WESTERN POWER DISTRIBUTION

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

Company Directive

STANDARD TECHNIQUE: CA1G/6

Relating to the Procedures for Making Low Voltage Mains Cable Terminations

This Standard Technique document contains all the approved mains cable terminations, 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 2014**
Approved by	
	Policy Manager
Date:	3 June 2014

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IMPLEMENTATION PLAN

Introduction

This document replaces the existing version, ST:CA1G/5 and reflects the change to a Lucy Isolatable LV CT Metering Panel / Cut-out.

Main Changes

This document provides details for the installation and testing of the Lucy Isolatable LV CT Metering Panel / Cut-out (7.404).

Impact of Changes

The Lucy Isolatable LV CT Metering Panel / Cut-out will be the preferred option for heavy duty LV supplies.

Implementation Actions

- All staff responsible for installing these units to be briefed by their Team Managers on the installation and testing of these units issued with this document
- All paper manuals to be updated.
- General Requirement 44 (ST:CA1C/4) to be removed from Manuals

Implementation Timetable

Immediate

Document Revision & Review Table		
Date	**Comments**	**Author**
June 2014	• Jointing Procedure 7.409 removed • Jointing Procedure 7.404 revised	Richard Summers
May 2013	• Jointing Procedure 7.403 revised • Option for solvent wipes included	Richard Summers

ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

INTRODUCTION

This Standard Technique document contains all the approved mains cable terminations, which shall be implemented in conjunction with the appropriate General Requirements contained in ST: CA1C, including: -

1. General Cleanliness and Accident Prevention

2. General Jointing Procedures – Dead Cables

3. General Jointing Procedures and Safety Precautions – Live Cables

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

The following Jointing Procedures shall only be applied to the termination of **dead cables** in accordance with POL: OS1.

CONTENTS

Note 1: - Jointing Procedures 7.402 and 7.406 Indoor Termination covers, Indoor Fuseboards, Pillars, Fuse Cabinets and other situations protected from the weather.

Note 2: - Jointing Procedures 7.405 and 7.4010 Outdoor Terminations covers Overhead Open Wire, ABC and Pole Mounted Fuses.

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.401

THREE CORE WAVECON MAINS CABLE 200/400/600A CUT-OUT TERMINATION

FOR DEAD CABLES ONLY

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/4 Section 6 Part 1 of the LV Jointing Manual

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JOINTING PROCEDURE 7.401

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	**Quantity**
200A Cut-out	1
Lugs LVET 120-12	3
Lug BET 60-12	1

185 Wavecon

400A Cut-out	1

300 Wavecon

600A Cut-out	1

ADDITIONAL ITEMS FOR EACH TERMINATION

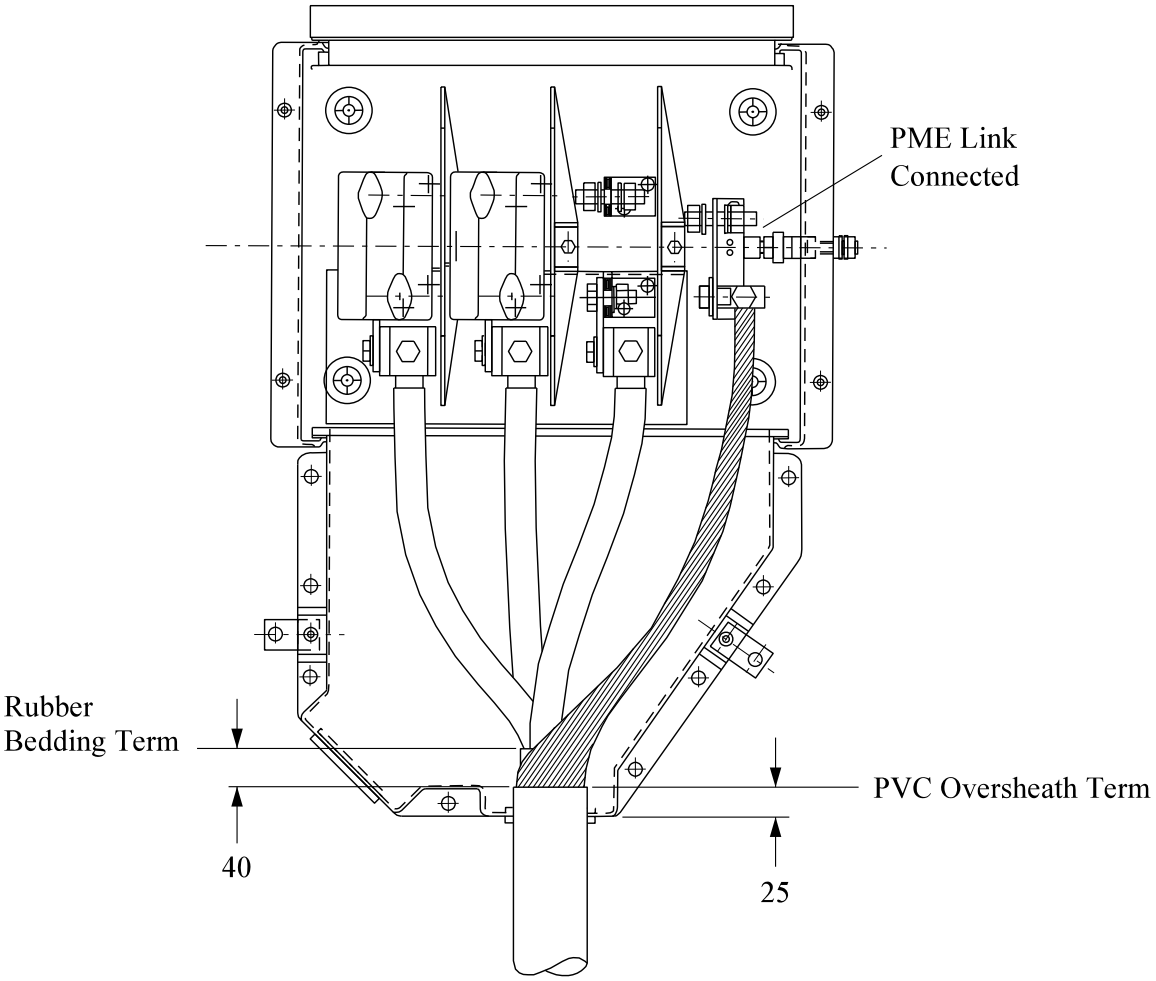
Cable ties
16 swg Tinned copper wire
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.401

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **LVJ 7.401.1** whilst undertaking this Jointing Procedure	
1.	Open and prove cable **dead**	14
2.	Fix cut-out in position	--
3.	Set and mark cables, cut cable to length (100mm above termination position).	--
4.	Remove PVC oversheath	6
5.	Prepare the neutral/earth wires for jointing	8
6.	Remove rubber bedding	9
7.	Set phase cores and neutral/earth wires in position	--
8.	Cut and connect neutral/wires	29
9.	Cut and connect phase conductors in turn	29
10.	Remove all temporary binders	--
11.	Replace covers and seal	--

All dimensions in mm



Rev No	Drawn	Chk'd	App'd	Date	Revision

ORIGINAL ISSUE		DATE	WESTERN POWER DISTRIBUTION Design Department. Avonbank,Feeder Road,Bristol BS2 0TB Tel: 0117 933 2000 Fax: 0117 933 2001.	WESTERN POWER DISTRIBUTION
Drawn	RJB	05/13		
Checked				
Approved				
SCALE	N.T.S.		Title: THREE CORE WAVECON HEAVY DUTY CUTOUT TERMINATION GENERAL LAYOUT	Drg. No. LVJ 7.401.1 / Rev No

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.402

THREE CORE WAVECON MAINS CABLE INDOOR TERMINATION

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.402

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	**Quantity**
Lugs LVET 120-12	3
Lug BET 60-12	1

185 Wavecon

Lugs LVET 185-12	3
Lug BET 120-12	1

300 Wavecon

Lugs LVET 300-12	3
Lug BET 120-12	1

ADDITIONAL ITEMS FOR EACH TERMINATION

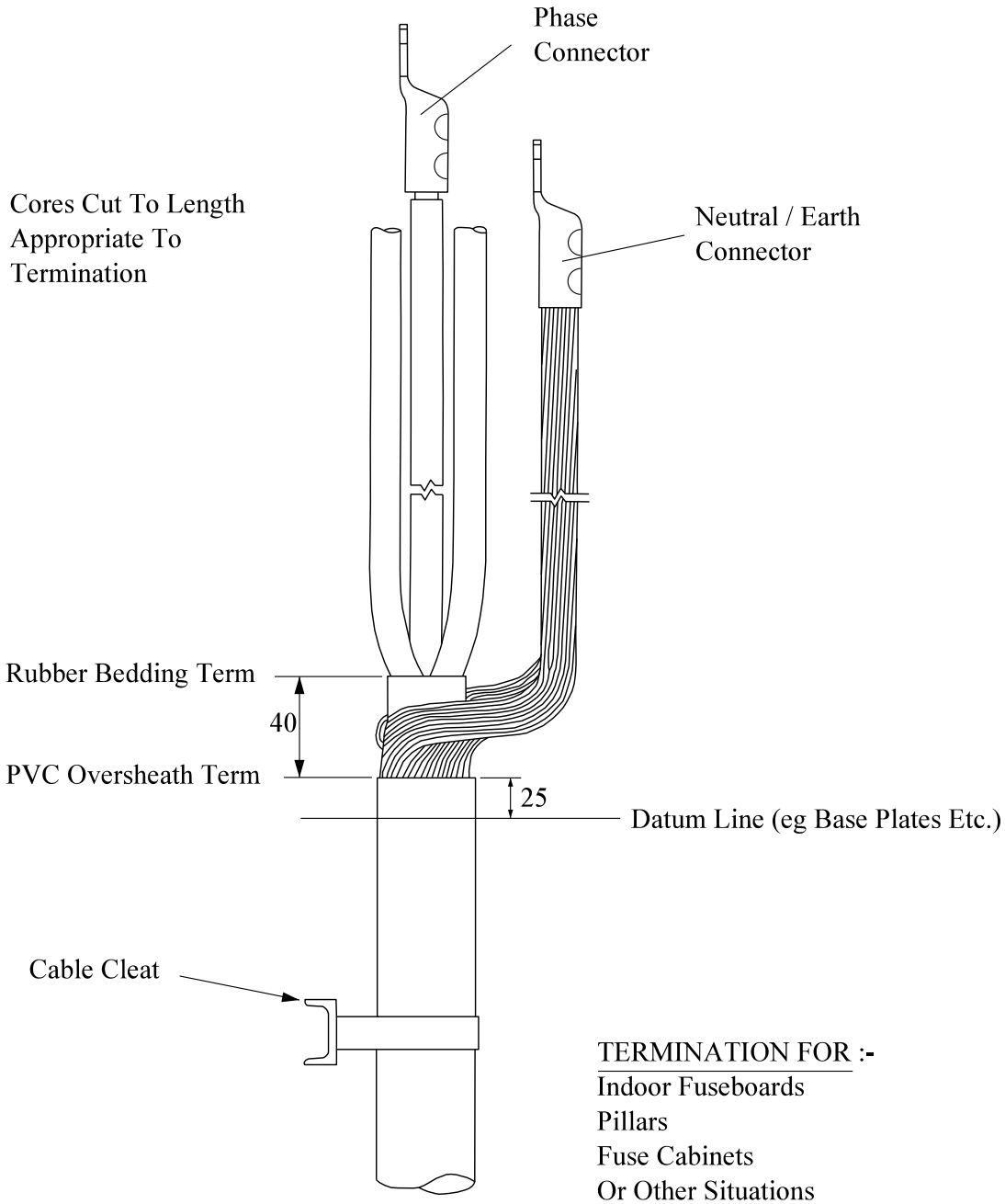
Cable ties
16 swg tinned copper wire
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.402

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **LVJ 7.402.1** whilst undertaking this Jointing Procedure	
1.	Open and prove cable **dead**	14
2.	Set and mark cable to length (100mm above termination position)	4
3.	Remove PVC oversheath	6
4.	Prepare the neutral/earth wires for jointing	8
5.	Remove rubber bedding	9
6.	Set phase cores and neutral/earth wires in position	--
7.	Cut and connect neutral/earth wires	29
8.	Cut and connect phase conductors in turn	29
9.	Remove all temporary binders	--

All dimensions in mm



TERMINATION FOR :-

Indoor Fuseboards
Pillars
Fuse Cabinets
Or Other Situations
Protected From The Weather

Rev No	Drawn	Chk'd	App'd	Date	Revision

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Drawn	RJB	05/13		
Checked				
Approved				
SCALE	N.T.S.		Title THREE CORE WAVECON INDOOR TERMINATION GENERAL LAYOUT	Drg. No. LVJ 7.402.1 / Rev No

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.403

THREE CORE WAVECON MAINS CABLE ISOLATABLE MULTI SERVICE DISTRIBUTION BOARDS (MSDB) 12, 18, 24 and 36 WAY LUCY

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.403

MATERIALS LIST

CABLE SIZE – 95 Wavecon 4c

Item	Quantity
Multiway Fuseboard	1
Mechanical Connectors	Supplied with the panel
Earth Connection BCNE	Supplied with the panel

185 Wavecon 4c

Multiway Fuseboard	1
Mechanical Connectors	Supplied with the panel
Earth Connection BCNE	Supplied with the panel

300 Wavecon 4c

Multiway Fuseboard	1
Mechanical Connectors	Supplied with the panel
Earth Connection BCNE	Supplied with the panel

ADDITIONAL ITEMS FOR EACH TERMINATION

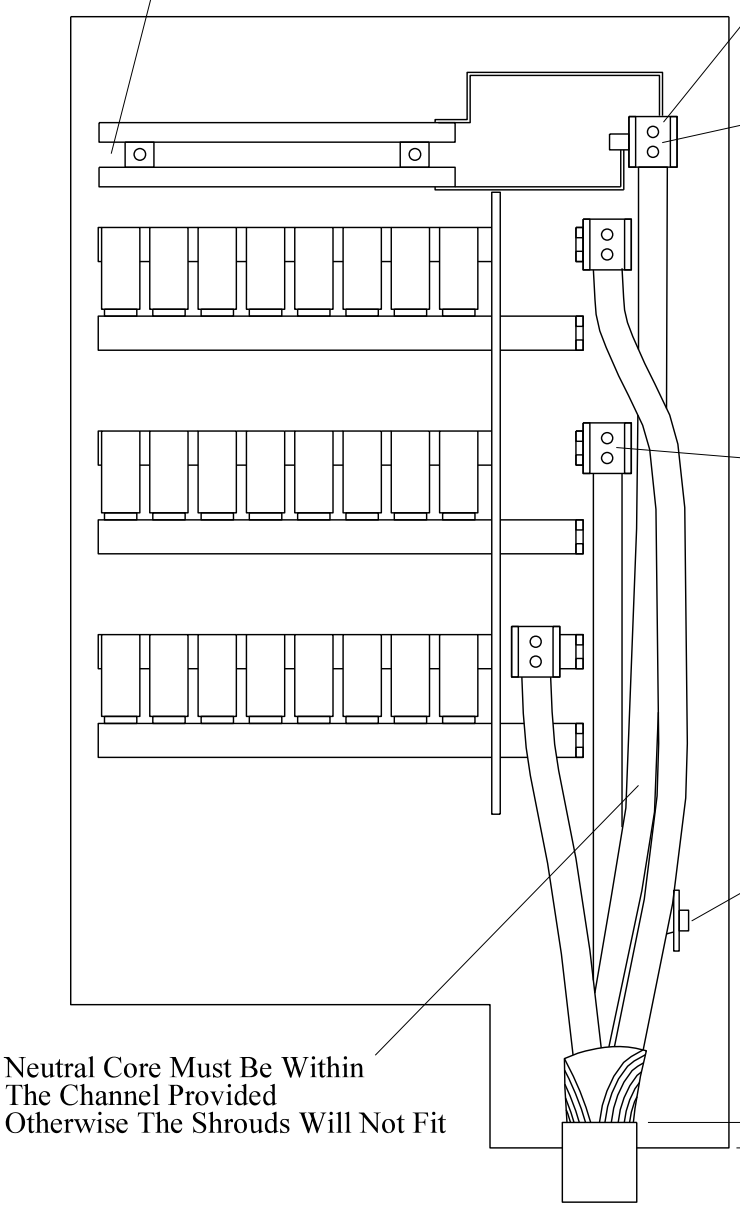
Cable ties
16 swg Tinned Copper Wire
Penetrox
De-solvit 1000FD
Workhorse dry / bucket wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.403

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **LVJ 7.403.1** whilst undertaking this Jointing Procedure	
1.	Open and prove cable **dead**	14
2.	Fix fuse board in position. (The doors and fuses can be removed to reduce weight).	
3.	Remove phase barriers and fuse bases	--
4.	Set and mark cable to length (200mm above termination position)	4
5.	Remove PVC oversheath	6
6.	Prepare the earth wires for jointing	8
7.	Remove rubber bedding	9
8.	Set phase / neutral cores and earth wires in their optimum position.	
	The neutral core MUST be within the cable channel otherwise the fuse shrouds will not fit – check before sheering the connections	--
9.	Cut and connect neutral/earth wires	29
10.	Cut and connect phase conductors in turn	29
11.	Remove all temporary binders	--
12.	Replace phase barriers, fuse bases, covers, test and seal	

All dimensions in mm



Rev No	Drawn	Chk'd	App'd	Date	Revision

ORIGINAL ISSUE		DATE
Drawn	RJB	05/13
Checked		
Approved		
SCALE	N.T.S.	

WESTERN POWER DISTRIBUTION
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WESTERN POWER DISTRIBUTION

Title: FOUR CORE WAVECON 12,18,24 AND 36 WAY MULTI SERVICE DISTRIBUTION BOARDS

Drg. No. LVJ 7.403.1

Rev No

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.404

THREE / FOUR CORE WAVECON MAINS CABLE ISOLATABLE LV CT METERING PANEL TERMINATION (INCLUDING TESTING AND COMMISSIONING)

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.404

MATERIALS LIST

CABLE SIZE – 95, 185 + 300mm^2 3c or 4c Wavecon

Item	Quantity
LV CT Metering Panel (200A, 400A or 600A)	1

ADDITIONAL ITEMS FOR EACH TERMINATION

J type fuses
Fixing bolts
Cable ties
16 swg Tinned Copper Wire
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes
Volt Meter
Continuity/Insulation Resistance Tester
Earth Fault Loop Impedance Tester
Test Lamp
Proving Unit
Phase Rotation Meter

To enable the installation and commissioning of the LVCT metering panel the following instruments from the Procurement Approved List, shall be supplied to the Jointer: -

An Earth Loop Impedance tester includes 10A fuse leads.
Continuity/Insulation resistance tester 500mA leads.
Kyoritsu safety phase rotation indicator with insulated clips (preferred) or other approved phase rotator with three insulated prods.
Volt meter.
Proving Unit.
Test Lamp.

Note: - Individual material item numbers (E5) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

ISOLATABLE LV CT METERING PANEL

Before commencing the level of PPE required for this complete operation shall be as the matrix given in General Requirement 3, also your attention is drawn to the Use of Solvents General Requirement 1.

ALL cables must be assumed to be live unless proved dead by means of an approved voltage device.

Attention is drawn to the following: -

General Requirement 3 "General Jointing Procedures and Safety Precautions – Live Cables."

General Requirement 20 "Temporary Earthing of Neutral/Earth Conductors in Live LV Cables during Jointing."

Before undertaking any Isolatable LV CT Metering Panel installation all the work required and the safety considerations shall be evaluated. A risk assessment shall form an integral component of the application of these techniques. All significant risks shall be recorded.

The following tests are to be undertaken in accordance with their relevant Standard Techniques: - Polarity ST: OS10F, Phase Rotation ST: MI13K, ST: OS8A – Selection of Approved Voltage Testing Devices. ST: OS8B – Use, Storage and Transport of Approved Voltage Testing Devices. ST: OS8C – Maintenance of Approved Voltage Testing Devices. POL: TP13 - The Calibration of Electrical Test Equipment., Earth Loop Impedance ST: NC5A and Required Inspections and Tests of an LV Service ST: NC5A, also General Requirement 7.

1. Scope of Work

To undertake the complete installation of the LV CT Metering Panel. Once the installation is complete there is a requirement on the Jointer to record the LV CT Metering Panel installation information and complete the commissioning form and Commissioning Check List which will then be entered into CROWN by the Team Support. The plastic type LV CT Metering Panel can be converted to PME (TNCS), SNE (TNS) or TT.

2. Planning

When a new 200A, 400A or 600A supply is requested by a customer a fully insulated combined Cut-out/ LV CT Metering Panel will be offered. This will require the Planner to identify the size of LV CT Metering Panel that is required, as these come in three sizes 200A, 400A and 600A. Firstly, the size of the LV CT Metering Panel the customer requires shall be provided. Secondly, the size of the fuse required i.e. 150A fuse, so that the Jointer can book the correct unit and fuses from the stores system, as the LV CT metering panel is supplied with NO FUSES fitted. In addition the Jointer shall be provided with a network plan which indicates the size and type of cable to be jointed to.

3 Completing The LV CT Metering Panel

Once the LV CT Metering Panel checks have been completed and prior to the Jointer leaving site the three loaded J Fuse carriers shall be put into a sealable waterproof bag and cable tied to the external earth stud, the Jointer shall then seal the Cut-out section and fit a "Danger Live" and Caution "Point of Isolation" notice to the Cut-out.

On return to the Depot the Jointer shall hand over the completed commissioning form and Commissioning Check List to the Team Support so as all the necessary information can be entered in CROWN.
The customer's electrician is expected to terminate the customer's tails to the top of the CT busbars. Once connected, the customer or his electrician should request the supply to be energised.

Either the customer will appoint a Meter Operator directly, or the customer's supplier, who in turn will appoint a Meter Operator. The Meter Operator will install a meter.

The supplier can request the Meter Operator to energise the supply, who can do this if his operative is authorised by WPD. If he cannot, he should refer this back to the supplier to request WPD Distribution Business to energise the supply.

If WPD is requested to energise the supply, by the supplier, the person energising shall check:-

a meter is installed
the customer's tails are connected and the correct size.
the installation complies with ST:NC5A.
the insulation barriers are correctly installed
the customer's main switch is off
an insulation test of the customers tails and earth has shown it safe to energise
the customer's installation (as far as one can see at the work position) appears to be complete, including earthing

If the checks are satisfactory, the person energising will remove the fuse carriers from the Wavecon termination section, check the fuses are the correct rating and correctly installed in the carrier, remove the red shrouds from the fuseways then place the red shrouds in the Wavecon termination section, and insert the fuses in the fuseways.

The person energising will remove any "Danger Live" and Caution "Point of Isolation" notices and seal all sections.

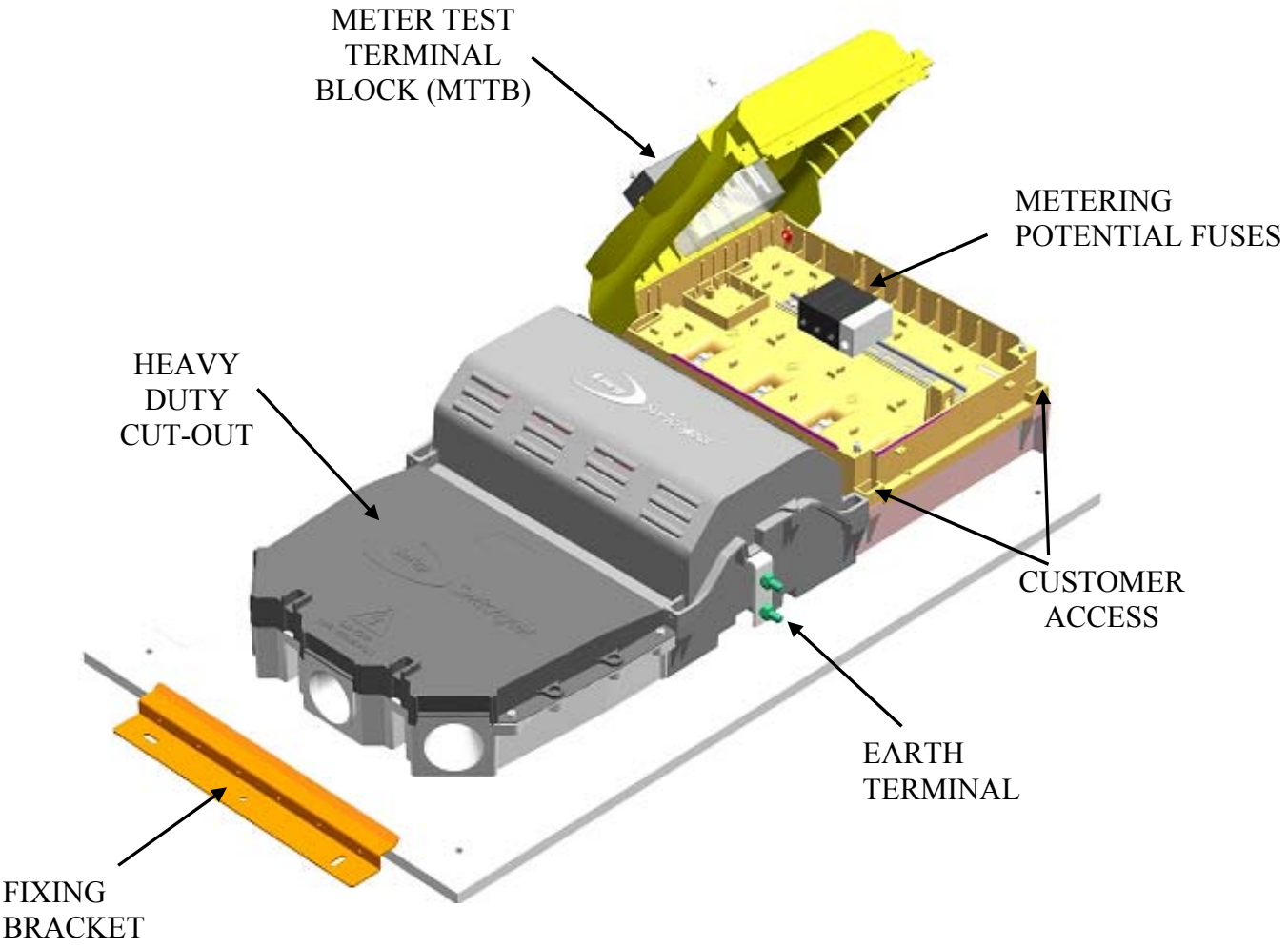
The person responsible for energising will inform Team Support that he has energised the supply, or the reason(s) why not, who in turn will update CROWN.

JOINTING PROCEDURE 7.404

Actions	General Requirements (ST: CA1C)

Refer to Drawing **LVJ 7.404.1** and the Appendix whilst undertaking this Jointing Procedure

1.	Fix LV CT Metering Panel in position. (If already fixed and connected prove dead)	
2.	Record the unit serial numbers on the Commissioning sheet	--
3.	Measure and record the resistance of each CT circuit at the Test block. (MTTB links open). If the meter is not fitted the CT's must be left shorted in the MTTB.	--
5.	Check insulation resistance of busbars and secondary wiring, at top stalk of J fuses. (Investigate if reading is less than 999MΩ)	--
4.	Replace all covers and seal the LV CT Panel before starting the service joint.	--
5.	Open and prove incoming service cable **dead**	14
7.	Test Continuity and Insulation resistance of incoming service cable.	--
6.	Make off the cut-out in accordance with the relevant Procedure	--
7.	Open the main cable using the relevant Jointing Procedure.	--
8.	Establish and mark neutral, shroud neutral and all exposed metalwork.	21
9.	Check the phase rotation of the main before making the joint	--
10.	Once energised check and record the polarity, phase rotation, voltages and the Earth fault loop impedances at the cut-out.	--
11.	Record size of J fuses and metering potential fuses and install.	--
12.	Check and record the polarity, phase rotation and the voltages at the test terminal block and customers connection point.	--
13.	Remove J fuse carriers and cable tie onto the external earth terminal	--
14.	Replace all covers and seal relevant sections.	--
15.	Pass the Commissioning and checklist Sheets to Tech Support for recording on CROWN.	--



Drawing LVJ 7.404.1

LV CT Metering Panel - COMMISSIONING CHECK LIST

Pre-energisation checks Tick the Boxes on completion of each task.

Confirm and prove panel dead. ☐

Check LVCT panel has correct current rating the customer requires and record current rating size. ☐

Check secondary wiring terminal connections, terminal wiring and that the shrouds are secure. ☐

Check the CT continuity and record the values (the maximum value to be 0.1Ω), ensure all CT's are of the same ratio and that the CT's are left shorted in the Meter Test Terminal Block (MTTB) . ☐

Remove and check the metering potential fuses (2A fuse) for correct rating and continuity. Record and replace fuse. ☐

If customer tails are connected confirm the tail size and confirm isolation at the customer's main switch. ☐

Check insulation resistance of busbars and secondary wiring, at top stalk of J fuse. If the values are not acceptable then consult the Team Manager immediately. ☐

Note: - If a meter is connected, remove the meter potential fuses before carrying out the insulation resistance testing otherwise the meter may be damaged.

Cable Installation

Ensure the Shorting Links at the metering test terminal block are in the closed or shorted position (refer A3). Install the cable termination. ☐

Test Continuity and Insulation resistance of incoming Wavecon cable. ☐

Fit red shrouds to incoming J fuse stalks. ☐

Fit internal panel shroud at termination position. ☐

Close and secure panel covers/door. ☐

Post Danger and Caution Point of Isolation Notices. ☐

COMMISSIONING CHECK LIST (Continued

Complete joint and termination connection ensuring correct polarity and phase rotation). ☐

Checks at Incoming Supply at J Fuse Position

Check polarity using test lamp. ☐

Check phase rotation and record. If phasing is incorrect DO NOT energise contact your Team Manager. ☐

Check and record voltages. ☐

Check and record earth loop impedances. ☐

Replace red shrouds to live fuse stalk. ☐

Check and record J fuse size. (De-rate J fuse size if necessary). ☐

If customer tails are fitted, ensure main switch is OFF and the Site electrician is informed before energising. ☐

Insert J fuses. ☐

Checks at Meter Test Terminal Block and at Connection Point of Customers Tails

Check polarity using test lamp. ☐

Check phase rotation and record. If phasing is incorrect DO NOT energise contact your Team Manager. ☐

Note: - The unit must NOT be left with incorrect phase rotation for metering purposes.

Check and record voltages. ☐

Panel Completion

Check and secure all internal shroud covers. ☐

Cable tie the loaded J fuse carriers to the external earth stud. ☐

Secure external panels and door then seal. ☐

Complete and return commissioning sheet and commissioning check list to the Team Support at the Depot. ☐

COMMISSIONING SHEET

Installation of LV CT Metering Equipment

From: -	

Customer details: -	
MPAN number: -	Enquiry number: -
Name Address	

Circuit name if multi-feeder (e.g. “Feeder 1”, etc.) If single feeder leave blank.	

Cabinet Details

	Lucy	Serial Number	
Circle one: -	**200A / 400A / 600A**		

Earthing Details

Circle one: -	**PME / TNCS**	**SNE / TNS**	**DIRECT EARTH / TT**

CT Details

Class:	0.5	L1 serial no	
Ratio		L2 serial no.	
Rating/Burden	5VA	L3 serial no.	
		Manufacturer	
CT wiring DC Resistance	L1= Ω	L2= Ω	L3= Ω

Voltage & Phase Rotation Details

Voltage	Three phase V	Single Phase V	**Phase rotation**	**Detail**
Cut-out voltages	L1-L2= V L1-L3= V L2-L3= V	L1-N= V L2-N= V L3-N= V	Cut-out phase rotation	Correct / Incorrect
Additional if SNE / TNS	N-E = V E-L1 = V E-L2 = V E-L3 = V			Correct / Incorrect
MTTB voltages	L1-L2= V L1-L3= V L2-L3= V	L1-N= V L2-N= V L3-N= V	MTTB phase rotation	Correct / Incorrect

Earth Loop Impedance Details

Earth Loop Impedance resistance Incoming Service cable	L1-E Ω	L2-E Ω	L3-E Ω

Signed …… Date …….

APPENDIX

A1 Fixing the LV CT Metering Panel

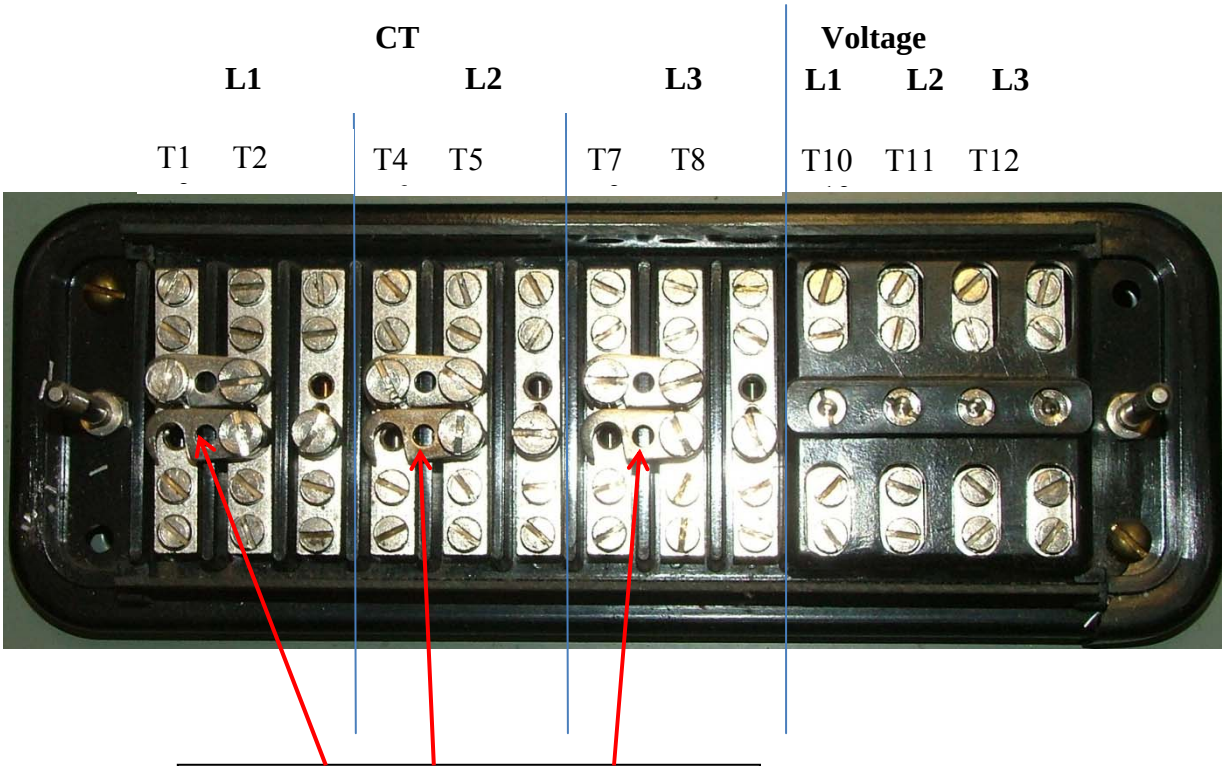
Fix the steel bracket to the wall using expanding bolts. Locate the panel on the bracket before drilling and fixing the two top bolts.

A2 Serial Number Location

The serial number is located on the inside of the meter access cover.

A3 Measuring the Resistance of Each CT Circuit at the Test Terminal Block.

Check that the shorting links are in the open position as shown below.



Meter test terminal block showing the "SHORTING" links in the "Open" or un-shorted position.

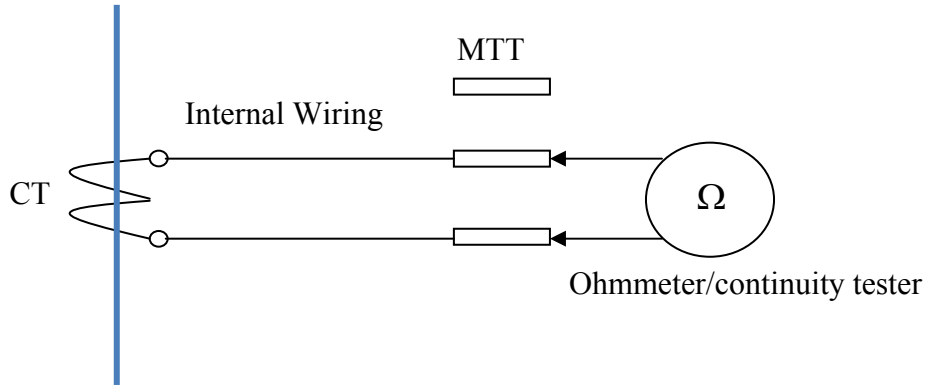
Measure the resistance of the L1 CT circuit by connecting the ohmmeter between terminals 2 and 3. Record the results on the commissioning sheet.

Measure the resistance of the L2 CT circuit by connecting the ohmmeter between terminals 5 and 6. Record the results on the commissioning sheet.

Measure the resistance of the L3 CT circuit by connecting the ohmmeter between terminals 8 and 9. Record the results on the commissioning sheet.

Note Any value greater than 0.1 Ω needs investigating, check all terminals are tight and test instrument is calibrated and accurate. If the resistance remains high, report to your Team Manager.

The drawing below shows what you are testing



A4 Checking the Phase Rotation on the Main Cable

To establish the phase rotation of the main the appropriate PPE as detailed in the matrix of General Requirement 3 must be worn.

When using a none direct contact Phase Rotation device to enable the plastic crocodile clips to clip onto the main the cores will need to be open and separate the cores using two core wedges. Once opened the plastic crocodile clips can be clipped over the core insulation on the relevant phases. If correct the indication will turn as indicated on the test device. If the phase rotation is incorrect report the condition to your supervisor. When using a contact Phase Rotator all connections must be adequately shrouded.

A5 Testing the Voltages at the Meter Test Terminal Block.

To test the L1-Neutral voltages connect the voltmeter between terminals T10 and T13
To test the L2-Neutral voltages connect the voltmeter between terminals T11 and T13
To test the L3-Neutral voltages connect the voltmeter between terminals T12 and T13

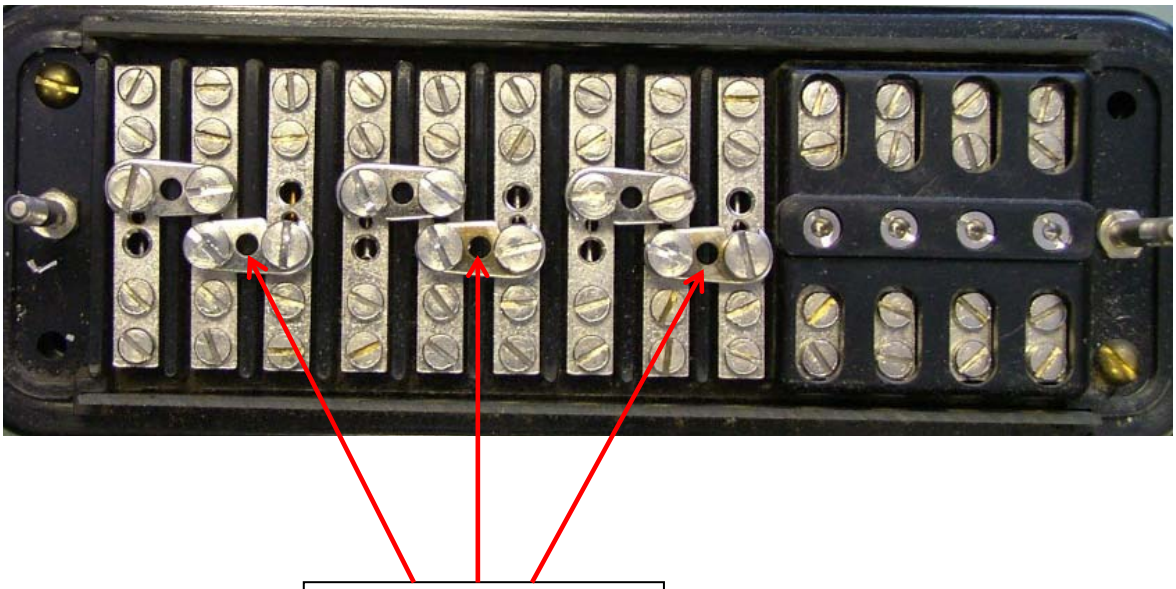
To test the L1-L2 voltages connect the voltmeter between terminals T10 and T11
To test the L2-L3 voltages connect the voltmeter between terminals T11 and T12
To test the L1-L3 voltages connect the voltmeter between terminals T10 and T12

A6 Testing the Phase Rotation at the Meter Test Terminal Block.

To measure the Phase Rotation at the MTTB connect the meter between terminals T10, T11 and T12.

A7 Closing the Links to Short the CTs

When the meter has not been connected and the CT panel has been completed the CTs must be shorted by closing the shorting links as shown below. If the meter has been commissioned the links must be left open.



Meter test terminal block showing the "SHORTING" links in the "Closed" or shorted out position.

A8 Non Standard Phase Rotation - Mains Cable

The phase rotation is required to be standard on the incoming supply to the isolatable LV CT Panel. Where the phase rotation of the main is non-standard investigations need to be made to identify where the conductors have been crossed.

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.405

THREE CORE WAVECON MAINS CABLE OUTDOOR TERMINATION

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.405

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	**Quantity**
Kit SMOE 81922	1
70mm² PVC sheathed copper	6m

185 Wavecon

Kit SMOE 81923	1
120mm² PVC sheathed copper	6m

300 Wavecon

Kit SMOE 81924	1
120mm² PVC sheathed copper	6m

ADDITIONAL ITEMS FOR EACH TERMINATION

Cable ties
16 swg tinned copper wire
PVC tape
Scotchfil putty
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.405

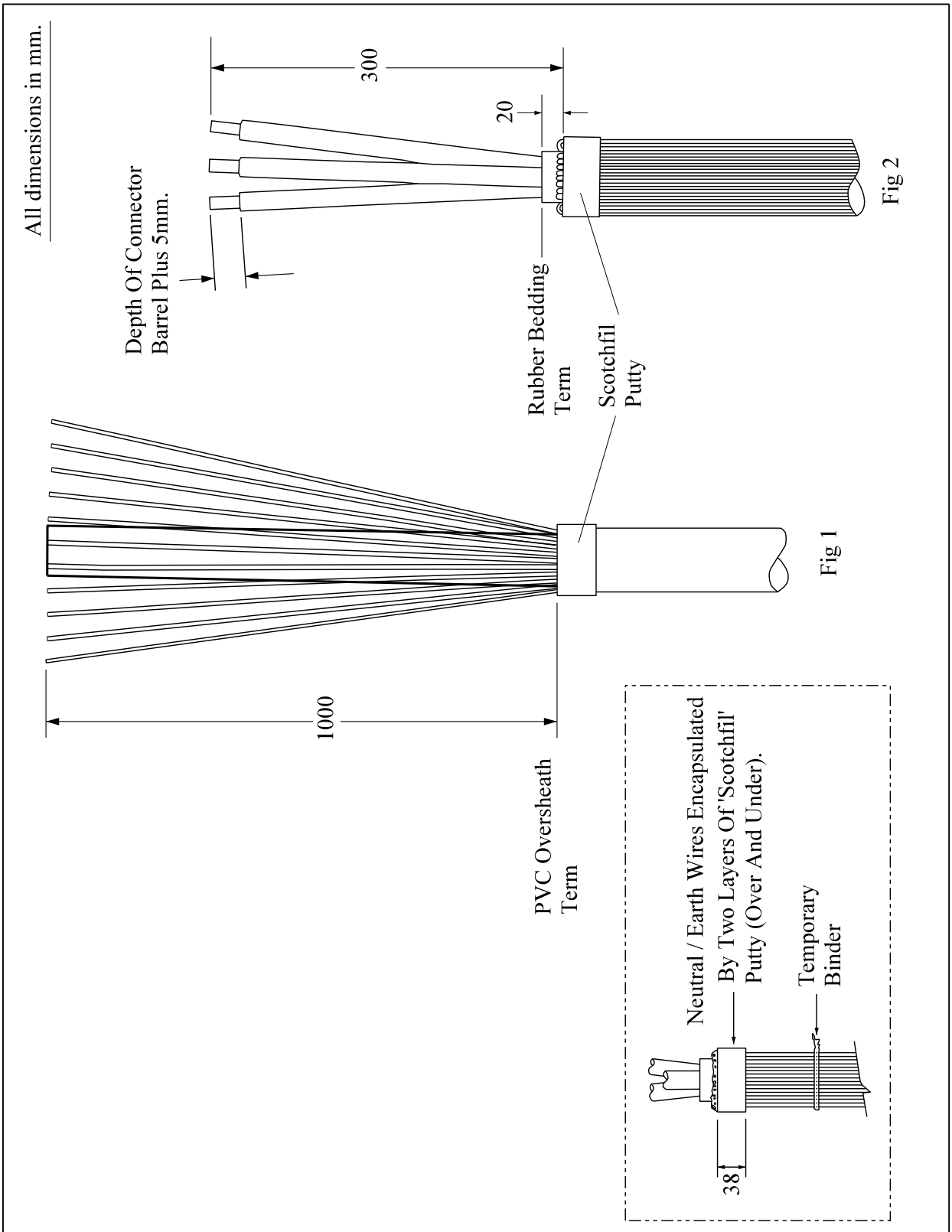
Actions		General Requirements (ST: CA1C)

Refer to Drawing **LVJ 7.405.1, 7.405.2**, **7.405.3, 7.405.4, 7.405.5** whilst undertaking this Jointing Procedure

1.	Open and prove cable **dead**	14
2.	Obtain the required termination height, measure and mark at the cut position	5
3.	Set and cut cable to length	4
4.	Remove PVC oversheath	6
5.	Prepare the neutral/earth wires for jointing	8
6.	Degrease the PVC oversheath	35
7.	Apply a single turn of Scotchfil putty around the oversheath	--
8.	Remove temporary binder applied in 5	--
9.	Taking each copper wire in turn, bend back onto the putty applied in 7, ensure a gap is formed between each wire. Temporary secure with cable ties 100mm (approx.) below PVC termination point.	--
10.	Remove the rubber bedding	9
11.	Apply a further layer of Scotchfil putty over the copper wires and previous layer.	--
12.	Position and shrink the breakout into position	26
13.	Cut the PVC sheathed copper into the required lengths	--
14.	Cut the Wavecon cores to length	--
15.	Pass the cut lengths of medium walled tube over the cores and breakout turrets and shrink into place.	26
16.	Make the connections between the Wavecon cores and PVC sheathed copper tails.	29

JOINTING PROCEDURES 7.405 – Continued

Actions		General Requirements (ST: CA1C)
17.	Apply phase colour tapes to the ends of the PVC sheathed copper tails	--
18.	Slide the mastic lined tubes over the tails, position central to the connector and shrink into position, starting at the centre and working towards the ends	26
19.	Apply temporary PVC tape binders at intervals around the tails	
20.	Slide the outer mastic lined tube over the bunched tails, centralize over the connector area and shrink into position, starting at the centre and working towards the ends	26
21.	Form the neutral/earth wires into a conductor and secure with PVC tape at intervals	--
22.	Protect the neutral/earth wires with thin wall tube and black PVC tape	--



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Drawn	RJB	05/13	
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SCALE	N.T.S.		Title: THREE CORE WAVECON OUTDOOR TERMINATION STRIPPING DIMENSIONS

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All dimensions in mm

℄ Of Connectors

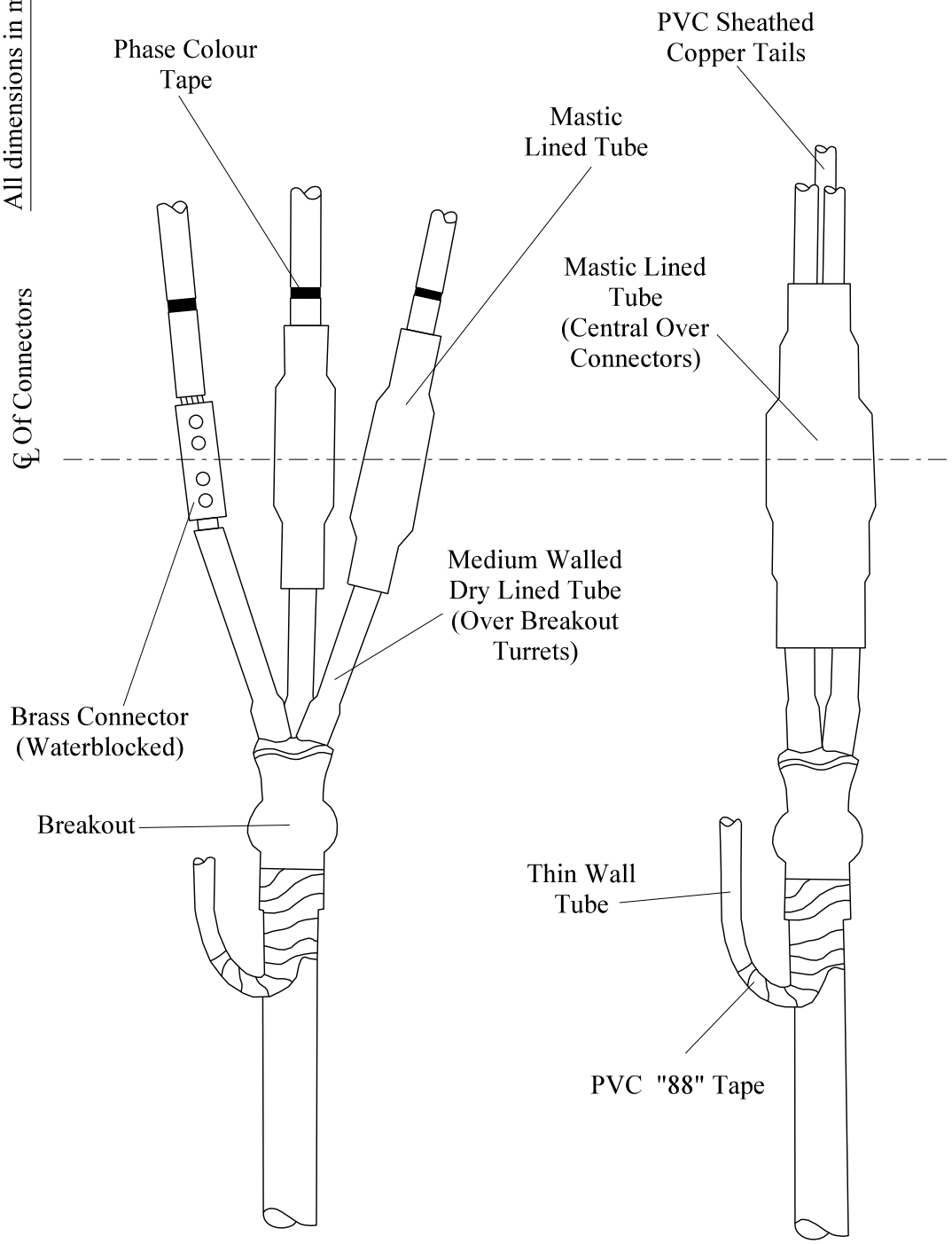

Fig 3

Fig 4

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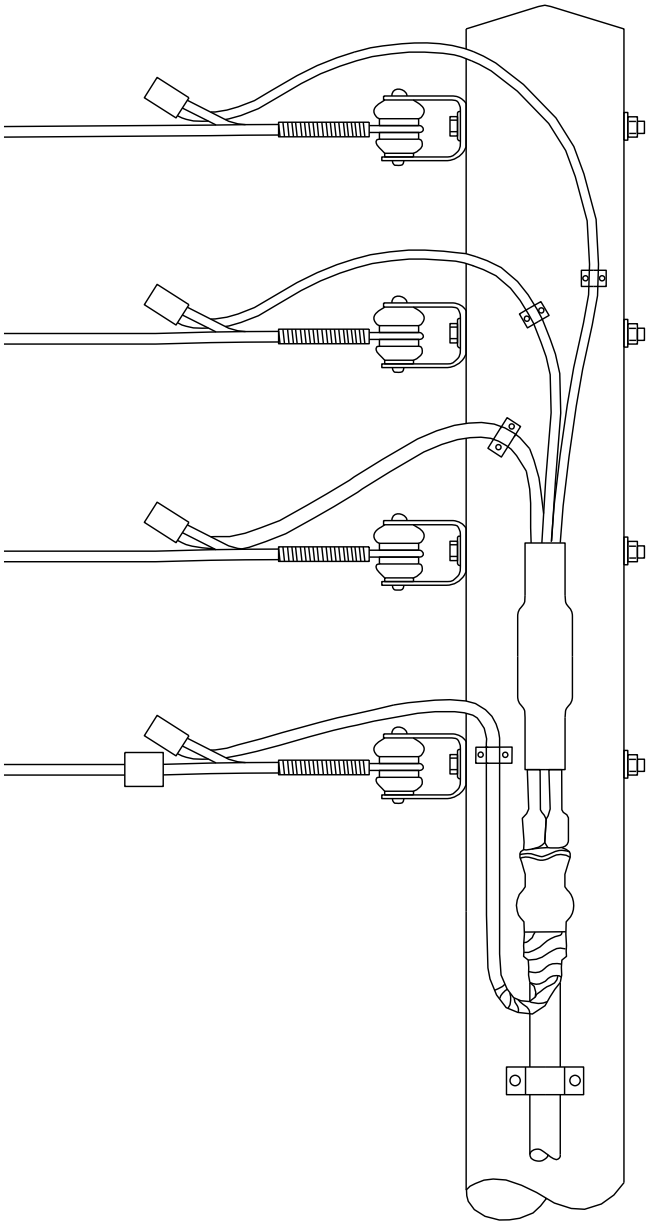

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Title: THREE CORE WAVECON
OUTDOOR TERMINATION - OPEN WIRE
GENERAL LAYOUT

Drg. No. LVJ 7.405.3

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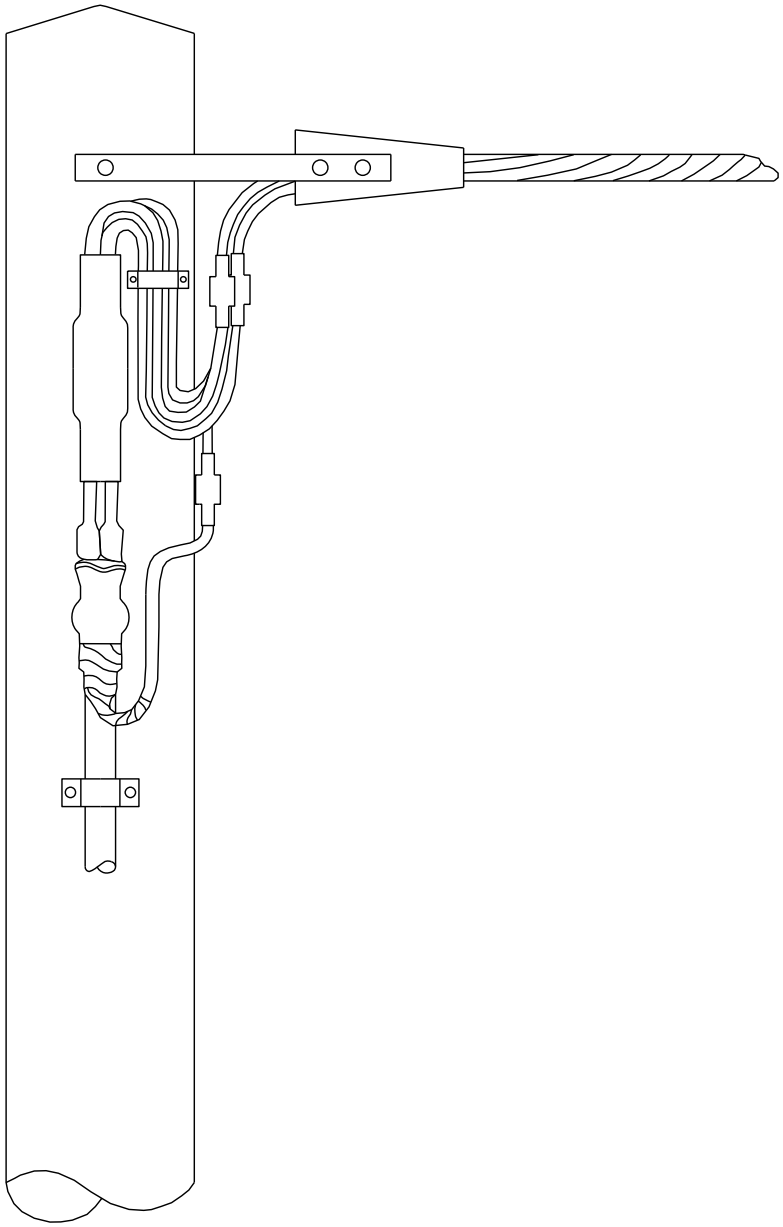

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Title: THREE CORE WAVECON
OUTDOOR TERMINATION - ABC LINE
GENERAL LAYOUT

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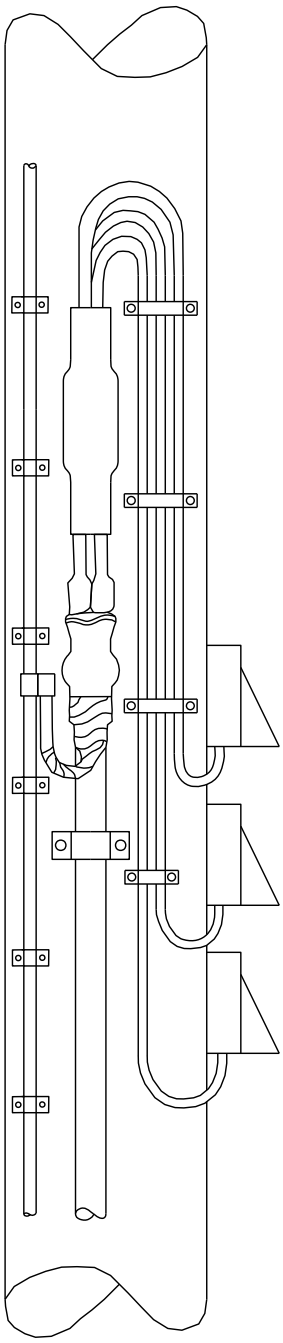

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Title: THREE CORE WAVECON OUTDOOR TERMINATION - FUSES GENERAL LAYOUT

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.406

FOUR CORE WAVECON MAINS CABLE 200/400/600A CUT-OUT TERMINATION

FOR DEAD CABLES ONLY

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/4 Section 6 Part 1 of the LV Jointing Manual

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JOINTING PROCEDURE 7.406

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	**Quantity**
200A Cut-out	1
Lugs LVET 120-12	4
Lug BET 60-12	1

185 Wavecon

400A Cut-out	1

300 Wavecon

600A Cut-out	1

ADDITIONAL ITEMS FOR EACH TERMINATION

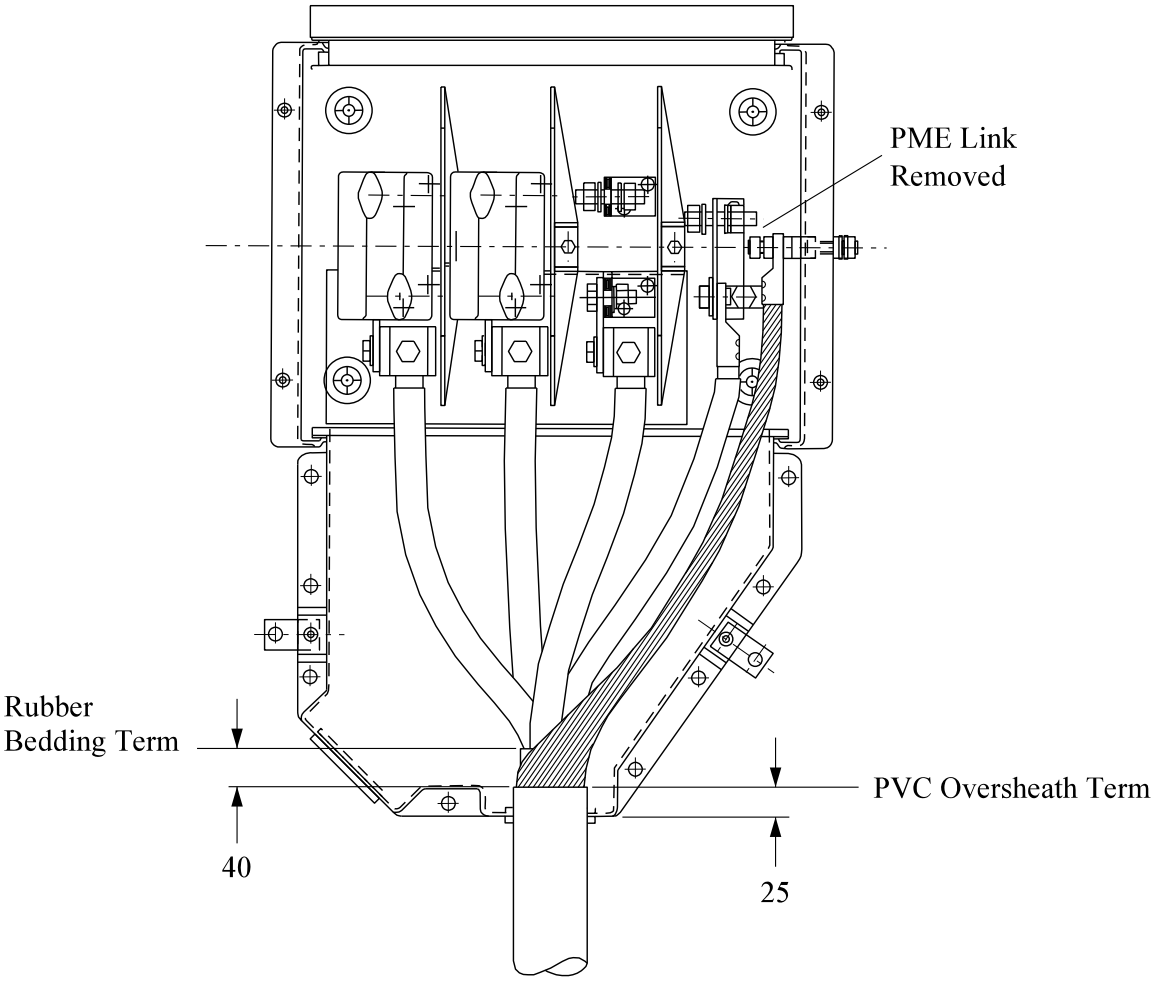
Cable ties
16 swg tinned copper wire
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.406

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **LVJ 7.406-1** whilst undertaking this Jointing Procedure	
1.	Open and prove cable **dead** in accordance with General Requirement 6.14	14
2.	Fix cut-out in position	- -
3.	Remove PME link to convert cut-out so SNE	--
4.	Set and mark cables, cut cable to length (100mm above termination position).	4
5.	Remove PVC oversheath	6
6.	Prepare the earth wires for jointing	8
7.	Remove rubber bedding	9
8.	Set phase, neutral cores and earth wires in position	--
9.	Cut and connect earth wires	29
10.	Cut and connect neutral and phase cores in turn	29
11.	Remove all temporary binders	--
12.	Replace covers and seal	--

All dimensions in mm



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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.407

FOUR CORE WAVECON MAINS CABLE INDOOR TERMINATION

FOR DEAD CABLES ONLY

This procedure is to be read in conjunction with the appropriate General Requirements ST: CA1C/4 Section 6 Pt 1 of the LV Jointing Manual

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JOINTING PROCEDURE 7.407

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	**Quantity**
Lugs LVET 120-12	4
Lug BET 60-12	1

185 Wavecon

Lugs LVET 185-12	4
Lug BET 120-12	1

300 Wavecon

Lugs LVET 300-12	4
Lug BET 120-12	1

ADDITIONAL ITEMS FOR EACH TERMINATION

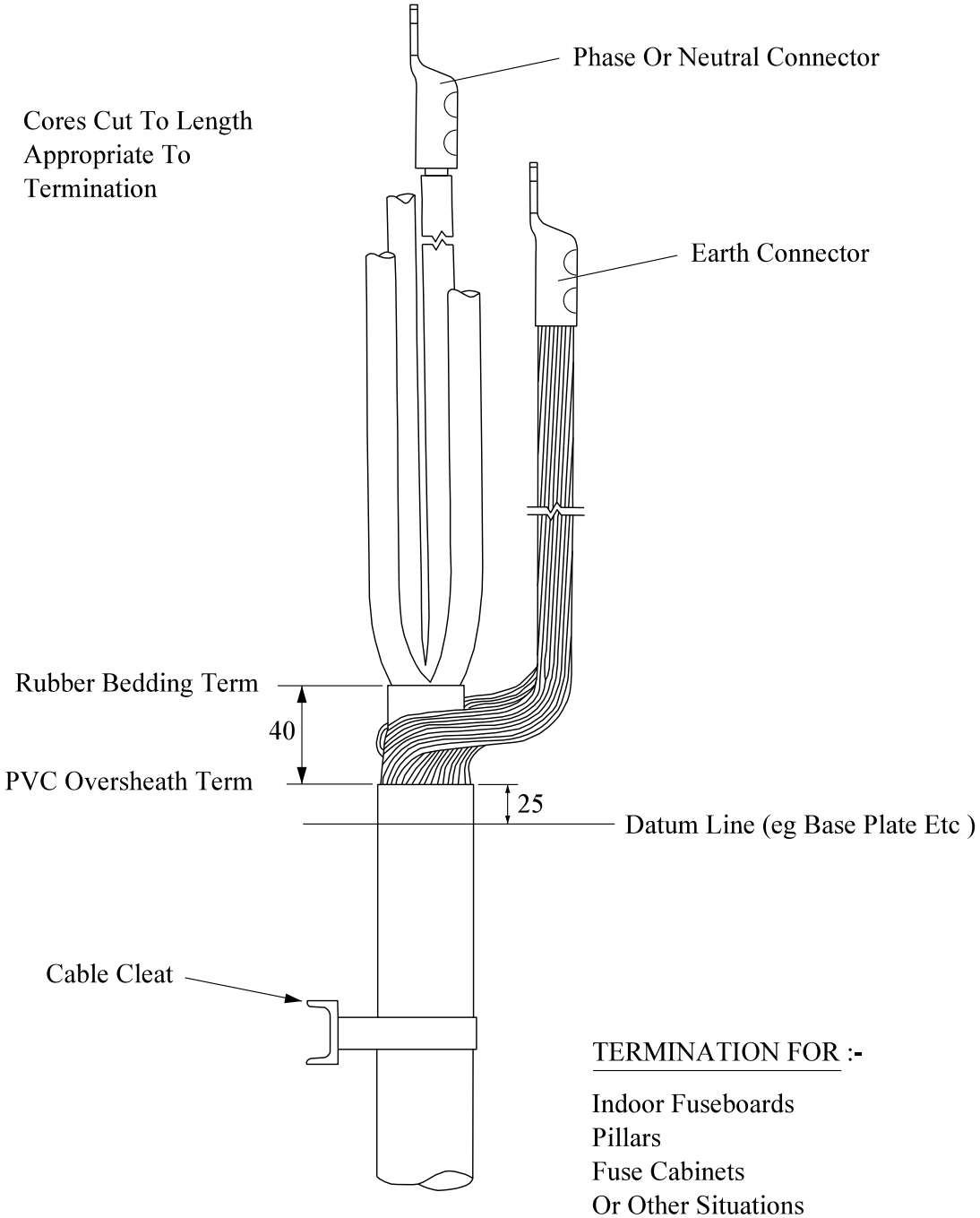
Cable ties
16 swg tinned copper wire
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.407

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **LVJ 7.407.1** whilst undertaking this Jointing Procedure	
1.	Open and prove cable **dead**	14
2.	Set and mark cable to length (100mm above termination position)	4
3.	Remove PVC oversheath	6
4.	Prepare the earth wires for jointing	8
5.	Remove rubber bedding	9
6.	Set phase neutral cores and earth wires in position	--
7.	Cut and connect earth wires	29
8.	Cut and connect neutral and phase cores in turn	29
9.	Remove all temporary binders	--

All dimensions in mm.



TERMINATION FOR :-

Indoor Fuseboards
Pillars
Fuse Cabinets
Or Other Situations
Protected From The Weather

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Drawn	RJB	05/13
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FOUR CORE WAVECON INDOOR TERMINATION GENERAL LAYOUT	LVJ 7.407.1	

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.408

FOUR CORE WAVECON MAINS CABLE ISOLATABLE MULTIWAY FUSEBOARD TERMINATION

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.408

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	Quantity
Multiway Fuseboard	1
Lugs LVET 120-12	4
Lug BET 60-12	1

185 Wavecon

Multiway Fuseboard	1
Lugs LVET 185-12	4
Lug BET 120-12	1

300 Wavecon

Multiway Fuseboard	1
Lugs LVET 300-12	4
Lug BET 120-12	1

ADDITIONAL ITEMS FOR EACH TERMINATION

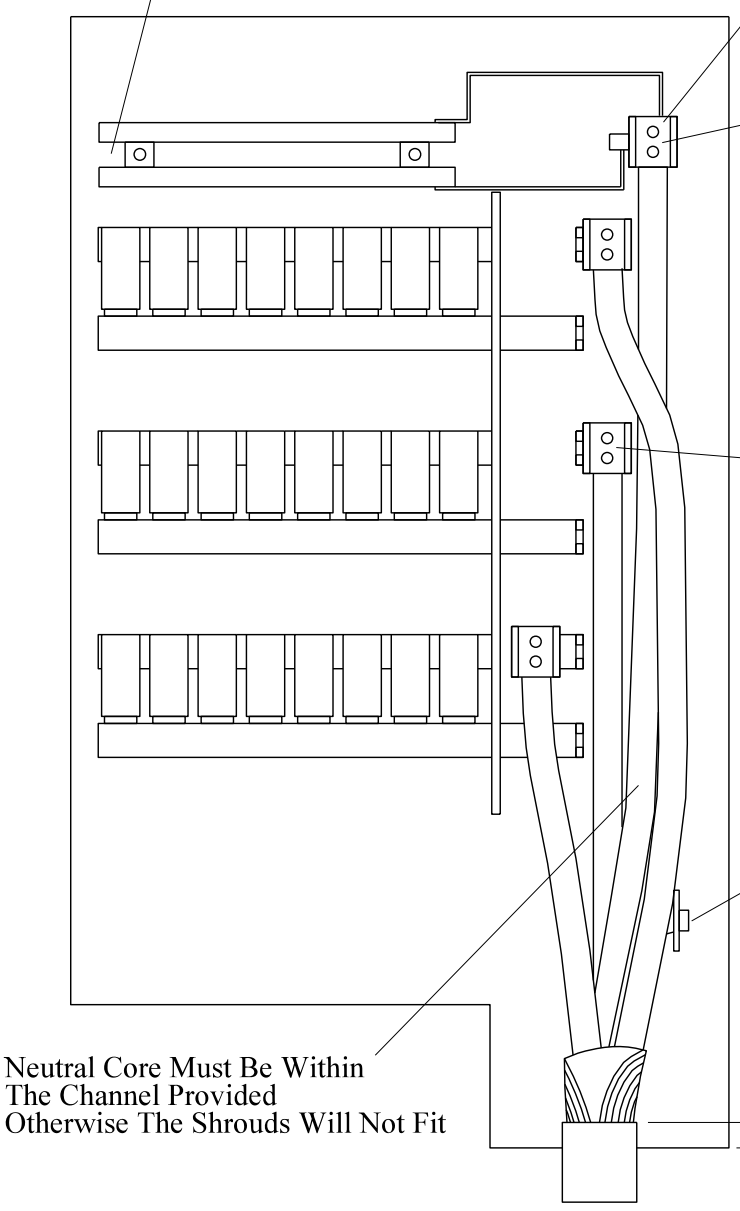
Cable ties
16 swg tinned copper wire
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.408

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **7.408.2** whilst undertaking this Jointing Procedure	
1.	Open and prove cable **dead**	14
2.	Fix fuseboard in position	--
3.	Remove PME link to convert fuseboard to SNE	--
4.	Set and mark cable to length (100mm above termination position)	4
5.	Remove PVC oversheath	6
6.	Prepare the earth wires for jointing	8
7.	Remove rubber bedding	9
8.	Set phase cores and earth wires in position	--
9.	Cut and connect earth wires	29
10.	Cut and connect neutral and phase conductors in turn	29
11.	Remove all temporary binders	--
12.	Replace covers and seal	--

All dimensions in mm



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SCALE	N.T.S.		Title: FOUR CORE WAVECON 12,18,24 AND 36 WAY MULTI SERVICE DISTRIBUTION BOARDS	Drg. No. LVJ 7.408.2 / Rev No

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.409

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.410

FOUR CORE WAVECON MAINS CABLE OUTDOOR TERMINATION

FOR DEAD CABLES ONLY

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JOINTING PROCEDURE 7.410

MATERIALS LIST

CABLE SIZE – 95 Wavecon

Item	**Quantity**
Kit SMOE 81925	1
70mm² PVC sheathed copper	8m

185 Wavecon

Kit SMOE 81926	1
120mm² PVC sheathed copper	8m

300 Wavecon

Kit SMOE 81927	1
120mm² PVC sheathed copper	8m

ADDITIONAL ITEMS FOR EACH TERMINATION

Cable ties
16 swg tinned copper wire
PVC tape
Scotchfil putty
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.410

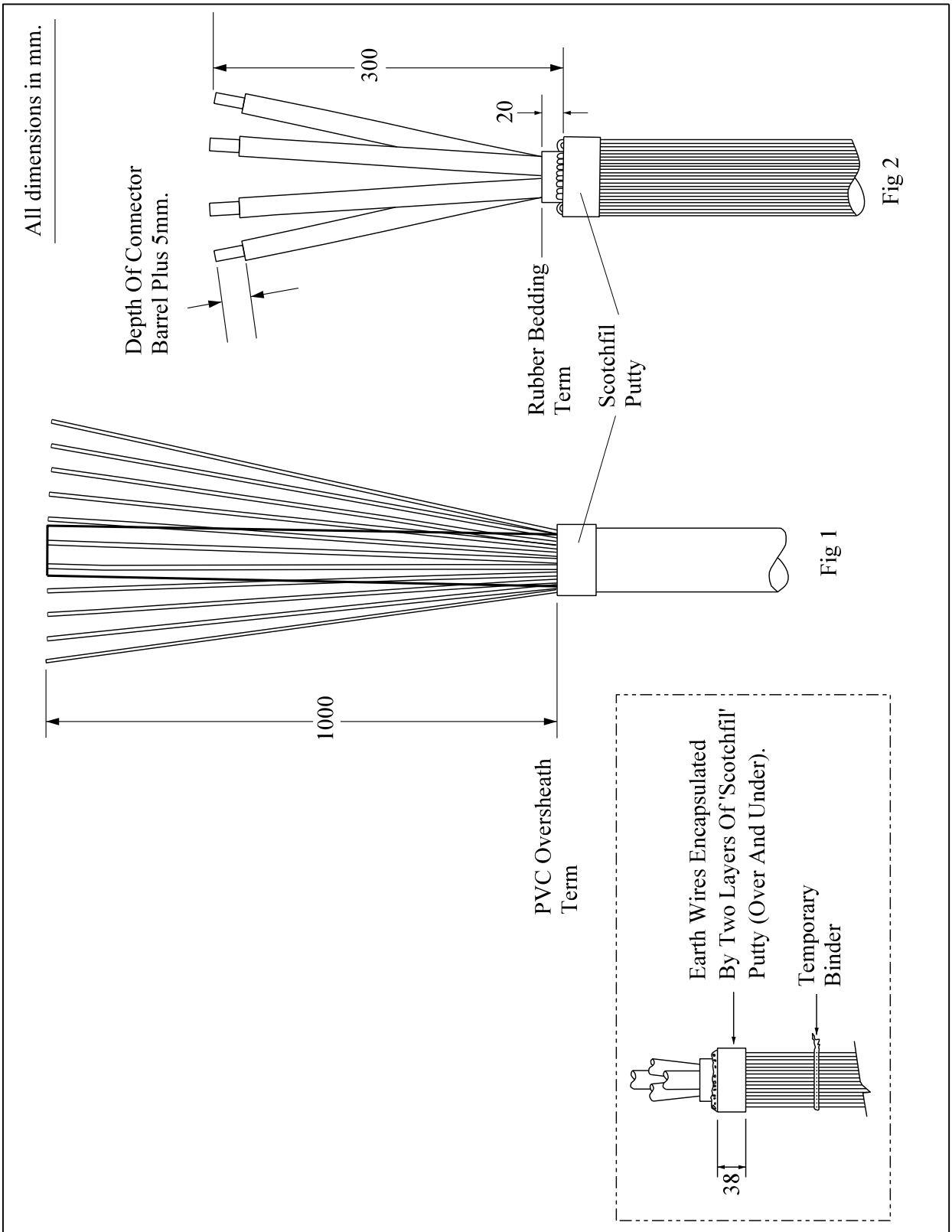
Actions		General Requirements (ST: CA1C)

Refer to Drawing **LVJ 7.410.1, 7.410.2, 7.410.3, 7.410.4, 7.410.5** whilst undertaking this Jointing Procedure

1.	Open and prove cable **dead**	14
2.	Obtain the required termination height, measure and mark at the cut position	5
3.	Set and cut cable to length	4
4.	Remove PVC oversheath	6
5.	Prepare the earth wires for jointing	8
6.	Degrease the PVC oversheath	35
7.	Apply a single turn of Scotchfil putty around the oversheath	--
8.	Remove the temporary binder applied in 5	--
9.	Taking each copper wire in turn, bend back onto the putty applied in 7, ensure a gap is formed between each wire. Temporary secure with cable ties 100mm approx. below PVC termination point.	--
10.	Remove the rubber bedding	7
11.	Apply a further layer of Scotchfil putty over the copper wires and previous layer	--
12.	Position and shrink the breakout into position	26
13.	Cut the PVC sheathed copper into the required lengths	--
14.	Cut the Wavecon cores to length	--
15.	Pass the cut lengths of medium walled tube over the cores and breakout turrets and shrink into place	26
16.	Make the connections between the Wavecon cores and PVC sheathed copper tails	29

JOINTING PROCEDURES 7.410 – Continued

Actions		General Requirements (ST: CA1C)
17.	Apply phase colour tapes to the ends of the PVC sheathed copper tails	--
18.	Slide the mastic lined tubes over the tails, position central to the connector and shrink into position, starting at the centre and working towards the ends	26
19.	Apply temporary PVC tape binders at intervals around the tails	--
20.	Slide the outer mastic lined tube over the bunched tails, centralize over the connector area and shrink into position, starting at the centre and working towards the ends	26
21.	Form the earth wires into a conductor and secure at intervals with PVC tape	--
22.	Protect the earth wires with thin wall tube and black PVC tape	--



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℄ Of Connectors

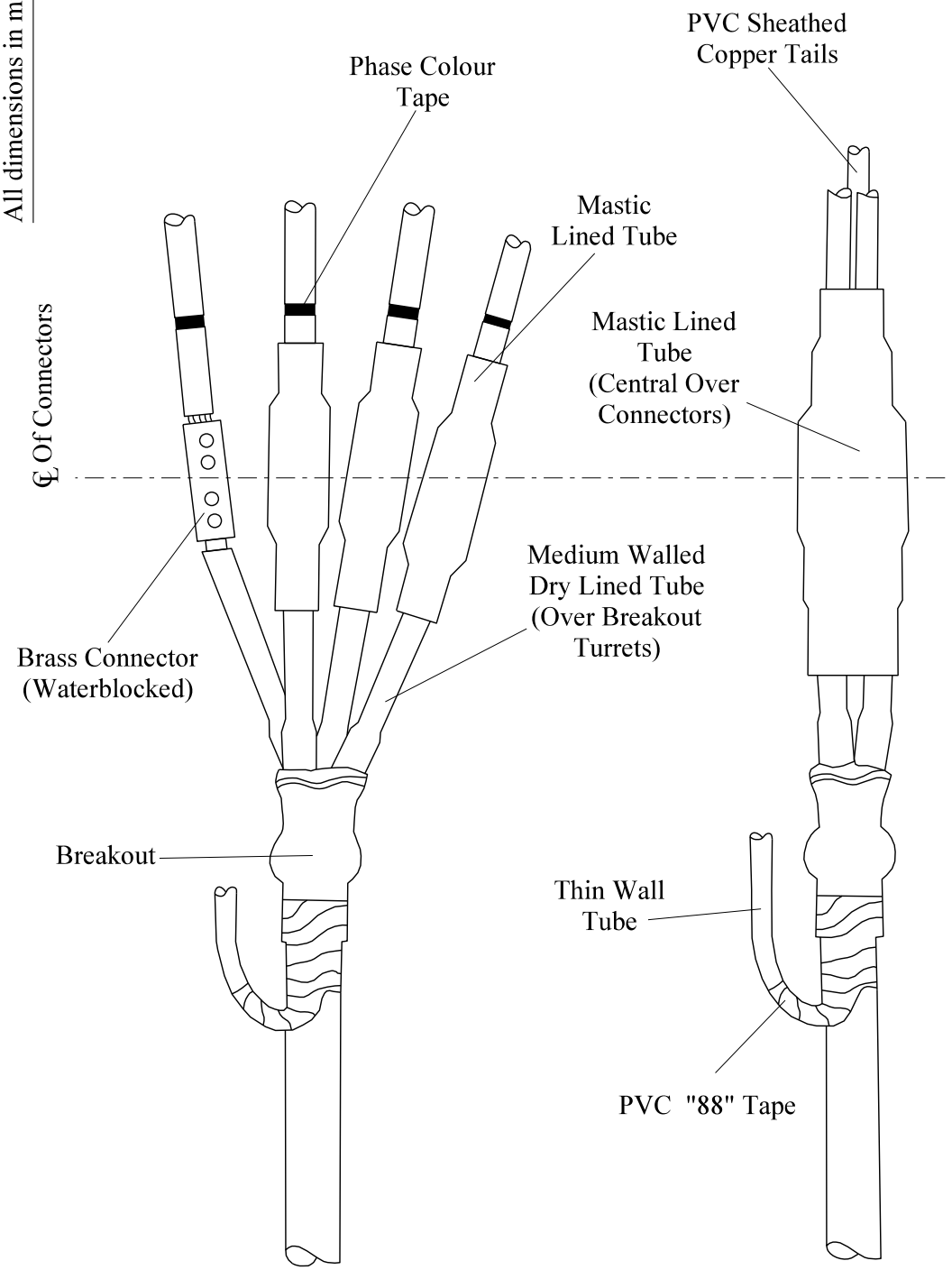

Fig 3

Fig 4

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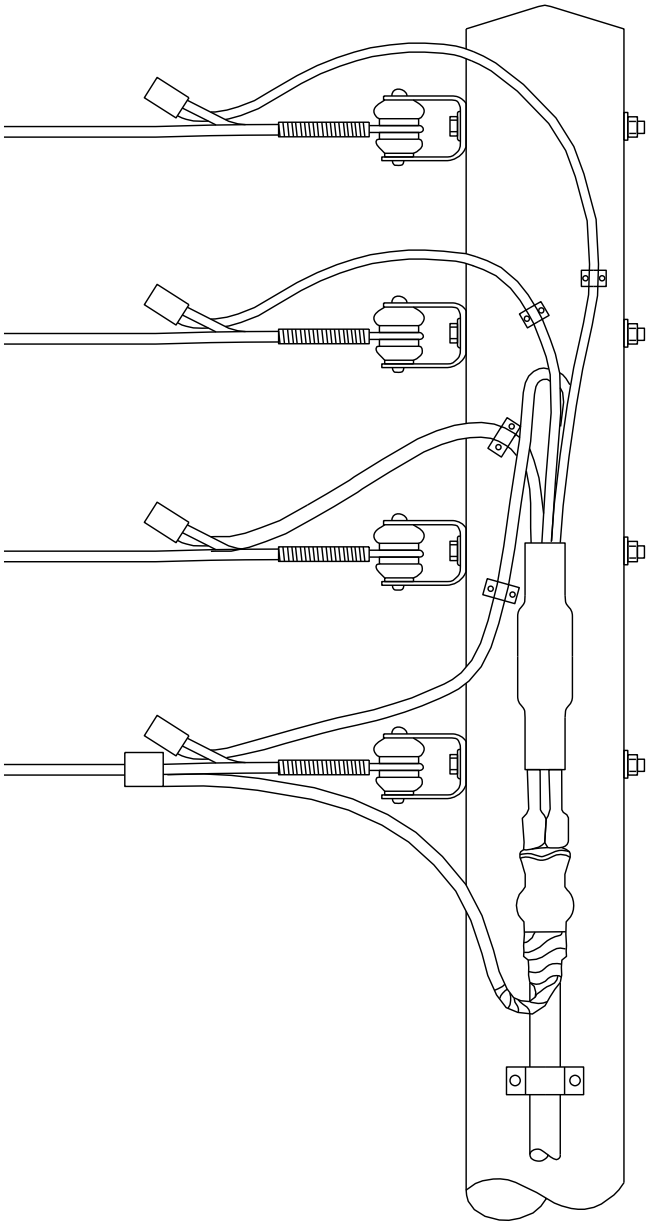

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GENERAL LAYOUT

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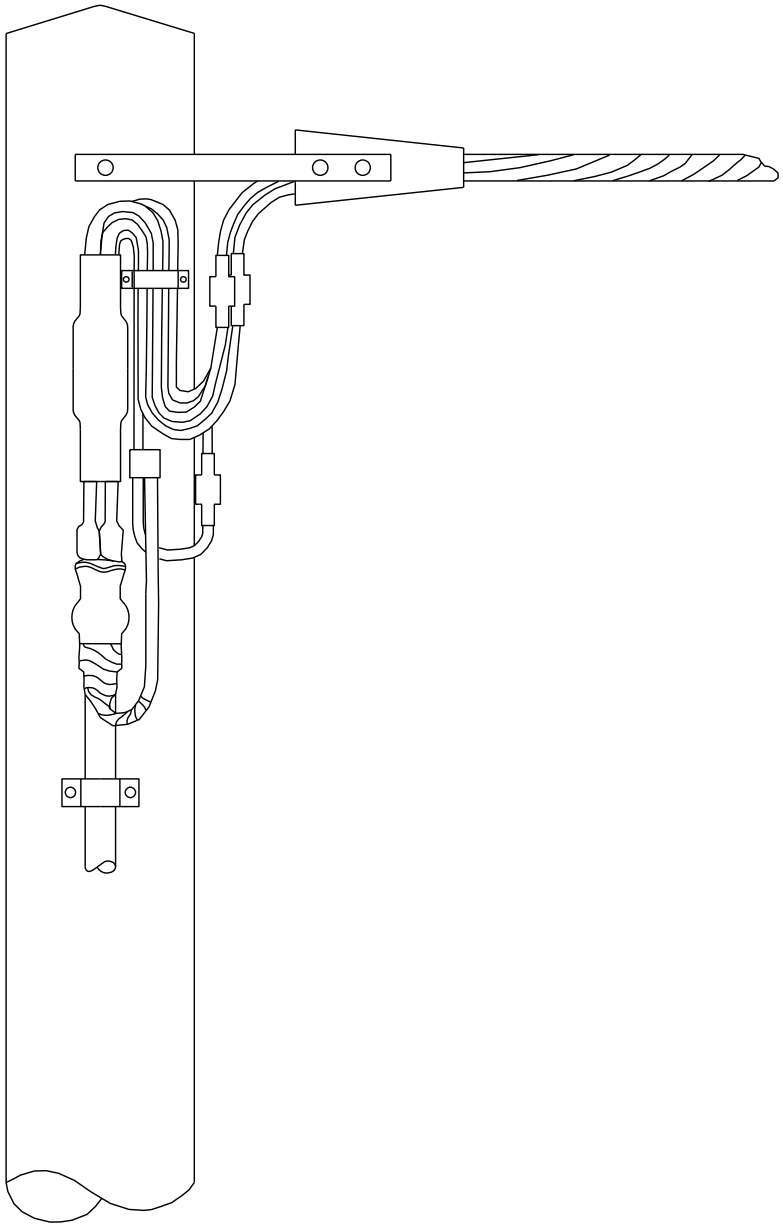

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Title: FOUR CORE WAVECON
OUTDOOR TERMINATION - ABC LINE
GENERAL LAYOUT

Drg. No. LVJ 7.410.4

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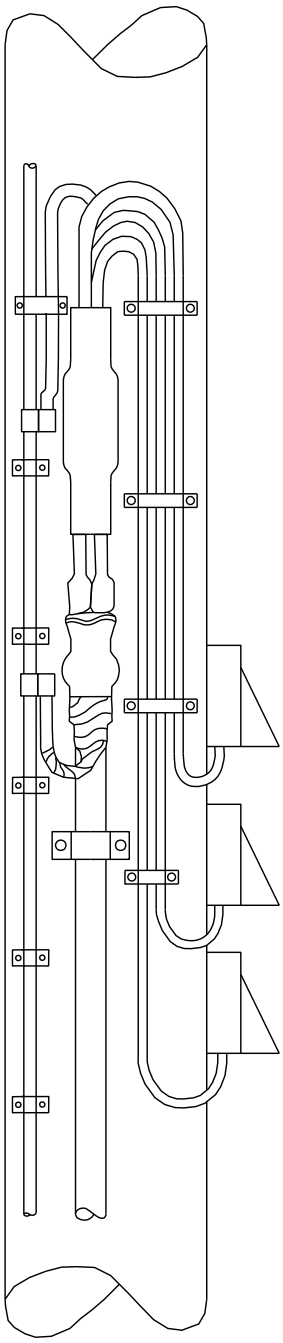
All dimensions in mm



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Title: FOUR CORE WAVECON
OUTDOOR TERMINATION - FUSES
GENERAL LAYOUT

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.411

SINGLE CORE SOLIDAL AWA MAINS CABLE TERMINATION - EARTHED

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.411

MATERIALS LIST

CABLE SIZE –600 Solidal (per cable)

Item	Quantity
Lug	1
Gland 422AL 58	1
Heatshrink tube WCSM 85/25 x 250	1
Lug BET 120-12	1

740 Solidal (per cable)

Lug	1
Gland 422AL 59	1
Heatshrink tube WCSM 85/25 x 250	1
Lug BET 120-12	1

ADDITIONAL ITEMS FOR EACH TERMINATION

Cable ties
16 swg tinned copper wire
PVC tape
35mm² PVC sheathed (green/yellow) copper
Penetrox
De-solvit 1000FD
Workhorse dry wipes
Solvent wipes

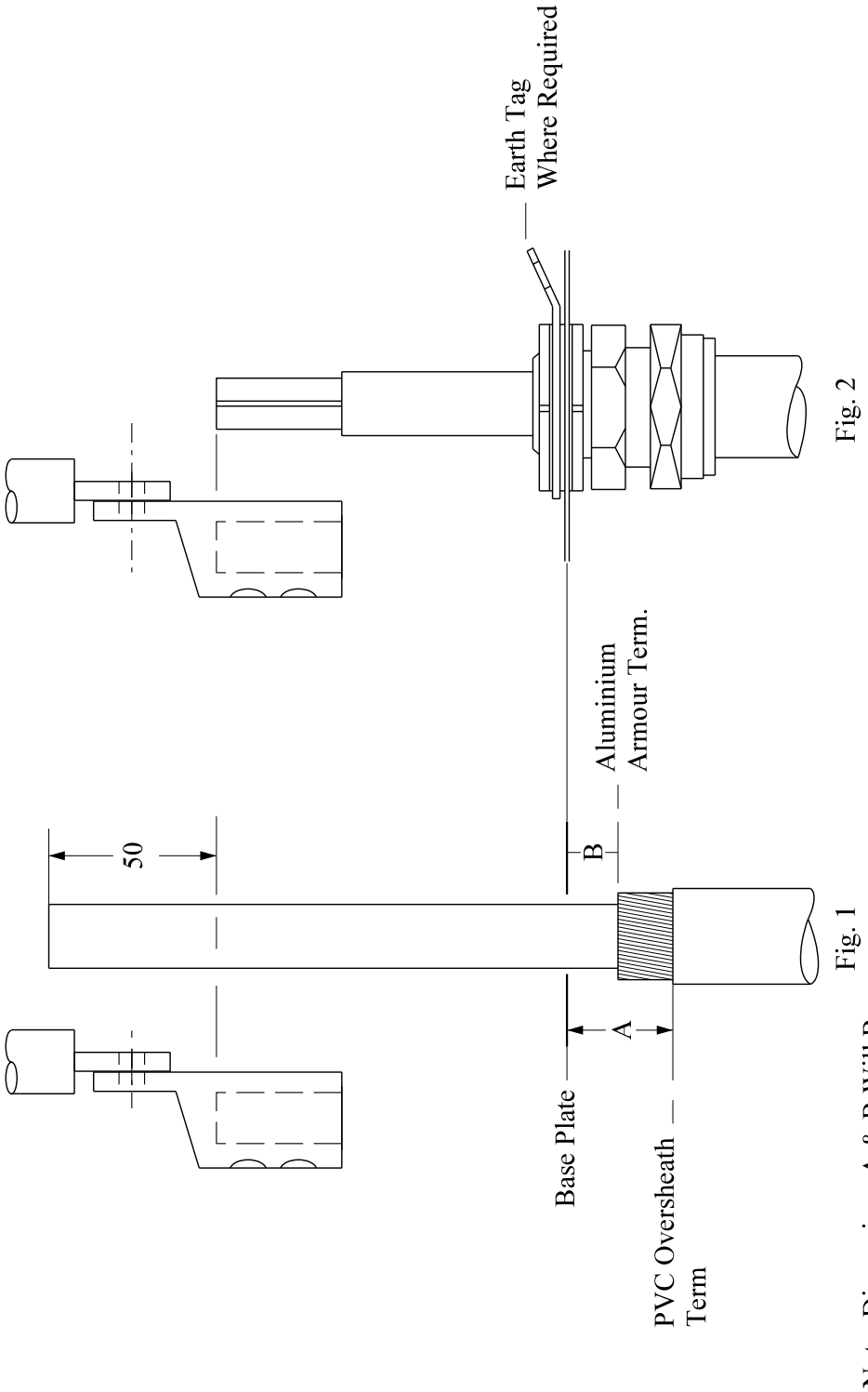
Note: - 36078 lugs are blank palm and will require drilling.

Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.411

	Actions	**General Requirements (ST: CA1C)**
	Refer to Drawing **LVJ 7.411.1, 7.411.2** whilst undertaking this Jointing Procedure	
1.	Set and mark cable, cut to length (100mm above termination point)	4
2.	Prepare cable armour gland for jointing	24
3.	Remove PVC oversheath – Fig 1	6
4.	Terminate aluminium wire armour – Fig 1 **Note: -** The armour may be aluminium strip, treat as aluminium wire.	24
5.	Fit armour gland to cable	24
6.	Position cable gland to base plate – Fig 2	--
7.	Cut core and fit lug to conductor – Fig 1 & 2	29
8.	Apply heatshrink tube to lug and conductor – Fig 4	26
9.	Make connection to busbar	29
10.	Fit cable gland to base plate, earth armour glands to earth reference point	24

All dimensions in mm



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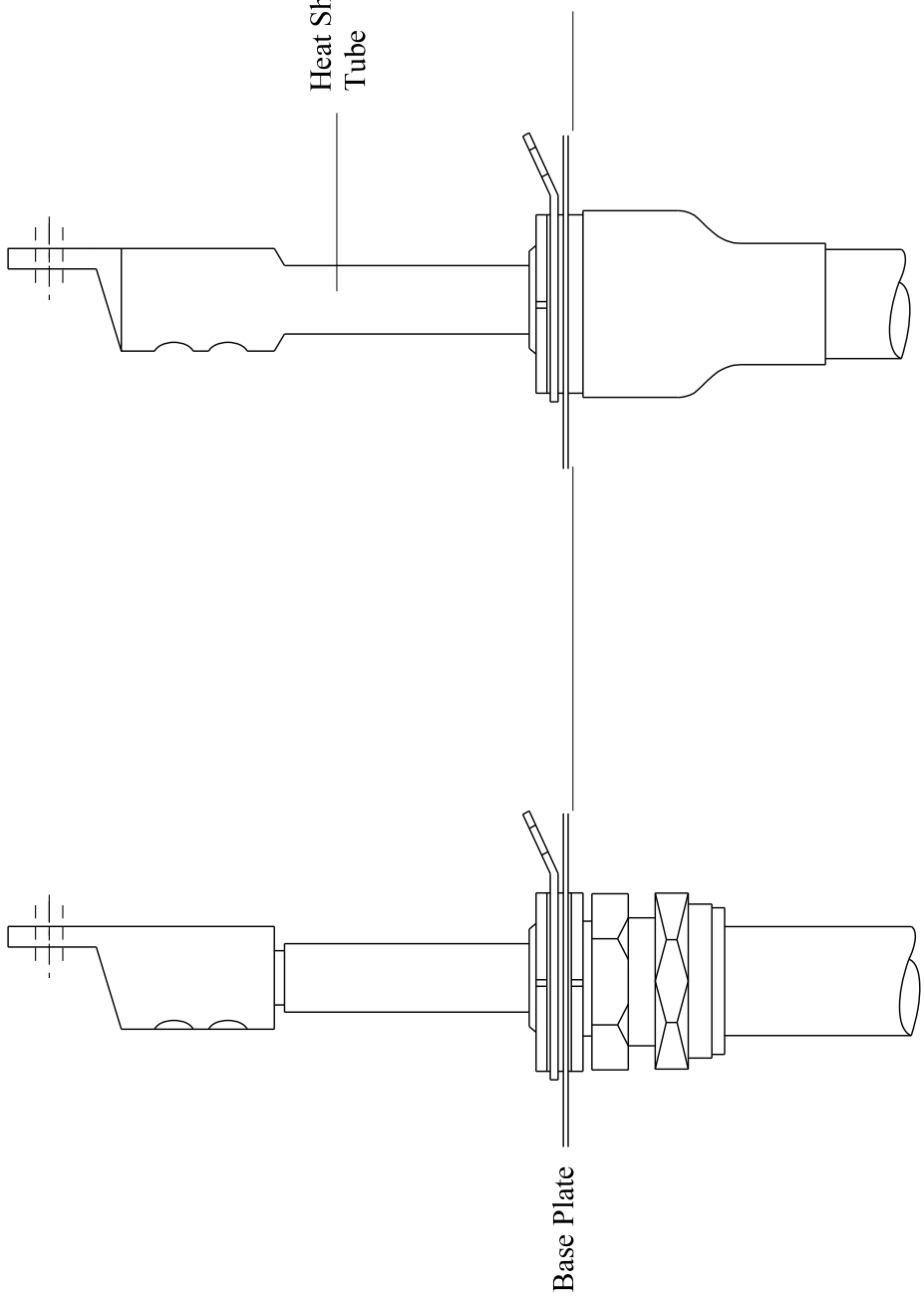

Fig. 4

Fig. 3

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ST: CA1G/6 PROCEDURES FOR MAKING LV MAINS CABLE TERMINATIONS

JOINTING PROCEDURE 7.412

SINGLE CORE SOLIDAL AWA MAINS CABLE TERMINATION - UNEARTHED

FOR DEAD CABLES ONLY

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

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JOINTING PROCEDURE 7.412

MATERIALS LIST

CABLE SIZE –600 Solidal (per cable)

Item	**Quantity**
Lug	1
Heatshrink tube WCSM 85/25 x 250	1

740 Solidal (per cable)

Lug	1
Heatshrink tube WCSM 85/25 x 250	1

ADDITIONAL ITEMS FOR EACH TERMINATION

Cable ties
16 swg tinned copper wire
PVC tape
Penetrox
Desolvit 1000FD
Workhorse dry wipes
Solvent wipes

Note: - Individual material item numbers (SHOPS) are to be found in Section 4 – Part 1 of the LV Mains Jointing Manual.

JOINTING PROCEDURE 7.412

Actions		General Requirements (ST: CA1C)
	Refer to Drawing **LVJ 7.412.1, 7.412.2** whilst undertaking this Jointing Procedure	
1.	Set up, mark and cut cable to length (100mm above termination point)	4
2.	Remove PVC oversheath	6
3.	Terminate aluminium wire armour – Fig 1, 2 & 3 **Note: -** The armour may be aluminium strip, treat as aluminium wire.	--
4.	Cut core to length and fit lug – Fig 1 & 2	29
5.	Apply heatshrink tube to lug and core – Fig 4	26
6.	Make connection to busbar	29

All dimensions in mm

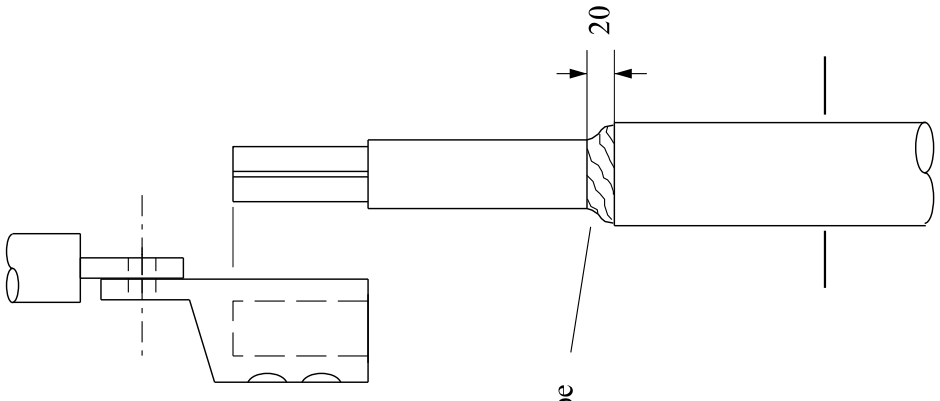

Fig. 2

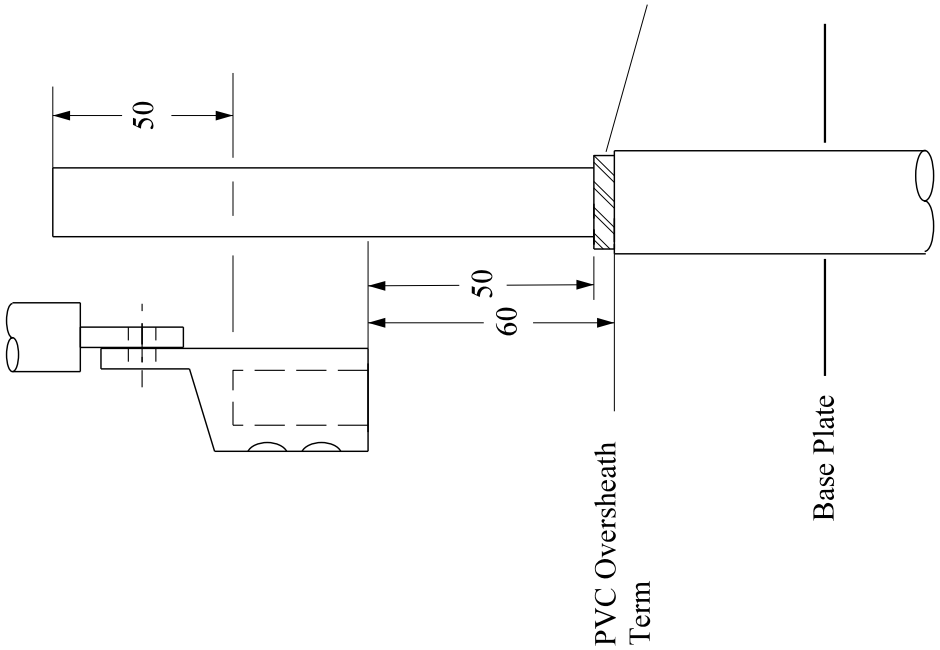

Fig. 1

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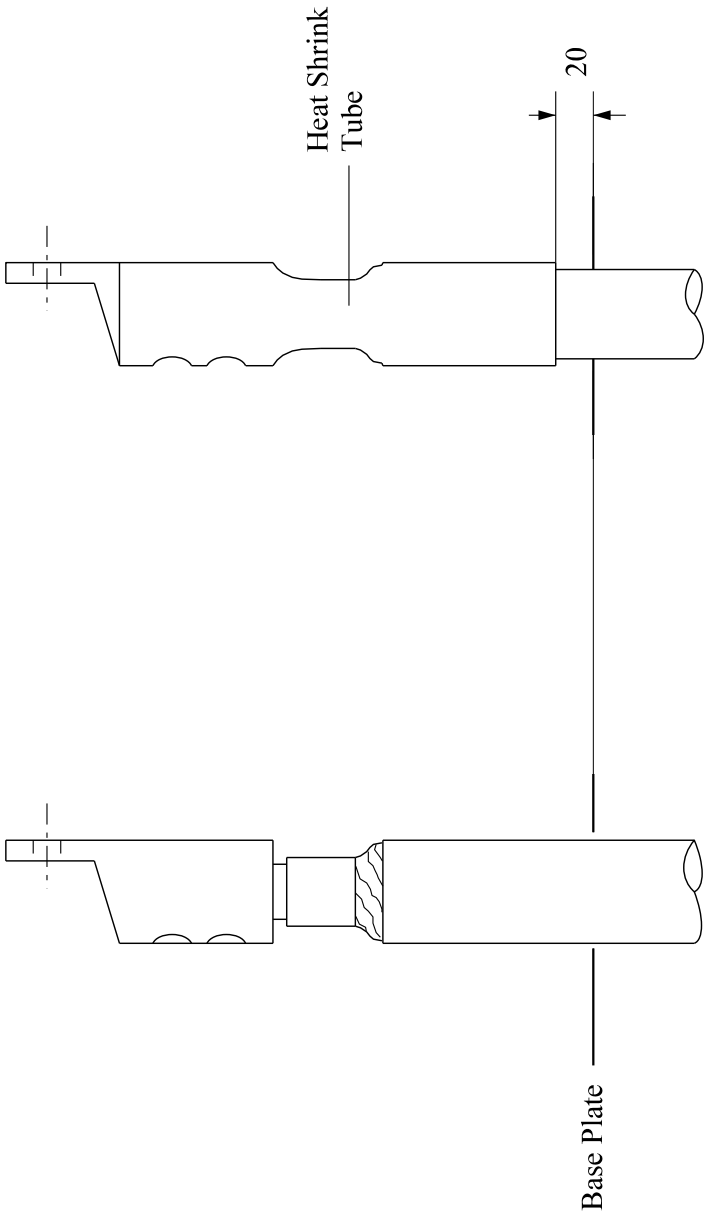

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APPENDIX A

SUPERSEDED DOCUMENTATION

This Standard Technique supersedes ST:CA1G/5 dated June 2013 which should now be withdrawn.

APPENDIX B

ASSOCIATED DOCUMENTATION

ST: CA1A, ST: CA1C/5, ST: CA1 D, ST: CA1E, ST: CA1F, ST: CA1H, ST: CA1I, ST: CA1U, ST: CA1W, ST: CA1X, ST: CA1Y, ST: CA1Z, ST: CA1AA, ST: CA1AB, ST: CA7A, ST: CA7B, ST: CA7C, ST: CA7D.

APPENDIX C

IMPACT ON COMPANY POLICY

This document complies with the latest ST: HS8H.

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

LV Mains terminations.