	51/16mm medium-wall, unlined	1	60228 (available in 12.5m roll)
4	Cable tie (black) 293 x 4.8 mm		1	176497 (available in pack of 100)
5	4-way Glove	Heatshrink	1	78527

Notes:

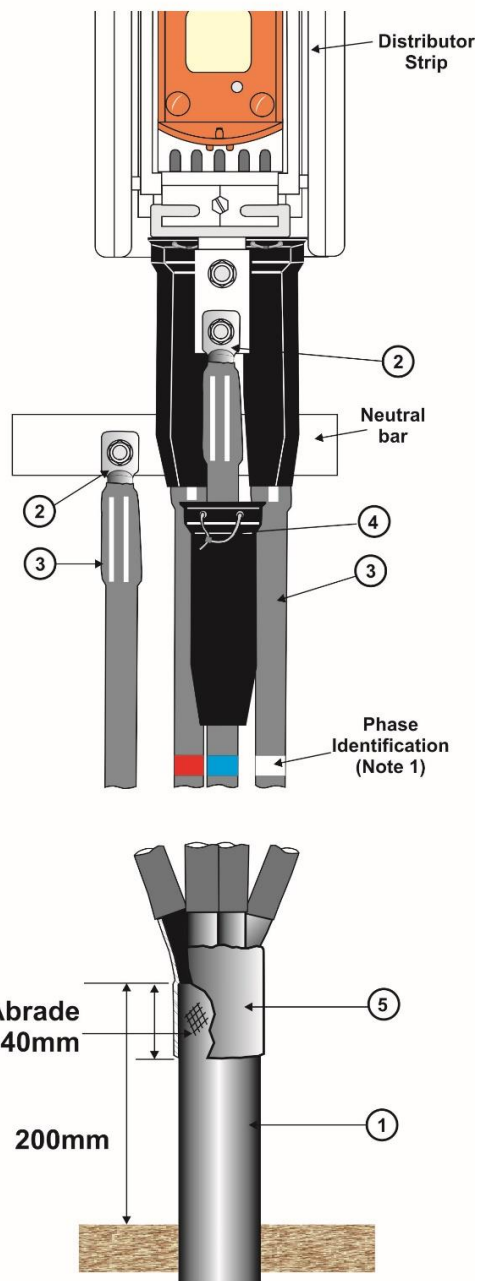
1. The conductor of the 240 CU4 XQ Z cables must be rounded with rounding dies (S/C 182051) before being inserted into the crimp lug.

Module D – For 240 AL4 XQ Z/SAC or 300 AL4 XQ Z/SAC**Table 28.1D – Material List**

Item	Description	Material	Quantity	Stockcode
1	Distribution cable	240 AL4 XQ Z/SAC 300 AL4 XQ Z/SAC	As required	141739 185413
2	240 mm ² compression lug	Bimetal	4	141770
	300 mm ² compression lug	Bimetal	4	186234
3	Heatshrink sleeve	51/16mm medium-wall, unlined	1	60228 (available in 12.5m roll)
4	Cable tie (black) 293 x 4.8 mm		1	176497 (available in pack of 100)
5	4-way Glove	Heatshrink	1	78527

28.1 Single circuit 400 amp SAIF board distributor strips

28.1.1 General arrangement and description



For Four Core Cables

(Polycarbonate cover is not shown in the above drawing for clarity.)

Figure 28.4 – General Arrangement – Single Circuit 400A

Notes:

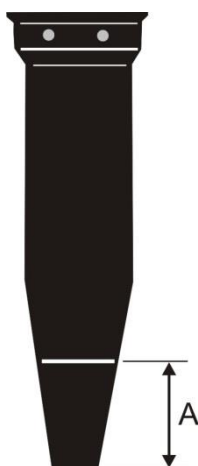
1. When the colour of the cable sheath does not correctly identify the cable, coloured heatshrink tubing or coloured PVC tape shall be used to correctly identify the cable. Colour coded for reference only.
2. Cable termination boots will be supplied with the switch.

28.1.2 Installation of cable termination boots on single circuit 400 amp distributor strips

1. Construct the cable termination as per Clause 28. Terminate the neutral cable first.
2. Cut the tapered end of the cable termination boots to the dimensions specified in Table 28.2 below dependent on cable size.

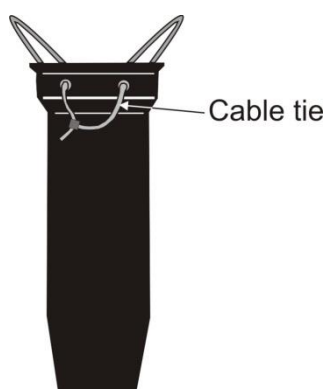
Table 28.2 – Termination boot dimensions

Cable Size	Dimension A
240 AL4 XQ Z/SAC	50 mm
300 AL4 XQ Z/SAC	50 mm
240 CU4 XQ Z	30 mm
185 CU1 XQ Z	30 mm
300 CU1 XQ Z	50 mm



3. Insert the cable tie through the holes in the cable termination boots and make a loose loop.

Note: Do not tighten the cable tie at this stage.

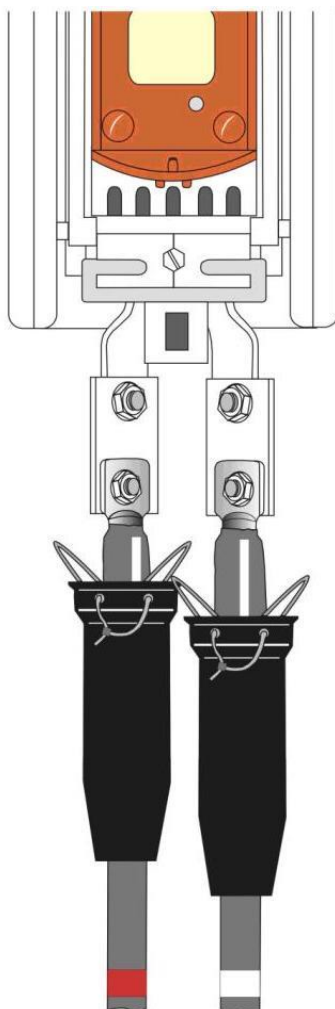


4. Slide the cable termination boot over each cable/core to expose the cable lug.

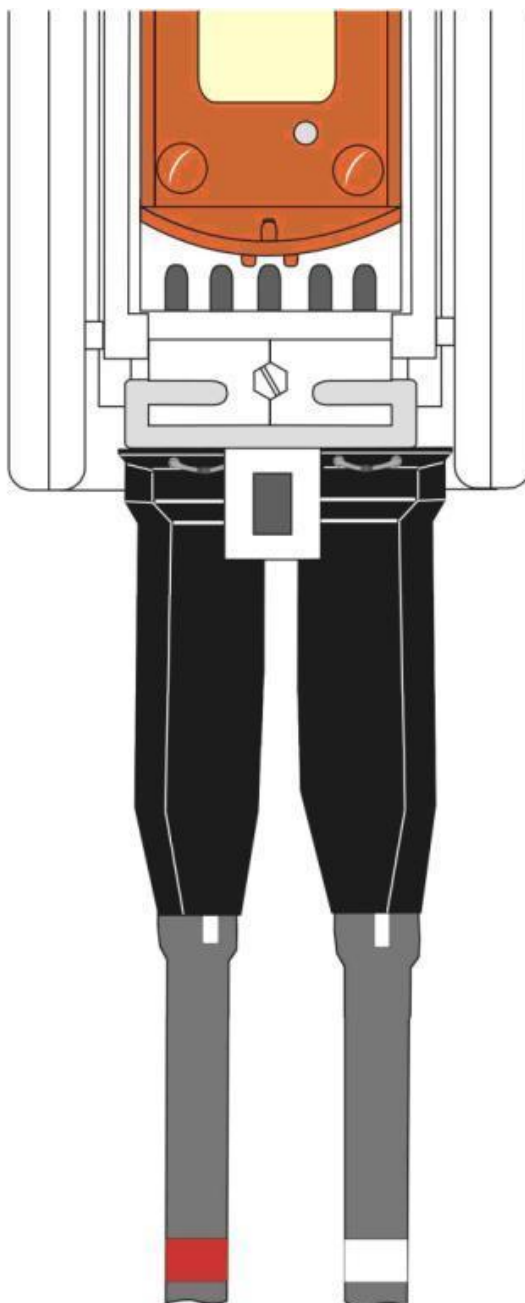


5. Unbolt the front busbar extension. Securely fasten the cable lug to the switchgear palm. Fasten the rear cable lugs first.

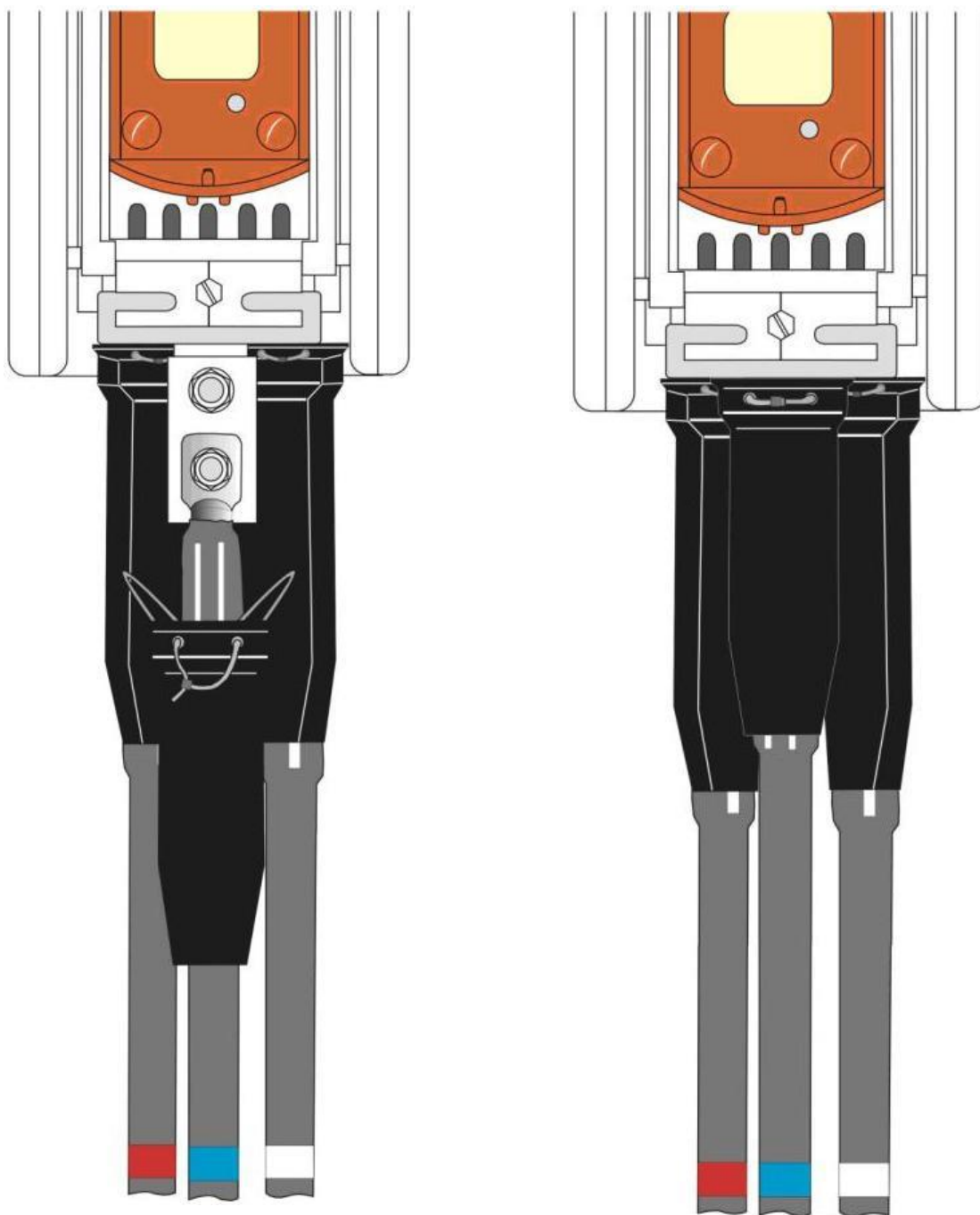
Note: Lubricate the thread as detailed in Clause . Wipe all excess anti-seize off the thread after tightening.



6. Slide the cable termination boots of the rear terminations over each one of the terminations. Ensure that the top of the cable termination boot is touching the bottom of the distributor strips and that there is no exposed metal showing. Secure the cable ties and cut off the excess tie ends.

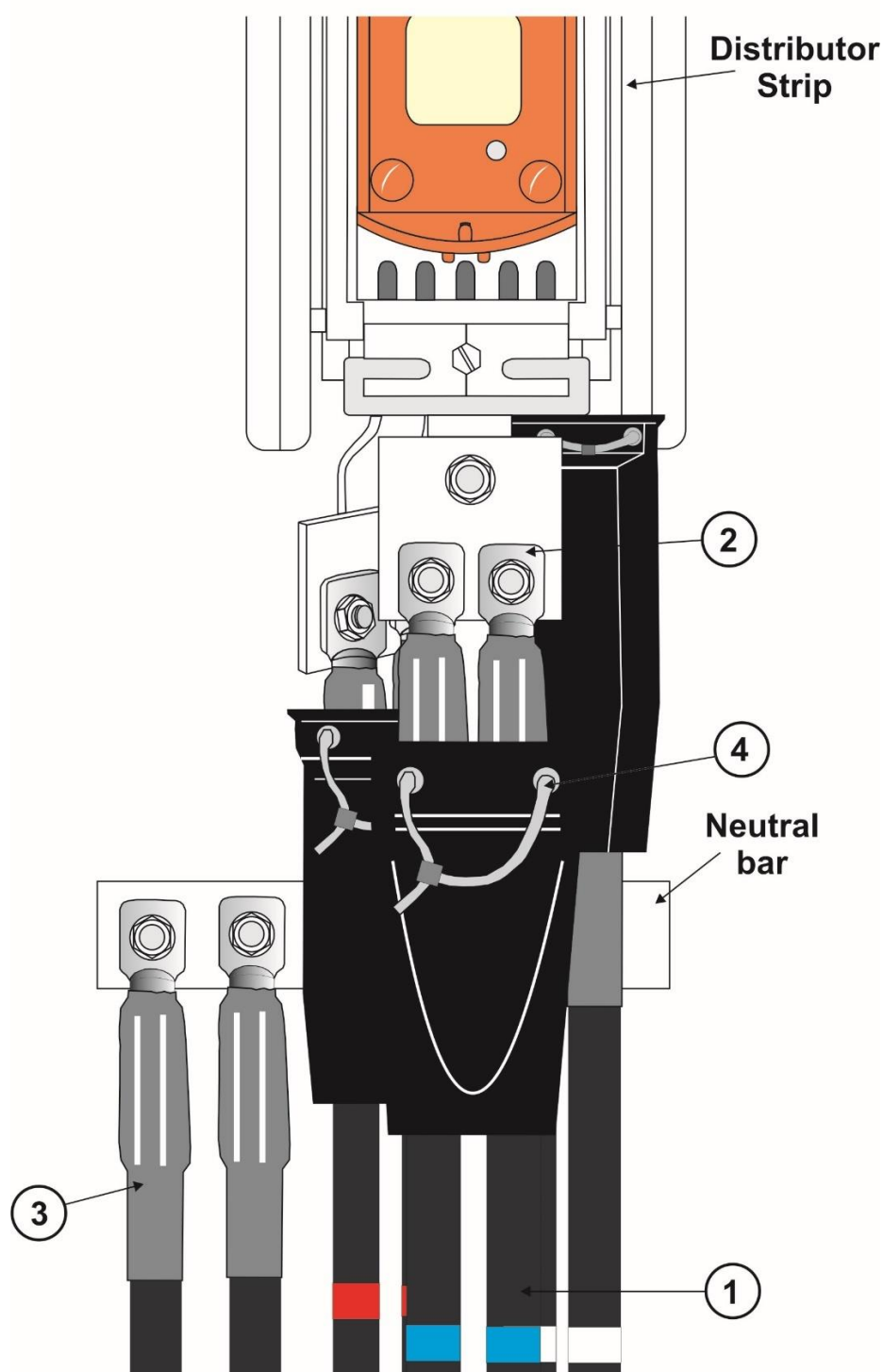


7. Fix the front extension busbar back in position. Securely fasten the cable lug to the switchgear palm. Slide the cable termination boot. Secure the cable tie and cut off the excess tie end.



28.2 Double circuit 800 amp SAIF board distributor strips

28.2.1 General arrangement and description



(Polycarbonate cover is not shown in the above drawing for clarity.)

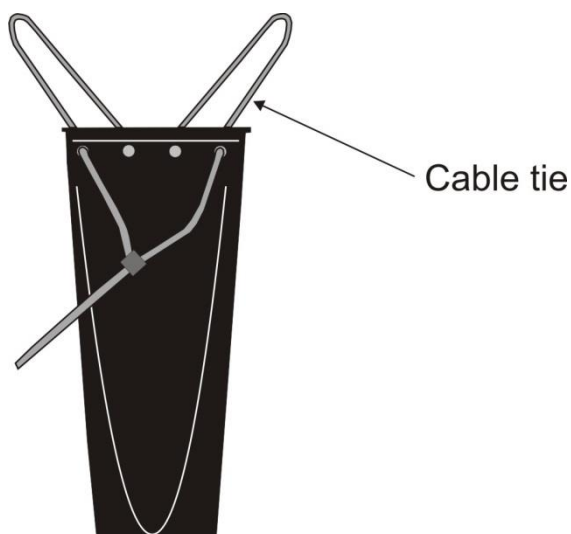
Figure 28.5 – General Arrangement – Double Circuit 800A

Items for 'Double Circuit 800Amp Distributor Strips' are the same as 'Single Circuit 400Amp Distributor Strips'. Refer to the relevant Table 28.1 (A, B, C or D) above for item descriptions.

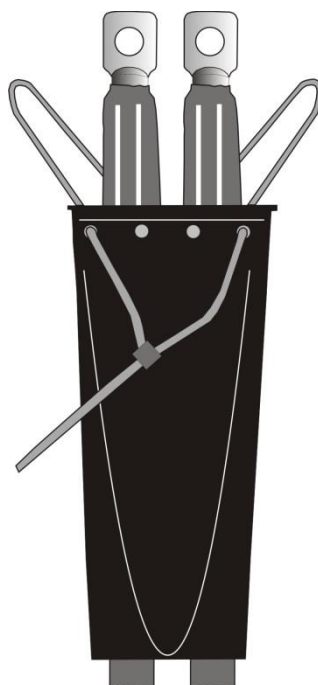
28.2.2 Installation of cable termination boots on double circuit 800 amp distributor strips

1. Construct the cable termination as per Clause 28.
2. Insert the cable tie through the outside holes in the cable termination boot and make a loose loop.

Note: Do not tighten the cable tie at this stage.

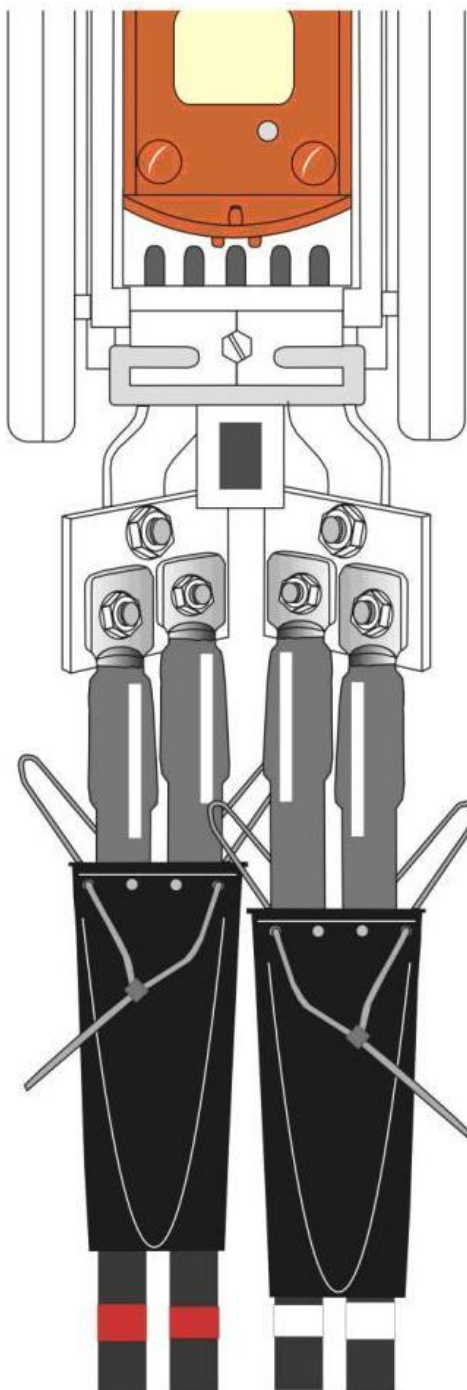


3. Slide the cable termination boot over the two cables/cores of the same phase to expose the cable lugs. Repeat for the remaining two phases.



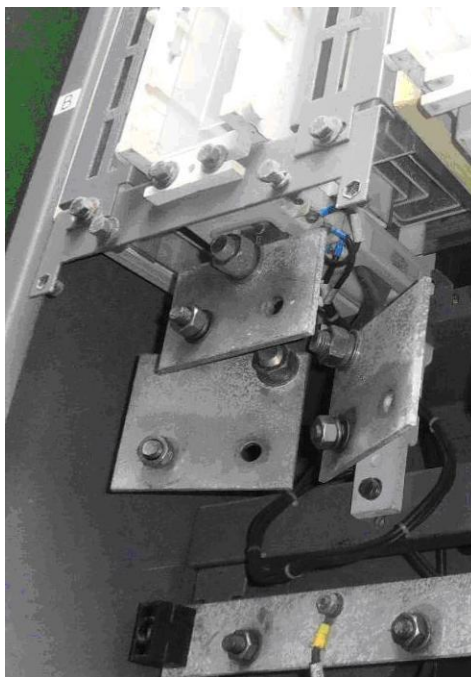
4. Unbolt the front busbar extension from the distributor strip.
5. Securely fasten each pair of cable lugs to their respective rear busbar extensions on the distributor strip.

Note: Lubricate the threads as detailed in Clause . Wipe all excess anti-seize off the threads after tightening.

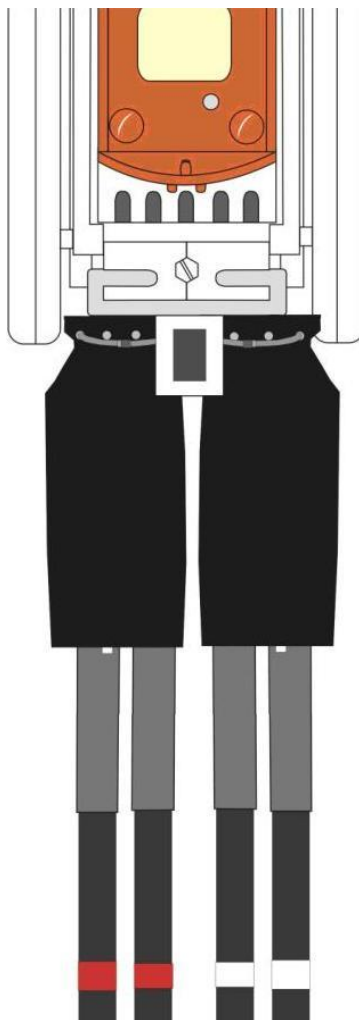


6. Slide the cable termination boot over each of the two rear cable terminations. Ensure that the top of the cable termination boots are touching the bottom of the distributor strip and that there is no exposed metal showing.

Note: If the MDI secondary wiring is installed at the base of the distributor strip (see photo below), ensure that the cable tie does not become entangled in the MDI secondary wiring and put undue pressure on the insulation of the MDI secondary wiring when the cable tie is secured.



7. Secure the cable ties and cut off the excess tie ends.



8. Secure the front busbar extension to the distributor strip palm using the M16 set screw, torque to 80Nm.

9. Securely fasten the cable lugs to the busbar extension.

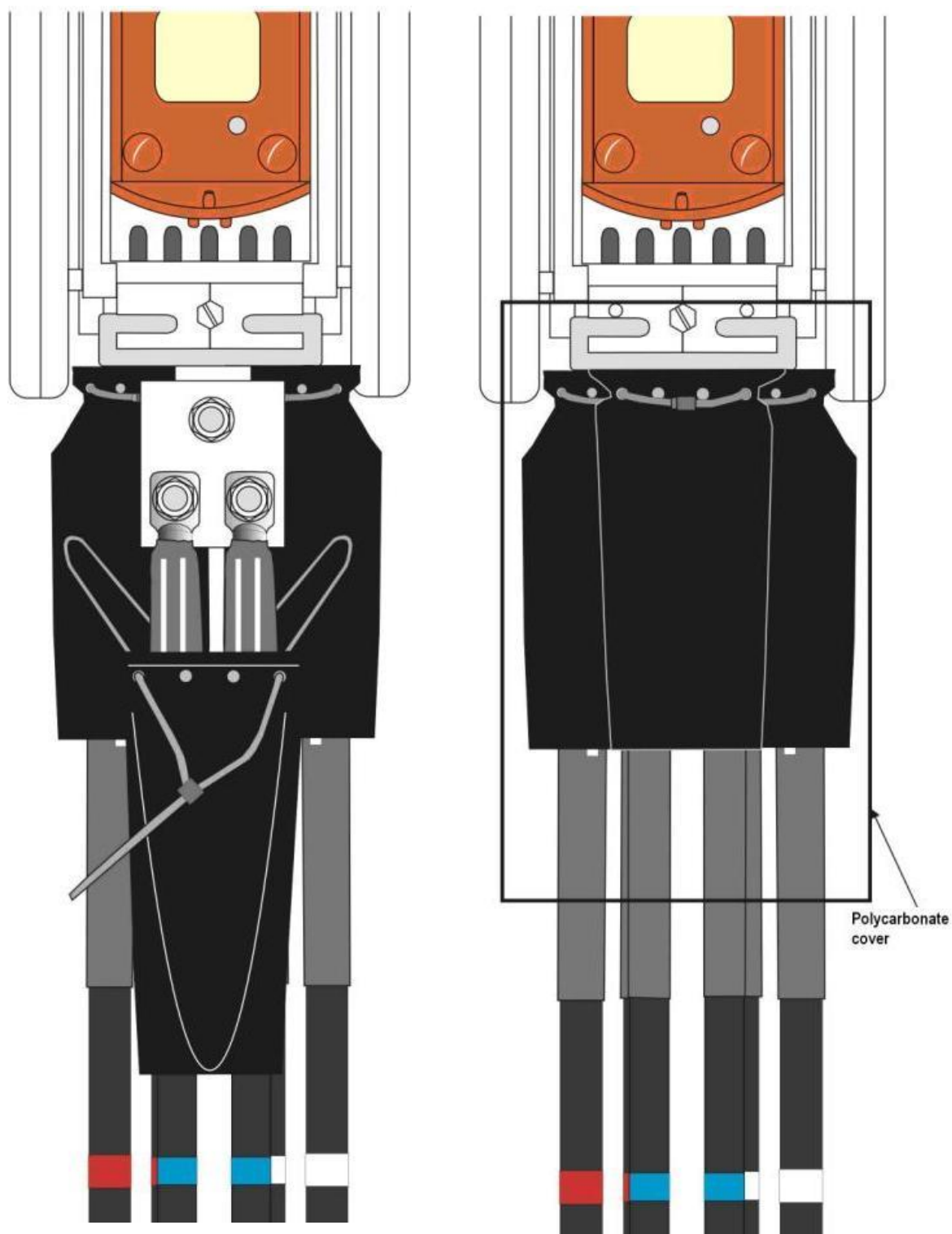
Note: Lubricate the threads as detailed in Clause . Wipe all excess anti-seize off the threads after tightening.

10. Slide the cable termination boot over the cable termination. Ensure that the top of the cable termination boot is touching the bottom of the distributor strip and that there is no exposed metal showing.

Note: If the MDI secondary wiring is installed at the base of the distributor strip (see photo below), ensure that the cable tie does not become entangled in the MDI secondary wiring and put undue pressure on the insulation of the MDI secondary wiring when the cable tie is secured.

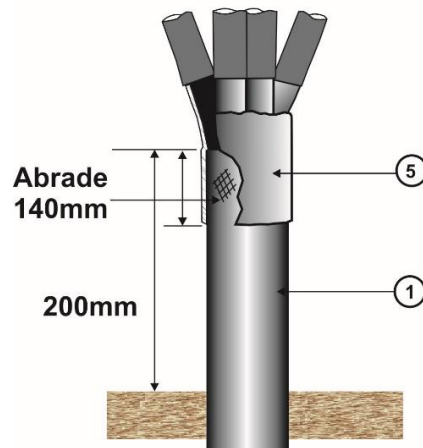


11. Secure the cable tie and cut off the excess tie end.
12. Install the polycarbonate cover.



28.3 Single circuit 400 amp Weber board distributor strips

28.3.1 General arrangement and description



For Four Core Cables

Figure 28.6 – General Arrangement – Weber Single Circuit 400A

Notes:

1. When the colour of the cable sheath or core insulation does not correctly identify the phase of the cable, coloured heatshrink tubing or coloured PVC tape shall be used to correctly identify the phase. Colour coded for reference only. Only 1 coloured tubing or tape required per phase.
2. Cable termination boots will be supplied with the switch.

28.3.2 Installation of cable termination boots on single circuit 400 amp distributor strips

1. Construct the cable termination as per Clause 28.0. Terminate the neutral cable first.
2. Cut the tapered end of the cable termination boots to exactly match the cable diameter,

Note: DO NOT slit the boot upwards.



3. Slide the cable termination boot over each cable/core to expose the cable lug.
4. Securely fasten the cable lug to the switchgear palm.

Note: Lubricate the thread as detailed in Clause . Wipe all excess anti-seize off the thread after tightening.



5. Slide the cable termination boots over each one of the terminations. Ensure that the top open part of the cable termination boot is touching the covered bottom of the distributor strips and that there is no exposed metal showing. Seal up the boot by using the black sealing pins and make sure boot is properly sealed and secure.



Covered bottom
of the distributor
strip.

29.0 POT END (LIVE END SEAL) FOR DISTRIBUTION CABLES (LV1-50)

29.1 Cables

This specification provides the requirements for a pot end (live end seal) on the following cables:

- single core paper-insulated lead sheathed cables.
- single core paper insulated lead sheathed, PVC oversheathed cables.
- single core cross-linked, polyethylene insulated PVC sheathed cables.
- four core sector shaped solid and stranded, cross-linked, polyethylene insulated, PVC sheathed cables.
- multicore paper insulated metal sheathed cables.

29.2 Using pot ends

Pot ends (Live End Seals) shall only be used for maintaining the existing network (e.g. decommissioning a section of LV cable) and must not be used on newly installed cables or network extensions such as staged subdivisions.

Where pot ends are to be used, they shall only be installed on cables:

- where it is possible to visually trace the entire length of cable from the pot end to the source of supply, or
- where it is possible to visually trace the entire length of cable from the pot end to the tee joint to which the pot ended section of cable is connected. Additionally, it shall be possible to identify the cables connected to the other two legs of the tee joint using cable identification equipment.

When pot ends are to be direct buried, the pot end shall be located as close as practicable to either:

- the source of supply, or
- the tee joint to which the pot ended section of cable is connected.

This requirement is to minimise future civil works for the purposes of cable identification.

If it is intended to join cable to the pot ended section of cable in the future, sufficient cable length shall be left to allow for the pot end to be replaced with a straight through joint.

29.3 Approved pot end kits

Ausgrid's stockcodes of approved pot ends are provided in the table below:

Table 29.1 – Material list

Cable Type	Stockcode
Single Core Cables, 95mm ² to 300mm ² (See Note 1)	152009
240mm ² and 300mm ² Four Core Cables	178611
Multicore Paper Insulated Cables, 35mm ² to 97mm ²	186531
Multicore Paper Insulated Cables, 120mm ² to 185mm ²	186532
Multicore Paper Insulated Cables, 194mm ² to 323mm ²	186533

Notes:

1. For 500 Cu1 XQ Z replace the small cable end cap included in the kit with a large cable end cap available on stockcode 62067.

30.0 STRAIGHT THROUGH JOINTS FOR 240 AL4 XQ Z/SAC AND/OR 300 AL4 XQ Z/SAC CABLES (LV2-35)

This specification provides the requirements for a straight through joint on four core sector shaped solid and stranded aluminium conductor, cross-linked, polyethylene insulated, PVC sheathed cables.

Ausgrid has approved the use of heatshrink or cold pour resin straight through joint kits for use on solid sector aluminium cables and only heatshrink straight through joint kits for use on stranded sector aluminium cables.

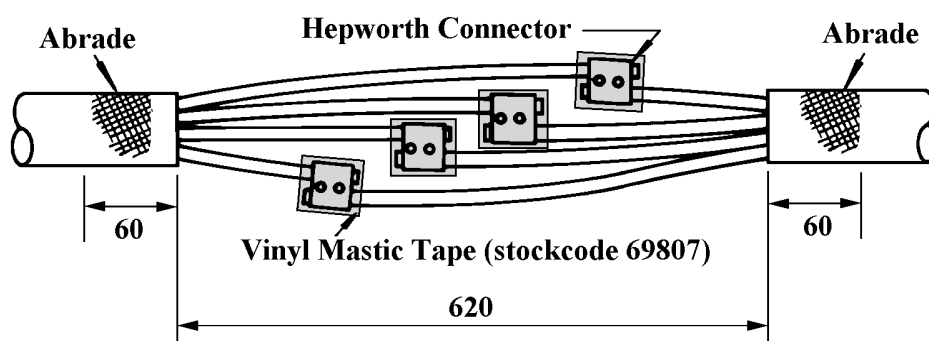
30.1 Heatshrink straight through joint kit

Table 30.1 – Straight Through Joint – Heatshrink Kits

Straight Through Joints		Joint Kit Stockcode
Cable Type	Cable Type	
240 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z/SAC	178444
240 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z	178444
300 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z/SAC	178444
300 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z	178444
300 mm ² AL4 XQ Z/SAC	300 mm ² AL4 XQ Z/SAC	178444

Note 1. The above kits include mechanical connectors.

30.2 Cold Pour Resin Joint Kits (only for solid sector aluminium cables)



Notes:

1. Joint mould omitted for clarity.
2. Vinyl mastic tape (stockcode: 69807) is applied with the ends left unsealed to allow the resin to flow around the connector.
3. Hepworth Connector Details:

Table 30.2 – Hepworth Connector Details

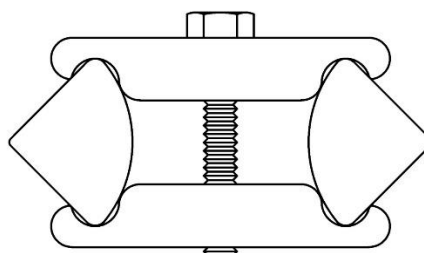
Straight Through Joints		Hepworth Connector Stockcode
Cable Type	Cable Type	
240 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z/SAC	128132
300 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z/SAC	128132
300 mm ² AL4 XQ Z/SAC	300 mm ² AL4 XQ Z/SAC	128132

4. Joint Mould and Resin Details:

Table 30.3 – Joint Mould and Resin Details

Description	Qty	Stockcode
Joint Mould	1	71274
Foam Tape (10 metre roll)	1	39172
Polyurethane Resin (6 litre mix)	2	75390

5. The conductor orientation in the connector shall be with the conductor apex pointing outwards as shown.



31.0 STRAIGHT THROUGH JOINTS FOR 240 CU4 XQ Z TO 240 CU4 XQ Z, 240 AL4 XQ Z, 240 AL4 XQ Z/SAC OR 300 AL4 XQ Z/SAC CABLES (LV2-34)

This specification provides the requirements for a straight through heatshrink joint from 240mm² four core, stranded copper conductor, XLPE insulated, PVC sheathed cables (240 CU4 XQ Z) to itself or to 240mm² four core solid (240 AL4 XQ Z/SAC) or stranded (240 AL4 XQ Z) or to 300mm² four core solid (300 AL4 XQ Z/SAC) aluminium conductor, XLPE insulated, PVC sheathed cables.

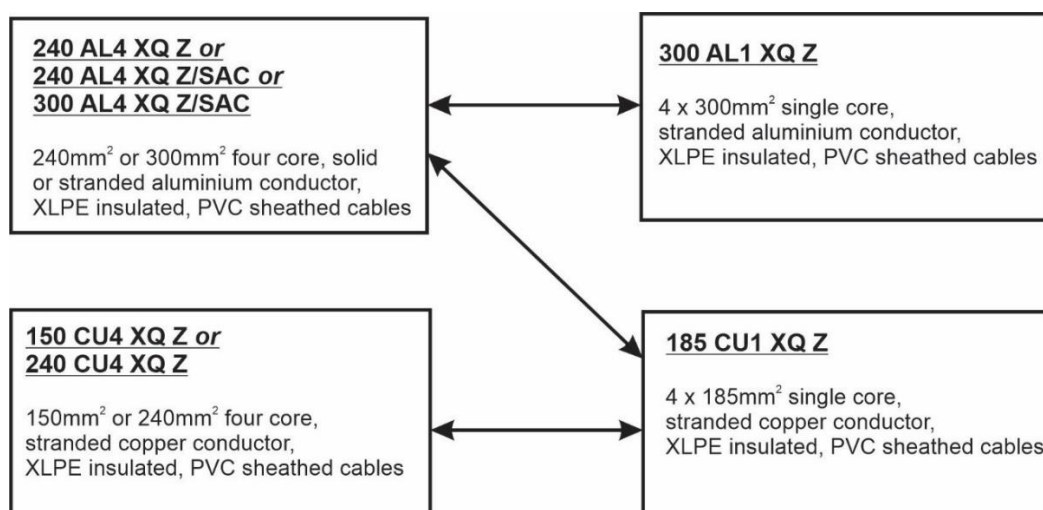
Table 31.1 – Straight Through Joint Kits

Straight Through Joints		Joint Kit	Connector
Cable Type	Cable Type	Stockcode	Stockcode
240 mm ² Cu4 XQ Z	300 mm ² AL4 XQ Z/SAC	182380	186229
240 mm ² Cu4 XQ Z	240 mm ² AL4 XQ Z/SAC	182380	182053
240 mm ² Cu4 XQ Z	240 mm ² AL4 XQ Z	182380	H109231
240 mm ² Cu4 XQ Z	240 mm ² Cu4 XQ Z	182380	182054

In addition to the requirements of Clauses 3.9 and 3.10, when jointing 240 CU4 XQ Z cables, the conductors must be rounded with rounding dies (S/C 182051) before being inserted into the crimp links.

32.0 FOUR-TO-ONE HEATSHRINK JOINT 150, 240 OR 300 FOUR CORE CABLES TO 4X185CU1XQZ OR 4X300AL1XQZ CABLES (LV2-36)

This specification provides the requirements for constructing one of the following Four-To-One Heatshrink Joints:



Notes:

- Any aluminium links are supplied pre-pasted - extra jointing paste is not required.
- Scratch brush the outside strands of any aluminium conductor and immediately fit the link onto the conductor.
- Compression links are marked with crimping position and required die size.
- The joints shall be constructed in accordance with installation instruction supplied in the joint kit.
- If 240 CU4 XQ Z is being used, the conductor must be rounded with rounding dies (S/C 182051) before being inserted into the crimp link.

Table 32.1 – Four-to-One Joint Kits

Four-to-One Joints		Joint Kit	Connector
Cable Type	Cable Type	Stockcode	Stockcode
240 mm² AL4 XQ Z	300 mm² AL1 XQ Z	143818	177740
240 mm² AL4 XQ Z	185 mm² CU1 XQ Z	143818	H104828
240 mm² AL4 XQ Z/SAC	300 mm² AL1 XQ Z	143818	144048
240 mm² AL4 XQ Z/SAC	185 mm² CU1 XQ Z	143818	175332
300 mm² AL4 XQ Z/SAC	300 mm² AL1 XQ Z	143818	186231
300 mm² AL4 XQ Z/SAC	185 mm² CU1 XQ Z	143818	186230
150 mm² Cu4 XQ Z	185 mm² CU1 XQ Z	143818	177764
240 mm² Cu4 XQ Z	185 mm² CU1 XQ Z	143818	182082

33.0 STRAIGHT THROUGH JOINT FOR SINGLE CORE CABLES (LV2-24)

This specification provides the requirements for the following single core straight through joints:

- single core cross-linked polyethylene insulated, PVC sheathed cables to single core cross-linked polyethylene insulated, PVC sheathed cables.
- single core cross-linked polyethylene insulated, PVC sheathed cables to single core paper insulated, metal sheathed, polymeric oversheathed cables.
- single core paper insulated, metal sheathed, polymeric oversheathed cables to single core paper insulated, metal sheathed, polymeric oversheathed cables.

Ausgrid's stockcodes of approved straight through joint kits for single core cables are provided in the tables below.

Table 33.1 – Straight Through Joint Kits for Single Core Polymeric Cables

Straight Through Joints		Joint Kit	Connector
Cable Type	Cable Type	Stockcode	Stockcode
120 mm ² AL1 XQ Z	185 mm ² Cu1 XQ Z	186499	186500
185 mm ² AL1 XQ Z	185 mm ² Cu1 XQ Z	74583	57018
185 mm ² Cu1 XQ Z	185 mm ² Cu1 XQ Z	74583	150250
194 mm ² AL1 XQ Z	185 mm ² Cu1 XQ Z	74583	179667
240 mm ² AL1 XQ Z	185 mm ² Cu1 XQ Z	74583	H104828
300 mm ² AL1 XQ Z	300 mm ² AL1 XQ Z	74583	148320
300 mm ² Cu1 XQ Z	300 mm ² Cu1 XQ Z	74583	80929
300 mm ² AL1 XQ Z	185 mm ² Cu1 XQ Z	74583	56994
323 mm ² AL1 BR Z	185 mm ² Cu1 XQ Z	74583	179664

Table 33.2 – Straight Through Transition Joint Kits for Single Core Cables

Straight Through Transition Joints		Joint Kit for Phase Conductor	Joint Kit for Neutral Conductor	Earthing Kit	Phase Connector
Cable Type	Cable Type	Stockcode	Stockcode (See Note 1)	Stockcode (See Note 2)	Stockcode
185 mm ² Cu1 XQ Z	185 mm ² Cu1 PL Z	152306	184041	184030	150250
185 mm ² Cu1 XQ Z	194 mm ² Cu1 PL Z	152306	184041	184030	184561
300 mm ² Cu1 XQ Z	300 mm ² Cu1 PL Z	152306	184042	184030	80929
300 mm ² Cu1 XQ Z	323 mm ² Cu1 PL Z	152306	184042	184030	184562

Notes:

1. The neutral connector is included in the neutral joint kit.
2. One earthing kit is sufficient to bond the sheaths of four single core PILC cables. All four tinned copper braids are bolted together using a M12 x 35mm SS bolt (stockcode 45021), two M12 SS flat washers (stockcode 49429), one SS spring washer (stockcode 143859) and M12 SS nut (stockcode 8987).

Table 33.3 – Straight Through Joint Kits for Single Core PILC Cables

Straight Through Joints		Joint Kit	Earthing Kit	Connector
Cable Type	Cable Type	Stockcode	Stockcode	Stockcode
185 mm ² Cu1 PL Z	185 mm ² Cu1 PL Z	152306	152330	150250
300 mm ² Cu1 PL Z	300 mm ² Cu1 PL Z	152306	152330	80929

34.0 STRAIGHT THROUGH JOINT AL4 XQ Z/SAC TO AL3 XQ CU(NW) Z/SAC CABLE (LV2-37)

This specification provides the requirements for constructing a straight through joint from four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (AL4 XQ Z/SAC) to three core, solid aluminium conductor, XLPE insulated, copper wave-wound concentric wire neutral, PVC sheathed cables (AL3 XQ CU(NW) Z/SAC).

Table 34.1 – Straight Through Joint Kits

Straight Through Joints		Joint Kit Stockcode	Phase Connector Stockcode	Neutral Connector Stockcode
Cable Type	Cable Type			
240 mm ² AL4 XQ Z/SAC	120 AL3 XQ CU(NW) Z/SAC	186667	186664	186796
240 mm ² AL4 XQ Z/SAC	185 AL3 XQ CU(NW) Z/SAC	186667	186664	186797
240 mm ² AL4 XQ Z/SAC	240 AL3 XQ CU(NW) Z/SAC	186668	186664	144014
300 mm ² AL4 XQ Z/SAC	120 AL3 XQ CU(NW) Z/SAC	186667	186664	186798
300 mm ² AL4 XQ Z/SAC	185 AL3 XQ CU(NW) Z/SAC	186667	186664	186799
300 mm ² AL4 XQ Z/SAC	240 AL3 XQ CU(NW) Z/SAC	186668	186664	186232

35.0 FOUR-TO-ONE HEATSHRINK JOINT AL3 XQ CU(NW) Z/SAC CABLES TO 4 X 185 CU1 XQ Z (LV2-29)

This specification provides the requirements for constructing a four-to-one straight through joint from three core, solid aluminium conductor, XLPE insulated, copper wave-wound concentric wire neutral, PVC sheathed cables (AL3 XQ CU(NW) Z/SAC) to 185mm² single core, stranded copper conductor, XLPE insulated, PVC sheathed cables (185 Cu1 XQ Z).

Table 35.1 – Four-to-One Joint Kits for AL3 XQ CU(NW) Z/SAC cables

Four to One Joints		Joint Kit Stockcode	Phase Connector Stockcode	Neutral Connector Stockcode
Cable Type	Cable Type			
120 AL3 XQ CU(NW) Z/SAC	185 mm ² Cu1 XQ Z	186669	186793	186767
185 AL3 XQ CU(NW) Z/SAC	185 mm ² Cu1 XQ Z	186669	179665	See Note 1
240 AL3 XQ CU(NW) Z/SAC	185 mm ² Cu1 XQ Z	186671	186794	179711

Notes:

- Buy in from TE Connectivity Part No CKR185-95. Acculec Power Part No CASR185/95EA is not suitable for this connection.

Table 36.1 – Material List

Multicore Transition Joints		Phase Connector Stockcode	Weak Back Ferrule Neutral Connector Stockcode	Earth Bond
PILC Cable	Solid Polymeric Cable			
0.15 inch ² (97 mm ²) Cu4	240 or 300 mm ² Al4	63834	63834	See Note 4
185 mm ² Cu3.5	240 mm ² Al4	175332	63834	See Note 5
185 mm ² Cu3.5	300 mm ² Al4	186230	63834	See Note 5
185 mm ² Cu4	240 mm ² Al4	175332	63834	See Note 5
185 mm ² Cu4	300 mm ² Al4	186230	63834	See Note 5
185 mm ² Al4	240 or 300 mm ² Al4	63834	63834	See Note 5
0.3 inch ² (194 mm ²) Cu3.5	240 or 300 mm ² Al4	63834	63834	See Note 5
0.3 inch ² (194 mm ²) Cu4	240 or 300 mm ² Al4	63834	63834	See Note 5
0.3 inch ² (194 mm ²) Al4	240 or 300 mm ² Al4	63834	63834	See Note 5
0.3 inch ² (194 mm ²) Al3.5	240 or 300 mm ² Al4	63834	63834	See Note 5
240 mm ² Al4	240 or 300 mm ² Al4	63834	63834	See Note 5
300 mm ² Cu4	240 or 300 mm ² Al4	63834	63834	See Note 6
0.5 inch ² (323 mm ²) Cu3.5	240 or 300 mm ² Al4	63834	63834	See Note 6
0.5 inch ² (323 mm ²) Al3.5	240 or 300 mm ² Al4	63834	63834	See Note 6

4. 35mm² tinned copper earth braid available direct from TE Connectivity Part No EPPA 013-5-1000.
5. 70mm² tinned copper earth braid available direct from TE Connectivity Part No EPPA 013-9-1000.
6. 85mm² tinned copper earth braid available direct from TE Connectivity Part No EPPA 013-5-1000 for the 35mm² braid and EPPA 013-6-1000 for the 50mm² braid.

Table 36.2 – Joint Mould and Resin Material List

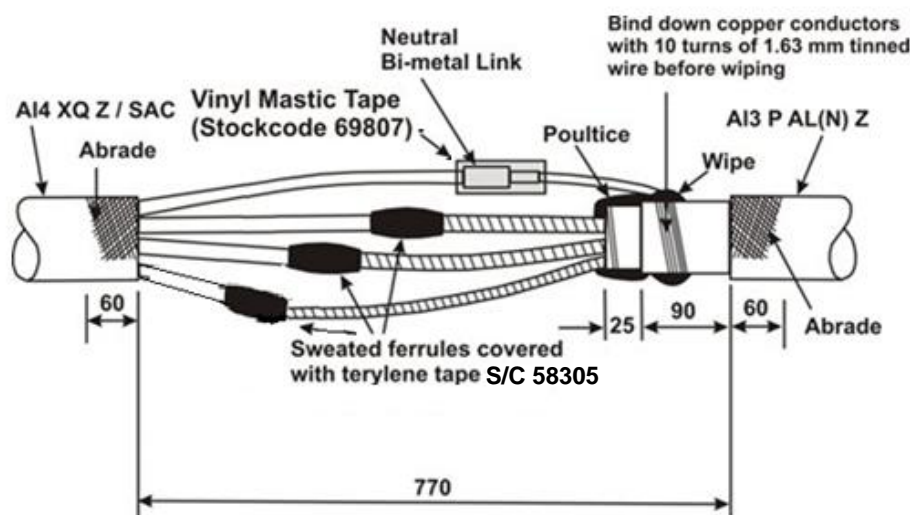
Description	Qty	Stockcode
Joint Mould	1	71274
Foam Tape (10 metre roll)	1	39172
Polyurethane Resin (6 litre mix)	2	75390

36.1 Requirements

In addition to the requirements of Clauses 3.9 and 3.10 the solid aluminium conductors must be abrasion tinned prior to sweating.

37.0 MULTICORE TRANSITION JOINT FOR CONSAC CABLES AL4 XQ Z/SAC TO AL3 PAL(N) Z CABLE (LV2-38)

This specification provides the requirements for constructing Transition Joint from four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (AL4 XQ Z/SAC) to three core, solid or stranded aluminium conductor, paper insulated, aluminium sheathed, PVC oversheathed cables (AL3 PAL(N)Z).



Notes:

1. Joint mould omitted for clarity.
2. Vinyl mastic tape (stockcode: 69807) is applied with the ends left unsealed to allow the resin to flow around the connector.
3. For the Neutral bond refer to Table 37.3

Table 37.1 – Phase Connectors

Multicore Transition Joints		Phase Connector Stockcode
Consac Cable	Solid Polymeric Cable	
0.15 inch ² (97 mm ²) Al3	240 or 300 mm ² Al4	63834
0.2 inch ² (129 mm ²) Al3	240 or 300 mm ² Al4	63834
185 mm ² Al3	240 or 300 mm ² Al4	63834
0.3 inch ² (194 mm ²) Al3	240 or 300 mm ² Al4	63834
0.45 inch ² (297 mm ²) Al3	240 or 300 mm ² Al4	63834
0.5 inch ² (323 mm ²) Al3	240 or 300 mm ² Al4	63834

Table 37.2 – Joint Mould and Resin Details

Description	Qty	Stockcode
Joint Mould	1	71274
Foam Tape (10 metre roll)	1	39172
Polyurethane Resin (6 litre mix)	2	75390

Table 37.3 – Neutral Bonding Cable for Transition Joints for CONSAC cables

Consac Cable	Neutral Bonding Cable	Neutral Bonding Cable Stockcode	Neutral Connector Stockcode	
			240mm ² Solid Poly Cable	300mm ² Solid Poly Cable
0.15 inch ² (97 mm ²) AL3	120mm ² Copper Cable	64196	144014	186232
0.2 inch ² (129 mm ²) AL3	120mm ² Copper Cable	64196	144014	186232
185 mm ² AL3 PAL(N) Z/SAC	120mm ² Copper Cable	64196	144014	186232
185 mm ² AL3 PAL(N) Z	120mm ² Copper Cable	64196	144014	186232
0.3 inch ² (194mm ²) AL3 PAL(N) Z/SAC	120mm ² Copper Cable	64196	144014	186232
0.3 inch ² (194mm ²) AL3 PAL(N) Z	120mm ² Copper Cable	64196	144014	186232
300 mm ² AL3 PAL(N) Z/SAC	185mm ² Copper Cable	61390	175332	186230
300 mm ² AL3 PAL(N) Z	185mm ² Copper Cable	61390	175332	186230
0.5 inch ² (323mm ²) AL3 PAL(N) Z	185mm ² Copper Cable	61390	175332	186230

38.0 STRAIGHT THROUGH JOINT 240AL4 XQ Z/SAC TO 194MM²-323MM² AL4 Z AL Z/SAC CABLES (LV2-39)

This specification provides the requirements for constructing a straight through joint from 240mm² four core, solid aluminium conductor, XLPE insulated, PVC sheathed cables (240AL4 XQ Z/SAC) to 194mm² – 323mm² four core, solid aluminium conductor, PVC insulated, aluminium armoured, PVC sheathed cables (194mm² – 323mm² AL4 Z AL Z/SAC).

The parts required to construct the joint are detailed below.

Table 38.1 – Material List

Item	Description	Ausgrid stockcode	Qty required
1	Joint mould	181762	1
2	Resin 6 Litre tubs	75390	4
3	Foam tape 10m	39172	1
4	Clamping ring	181748	1
5	Core connectors (70-300mm ²)	181745	3
6	Connector with 2 service tap-offs	181746	1
7	CR Insulation pad for phase connector	181752	3
8	CR Insulation pad for neutral connector	181761	1
9	Copper conductor 35mm ²	H118612	2m
10	35mm ² Tinned Cu lug M10	73155	2

The joint shall be constructed in accordance with the Installation Instruction located in Annexure A of this Network Standard.

39.0 FOUR-TO-ONE STRAIGHT THROUGH JOINT 194MM²-323MM² AL4 Z AL Z/SAC TO 185CU1 XQ Z CABLES (LV2-40)

This specification provides the requirements for constructing a four-to-one straight through joint from 185mm² single core, stranded copper conductor, XLPE insulated, PVC sheathed cables (185Cu1 XQ Z) to 194mm² – 323mm² four core, solid aluminium conductor, PVC insulated, aluminium armoured, PVC sheathed cables (194mm² – 323mm² AL4 Z AL Z/SAC).

The parts required to construct the joint are detailed below.

Table 39.1 – Material List

Item	Description	Ausgrid stockcode	Qty required.
1	Joint mould	181762	1
2	Resin 6 Litre tubs	75390	4
3	Foam tape 10m	39172	1
4	Clamping ring	181748	1
5	Core connectors (70-300mm ²)	181745	3
6	Connector with 2 service tap-offs	181746	1
7	CR Insulation pad for phase connector	181752	3
8	CR Insulation pad for neutral connector	181761	1
9	Copper conductor 35mm ²	H118612	2m
10	35mm ² Tinned Cu lug M10	73155	2
11	4-Way Glove	78527	1
12	Mastic-lined heatshrink sleeve, 150mm length	181351	1 pack (contains 16 in a pack)

The joint shall be constructed in accordance with the Installation Instruction located in Annexure B of this Network Standard.

40.0 FOUR-TO-ONE TRANSITION JOINTS FOR CONSAC CABLES (LV2-42)

This specification provides the requirements for the following Four-To-One Transition Joints:

- Three core stranded aluminium conductor, paper insulated, aluminium sheathed, PVC oversheathed cables (CONSAC) to single core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.
- Three core solid aluminium conductor, paper insulated, aluminium sheathed, PVC oversheathed cables (CONSAC) to single core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.

Ausgrid's stockcodes of approved straight through joint kits for single core cables are provided in the table below.

Table 40.1 – Four-to-One Transition Joint Kits for CONSAC cables

Four-To-One Transition Joints		Joint Kit Stockcode	Phase Connector Stockcode
Consac Cable	Cable Type		
185 mm ² AL3 PAL(N) Z/SAC	185 mm ² Cu1 XQ Z	179669	179665
185 mm ² AL3 PAL(N) Z	185 mm ² Cu1 XQ Z	179669	57018
0.3 inch ² (194mm ²) AL3 PAL(N) Z/SAC	185 mm ² Cu1 XQ Z	179669	179666
0.3 inch ² (194mm ²) AL3 PAL(N) Z	185 mm ² Cu1 XQ Z	179669	179667
300 mm ² AL3 PAL(N) Z/SAC	185 mm ² Cu1 XQ Z	179669	179668
300 mm ² AL3 PAL(N) Z	185 mm ² Cu1 XQ Z	179669	56994
0.5 inch ² (323mm ²) AL3 PAL(N) Z	185 mm ² Cu1 XQ Z	179669	179664

Table 40.2 – Neutral Bonding Cable for Four-to-One Transition Joints for CONSAC cables

Consac Cable	Neutral Bonding Cable	Neutral Bonding Cable Stockcode	Neutral Connector Stockcode
185 mm ² AL3 PAL(N) Z/SAC	120mm ² Copper Cable	64196	179711
185 mm ² AL3 PAL(N) Z	120mm ² Copper Cable	64196	179711
0.3 inch ² (194mm ²) AL3 PAL(N) Z/SAC	120mm ² Copper Cable	64196	179711
0.3 inch ² (194mm ²) AL3 PAL(N) Z	120mm ² Copper Cable	64196	179711
300 mm ² AL3 PAL(N) Z/SAC	185mm ² Copper Cable	61390	150250
300 mm ² AL3 PAL(N) Z	185mm ² Copper Cable	61390	150250
0.5 inch ² (323mm ²) AL3 PAL(N) Z	185mm ² Copper Cable	61390	150250

41.0 FOUR-TO-ONE TRANSITION JOINTS FOR PILC CABLES (LV2-43)

This specification provides the requirements for the following Four-To-One Transition Joints:

- Four core, stranded conductor, paper insulated, lead sheathed, polymeric oversheathed, armoured and unarmoured cables to single core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.
- Four core with reduced neutral, stranded conductor, paper insulated, lead sheathed, polymeric oversheathed, armoured and unarmoured cables to single core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.

Ausgrid's stockcodes of approved straight through joint kits for single core cables are provided in the table below.

Table 41.1 – Four-to-One Transition Joint Kits for PILC cables

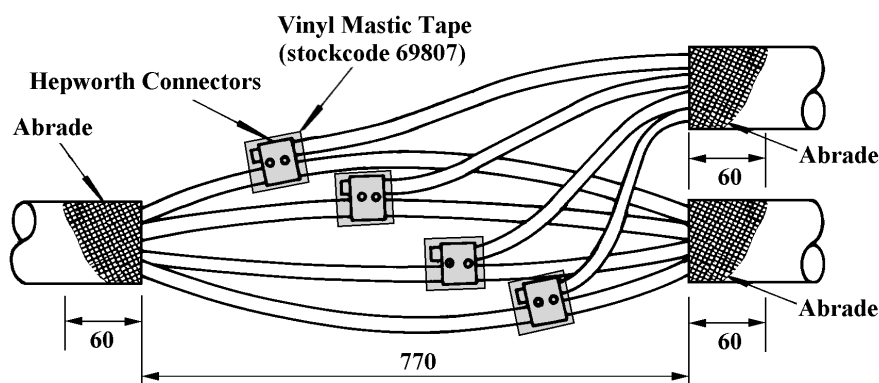
Four-To-One Transition Joints		Joint Kit Stockcode	Phase Connector Stockcode	Neutral Connector Stockcode
PILC Cable	Polymeric Cable			
0.1 inch ² (65 mm ²) Cu4	185 mm ² Cu1	See Note 1	See Note 2	See Note 3
95 mm ² Cu4	185 mm ² Cu1	See Note 1	176517	See Note 4
0.15 inch ² (97 mm ²) Cu4	185 mm ² Cu1	See Note 1	176517	See Note 4
185 mm ² Cu3.5	185 mm ² Cu1	184476	150250	184472
185 mm ² Cu4	185 mm ² Cu1	184476	150250	184474
185 mm ² Al4	185 mm ² Cu1	184476	57018	184471
0.3 inch ² (194 mm ²) Cu3.5	185 mm ² Cu1	184476	184561	184472
0.3 inch ² (194 mm ²) Cu4	185 mm ² Cu1	184476	184561	184474
0.3 inch ² (194 mm ²) Al4	185 mm ² Cu1	184476	179667	184471
0.3 inch ² (194 mm ²) Al3.5	185 mm ² Cu1	184476	179667	184470
300 mm ² Cu4	300 mm ² Cu1	184477	80929	184475
0.5 inch ² (323 mm ²) Cu3.5	185 mm ² Cu1	184478	See Note 5	184474
0.5 inch ² (323 mm ²) Cu3.5	300 mm ² Cu1	184477	184562	184473
0.5 inch ² (323 mm ²) Al3.5	185 mm ² Cu1	184478	179664	184471

Notes:

1. Buy in from TE Connectivity Part No EPKJ-SY413.
2. Buy in from TE Connectivity Part No CKR185-65 or from Acculec Power Part No CASR185/65.
3. Buy in from TE Connectivity Part No CKB64/65-185X01.
4. Buy in from TE Connectivity Part No CKB95-97/185X01.
5. Buy in from TE Connectivity Part No CKR323-185/1.

42.0 LAY-ON TEE JOINT AL4 XQ Z/SAC CABLES (LV3-40)

This specification provides the requirements for constructing Lay-On Tee Joint from four core, solid aluminium conductor, XLPE insulated, PVC sheathed main cables (AL4 XQ Z/SAC) to four core, solid aluminium conductor, XLPE insulated, PVC sheathed tee cables (AL4 XQ Z/SAC).



Notes:

1. Joint mould omitted for clarity.
2. Vinyl mastic tape (stockcode: 69807) is applied with the ends left unsealed to allow the resin to flow around the connector.
3. Hepworth Connector Details:

Table 42.1 – Hepworth Connector Details

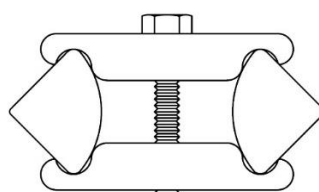
Straight Through Joints		Hepworth Connector Stockcode
Main Cable Type	Tee Cable Type	
240 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z/SAC	128132
240 mm ² AL4 XQ Z/SAC	300 mm ² AL4 XQ Z/SAC	128132
300 mm ² AL4 XQ Z/SAC	240 mm ² AL4 XQ Z/SAC	128132
300 mm ² AL4 XQ Z/SAC	300 mm ² AL4 XQ Z/SAC	128132

4. Joint Mould and Resin Details:

Table 42.2 – Joint Mould and Resin Details

Description	Qty	Stockcode
Joint Mould	1	71282
Foam Tape (10 metre roll)	1	39172
Polyurethane Resin (6 litre mix)	2	75390

5. The conductor orientation in the connector shall be with the conductor apex pointing outwards as shown.



43.0 DISCONNECTION LINK BOX (FOUR-WAY) FOR SINGLE CORE CABLES (LV5-9)

This specification provides the requirements for constructing a four-way underground disconnection link box for connecting four 4 x 185mm² stranded copper conductors, XLPE insulated, PVC sheathed, single core cables. The cast iron frame and lid are designed for installation in areas reserved for pedestrians only.

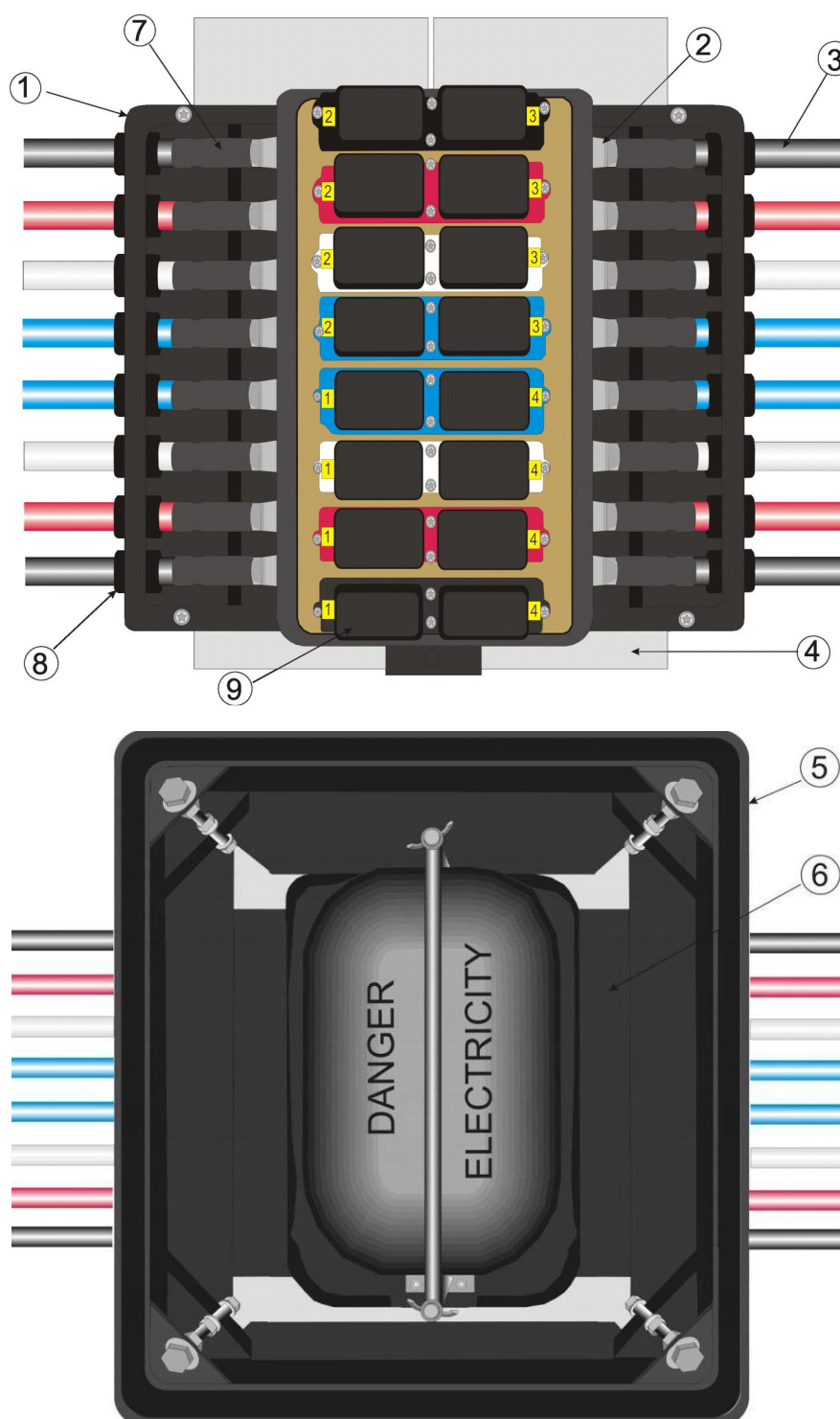


Figure 43.1 – Link box and frame

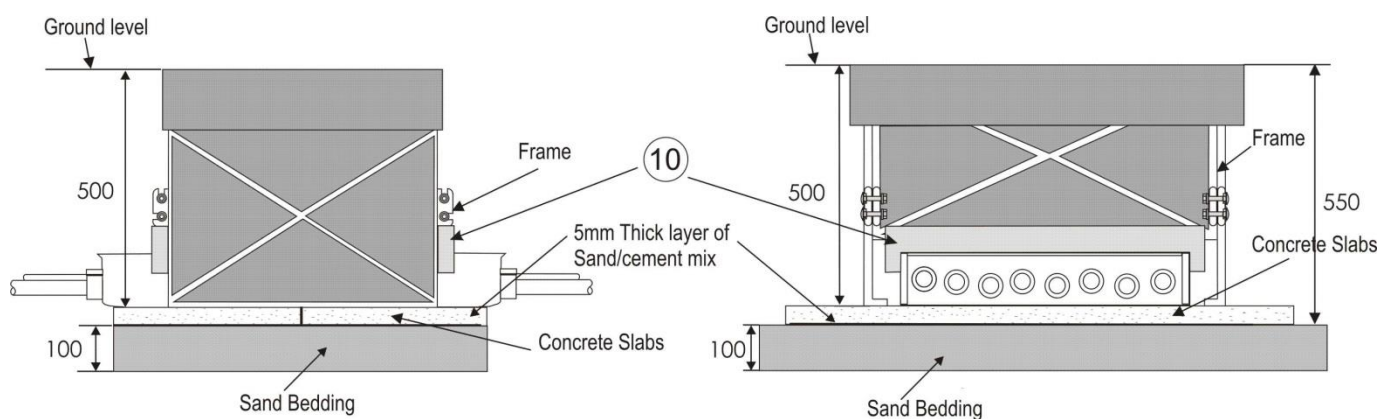


Figure 43.2 – Link Box – Front and End Elevation

Note: Apply a 5mm thick layer of sand/cement mix on top of the sand bedding prior to installing the concrete slabs.

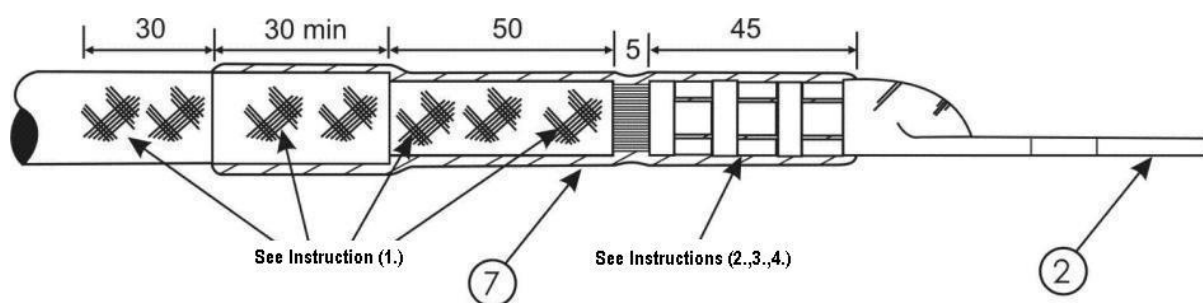


Figure 43.3 – Link Box Cable Termination

1. Abrade the cable sheath and the cable insulation to the dimensions shown.
2. Pre-heat the compression lug before placing the heatshrink sleeve over the cable.
3. Shrink the sleeve starting from the cable end.
4. Apply additional heat to the sleeve and the palm of the lug until a bead of mastic appears around the ends of the sleeve.

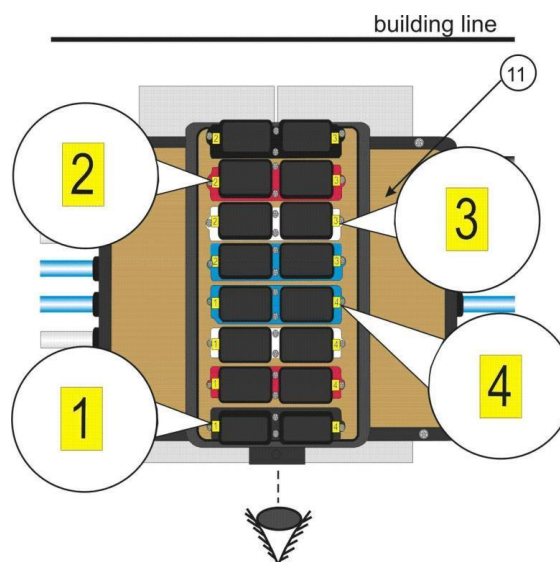
Table 43.1 – Material List

Item	Description	Qty	Stockcode
1	4-way Link box	1	180181
2	185mm ² Copper Cable Lug	16	175532
3	Single Core Cables: 185 Cu1 XQ Z/COM/#COLOUR 185 Cu1 XQ Z	As required	151183 61432
4	Concrete slabs	2	59725
5	Cast iron frame	1	180252
6	Cable Trough Covers	2	See Note 1
7	Mastic-lined heatshrink sleeve, 150mm length	1 pack (contains 16 in a pack)	181351
8	Foam tubes	16	See Note 1
9	Link Cover	16	See Note 1
10	Sand barrier	2	See Note 1
11	Resin	4 tubs	75390

Notes:

1. Disconnection link box is available on stockcode 180181 and comes complete with activating links, link covers, tee operating handle, foam tubes, bell housing, circuit numbers, circuit number housings, cable trough covers and sand barriers.
2. The dimensions of the disconnection link box are 470mm wide x 720mm long x 410mm high.
3. The threads of the stainless steel studs shall be lubricated with Nickel anti-seize grease (stockcode 177212) prior to tightening. Wipe off any excess anti-seize after the nuts have been tightened.
4. Cable connections to be tighten to a torque of 45Nm.

The link box shall be positioned so that when facing the link box and the building line “1” is in the bottom left corner followed by “2”, “3”, and “4” in a clockwise direction. See drawing below.



5. Resin shall be used in accordance with the manufacturer's instructions.
6. The resin must be allowed to set before applying mechanical load to it or energising the link box. This will typically be a minimum of 2 hours.

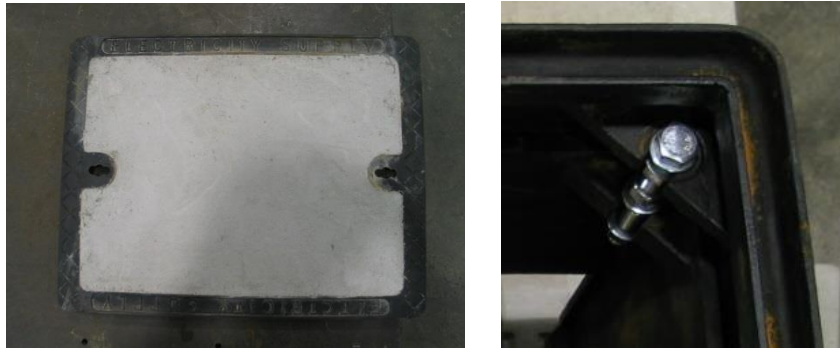


Figure 43.4 – Cast Iron lid and the bolts provided with the pit frame

Note: Use string lines to determine the pavement height and then adjust the bolts provided with the pit frame to ensure that the cast iron lid is level with the pavement surface.

The Cast Iron lid shall be infilled with concrete.

44.0 STRAIGHT THROUGH JOINT STREETLIGHT AND SERVICE CABLES (LV2-45)

44.1 Joints

This specification provides the requirements for the following straight through joints:

- two core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to two core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.
- four core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to four core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.
- four core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to three core stranded copper, cross-linked polyethylene insulated, copper helically wound concentric wire neutral, PVC sheathed cables.
- four core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to single core stranded copper, PVC insulated, PVC sheathed cables.
- five core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to five core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables.
- transition joint from two core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to two core stranded copper paper insulated, lead sheathed, polymeric oversheathed armoured and unarmoured cables.
- transition joint from four core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables or three core stranded copper, cross-linked polyethylene insulated, copper helically wound concentric wire neutral, PVC sheathed cables to four core stranded copper paper insulated, lead sheathed, polymeric oversheathed armoured and unarmoured cables.
- transition joint from four core stranded copper, cross-linked polyethylene insulated, PVC sheathed cables to three core solid sector aluminium paper insulated, metal sheathed, polymeric oversheathed cables.

Ausgrid's stockcodes of approved straight through joint kits for service cables are provided in the table below.

Table 44.1 – Straight Through Joint Kits for Streetlight and Service Cables

Straight Through Joints		Joint Kit	Connector
Cable Type	Cable Type	Stockcode	Stockcode
16 mm ² Cu2 XQ Z	0.0225inch ² (15 mm ²) CU2 P L Z	186665	90092 – Phase 177742 – Neutral
16 mm ² Cu2 XQ Z	0.0225inch ² (15 mm ²) CU2 P L DT J	186665	90092 – Phase 177742 – Neutral
16 mm ² Cu2 XQ Z	16 mm ² Cu2 XQ Z	74138	90092
16 mm ² Cu3 XQ Cu(N) Z	0.0225inch ² (15 mm ²) CU4 P L Z	186666 *	90092 – Phase 177742 – Neutral
16 mm ² Cu3 XQ Cu(N) Z	0.0225inch ² (15 mm ²) CU4 P L DT J	186666 *	90092 – Phase 177742 – Neutral
16 mm ² Cu4 XQ Z	0.0225inch ² (15 mm ²) CU4 P L Z	186666	90092 – Phase 177742 – Neutral
16 mm ² Cu4 XQ Z	0.0225inch ² (15 mm ²) CU4 P L DT J	186666	90092 – Phase 177742 – Neutral
16 mm ² Cu4 XQ Z	16mm ² Cu1 Z Z	167742	90092
16 mm ² Cu4 XQ Z	16 mm ² Cu3 XQ Cu(N) Z	74120 *	90092
16 mm ² Cu4 XQ Z	16 mm ² Cu4 XQ Z	74120	90092

16 mm ² Cu4 XQ Z	25 mm ² AL3 P AL(N) Z/SAC	179134	177742
16 mm ² Cu5 XQ Z	16 mm ² Cu5 XQ Z	74120 **	90092
50 mm ² Cu4 XQ Z	50 mm ² Cu3 XQ Cu(N) Z	74211 *	57174
50 mm ² Cu4 XQ Z	50 mm ² Cu4 XQ Z	74211	57174

* The neutral insulating sleeve for the ceander cable is to be cut to length from 40m roll (stockcode 177751).

** The core insulating sleeve for the 5th core shall be cut to a length of 100mm from a MWTM-16/5-1200 mastic lined heatshrink tube.

Table 44.2 – Neutral Bonding Cable for Multicore CONSAC Service Cable

Service Cable	Neutral Bonding Cable	Stockcode
25mm ² Aluminium Multicore CONSAC Service Cable	16mm ² Copper Cable	90126

44.2 Requirements

In addition to the requirements of Clauses and wire brush the surface of the aluminium conductors prior to applying jointing compound with conductive zinc particles. Use a different wire brush, to again abrade the surface of the aluminium conductors prior to terminating into the connectors.

45.0 POT END (LIVE END SEAL) FOR STREETLIGHT AND SERVICE CABLES (LV1-55)

45.1 Cables

This specification provides the requirements for a pot end (live end seal) on the following cables:

- two core cross-linked, polyethylene insulated PVC sheathed cables.
- four core cross-linked, polyethylene insulated PVC sheathed cables.
- multicore paper insulated metal sheathed cables.

45.2 Using pot ends

Pot ends (Live End Seals) shall only be used for maintaining the existing network (e.g. decommissioning a section of LV cable) and must not be used on newly installed cables or network extensions such as staged subdivisions.

Where pot ends are to be used, they shall only be installed on cables:

- where it is possible to visually trace the entire length of cable from the pot end to the source of supply, or
- where it is possible to visually trace the entire length of cable from the pot end to the tee joint to which the pot ended section of cable is connected. Additionally, it shall be possible to identify the cables connected to the other two legs of the tee joint using cable identification equipment.

When pot ends are to be direct buried, the pot end shall be located as close as practicable to either:

- the source of supply, or
- the tee joint to which the pot ended section of cable is connected.

This requirement is to minimise future civil works for the purposes of cable identification.

If it is intended to join cable to the pot ended section of cable in the future, sufficient cable length shall be left to allow for the pot end to be replaced with a straight through joint.

45.3 Approved pot end kits

Ausgrid's stockcodes of approved pot ends for service and streetlight cables are provided in the table below:

Table 45.1 – Material List

Cable Type	Stockcode
16mm ² Cu1 XQ Cu(N) Z	185023*
16mm ² Cu2 XQ Z	185023
16mm ² Cu3 XQ Cu(N) Z	185025*
16mm ² Cu4 XQ Z	185025
50mm ² Cu3 XQ Cu(N) Z	185026*
50mm ² Cu4 XQ Z	185026
Multicore Paper Insulated Cables, 15mm ² to 25mm ²	186530
Multicore Paper Insulated Cables, 35mm ² to 97mm ²	186531

* The neutral insulating sleeve for the ceander cable is to be cut to length from 40m roll (stockcode 177751).

46.0 TESTING CABLE JOINTS AFTER INSTALLATION

All completed low voltage electrical works shall be tested prior to commissioning in accordance with the requirements of NS161.

47.0 STORES AND MATERIALS

Only approved materials and equipment may be used in the construction of infrastructure which ultimately forms part of Ausgrid's electrical network. The approved materials and equipment contained in this Network Standard are detailed in Ausgrid's Approved Material List (AML) with manufacturer and supplier information and Ausgrid stockcodes where appropriate. Ausgrid will consider adding alternative materials and equipment to the AML in accordance with NS181.

ASPs may obtain approved materials and equipment items as listed in the AML from any source. Where an ASP wishes to use alternative materials and equipment, application to have the materials or equipment considered for approval is to be made in accordance with NS181. Alternatively, where approved materials and equipment are held as stock in Ausgrid's stores system, ASPs may purchase them from Ausgrid. All enquiries and requests for quotations shall be directed by email to aspsales@ausgrid.com.au and include the appropriate stockcode numbers.

All materials used on Ausgrid's network must be new.

48.0 AUTHORITIES AND RESPONSIBILITIES

For this Network Standard the authorities and responsibilities of Ausgrid employees and managers in relation to content, management and document control of this Network Standard can be obtained from the Company Procedure (Network) – Production / Review of Engineering Technical Documents within the document repository. The responsibilities of persons for the design or construction work detailed in this Network Standard are identified throughout this Standard in the context of the requirements to which they apply.

49.0 RELATED DOCUMENTS

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards. Current Network Standards are available on Ausgrid's Internet site at www.ausgrid.com.au.

ASPs and other persons external to Ausgrid are responsible for sourcing the manufacturer's instructions and manuals.

49.1 Ausgrid documents

- Connection Policy
- Customer Installation Safety Plan
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- ES4 Accredited Service Provider Authorisation
- Low Voltage Live Work Manual Book 2 – Overhead Work
- Low Voltage Live Work Manual Book 4 – Underground Work
- NS001 Glossary of Terms
- NS100 Field Recording of Network Assets
- NS100 External Annexure C
- NS110 Design and Construction Standard for Underground Residential Subdivisions
- NS116 Design Standards for Distribution Equipment Earthing
- NS125 Construction of Low Voltage Overhead Mains
- NS130 Laying Underground Cables up to and including 11 kV
- NS161 Testing of Underground Cables
- NS174 Environmental Procedures
- NS181 Approval of Materials and Equipment and Network Standard Variations
- NS181 Approved Material List (AML)
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- NS260 Sub-Transmission Feeder Earthing
- Policy for ASP/1 Premises Connections

49.2 Other standards and documents

- AS 1428.1:2021 Design for access and mobility – General requirements for access – New building work
- AS 1428.4.1:2009 Design for access and mobility – Means to assist the orientation of people with vision impairment – Tactile ground surface indicators
- Service and Installation Rules of New South Wales

49.3 Acts and regulations

- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014
- Work Health and Safety Act 2011 (NSW)
- Work Health and Safety Regulation 2017 (NSW)

50.0 DEFINITIONS

Refer to NS001 Glossary of Terms.

51.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Table 51.1 – Recordkeeping

Type of Record	Storage Location	Retention Period*
Approved copy of the Network Standard	Document repository Network sub process Standard – Company	Unlimited
Draft Copies of the Network Standard during amendment/creation	Work Folder for Network Standards (HPRM ref. 2014/21250/309)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	Records management system Work Folder for Network Standards (HPRM ref. 2014/21250/309)	Unlimited

* The following retention periods are subject to change e.g. if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

52.0 DOCUMENT CONTROL

Document Owner : Head of Asset Risk & Performance

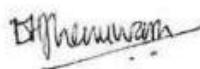
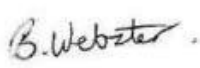
Distribution Coordinator : Manager Asset Standards

Annexure A - Installation Instruction – LV 4-Core Straight Through Joints 240AL4 XQ Z/SAC Cable



Installation Instruction

Low Voltage Four Core
Straight Through Joint
Between 194mm² to 323mm²
Polymeric Insulated Cable
with Aluminium Armours and
240AL4 XQ Z/SAC Cable

	Name & Position	Signature	Date
Prepared by	Duminda Thenuwara Engineer – Distribution Engineering Mains Services		30-03-2010
Approved by	Bruce Webster Senior Engineer – Distribution Engineering Mains Services		30/03/2010

Revision History

Version	Date	Summary of Change
1	03/02/2010	Initial Issue.
2	30/03/2010	Quantity of Resin tubs (6 Litre) reduced from 6 to 4

Before Starting

Refer to the title of the installation instruction to ensure that the components you are going to use fits the cable.

Ensure all components are present and in good order.

Components or work steps may have improved since you last installed this product. Carefully read and follow the steps in the installation instruction.

Parts List

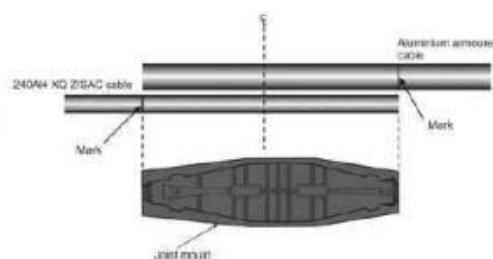
Table 1

Item	Description	EA stockcode	Qty reqd.
1	Joint mould	181762	1
2	Resin 6 Litre tubs	178871	4
3	Foam tape 10m	39172	1
4	Clamping ring	181748	1
5	Core connectors (70-300mm ²)	181745	3
6	Connector with 2 service tap-offs	181746	1
7	CR Insulation pad for phase connector	181752	3
8	CR Insulation pad for neutral connector	181761	1
9	Copper conductor 35mm ²	H118612	2m
10	35mm ² Tinned Cu lug M10	73155	2

Note: Set the cables level before starting so that resin will fill the joint mould evenly.

Cable overlap

1. Overlap the cables to be jointed by the length of the joint mould.
2. Please mark on the cable sheath of both cables at the end of the joint moulds.

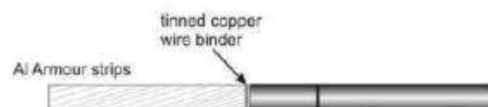


Preparation of Aluminium Armoured Cable

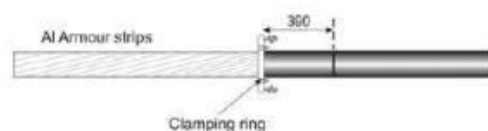
3. Remove the PVC sheath for a distance 380mm from the mark made in step 2 as shown.



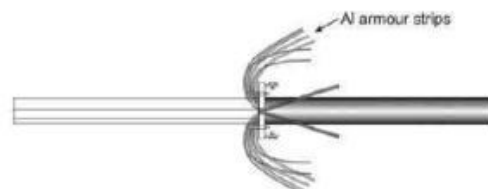
4. Bind the armour wires at the sheath cut using tinned copper wire binder.



5. Insert one half of the clamping ring (which has the two lugs on the ring for earth bonding) over the cable and position it over the sheath cut according to the dimension shown. Note the lugs must face away from the centre of the joint.

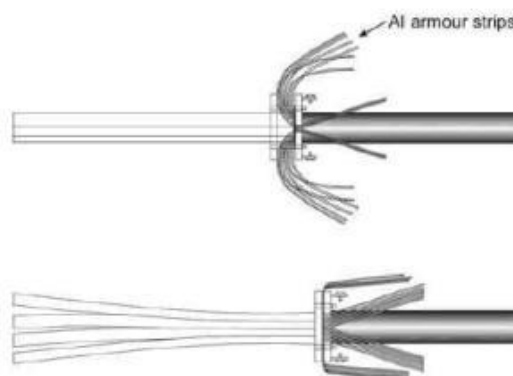


6. Lay the Aluminium armour strips back onto the clamping ring, one at a time.



7. Remove the binder tapes and the fillers between the cores of the cable level with the clamping ring before the 2nd half of the clamping ring is installed.

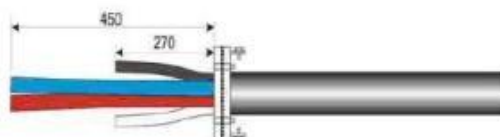
8. Install the second half of the clamping ring. Centralize the clamping ring over the cable and tighten the two clamping ring halves together. Ensure the armours are sitting flat between the clamping rings.



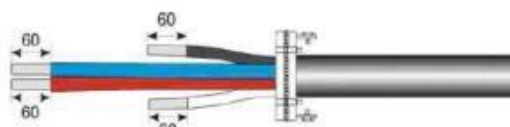
9. Break the Aluminium strips which project out of the clamping ring by bending them back and forth. Retension the clamping ring.



10. Cut the cable cores as per the dimensions shown. The neutral core dimension is critical as the neutral connector should be positioned as close as possible to clamping ring, to minimize the length of the neutral-earth bond cable.

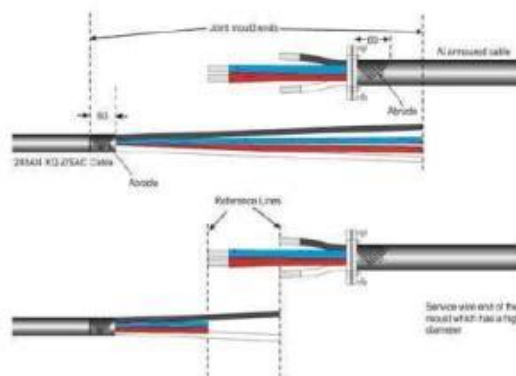


11. Remove the insulation from cores for a distance of 60mm from the end of the cable core.

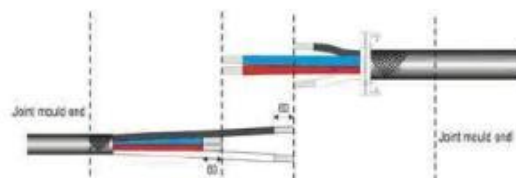


Preparation of 240Al4 XLPE Cable

12. Position the 240Al4 cable, remove cable sheath 60mm from mark. Then cut the cores at the reference lines as shown. Abrade the cable sheath to a distance of 60mm from cable sheath cut.

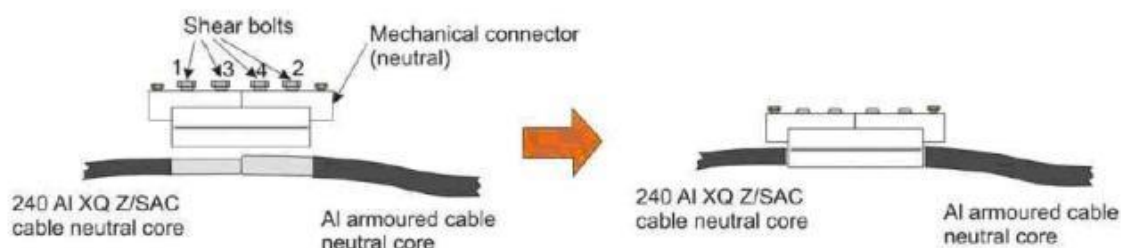


13. Remove the insulation from all cores for a distance of 60mm from the end of the cable core.

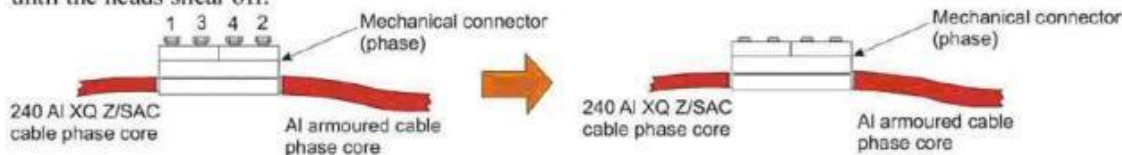


Completion of the Joint

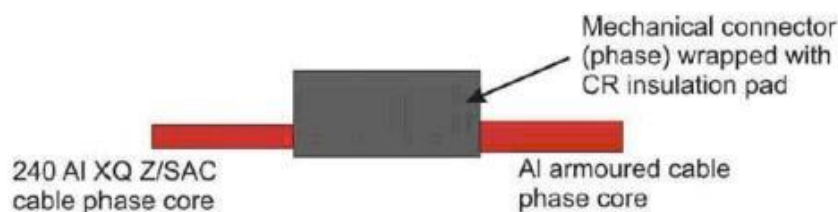
14. Straighten, level and align the two cables, Al armoured cable and 240Al4 cable.
15. Wire brush Al conductors. Fit the neutral conductors into the mechanical connector (EA s/c 181746) as per the diagram. Take up the tension equally on the four main shear bolts with a tee bar spanner. (do not shear the heads at this stage). Do not tighten the service tap-off shear bolts (brass) at this stage.
- Starting at the connector ends and working towards the middle of the connector, tighten the bolts until the heads shear off.



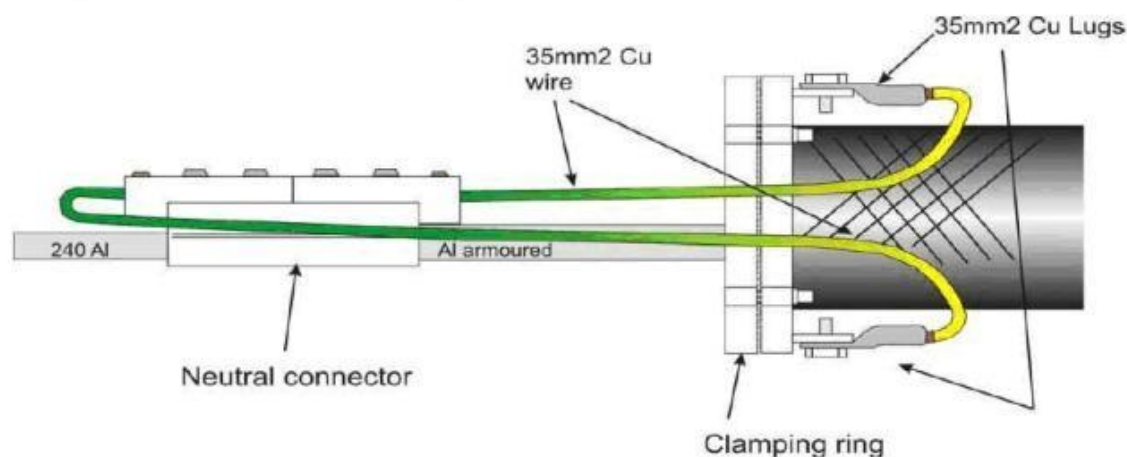
16. Wire brush Al conductors. Fit the phase conductors of both cables into the mechanical connector (EA s/c 181745) as per the diagram. (only one core is shown for clarity).
Take up the tension equally on all four shear bolts with a tee bar spanner.
Starting at the connector ends and working towards the middle of the connector, tighten the bolts until the heads shear off.



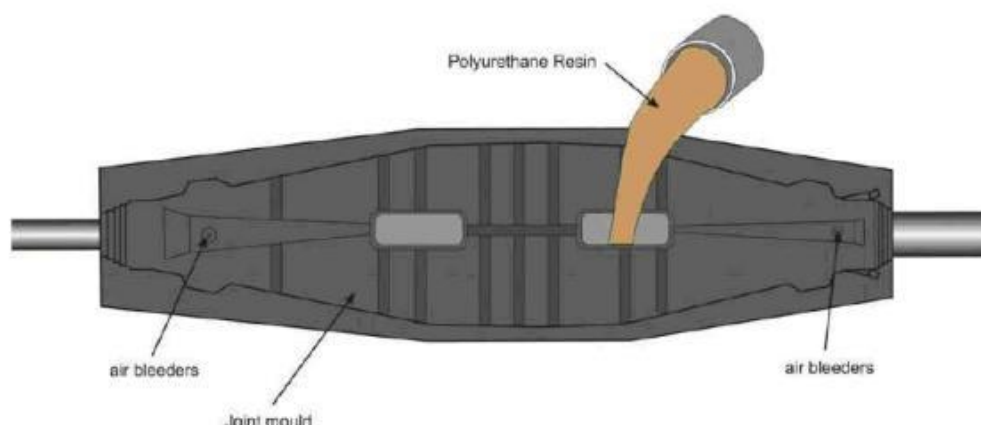
17. Remove the backing from CR insulation pad and wrap it centrally around the connector leaving the ends open as in a tube to allow resin to flow in and fill any voids.



18. Take the 35mm² stranded copper Earth wire and make two leads lugged at one end only.
19. Connect the lugged ends to the clamping ring first and tighten the bolts.
20. Measure the length of the earth leads to reach service tap-offs in the Neutral connector and cut them.
21. Remove the insulation from each earth lead and insert unlugged ends of the earth lead into the service tap-off holes in the neutral connector.
22. Tighten the shear bolts in the service tap-off holes until the heads shear off.



23. Position the joint in the joint mould. Build up the cable diameters at the entry holes using foam tape to ensure a tight seal when the polyurethane compound is poured.
24. Double check clearances. 10mm or more clearance should be maintained between bottom half of the joint mould and any part of the joint. Repeat for the top half of the joint mould.
25. Secure the two halves of the joint mould together by fitting the metal clips adjacent to the cable entries and the edge strips along the flanges.
26. Pack dry sand firmly underneath the joint mould up to the cable entries.
27. Cut off the tops of the air bleeders located at each end of the top half of the joint mould.
28. Mix the compound in accordance with the instruction provided with the compound.
29. Pour the compound STEADILY into the joint through one of the filling holes as long as possible before switching to the other filling hole. **Note:** Each bucket must be mixed and poured immediately following the previous bucket.
30. Pour the final bucket through both filling holes until the joint is full.
31. Fit the plastic lids over the filling holes once the joint mould is completely full.



32. Allow 2 hours for the resin to harden before back filling and energising the cables.

IMPORTANT NOTE:

YOU MUST ENSURE THAT A BURIED JOINT IS SURROUNDED WITH SOFT BEDDING MATERIAL TO A DEPTH OF 100MM ABOVE THE JOINT.



DISCARD THIS INSTRUCTION ONCE THE JOINT IS COMPLETE.

Annexure B - Installation Instruction – LV 4 to 1 Straight Through Joint 185Cu1 XQ Z Cables



Installation Instruction

Low Voltage Four to One
Straight Through Joint
Between 194mm² to 323mm²
Polymeric Insulated Cable
with Aluminium Armours and
185Cu1 XQ Z Cables

	Name & Position	Signature	Date
Prepared by	Duminda Thenuwara Engineer - Distribution Engineering Mains Services		08/08/2012
Approved by	Bruce Webster Senior Engineer - Distribution Engineering Mains Services		08/08/2012

Revision History

Version	Date	Summary of Change
1	20/07/2012	Initial Issue.

Before Starting

Refer to the title of the Installation Instruction to ensure that the components you are going to use fits the cable.

Ensure all components are present and in good order.

Components or work steps may have improved since you last installed this product. Carefully read and follow the steps in the installation instruction.

Parts List

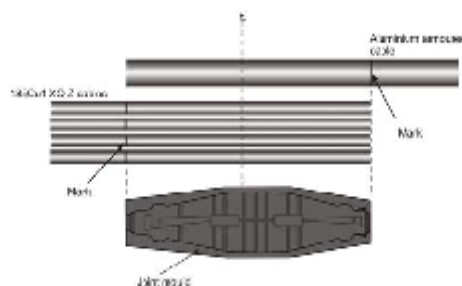
Table 1

Item	Description	Part no.	AG stockcode	Qty reqd.
1	Joint mould	3736-037	181762	1
2	Resin 6 Litre tubs	—	178871	4
3	Foam tape 10m	8GE0003-006	39172	1
4	Clamping ring	EPPA 022-5	181748	1
5	Core connectors (70-300mm ²)	UM300	181745	3
6	Connector with 2 service tap-offs	UM300/S	181746	1
7	CR Insulation pad for phase connector	CRP180x150B	181752	3
8	CR Insulation pad for neutral connector	CRP200x180B	181761	1
9	Copper conductor 35mm ²	—	H118612	2m
10	35mm ² Tinned Cu lug M10	H1368/50	73155	2
11	4-Way Glove	502K026/S	78527	1
12	Mastic-lined heatshrink sleeve, 150mm length	MWTM 35/12-150/S-CS016	181351	1 pack (contains 16 in a pack)

Note: Set the cables level before starting so that resin will fill the joint mould evenly.

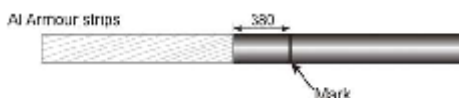
Cable overlap

1. Overlap the cables to be jointed by the length of the joint mould.
2. Please mark on the cable sheath of all cables at the end of the joint mould.

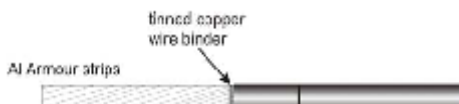


Preparation of Aluminium Armoured Cable

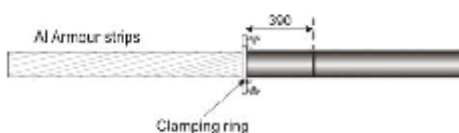
3. Remove the PVC sheath for a distance of 380mm from the mark made in step 2 as shown.



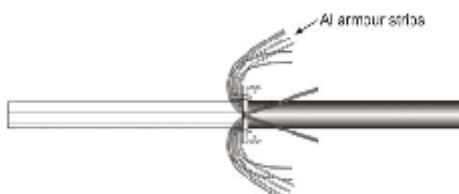
4. Bind the armour wires at the sheath cut using tinned copper wire binder.



5. Insert one half of the clamping ring (which has the two lugs on the ring for earth bonding) over the cable and position it over the sheath cut according to the dimension shown. Note the lugs must face away from the centre of the joint.

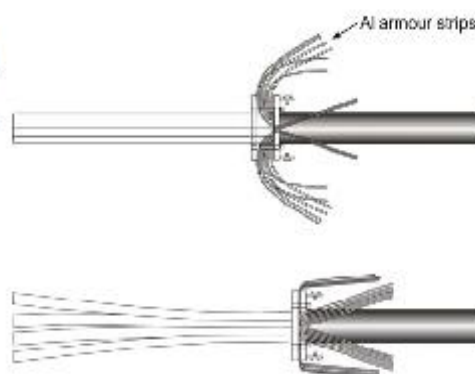


6. Lay the Aluminium armour strips back onto the clamping ring, one at a time.



7. Remove the binder tapes and the fillers between the cores of the cable level with the clamping ring before the 2nd half of the clamping ring is installed.

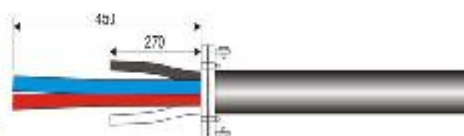
8. Install the second half of the clamping ring. Centralize the clamping ring over the cable and tighten the two clamping ring halves together. Ensure the armours are sitting flat between the clamping rings.



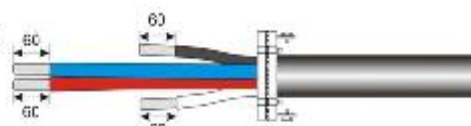
9. Break the Aluminium strips which project out of the clamping ring by bending them back and forth. Retension the clamping ring.



10. Cut the cable cores as per the dimensions shown. The neutral core dimension is critical as the neutral connector should be positioned as close as possible to clamping ring, to minimize the length of the neutral-earth bond cable.

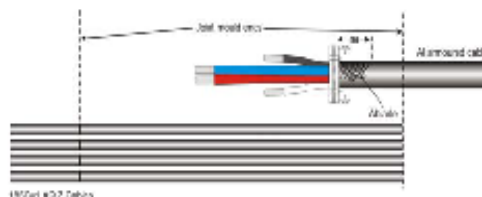


11. Remove the insulation from cores for a distance of 60mm from the end of the cable core.

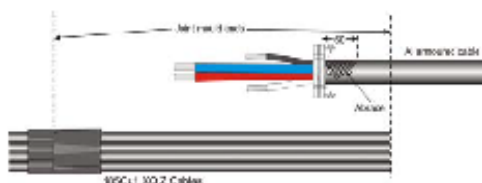


Preparation of 185Cu1 XLPE Cables

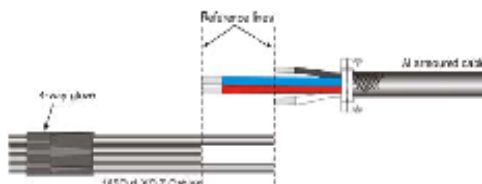
12. Position 4x185Cu1 cables.



13. Park the 4-way Glove on the four single core cables, with the glove fingers pointing away from the centre of the joint.

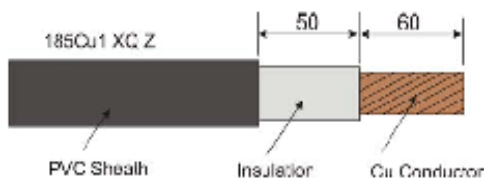


14. Cut the cores at the reference lines as shown.



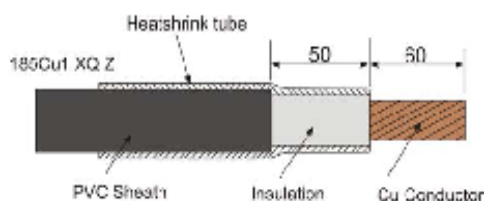
15. Remove the PVC sheath from all cores for a distance of 110mm from the end of the cable.

Remove the insulation for a distance of 60mm from the end of the cable.



16. Apply the 150mm long heatshrink tubes over the insulation and PVC sheath as per the diagram.

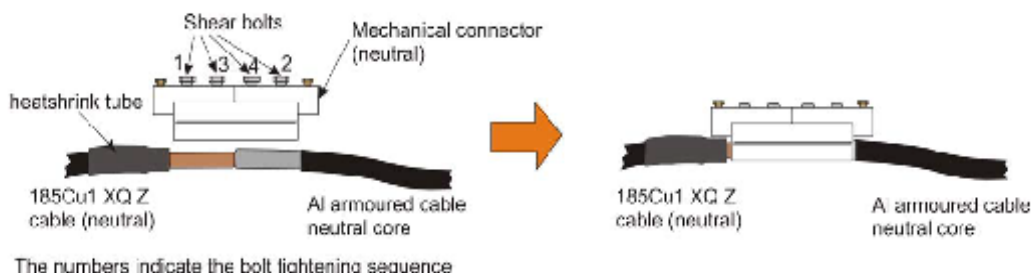
Start shrinking the tube from the end of the insulation working towards the cable sheath.



Completion of the Joint

17. Straighten, level and align the cables, Al armoured cable and 185Cu1 cables.

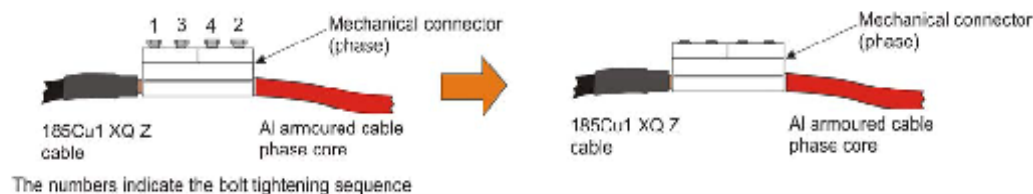
18. Wire brush Al conductors. Fit the neutral conductors into the mechanical connector UM300/S as per the diagram. Take up the tension equally on the four main shear bolts with a tee bar spanner. (do not shear the heads at this stage). Do not tighten the service tap-off shear bolts (brass) at this stage. Starting at the connector ends and working towards the middle of the connector (following the number sequence indicated), tighten the bolts until the heads shear off.



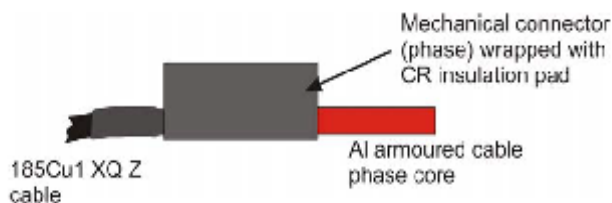
19. Wire brush Al conductors. Fit the phase conductors of both cables into the mechanical connector UM300 as per the diagram. (only one core is shown for clarity).

Take up the tension equally on all four shear bolts with a tee bar spanner.

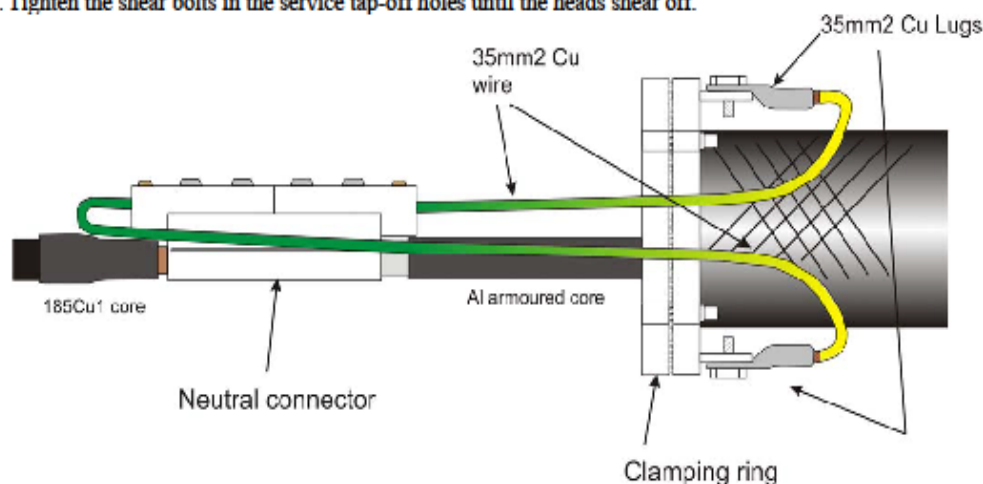
Starting at the connector ends and working towards the middle of the connector (following the number sequence indicated), tighten the bolts until the heads shear off.



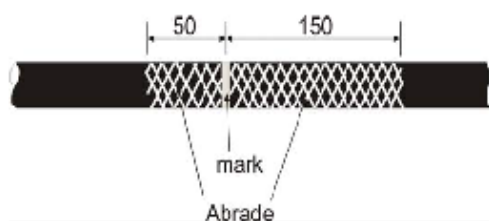
20. Remove the backing from CR insulation pad (S/C 181752) and wrap it centrally around the phase connector leaving the ends open as in a tube to allow resin to flow in and fill any voids. Repeat for the two remaining phase connectors.



21. Take the 35mm² stranded copper Earth wire and make two leads lugged at one end only.
22. Connect the lugged ends to the clamping ring first and tighten the bolts.
23. Measure the length of the earth leads to reach service tap-offs in the Neutral connector and cut them.
24. Remove the insulation from each earth lead and insert the unlugged ends of the earth lead into the service tap-off holes in the neutral connector.
25. Tighten the shear bolts in the service tap-off holes until the heads shear off.

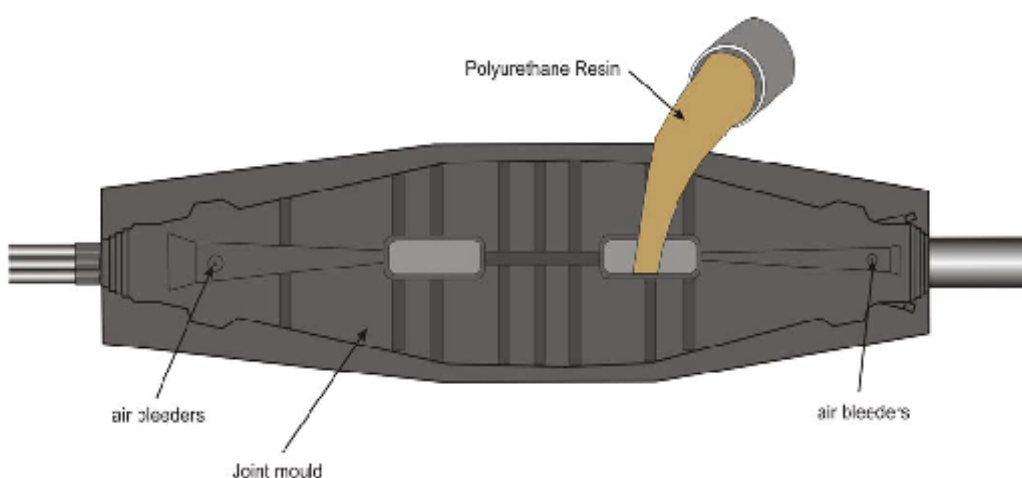


26. Remove the backing from CR insulation pad (S/C 181761) and wrap it centrally around the neutral connector leaving the ends open as in a tube to allow resin to flow in and fill any voids.
27. Abrade the PVC sheath of 185Cu1 XQ Z cables for a distance of 200mm across the mark made in step 2 as shown.



28. Position the 4-way Glove on the single core cables, the base of the fingers being positioned 10mm from the end of the joint mould.
29. Shrink the glove into place – start at the base of the fingers and work towards the centre of the joint, then shrink the fingers starting at the base of the fingers and working towards the end of the fingers.
30. Position the joint in the joint mould. Build up the cable diameters at the entry holes using foam tape to ensure a tight seal when the polyurethane compound is poured.
31. Double check clearances. 10mm or more clearance should be maintained between bottom half of the joint mould and any part of the joint. Repeat for the top half of the joint mould.
32. Secure the two halves of the joint mould together by fitting the metal clips adjacent to the cable entries and the edge strips along the flanges.

33. Pack dry sand firmly underneath the joint mould up to the cable entries.
34. Cut off the tops of the air bleeders located at each end of the top half of the joint mould.
35. Mix the compound in accordance with the instruction provided with the compound.
36. Pour the compound STEADILY into the joint through one of the filling holes as long as possible before switching to the other filling hole. Note: Each bucket must be mixed and poured immediately following the previous bucket.
37. Pour the final bucket through both filling holes until the joint is full.
38. Fit the plastic lids over the filling holes once the joint mould is completely full.



39. Allow 2 hours for the resin to harden before back filling and energising the cables.

IMPORTANT NOTE:

YOU MUST ENSURE THAT A BURIED JOINT IS SURROUNDED WITH SOFT BEDDING MATERIAL TO A DEPTH OF 100MM ABOVE THE JOINT.

DISCARD THIS INSTRUCTION ONCE THE JOINT IS COMPLETE.