

Serving the Midlands, South West and Wales Gwasanaethu Canolbarth a De Orllewin Lloegr a Chymru

Company Directive

STANDARD TECHNIQUE: CA1H/6

Relating to the Procedures for Making Low Voltage Mains Cable Disconnecting Boxes

This Standard Technique document contains all the approved LV Mains Cable Link Disconnecting Boxes, which shall be implemented in conjunction with the appropriate General Requirements contained in ST: CA1C.

This ST has not been written as a training document. It is not intended to be exhaustive in content and you must refer to your supervisor if you require training or instruction.

You shall work safely and skilfully, utilising the training/instruction you have already received, relating to the contents of this document and its cross-references.

You must make sure that you understand your job instructions and that you have the necessary tools and equipment for the job.

Author: Richard Summers

Implementation Date: June 2017

Policy Manager

Date: 8 June 2017

NOTE: The current version of this document is stored in the WPD Corporate Information Database. Any other copy in electronic or printed format may be out of date.

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Approved by

IMPLEMENTATION PLAN

Introduction

This Standard Technique has been updated to remove the Tyco pre-filled Linkbox and replace it with the Sicame Mk3 Linkbox.

Main Changes

Jointing Procedure 7.507 replaced.

Impact of Changes

No major impact. Midland Jointers to be made aware of the change via team meetings.

Implementation Actions

Distribution Managers and Team Managers shall brief their teams on the contents of this policy to the relevant staff.

Implementation Timetable

May/June 2017 dependent upon usage of old stocks in the Midlands area.

Document Revision & Review Table			
Date	Comments	Author	
June 2017	Jointing Procedure 7.507 replace with Sicame Mk3 Linkbox	Richard Summers	
June 2014	 Jointing Procedure 7.507 revised Option for solvent wipes included	Richard Summers	

ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

INTRODUCTION

This Standard Technique document contains all the approved LV Mains Cable Link Disconnecting Boxes, which shall be implemented in conjunction with the appropriate General Requirements contained in ST: CA1C/7, including: -

- 1. General Cleanliness and Accident Prevention
- 2. General Jointing Procedures Dead Cables
- 3. General Jointing Procedures and Safety Precautions Live Cables

Note: - Resin encapsulated joints must not be broken down.

If the need arises to undertake a Mains Link Disconnection Box configuration (i.e. non-standard) not covered within this Standard Technique the Policy Manager, Avonbank, is to be consulted.

The Jointing Procedures covered within this Standard Technique are for PRYSMIAN LDB's only where by they can be undertaken using Live techniques.

Notes: -

- a) Consac cables SHALL NOT be terminated into Link Disconnection Boxes.
- b) A combination of PILC and 4 core Wavecon cables may be used within 2 & 4 way Prysmian LDB's, where this need arises then a combination of Jointing Procedures is to be used for material selection and construction of the LDB.

CONTENTS

- 7.501 Three Core Wavecon 2 Way LDB (Prysmian)
- 7.502 Three Core Wavecon 4 Way LDB (Prysmian)
- 7.503 Four Core Wavecon 2 Way LDB (Prysmian)
- 7.504 Four Core Wavecon 4 Way LDB (Prysmian)
- 7.505 PILC 2 Way LDB (Prysmian)
- 7.506 PILC 4 Way LDB (Prysmian)
- 7.507 Three Core Wavecon 2 and 4 Way LDB (Sicame)



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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.501

THREE CORE WAVECON MAINS CABLE TWO WAY PRYSMIAN LINK DISCONNECTING BOX

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7 Section 6 Pt 1 of the LV Jointing Manual

MATERIALS LIST

CABLE SIZE – 185/300 Three Core Wavecon

Item	Quantity
Link Box Complete	1
Resin	24 Litres
Copper Earth Tail LVCU 1700/5	2
Connectors UST 300	8
Connector BCNE 3	2
External Neutral/Earth Kit (where required)) 1
Earth Rod	1
Connector 70mm ² Line Tap	2

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape
Sealing putty
Cable ties
16 swg tinned copper wire
PVC tape
Denso tape
De-solvit 1000FD
Workhorse dry wipes
LV Cable wipes

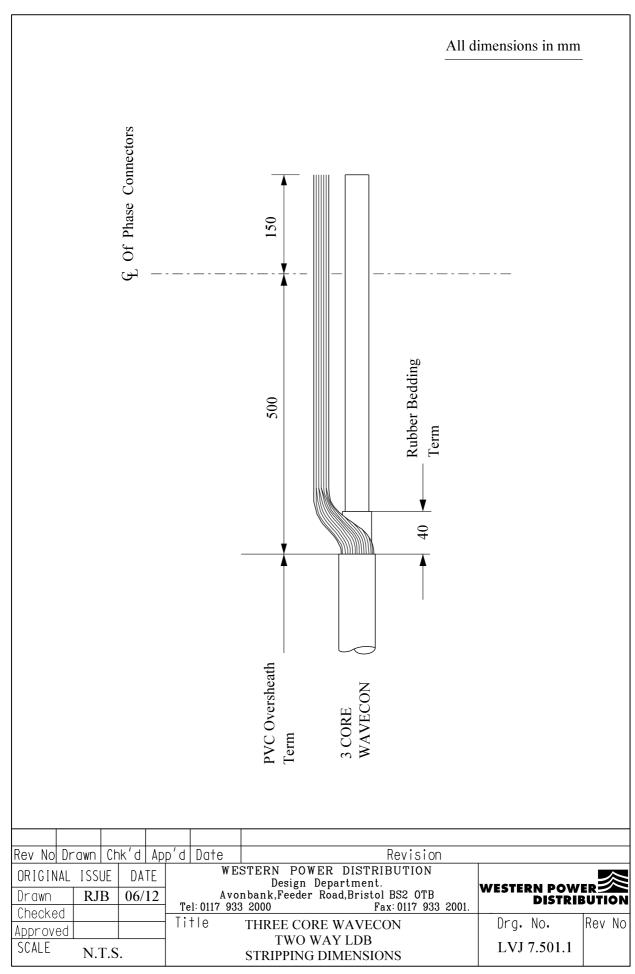
Note: - Individual material item numbers (SHOPS) are to be found in Section $4-Part\ I$ of the LV Mains Jointing Manual.

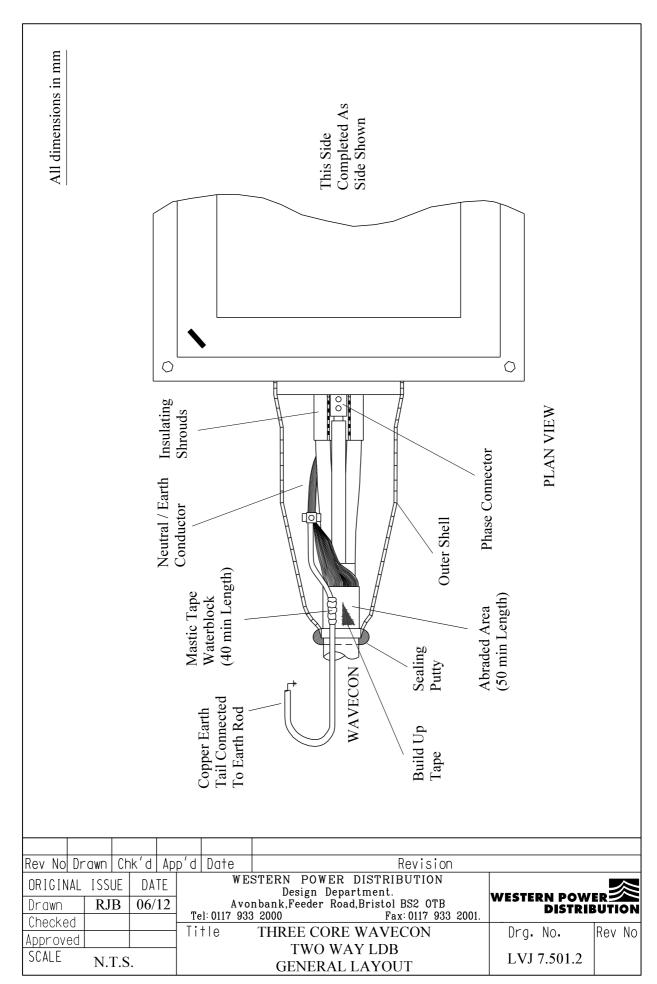
Actions

General Requirements (ST: CA1C/7)

Refer to Drawing LVJ 7.501.1	and LVJ	7.501.2	whilst	undertaking	this	Jointing
Procedure						

1.	Set and mark cables.	4
2.	Open, prove and cut cable.	14
3.	Set up Link Box bottom chamber on plinth.	41
4.	Prepare neutral/earth wires for jointing.	8
5.	Set cores in joint position.	27
6.	Make and insulate neutral / earth connection.	29/30
7.	Connect copper earth tail to earth rod and neutral / earth wires, remove temporary PME earth applied in 2.	29
8.	Apply temporary shrouding.	21/41
9.	Make and insulate phase connections.	29/30
10.	Remove temporary shrouding applied in 8.	
11.	Form neutral/earth wires into their final position.	
12.	Abrade and build up cable sheaths.	32
13.	Thoroughly degrease the joint.	35
14.	Apply mastic water block to copper earth tail.	33
15.	Remove temporary binders and temporary shrouding applied in 7.	
16.	Prepare and fit shell, ensuring 15mm clearance.	36
17.	Mix and pour resin.	36
18.	Complete link box.	41







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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.502

THREE CORE WAVECON MAINS CABLE FOUR WAY PRYSMIAN LINK DISCONNECTING BOX

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7 Section 6 Pt 1 of the LV Jointing Manual

MATERIALS LIST

CABLE SIZE – 185/300 Three Core Wavecon

Item	Quantity
Link Box Complete	1
Resin	48 Litres
Copper Earth Tail LVCU 1700/5	2
Connectors UST 300	16
Connector BCNE 3	2
External Neutral/Earth Kit (where required)	1
Earth Rod	1
Connector 70mm ² Line Tap	2

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape
Sealing putty
Cable ties
16 swg tinned copper wire
PVC tape
Denso tape
De-solvit 1000FD
Workhorse dry wipes
LV Cable wipes

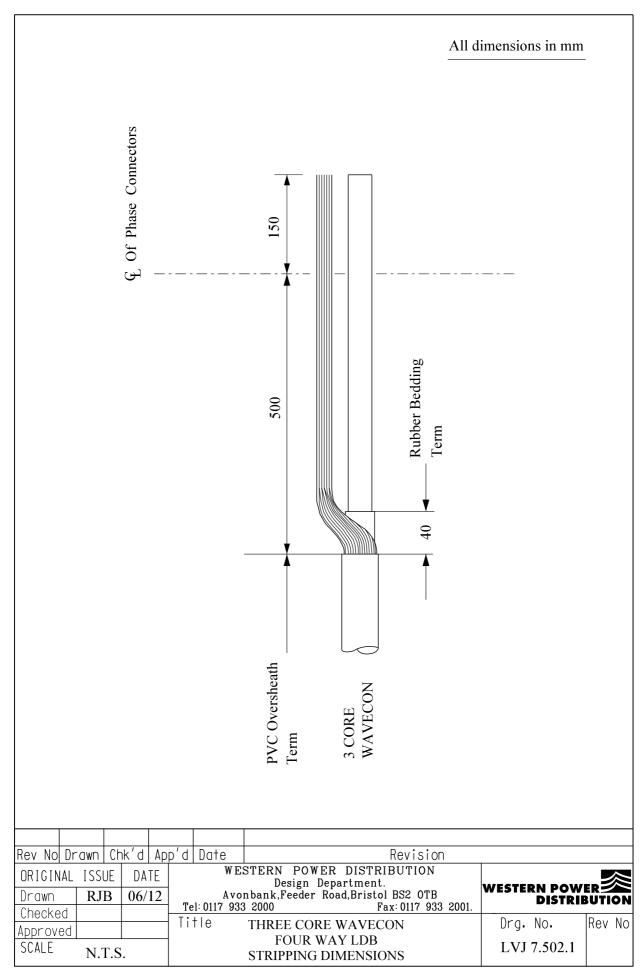
Note: - Individual material item numbers (SHOPS) are to be found in Section $4-Part\ I$ of the LV Mains Jointing Manual.

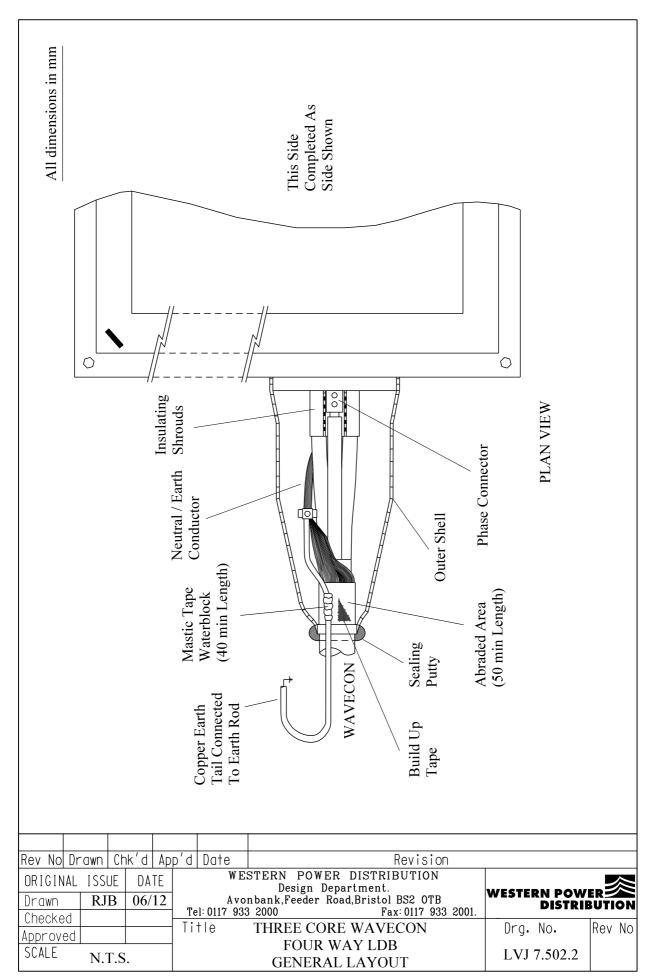
Actions

General Requirements (ST: CA1C/7)

Refer to Drawing LVJ 7.502.1 and LVJ 7.502.2 whilst undertaking this Jointing Procedure

1.	Set and mark cables.	4
2.	Open, prove and cut cable.	14
3.	Set up Link Box bottom chamber on plinth.	41
4.	Prepare neutral/earth wires for jointing.	8
5.	Set cores in joint position.	27
6.	Make and insulate neutral / earth connection.	29/30
7.	Connect copper earth tail to earth rod and neutral / earth wires, remove temporary PME earth applied in 2.	29
8.	Apply temporary shrouding.	21/41
9.	Make and insulate phase connections.	29/30
10.	Remove temporary shrouding applied in 8.	
11.	Form neutral/earth wires into their final position.	
12.	Abrade and build up cable sheaths.	32
13.	Thoroughly degrease the joint.	35
14.	Apply mastic water block to copper earth tail.	33
15.	Remove temporary binders and temporary shrouding applied in 7.	
16.	Prepare and fit shell, ensuring 15mm clearance.	36
17.	Mix and pour resin.	36
18.	Complete link box.	41







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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.503

FOUR CORE WAVECON MAINS CABLE TWO WAY PRYSMIAN LINK DISCONNECTING BOX

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7 Section 6 Pt 1 of the LV Jointing Manual

MATERIALS LIST

CABLE SIZE – 185/300 Four Core Wavecon

Item	Quantity
Link Box Complete	1
Resin	26 Litres
Copper Earth Tail LVCU 1700/5	2
Connectors UST 300	8
Connector BCNE 3	2
External Earth Kit U8208004	1
Earth Rod	1
Connector 70mm ² Line Tap	2

Note: - The single shells supplied with the LDB are discarded.

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape
Sealing putty
Cable ties
16 swg tinned copper wire
PVC tape
Denso tape
De-solvit 1000FD
Workhorse dry wipes
LV Cable wipes

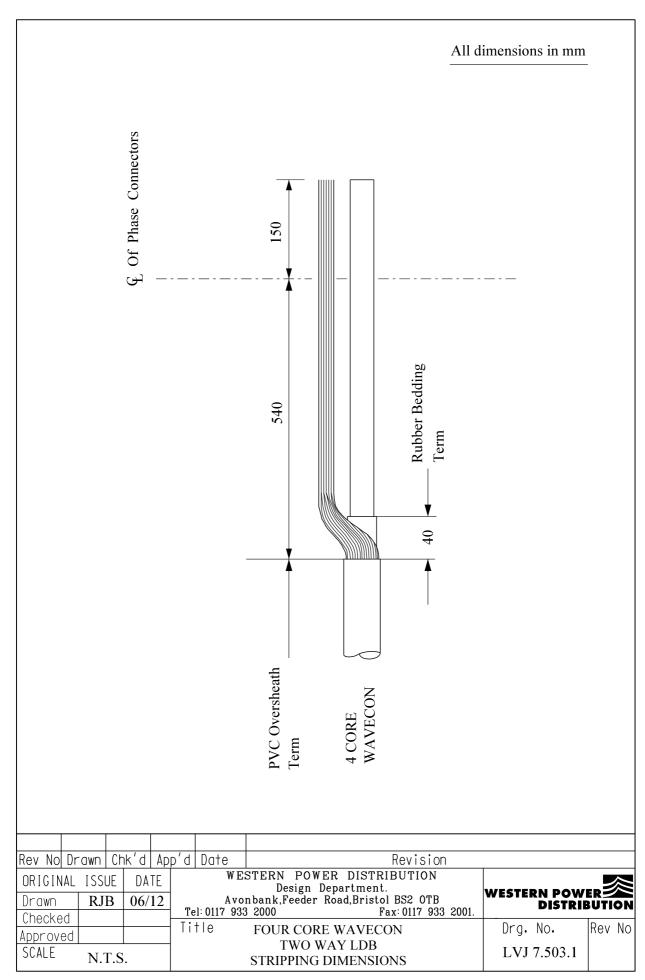
Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part I of the LV Mains Jointing Manual.

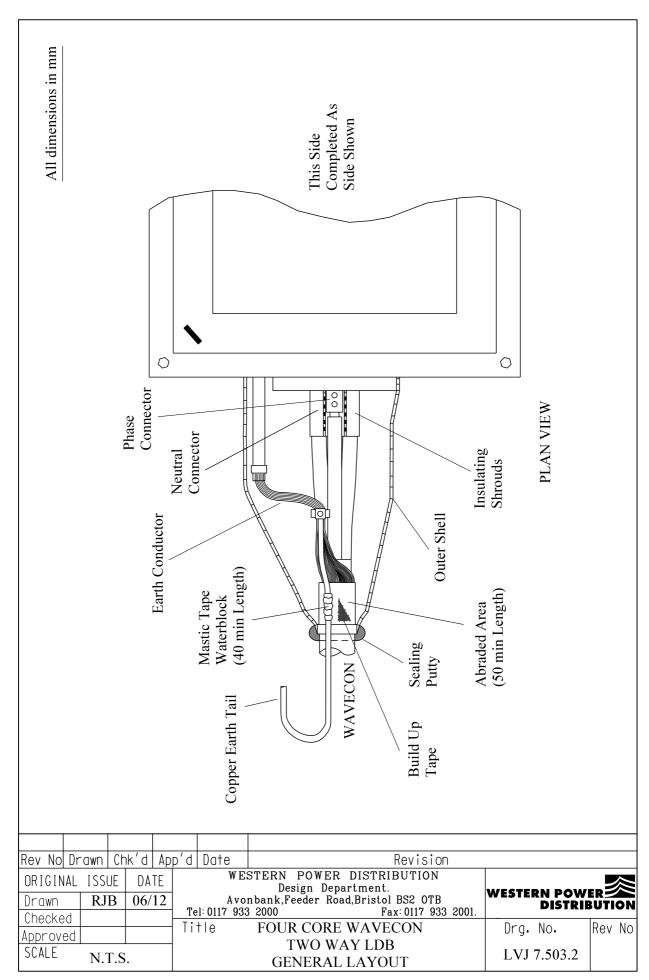
Actions

General Requirements (ST: CA1C/7)

Refer to Drawing LVJ 7.503.1 and LVJ 7.503.2 whilst undertaking this Jointing Procedure

1.	Set and mark cables.	4
2.	Open, prove and cut cable.	14
3.	Set up Link Box bottom chamber on plinth.	41
4.	Prepare neutral/earth wires for jointing.	8
5.	Set cores in joint position.	27
6.	Connect earth wires including copper earth tail.	29
7.	Apply temporary shrouding.	21/41
8.	Make and insulate neutral connection.	29/30
9	Make and insulate phase connections.	29/30
10.	Remove temporary shrouding applied in 7.	
11.	Form earth wires into their final position.	
12.	Abrade and build up cable sheath.	32
13.	Thoroughly degrease the joint.	35
14.	Apply mastic water block to copper earth tail.	33
15.	Remove temporary binders.	
16.	Prepare and fit shell, ensuring 10mm clearance.	36
17.	Mix and pour resin.	36
18.	Complete link box.	41







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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.504

FOUR CORE WAVECON MAINS CABLE FOUR WAY PRYSMIAN LINK DISCONNECTING BOX

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7 Section 6 Pt 1 of the LV Jointing Manual

MATERIALS LIST

CABLE SIZE – 185/300 Four Core Wavecon

Item	Quantity
Link Box Complete	1
Resin	56 Litres
Copper Earth Tail LVCU 1700/5	2
Connectors UST 300	16
Connectors BCNE 3	2
External Earth Kit U8208005	1
Earth Rod	1
Connector 70mm ² Line Tap	2

Note: - The single shells supplied with the LDB are discarded.

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape
Sealing putty
Cable ties
16 swg tinned copper wire
PVC tape
Denso tape
De-solvit 1000FD
Workhorse dry wipes
LV Cable wipes

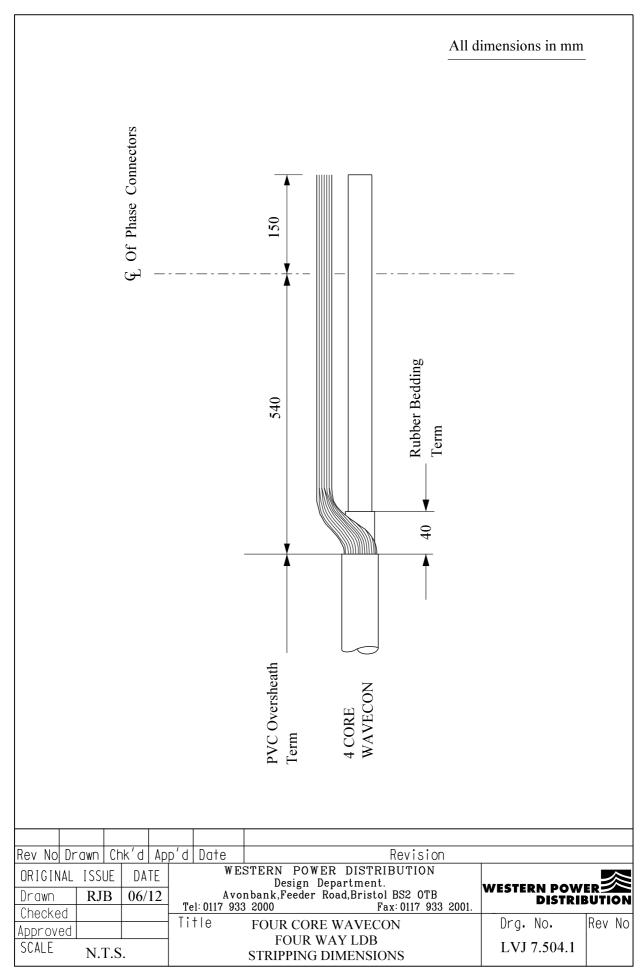
Note: - Individual material item numbers (SHOPS) are to be found in Section 4 - Part I of the LV Mains Jointing Manual.

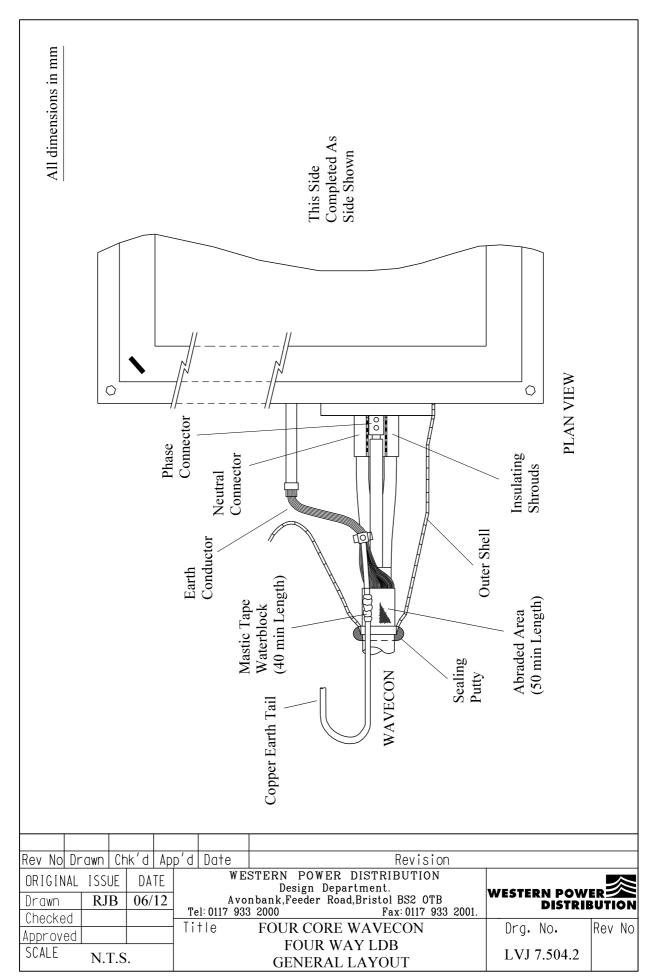
Actions

General Requirements (ST: CA1C/7)

Refer to Drawing **LVJ 7.504.1 and LVJ 7.504.2** whilst undertaking this Jointing Procedure

1.	Set and mark cables.	4
2.	Open, prove and cut cable.	14
3.	Set up Link Box bottom chamber on plinth.	41
4.	Prepare neutral/earth wires for jointing.	8
5.	Set cores in joint position.	27
6.	Connect earth wires including copper earth tail.	29
7.	Apply temporary shrouding.	21/41
8.	Make and insulate neutral connection.	29/30
9	Make and insulate phase connections.	29/30
10.	Remove temporary shrouding applied in 7.	
11.	Form earth wires into their final position.	
12.	Abrade and build up cable sheath.	32
13.	Thoroughly degrease the joint.	35
14.	Apply mastic water block to copper earth tail.	33
15.	Remove temporary binders.	
16.	Prepare and fit shell, ensuring 10mm clearance.	36
17.	Mix and pour resin.	36
18.	Complete link box.	41







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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.505

FOUR CORE PILC MAINS CABLE TWO WAY PRYSMIAN LINK DISCONNECTING BOX

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7 Section 6 Pt 1 of the LV Jointing Manual

MATERIALS LIST

CABLE SIZE - 185/300 PILC

Quantity
1
26 Litres
2
2
8
2
1

Note: - The single shells supplied with the LDB are discarded.

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape
Sealing putty
Cable ties
16 swg tinned copper wire
PVC tape
Denso tape
De-solvit 1000FD
Workhorse dry wipes
LV Cable wipes

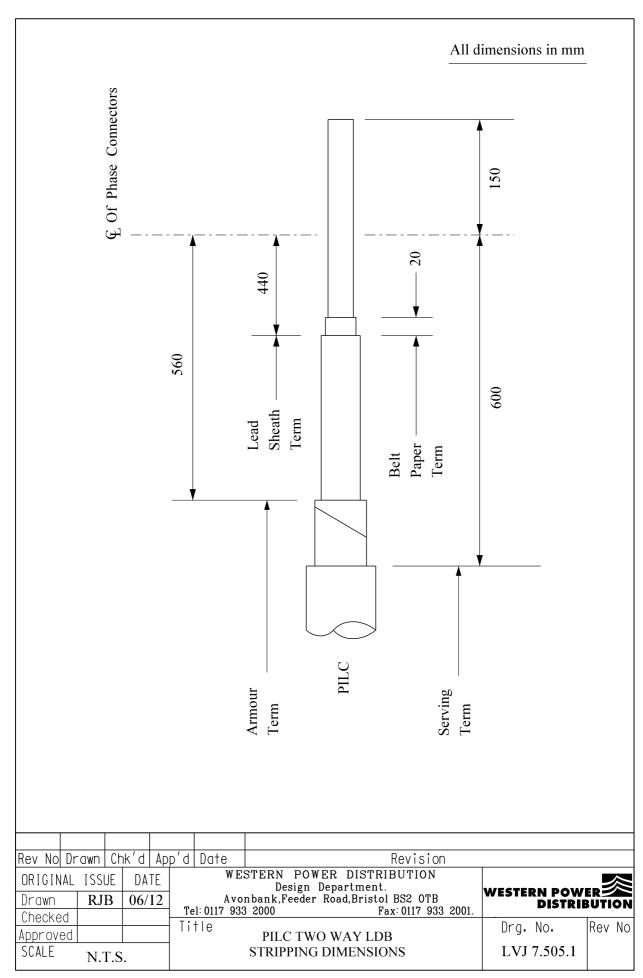
Note: - Individual material item numbers (SHOPS) are to be found in Section $4-Part\ I$ of the LV Mains Jointing Manual.

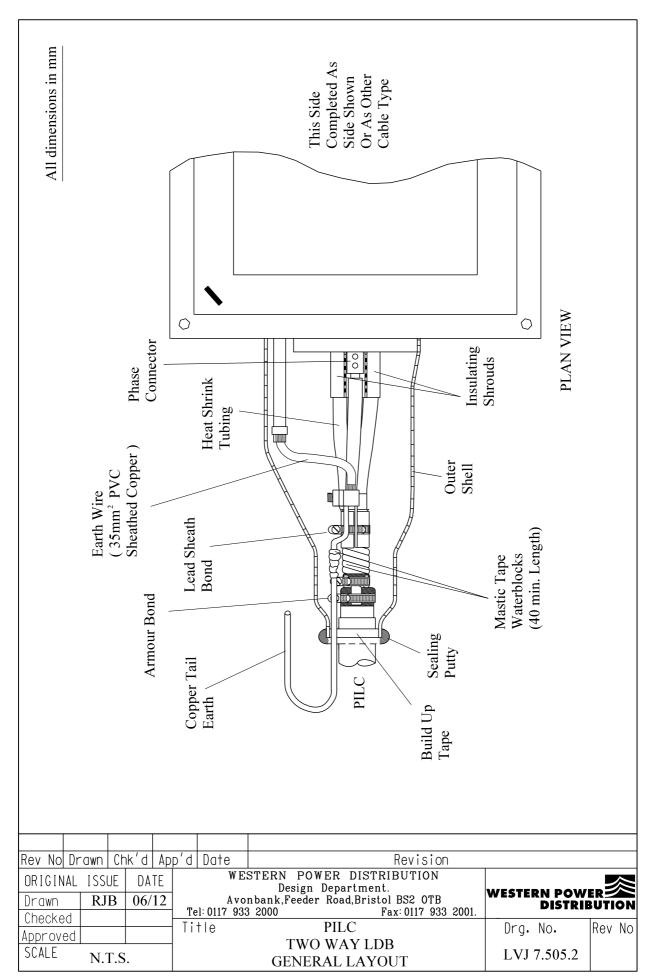
Actions

General Requirements (ST: CA1C/7)

Refer to Drawing **LVJ 7.505.1 and LVJ 7.505.2** whilst undertaking this Jointing Procedure

1.	Set up and mark cables.	4
2.	Open and cut the cable.	16
3.	Set up Link Box bottom chamber on plinth.	41
4.	Carry out moisture test.	19
5.	Apply core protection.	25
6.	Apply armour bond.	22
7.	Apply lead sheath bond.	23
8.	Set cores in joint position.	27
9.	Connect a 35mm ² earth wire between lead sheath bond and earth bar also connect copper earth tail.	23
10.	Apply temporary shrouding.	21
11.	Make and insulate neutral connection.	29/30
12.	Make and insulate phase connections.	29/30
13.	Remove temporary shrouding applied in 10.	
14.	Abrade and build up oversheaths.	32
15.	Thoroughly degrease the joint.	35
16.	Apply mastic water blocks to lead sheath and copper earth tail.	33
17.	Remove temporary binders.	
18.	Prepare and fit shell ensuring 10mm clearance.	36
19.	Mix and pour resin	36
20.	Complete Link Box.	41







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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.506

FOUR CORE PILC MAINS CABLE FOUR WAY PRYSMIAN LINK DISCONNECTING BOX

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7 Section 6 Pt 1 of the LV Jointing Manual

MATERIALS LIST

CABLE SIZE - 185/300 PILC

Item	Quantity
Link Box Complete	1
Resin	56 Lts
Earth bond LVEB 08	2 (Quantity depends upon cable combination)
Connectors UST 300	16
Copper Earth Tail LVCU 1700/5	2
External Earth Kit U8208005	1

Note: - The single shells supplied with the LDB are discarded.

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape
Sealing putty
Cable ties
16 swg tinned copper wire
PVC tape
Denso tape
De-solvit 1000FD
Workhorse dry wipes
LV Cable wipes

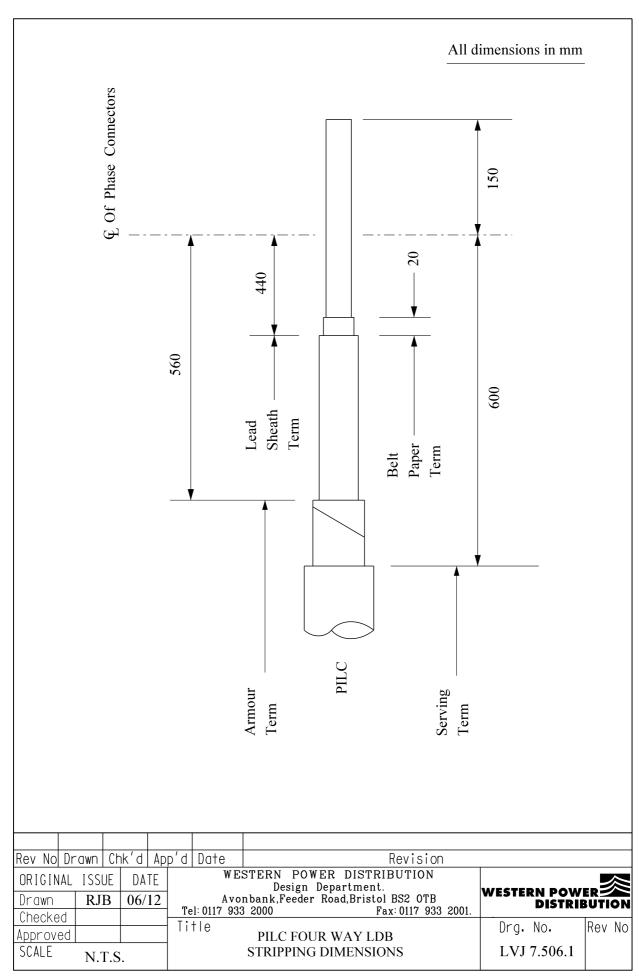
Note: - Individual material item numbers (SHOPS) are to be found in Section $4-Part\ I$ of the LV Jointing Manual.

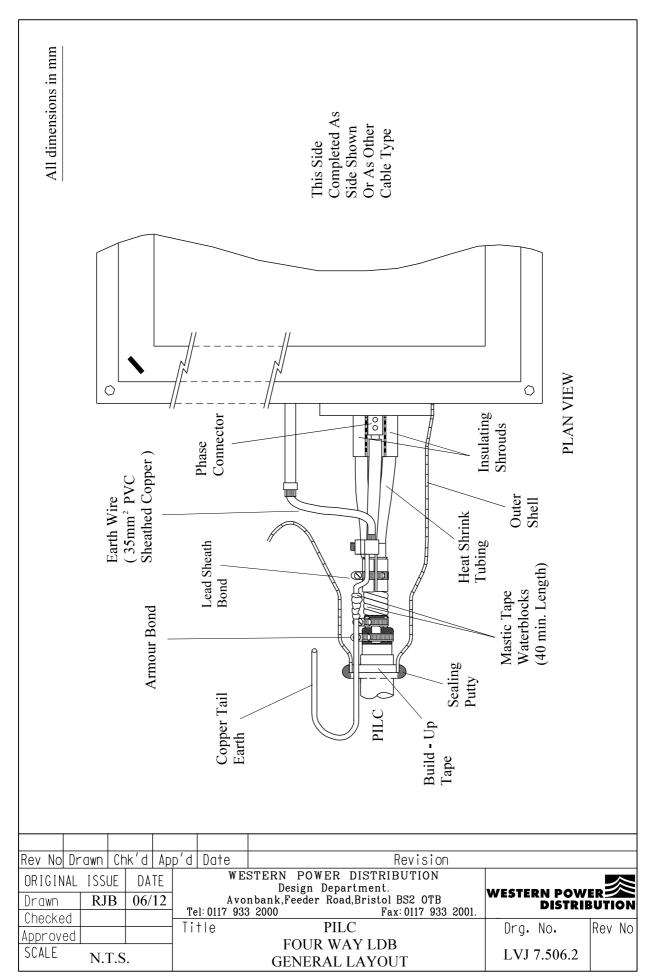
Actions

General Requirements (ST: CA1C/7)

Refer to Drawing LVJ 7.506.1 and LVJ 7.506.2 whilst undertaking this Jointing Procedure

1.	Set up and mark cables.	4
2.	Open and cut the cable.	16
3.	Set up Link Box bottom chamber on plinth.	41
4.	Carry out moisture test.	19
5.	Apply core protection.	25
6.	Apply armour bond.	22
7.	Apply lead sheath bond.	23
8.	Set cores in joint position.	27
9.	Connect a 35mm ² earth wire between lead sheath bond and earth bar also connect copper earth tail.	23
10.	Apply temporary shrouding.	21
11.	Make and insulate neutral connection.	29/30
12.	Make and insulate phase connections.	29/30
13.	Remove temporary shrouding applied in 10.	
14.	Abrade and build up oversheaths.	32
15.	Thoroughly degrease the joint.	35
16.	Apply mastic water blocks to lead sheath and copper earth tail.	33
17.	Remove temporary binders.	
18.	Prepare and fit shell ensuring 10mm clearance.	36
19.	Mix and pour resin	36
20.	Complete Link Box.	41







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ST: CA1H/6 PROCEDURES FOR MAKING LV MAINS CABLE LINK DISCONNECTING BOXES

JOINTING PROCEDURE 7.507

WAVECON MAINS CABLE SICAME LINK DISCONNECTING BOX (Mk3)

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/7

MATERIALS LIST

CABLE SIZE - 95/185/300 Wavecon

Item	Quantity
Link Box Complete 2 or 4 way Connector BCNE 3	1 1 per box
Earth Rod with Copper Tail LVCU 1700/5	1 per box

Resin	6.5ltr	5ltr		
2 Way	Supplied w	Supplied with box		
4 Way	Supplied w	ith box		

SNE Conversion Kit	E5 Code
2 Way	41792
4 Way	41793

ADDITIONAL ITEMS FOR EACH JOINT

Black cotton tape Sealing putty Cable ties 16 swg tinned copper wire PVC tape LV Cable wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section $4-Part\ I$ of the LV Jointing Manual.

SICAME LINK BOX PREPERATION

THE SET UP OF A 2 OR 4 WAY SICAME LINK DISCONNECTION BOX

The level of PPE required for this operation shall be in accordance with the matrix given in the General Requirement 3, also your attention to the Use of Solvents General Requirement 1.

It is important that the set-up of 2 and 4 way link disconnection boxes are level and the excavation depth is such that on completion there is sufficient adjustment that the pavement cover is level with the pavement surface.

Where the Linkbox is required within a SNE system the preferred option is to install 3 core Wavecon and convert the mains network up to that location to PME. When doing this an Earth Rod <u>MUST</u> be connected to the earth electrode at the link box (for more details please see TP21D).

GENERAL NOTES

These boxes are designed for the installation of Dead Waveform cables only. Under no circumstances shall these link boxes be jointed onto live or PILC cables.

EXCAVATION DEPTH AND PREPARATORY WORK

- 1. Excavate the joint bay to accommodate the box and to provide adequate working space.
- 2. Lay the support base on a level bed of sand at a depth of 560+- 10mm measured from the top of the support base to the top of the prepared footpath surface. Ensure all cables are parallel to ground level for 1 to 2 metres as they leave the Link Box. In poor ground conditions the plastic support base shall be laid on a bed of concrete to prevent movement during reinstatement.
- 3. Check for level using a spirit level provided.
- 4. Position the bottom shell and the precast centre section onto the levelled base plate.
- 5. Remove all links from the linkbox

RESIN

The Sicame Link Box comes supplied with 2 part resin (no added sand). This ensures that the resin will flow into all areas of the joint shells. **Do not heat the resin above 30°C** otherwise the resin will not flow correctly and will be prone to shrinkage and cracking at the moisture seals. As a general rule the resin should be in the shell 15min before it starts to set.

LINK BOX WEIGHTS

When installing link boxes consideration must be given to the weights of the components. On site risk assessment must be carried out and mechanical aids considered where required.

	Weight (KG)	
Part Description	2 Way	4 Way
Full Assembly	106	175.8
Support Base	16	20
Turret Assembly	16	20
Bell Cover	9	9(x4)
Box of Solid Links	1.4	2.5(x2)
3 Ring Enclosure	10.6	14.4
Galvanised Steel	6	8.4
Frame		
Concrete Cover	24	49

Actions

General Requirements (ST: CA1C/7)

Refer to Drawing LVJ 7.507.1 whilst undertaking this Jointing Procedure

1.	Set and mark cables.	4
2.	Open, prove and cut cable.	14
3.	Prepare neutral/earth wires for jointing.	8
4.	Set cores in joint position.	27
5.	Connect copper earth electrode to the earth rod.	34
6.	Make the neutral / earth connection incorporating the earth electrode where required (one per box) .	29
7.	Make phase connections	29
8.	Abrade and build up cable sheaths.	32
9.	Thoroughly degrease the joint.	35
10.	Apply mastic water block to copper earth tail.	33
11.	Remove temporary binders	
12.	Ensure that the turret assembly is seated correctly in the lower joint shell and has not been misaligned during the fitting of the phase and neutral cores	
13.	Prepare and fit shell, ensuring 15mm clearance.	36
14	Confirm that the polarity and phase rotation are correct before mixing and pouring the resin.	37
15.	Install links as required.	

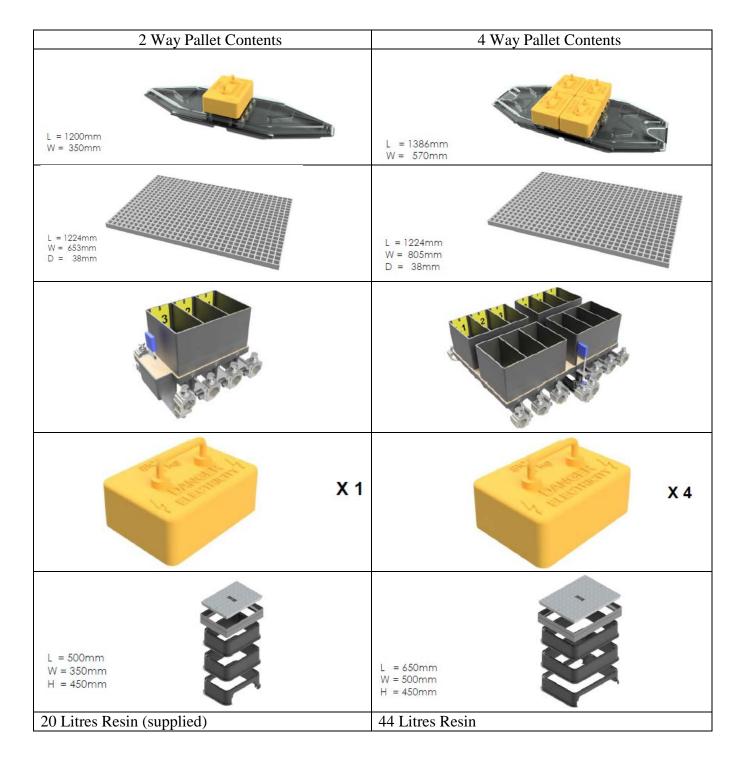
PAVEMENT ACCESS ASSEMBLY

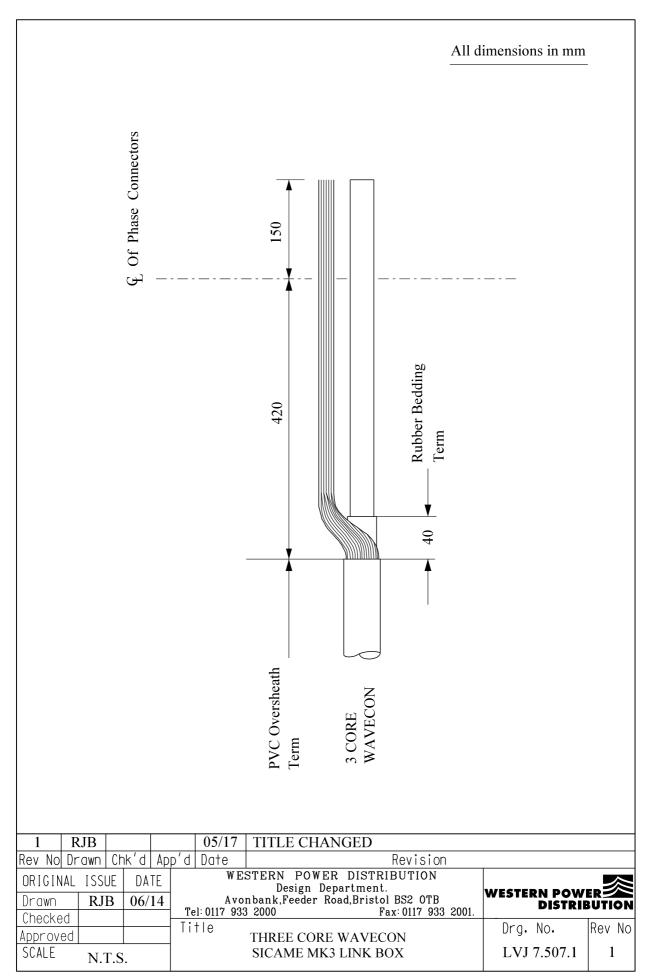
- 16. Centrally position the HDPE chamber assembly (3 rings) over the turret/joint shell and sit on the support base.
- 17. Fit the 8 x set screw assemblies (including square washer) into the pre-drilled holes on the upper ring.
- 18. Position the galvanized steel frame on top of the chamber locating on the set screw assemblies.

HEIGHT/LEVEL ADJUSTMENT

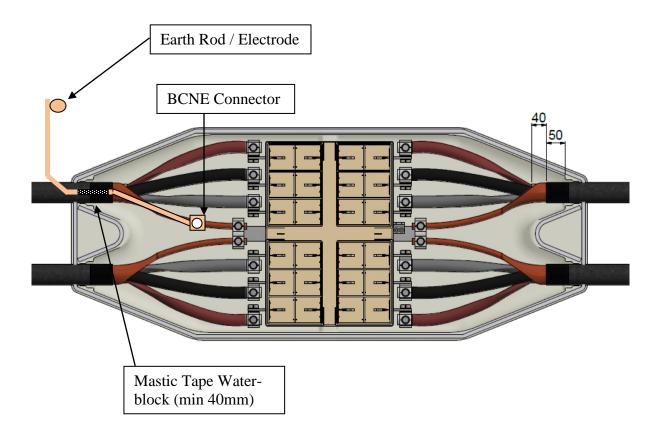
19. Set the height/level of the concrete cover and frame using the height adjustment assemblies ensuring that all 8 set screw assemblies are in contact with the steel frame.

IMPORTANT ... allow the resin to cure for a min of 2 hours before any further jointing work be carried out externally to the Link Box. Alternatively pour the joint resin and the link box at the same time.

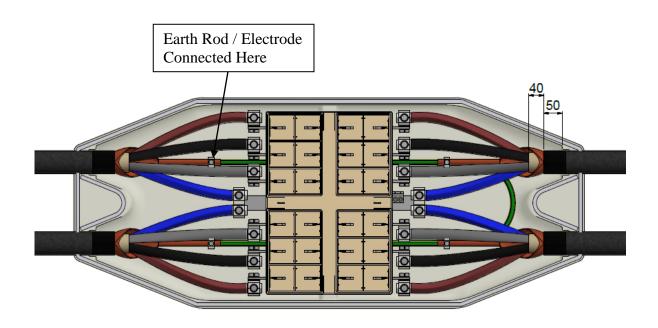




CNE Cable – General Arrangement (2 and 4 way)



SNE Cable – General Arrangement (2 and 4 way)



APPENDIX A

SUPERSEDED DOCUMENTATION

This Standard Technique supersedes ST:CA1H/5 dated July 2014 which should now be withdrawn.

APPENDIX B

ASSOCIATED DOCUMENTATION

ST: CA1A, ST: CA1D, ST: CA1W, ST: CA1Z, ST: CA1AA, ST: CA1E, ST: CA1F, ST: CA1G, ST: CA1H, ST: CA1I, ST: CA1U, ST: CA1Y, ST: CA7A.

APPENDIX C

IMPACT ON COMPANY POLICY

None, as this document has just been updated to incorporate the latest ST: HS8H and other minor changes.

APPENDIX D

IMPLEMENTATION OF POLICY

This Standard Technique shall be communicated to all relevant WPD engineers and site staff at the next Team Briefing by the Team Manager.

APPENDIX E

KEY WORDS

Link Boxes, LDB's, two way LDB, four way LDB.