

Company Directive

STANDARD TECHNIQUE: CA3M/3

Relating to Procedures for Making 33kV Cable Straight Joints

Policy Summary

This Standard Technique document contains all the approved 33kV cold applied Straight Joints for EPR, XLPE Pb sheath, H Cable, HSL Cable, 3 Core XLPE SWA and PILC cables. It shall be implemented in conjunction with the appropriate General Requirements in ST: CA3C/2.

Only materials stated in this ST are approved for use on WPD's 33kV Underground Cable System unless the Policy Manager, Avonbank, has granted prior permission.

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: Peter White

Implementation Date: June 2017

Approved by

Policy Manager

Date:

29 June 2017

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IMPLEMENTATION PLAN

Introduction

This Standard Technique document contains all the approved 33kV cold applied Straight Joint jointing procedures for EPR, XLPE Pb sheath, H Cable, HSL Cable, 3 Core XLPE SWA and single core PILC cables used on the WPD 33kV underground cable network.

Main Changes

Errors found in Jointing Procedures 7.104.1 and 7.107.1 stripping dimensions.

Impact of Changes

None

Implementation Actions

Team Managers responsible for 33kV jointers shall make them aware that some of the stripping dimensions have changed.

Implementation Timetable

This Standard Technique can be implemented with immediate effect.

Page revised 29th August 2017

REVISION HISTORY

Document Revision & Review Table		
Date	Comments	Author
August 2017	The stripping dimensions for the following joints: - 7.104.1 and 7.107.1 have been changed.	Peter White
June 2017	New jointing procedure 7.108 added for the M105 series of joints.	Peter White
December 2016	This is a new document.	Peter White

ST: CA3M/3 Relating to Procedures for Making 33kV Cable Straight Joints.

This Standard Technique document contains all the approved 33kV cold applied Straight Joints for Single core EPR, H Cable, HSL Cable, 3 Core XLPE SWA and Single core PILC cables. It shall be implemented in conjunction with the appropriate General Requirements in ST: CA3C/2, including: -

1. General Cleanliness and Accident Prevention.
2. Joint Bay Preparation.
3. General Jointing Procedures – Dead Cables.

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

Cable sizes shown are the maximum for the individual joint, cable sizes below the maximum and there combinations are accommodated and are provided for in the relevant Jointing Procedure, this is particularly evident for transitional jointing.

Where 240mm² EPR is to be found, then for material selection and installation data use 300mm² EPR; but for the electrical purposes i.e. loadings, ratings etc. then the 240mm² EPR shall be treated as 185mm² EPR. Likewise where 150mm² EPR is to be found, then for material selection and installation data use 185mm² EPR.

Resin encapsulated joints must not be broken down.

Any reference to single core EPR cable equally applies to single core XLPE cable.

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.101

**185/300/400mm² EPR CWS SINGLE CORE to 185/300/400mm² EPR
CWS SINGLE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 400mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.101

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
185 EPR	185 EPR	SJ 3301
	300 EPR	SJ 3302
	400 EPR	SJ 3303
300 EPR	185 EPR	SJ 3304
	300 EPR	SJ 3305
	400 EPR	SJ 3306
400 EPR	185 EPR	SJ 3307
	300 EPR	SJ 3308
	400 EPR	SJ 3309

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.101

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE	CABLE DEPENDING MODULES		CONNECTORS			TUBE SET
	M85	B	CM MX85 EPR SCCWS185	CM MX85 EPR SCCWS300	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3301	3	3	3		3			6
SJ 3302	3	3		3		3		6
SJ 3303	3	3		3			3	6
SJ 3304	3	3	3		3			6
SJ 3305	3	3		3		3		6
SJ 3306	3	3		3			3	6
SJ 3307	3	3	3		3			6
SJ 3308	3	3		3		3		6
SJ 3309	3	3		3			3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
 Scotch 70
 Tinned copper wire 16 swg
 Tinned copper wire 20 swg
 De-solvit 1000 FD
 De-solvit 1000
 Workhorse dry wipes
 Emery cloth
 5313 Water block tape
 Cable ties
 Sealing putty
 Aluminium oxide cloth 320 grit
 Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.101

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.101.1, 7.101.2 and 7.101.3** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark.

COMPLETION OF THE JOINT

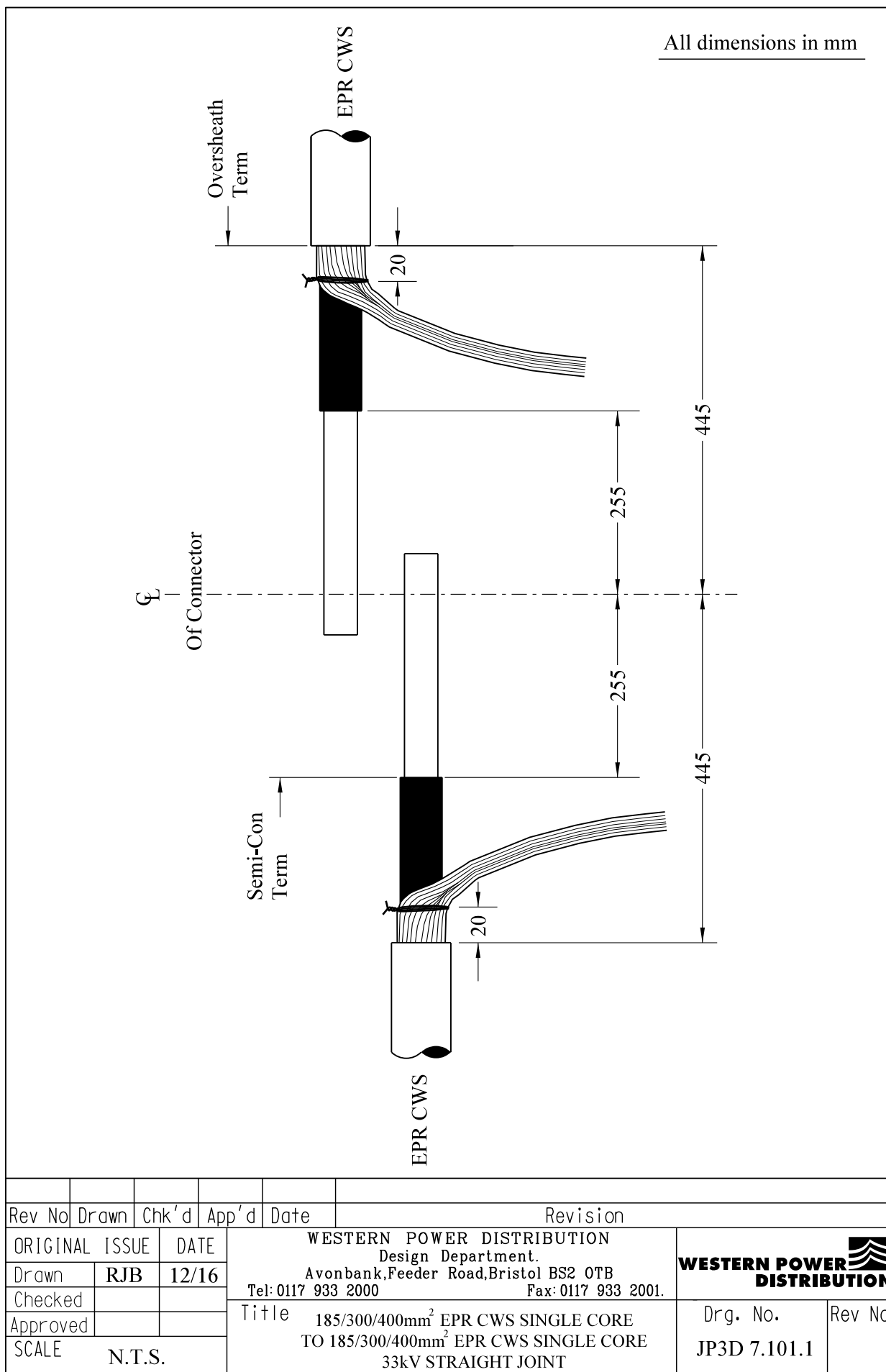
- | | | |
|-----|--|-------|
| 11. | Position a stress cone applicator with cone over each core. | 32 |
| | Note; - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator. | |
| 12. | Connect phase conductors. Do not shear connector bolts at this stage. | 28/33 |
| 13. | Remove connectors centre bolt applied in 12. | -- |

JOINTING PROCEDURE 7.101 – Continued

Actions	General Requirements (ST: CA3C/2)
14. Apply semi-con tape to terminations of semi-con screens.	32
15. Fit a copper equalisation braid onto centre of phase insulation sleeve.	34
16. Position phase insulation sleeve over a core to one side of the joint.	34
17. Reconnect phase conductors ensuring correct connector set up.	33
Note:- Ensure actions 4/11/14/16 are complete before final shearing off connector centre bolt.	
18. Position insulation sleeve at joint centre.	34
19. Position and fit stress cones.	32
20. Clean and degrease joint length.	40
21. Connect copper earth braid from insulation sleeve to semi-con screen.	34
22. Offer inner sleeve to cable, mark position and fit split foam rings.	34
23. Fit inner sleeve to joint.	36/37
24. Ensure joint is level and fill with Lovisil.	38
25. Clean and degrease inner sleeve.	40
26. Form copper screen wires into one conductor at either end and connect to copper earth bar.	39
27. Wrap copper mesh earth screen around inner sleeve, connecting to copper screen wires at either end.	41
28. Remove temporary earth continuity bond applied in 3 and reseal EPR oversheaths.	11/45
29. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
30. Build-up cable oversheaths.	30

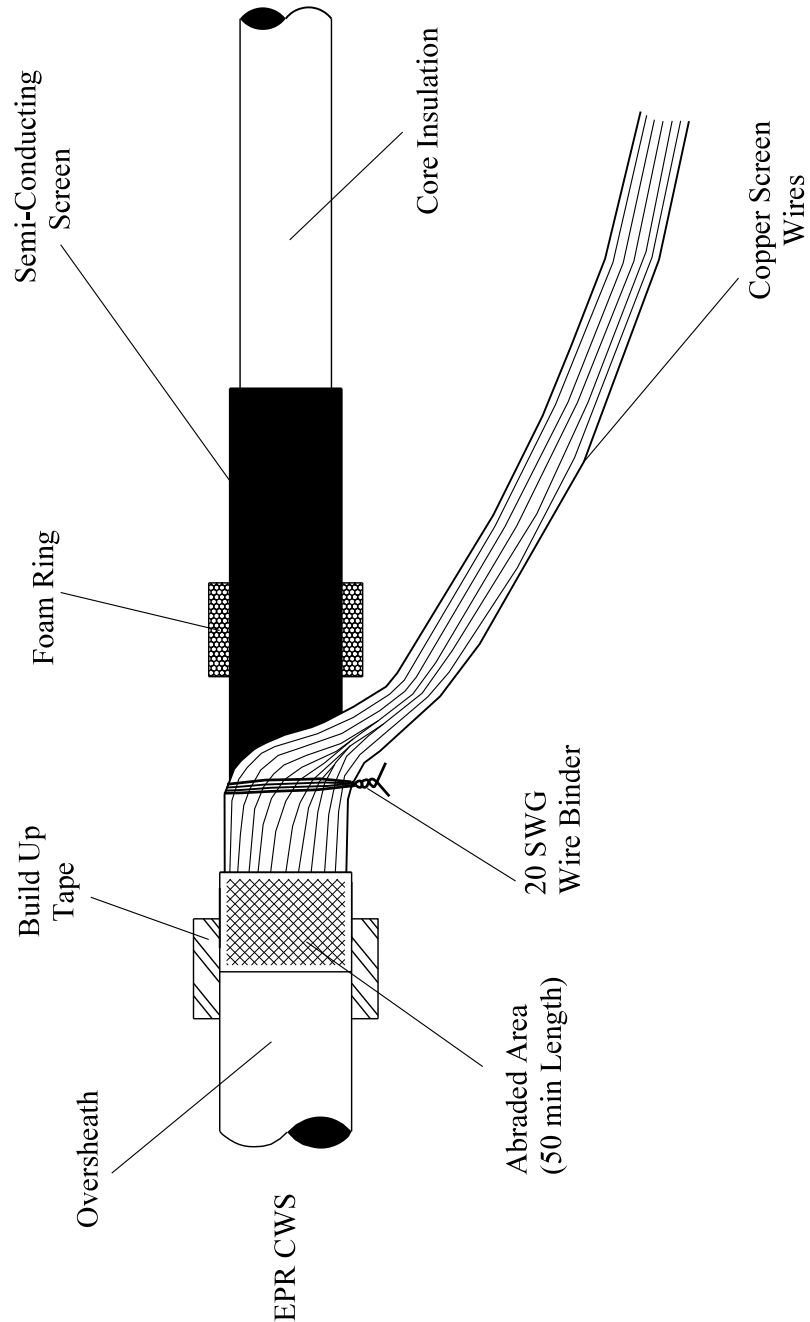
JOINTING PROCEDURE 7.101 – Continued

Actions	General Requirements (ST: CA3C/2)
31. Fit and support outer sleeve ensuring 15mm clearance.	43
32. Mix and pour resin.	44



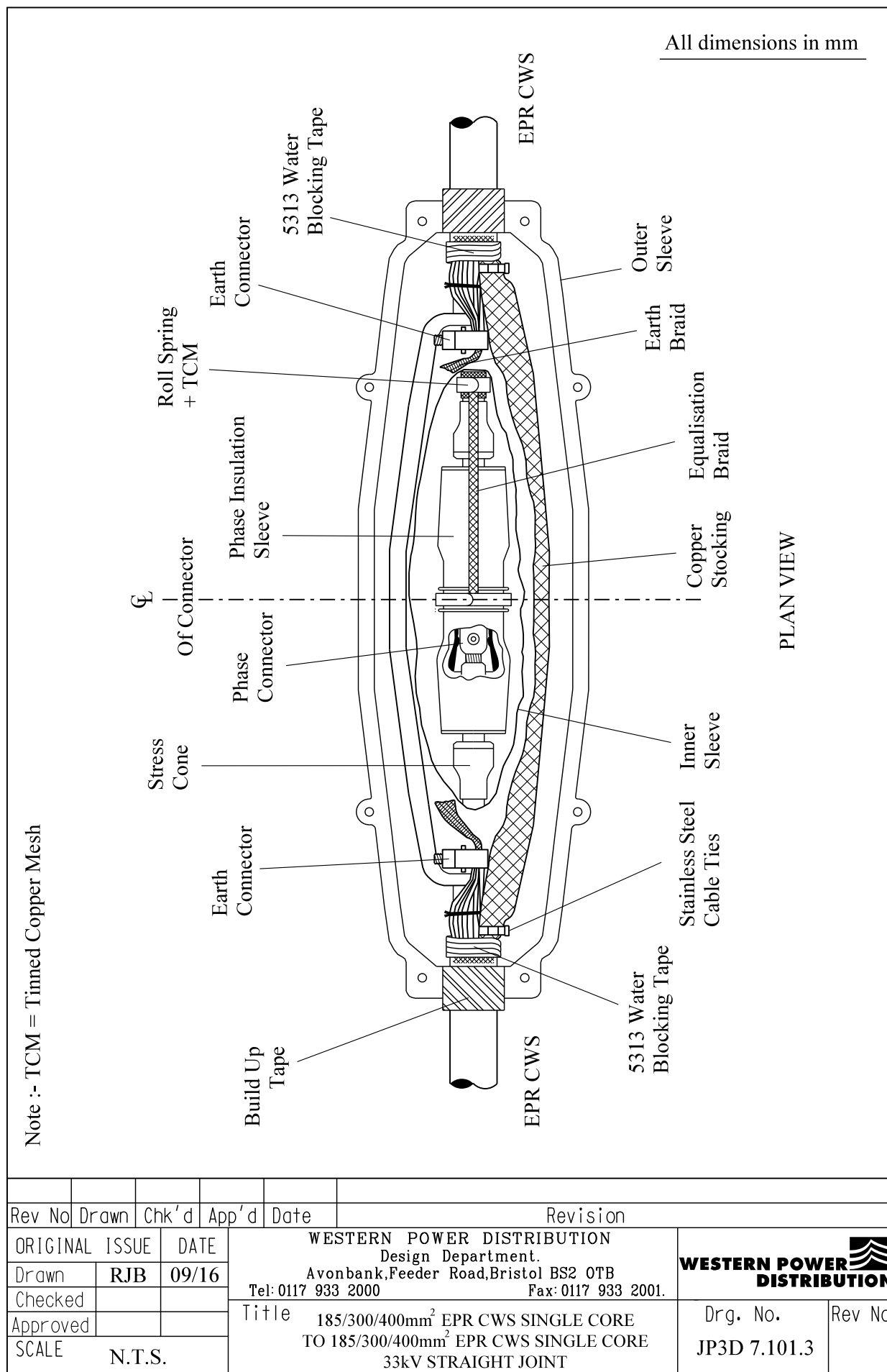
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All dimensions in mm



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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.102

**400/500/630mm² EPR CWS SINGLE CORE to 400/500/630mm² EPR
CWS SINGLE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 630mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.102

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
630 EPR	400 EPR	SJ 3310
	500 EPR	SJ 3311
	630 EPR	SJ 3312

JOINTING PROCEDURE 7.102

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULES		CABLE DEPENDENT MODULES		CONNECTORS	TUBE SET
	M105	B	C	CM MX105 EPR CWS300	CM MX105 EPR CWS630	VTPC36UTB	WCSM 90/25 x 250
SJ 3310	3	3	3	3	-	3	6
SJ 3311	3	3	3	-	3	3	6
SJ 3312	3	3	3	-	3	3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.102

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.102.1, 7.102.2 and 7.102.3** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark.

COMPLETION OF THE JOINT

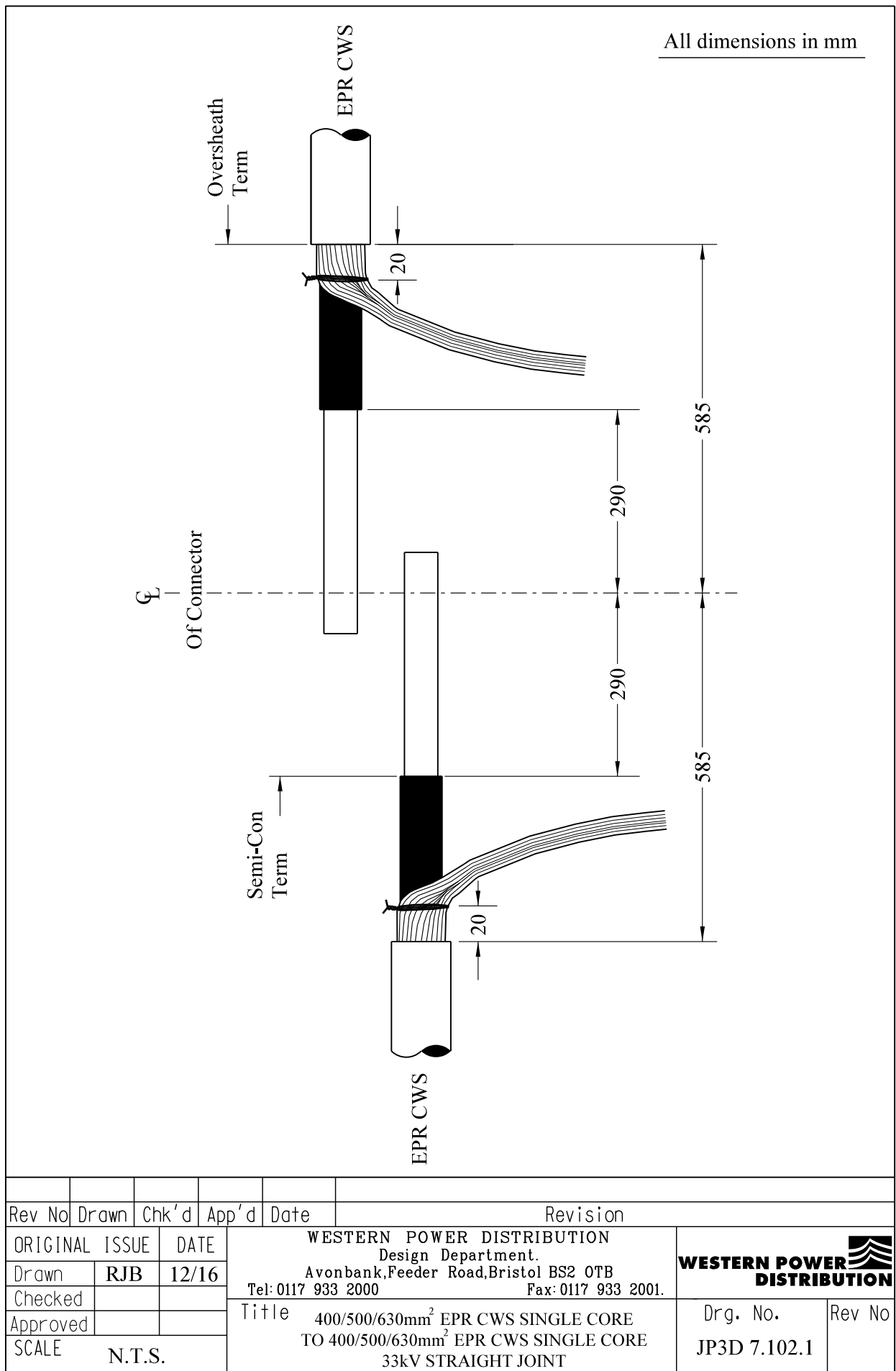
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|-----|--|-------|
| 11. | Position a stress cone applicator with cone over each core. | 32 |
| | Note; - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator. | |
| 12. | Connect phase conductors. Do not shear connector bolts at this stage. | 28/33 |
| 13. | Remove connectors centre bolt applied in 12. | -- |

JOINTING PROCEDURE 7.102 – Continued

Actions	General Requirements (ST: CA3C/2)
14. Apply semi-con tape to terminations of semi-con screens.	32
15. Fit a copper equalisation braid onto centre of phase insulation sleeve.	34
16. Position phase insulation sleeve over a core to one side of the joint.	34
17. Reconnect phase conductors ensuring correct connector set up.	33
Note:- Ensure actions 4/11/14/16 are complete before final shearing off connector centre bolt.	
18. Position insulation sleeve at joint centre.	34
19. Position and fit stress cones.	32
20. Clean and degrease joint length.	40
21. Connect copper earth braid from insulation sleeve to semi-con screen.	34
22. Offer inner sleeve to cable, mark position and fit split foam rings.	34
23. Fit inner sleeve to joint.	36/37
24. Ensure joint is level and fill with Lovisil.	38
25. Clean and degrease inner sleeve.	40
26. Form copper screen wires into one conductor at either end and connect to copper earth bar.	39
27. Wrap copper mesh earth screen around inner sleeve, connecting to copper screen wires at either end.	41
28. Remove temporary earth continuity bond applied in 3 and reseal EPR oversheaths.	11/45
29. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
30. Build-up cable oversheaths.	30

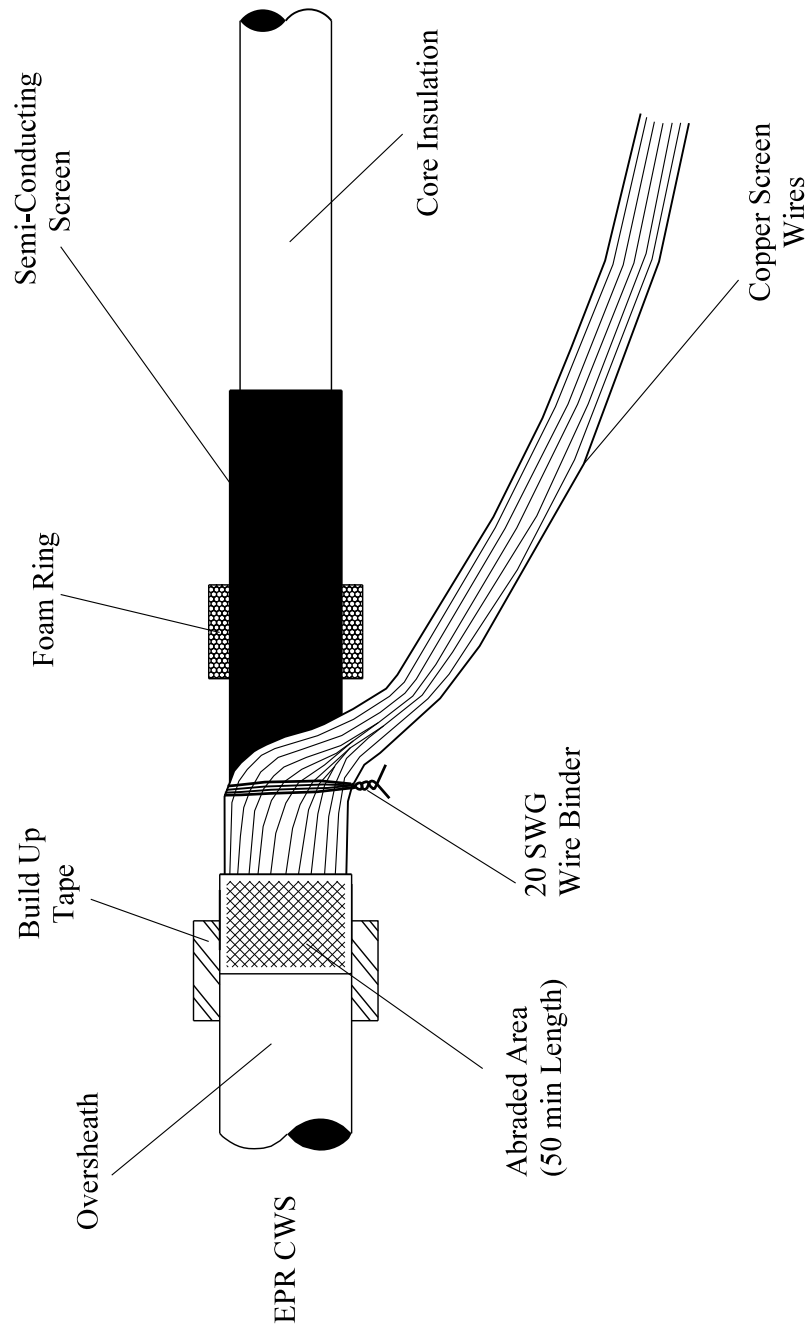
JOINTING PROCEDURE 7.102 – Continued

Actions	General Requirements (ST: CA3C/2)
31. Fit and support outer sleeve ensuring 15mm clearance.	43
32. Mix and pour resin.	44



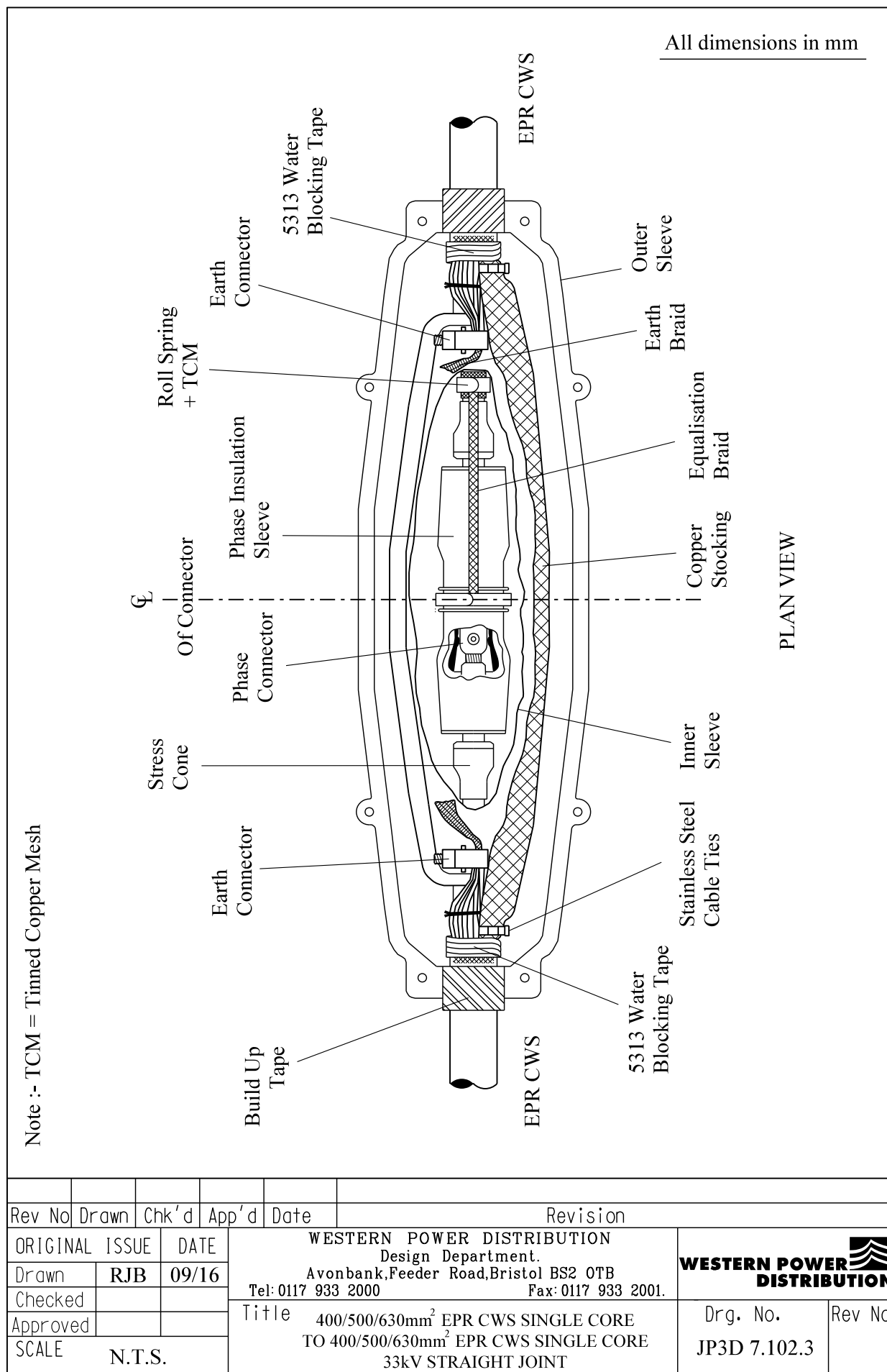
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All dimensions in mm



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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.103

**800/1000mm² EPR CWS SINGLE CORE to 800/1000mm² EPR CWS
SINGLE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 1000mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.103

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
800	800 EPR	SJ 3313
	1000 EPR	SJ 3314

JOINTING PROCEDURE 7.103

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULES		CABLE DEPENDENT MODULES	CONNECTORS	TUBE SET
	M105	B	C	CM MX105 EPR CWS800	VTPC44UTB	WCSM 90/25 x 250
SJ 3313	3	3	3	3	3	6
SJ 3314	3	3	3	3	3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.103

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.103.1, 7.103.2 and 7.103.3** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark.

COMPLETION OF THE JOINT

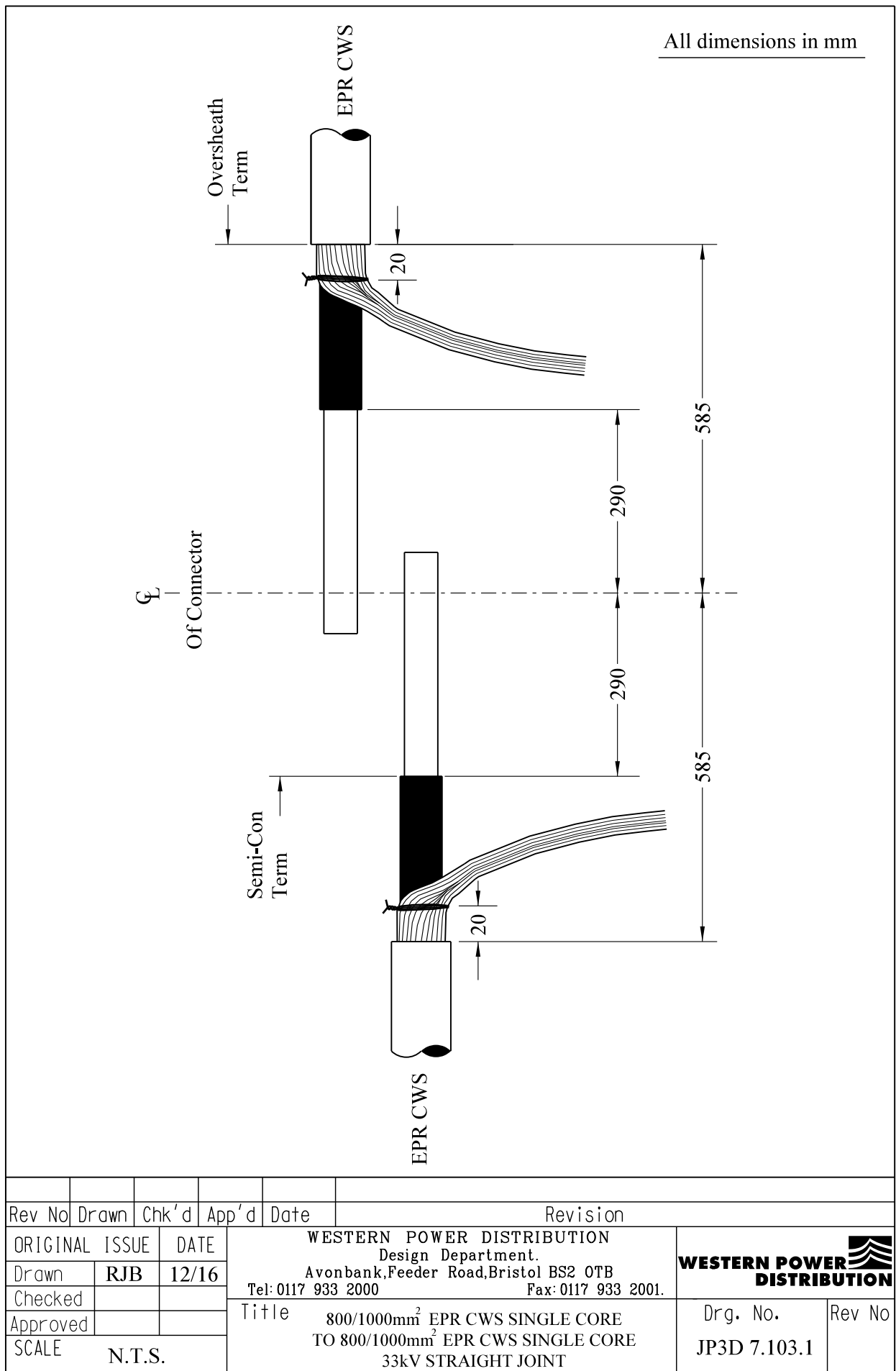
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|-----|--|-------|
| 11. | Position a stress cone applicator with cone over each core. | 32 |
| | Note; - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator. | |
| 12. | Connect phase conductors. Do not shear connector bolts at this stage. | 28/33 |
| 13. | Remove connectors centre bolt applied in 12. | -- |

JOINTING PROCEDURE 7.103 – Continued

Actions	General Requirements (ST: CA3C/2)
14. Apply semi-con tape to terminations of semi-con screens.	32
15. Fit a copper equalisation braid onto centre of phase insulation sleeve.	34
16. Position phase insulation sleeve over a core to one side of the joint.	34
17. Reconnect phase conductors ensuring correct connector set up.	33
Note: - Ensure actions 4/11/14/16 are complete before final shearing off connector centre bolt.	
18. Position insulation sleeve at joint centre.	34
19. Position and fit stress cones.	32
20. Clean and degrease joint length.	40
21. Connect copper earth braid from insulation sleeve to semi-con screen.	34
22. Offer inner sleeve to cable, mark position and fit split foam rings.	34
23. Fit inner sleeve to joint.	36/37
24. Ensure joint is level and fill with Lovisil.	38
25. Clean and degrease inner sleeve.	40
26. Form copper screen wires into one conductor at either end and connect to copper earth bar.	39
27. Wrap copper mesh earth screen around inner sleeve, connecting to copper screen wires at either end.	41
28. Remove temporary earth continuity bond applied in 3 and reseal EPR oversheaths.	11/45
29. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
30. Build-up cable oversheaths.	30

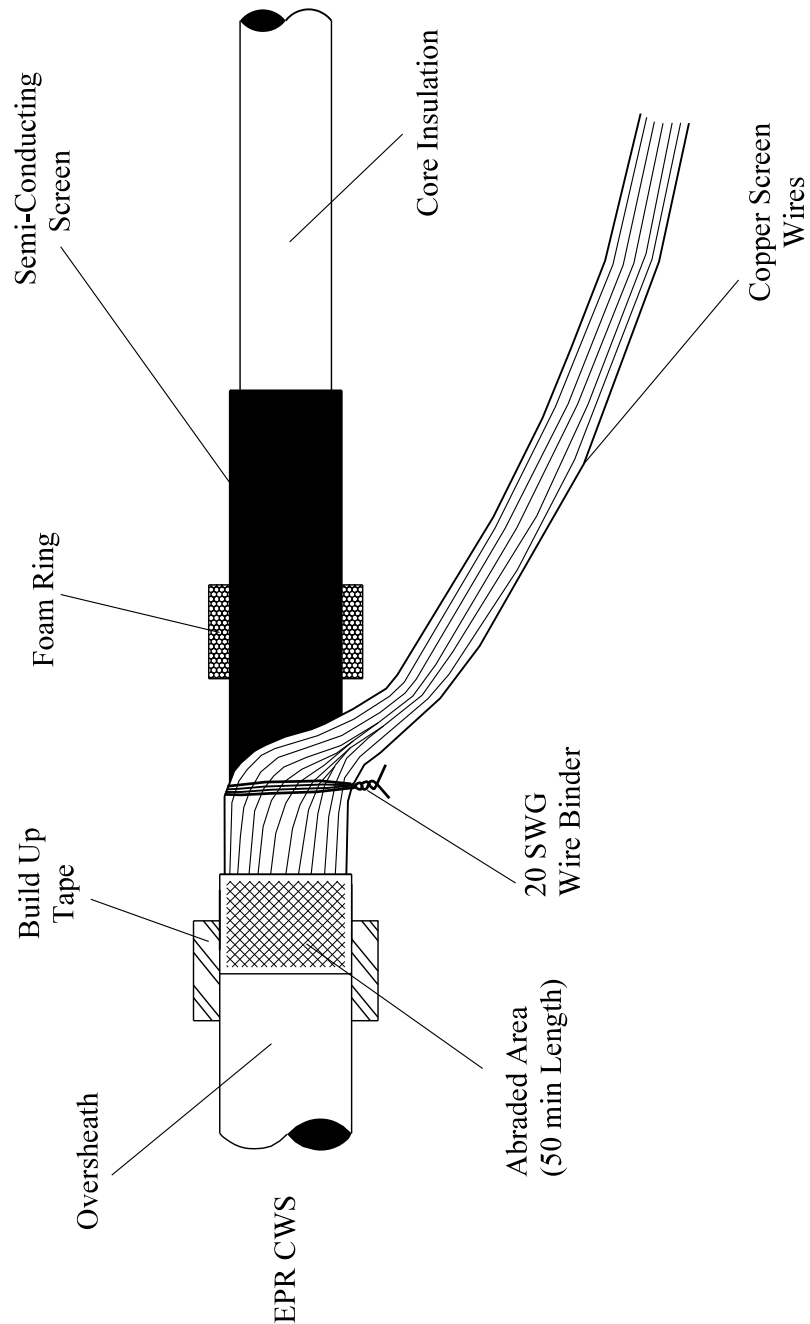
JOINTING PROCEDURE 7.103 – Continued

Actions	General Requirements (ST: CA3C/2)
31. Fit and support outer sleeve ensuring 15mm clearance.	43
32. Mix and pour resin.	44



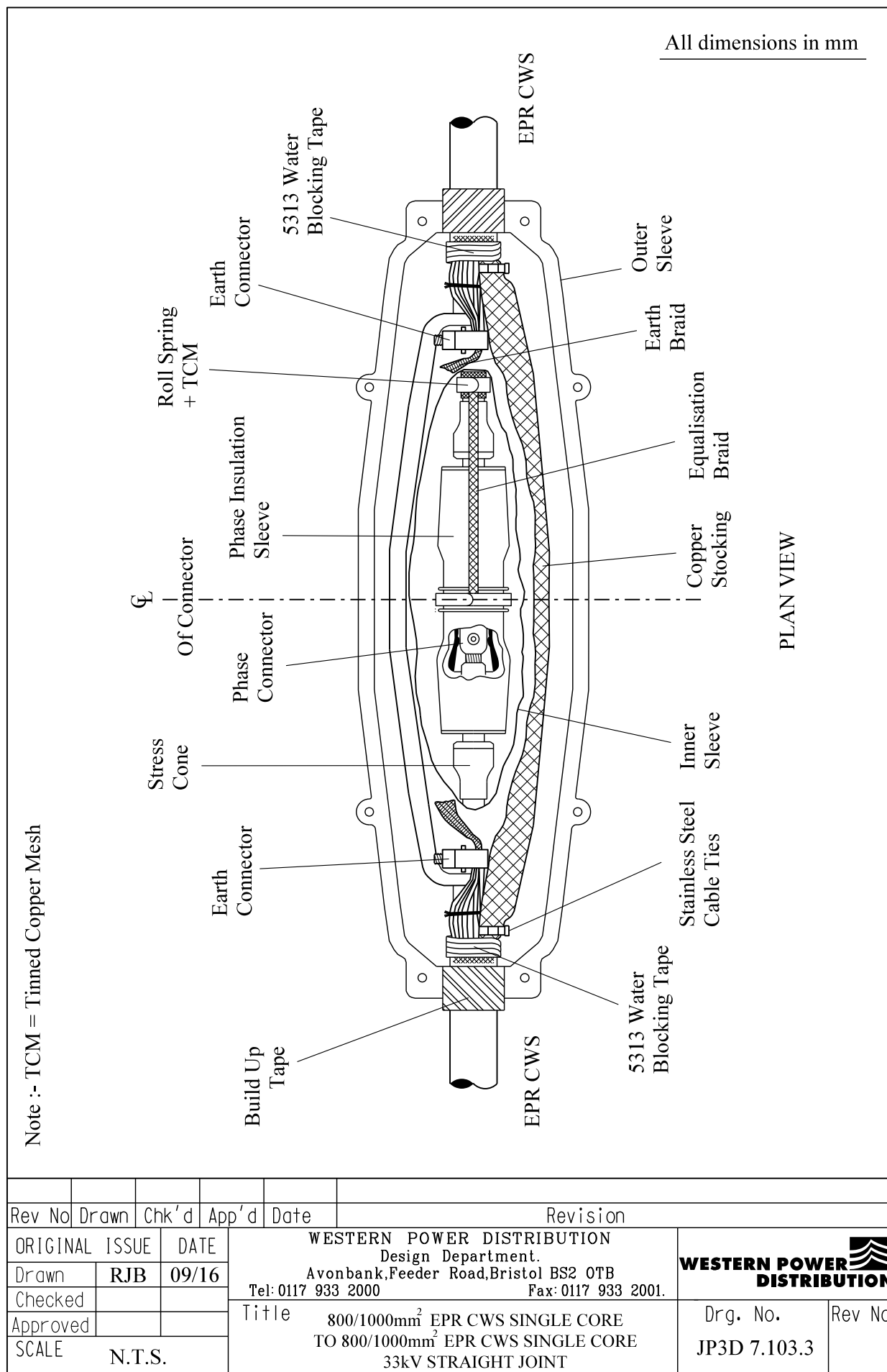
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All dimensions in mm



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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.104

185/300/400mm² EPR CWS SINGLE CORE to 185/300/400mm² XLPE Pb SHEATH SINGLE CORE 33KV STRAIGHT JOINT.

(This Jointing Procedure covers cable sizes up to and including 400mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.104

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
185 EPR	185 XLPE	SJ 3315
	300 XLPE	SJ 3316
	400 XLPE	SJ 3317
300 EPR	185 XLPE	SJ 3318
	300 XLPE	SJ 3319
	400 XLPE	SJ 3320
400 EPR	185 XLPE	SJ 3321
	300 XLPE	SJ 3322
	400 XLPE	SJ 3323

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.104

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE	CABLE DEPENDING MODULES				CONNECTORS			TUBE SET
	M85	B	CM MX85 EPR SCCWS185	CM MX85 EPR SCCWS300	CM MX85 XLPEPbCWS185	CM MX85 XLPEPbCWS300	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3315	3	3	3		3		3			6
SJ 3316	3	3		3		3		3		6
SJ 3317	3	3		3		3			3	6
SJ 3318	3	3	3		3		3			6
SJ 3319	3	3		3		3		3		6
SJ 3320	3	3		3		3			3	6
SJ 3321	3	3	3		3		3			6
SJ 3322	3	3		3		3		3		6
SJ 3323	3	3		3		3			3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
 Scotch 70
 Tinned copper wire 16 swg
 Tinned copper wire 20 swg
 De-solvit 1000 FD
 De-solvit 1000
 Workhorse dry wipes
 Emery cloth
 5313 Water block tape
 Cable ties
 Sealing putty
 Aluminium oxide cloth 320 grit
 Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.104

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.104.1, 7.104.2, 7.104.3 and 7.104.4** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark.

XLPE CABLE – PREPARATION

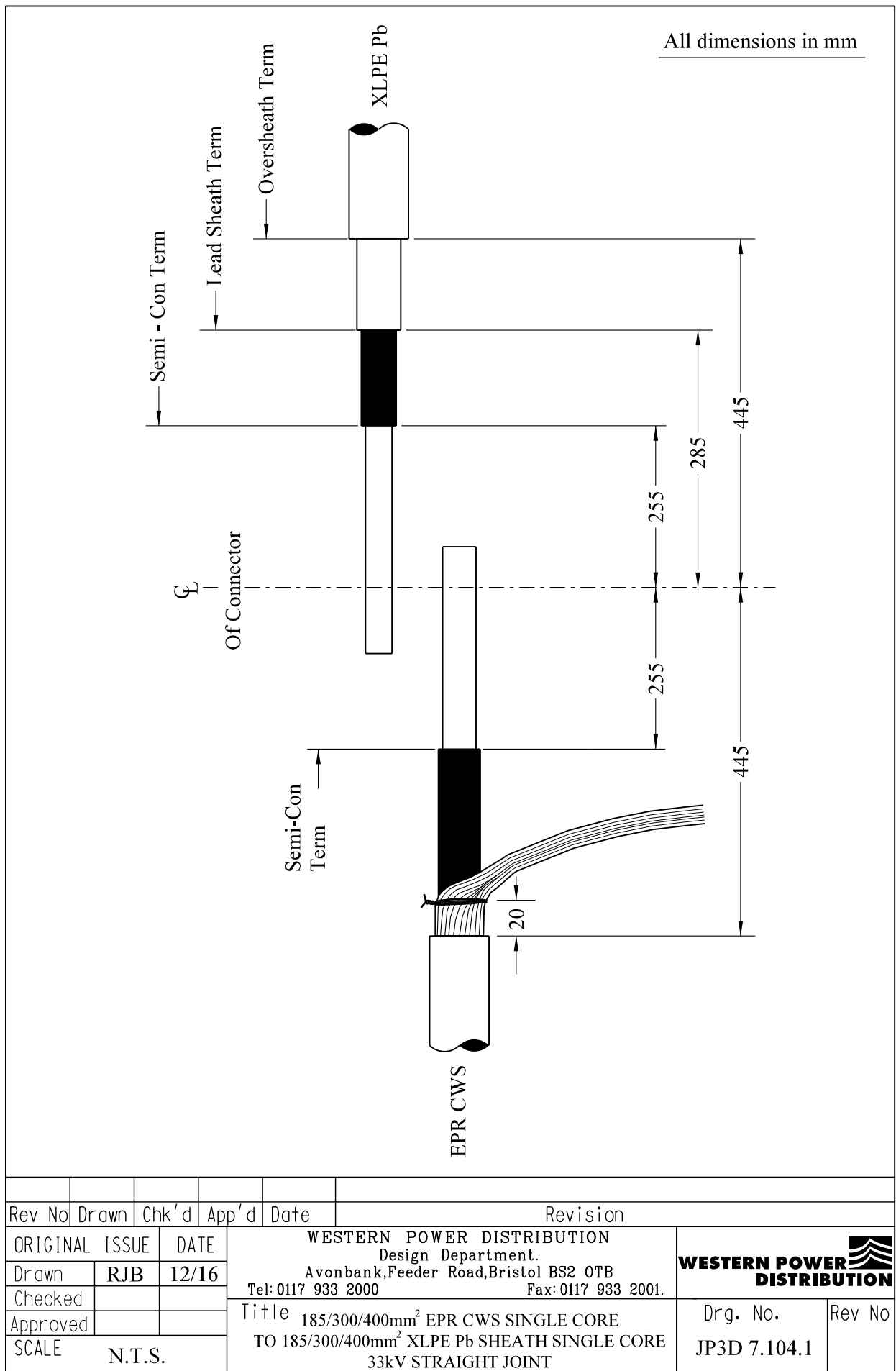
- | | | |
|-----|---|----|
| 11. | Clean oversheath for a distance of 2m. | -- |
| 12. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 13. | Park a mastic lined heat shrink tube next to temporary earth continuity bond. | -- |

JOINTING PROCEDURE 7.104 – Continued

Actions	General Requirements (ST: CA3C/2)
14. Remove oversheath, clean and abrade lead sheath.	17
15. Remove lead sheath.	19
16. Remove semi-conducting screens ensuring insulation is free from all conductive material.	25
17. Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer.	27/29
Note: - Ensure to allow for solid centre block of the split connector when cutting core from joint centre line mark.	
COMPLETION OF JOINT	
18. Position a stress cone applicator with cone over each core.	32
Note: - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator.	
19. Connect phase conductors. Do not shear connector bolts at this stage.	28/33
20. Remove connectors centre bolt applied in 20.	--
21. Apply semi-con tape to terminations of semi-con screens.	32
22. Fit a copper equalisation braid onto centre of the insulation sleeve.	34
23. Position a stress cone applicator with cone over each core.	32
24. Reconnect phase conductors ensuring correct connector set up.	33
Note: - Ensure actions 23/24/25/26/27 are complete before final shearing off connector centre bolt.	
25. Position insulation sleeve at joint centre.	34
26. Position and fit stress cones.	32

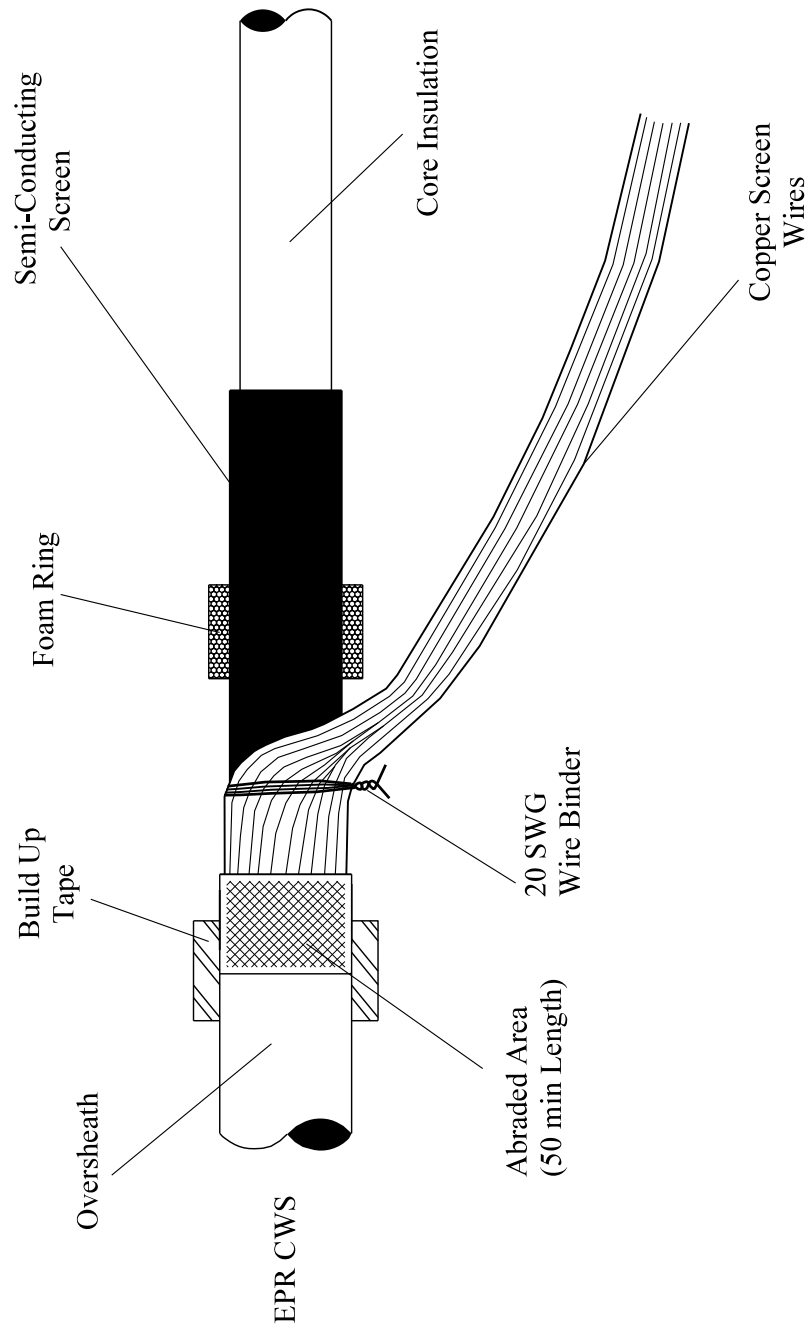
JOINTING PROCEDURE 7.104 – Continued

Actions	General Requirements (ST: CA3C/2)
27. Clean and degrease joint length.	40
28. Connect copper earth braid from insulation sleeve to semi-con screen.	--
29. Offer inner sleeve to cable, mark position and fit split foam rings.	31
30. Fit inner sleeve.	36
31. Ensure joint is level and fill with Lovisil.	38
32. Clean and degrease inner sleeve.	43
33. Form copper screen wires into one conductor and connect to copper earth bar clamp.	42
34. Apply tinned copper mesh to lead sheath and connect earth braid with a roll spring. Apply PVC tape to enclose the roll spring connection assembly.	39
35. Remove temporary earth continuity bond applied in 3 and reseal oversheaths.	11/45
36. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
37. Apply a 40mm water block to the lead sheath.	42
38. Build-up cable oversheaths.	34
39. Fit and support outer sleeve ensuring 15mm clearance.	43
40. Mix and pour resin.	44



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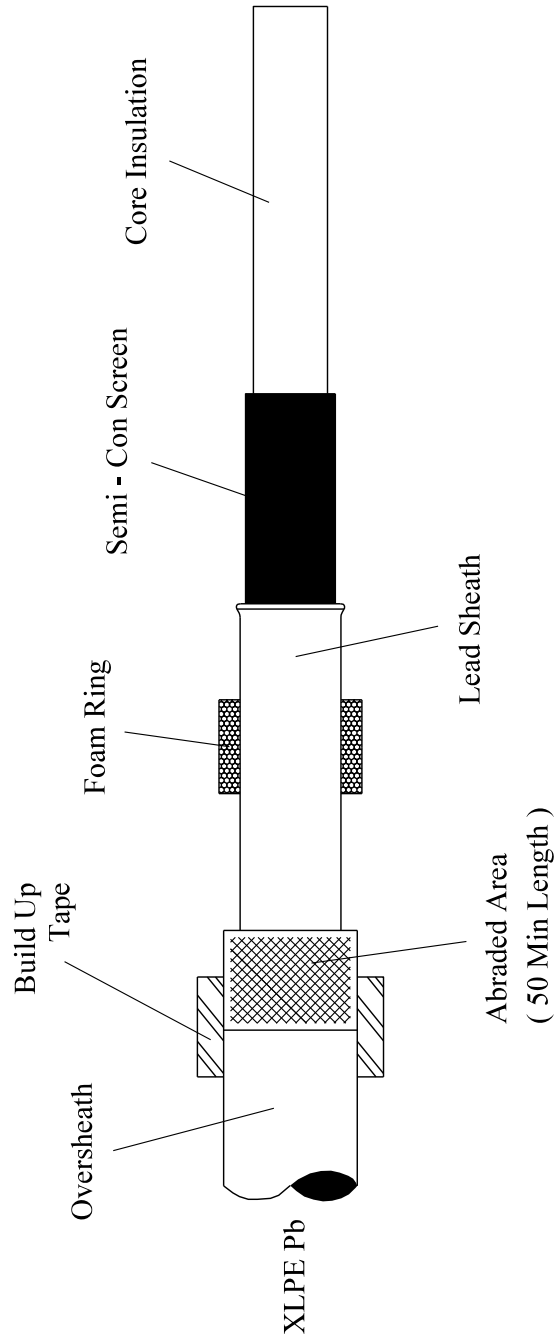
All dimensions in mm



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SCALE		N.T.S.		Title	
				PREPARATION OF EPR CWS	
				Drg. No. JP3D 7.104.2	
				Rev No	

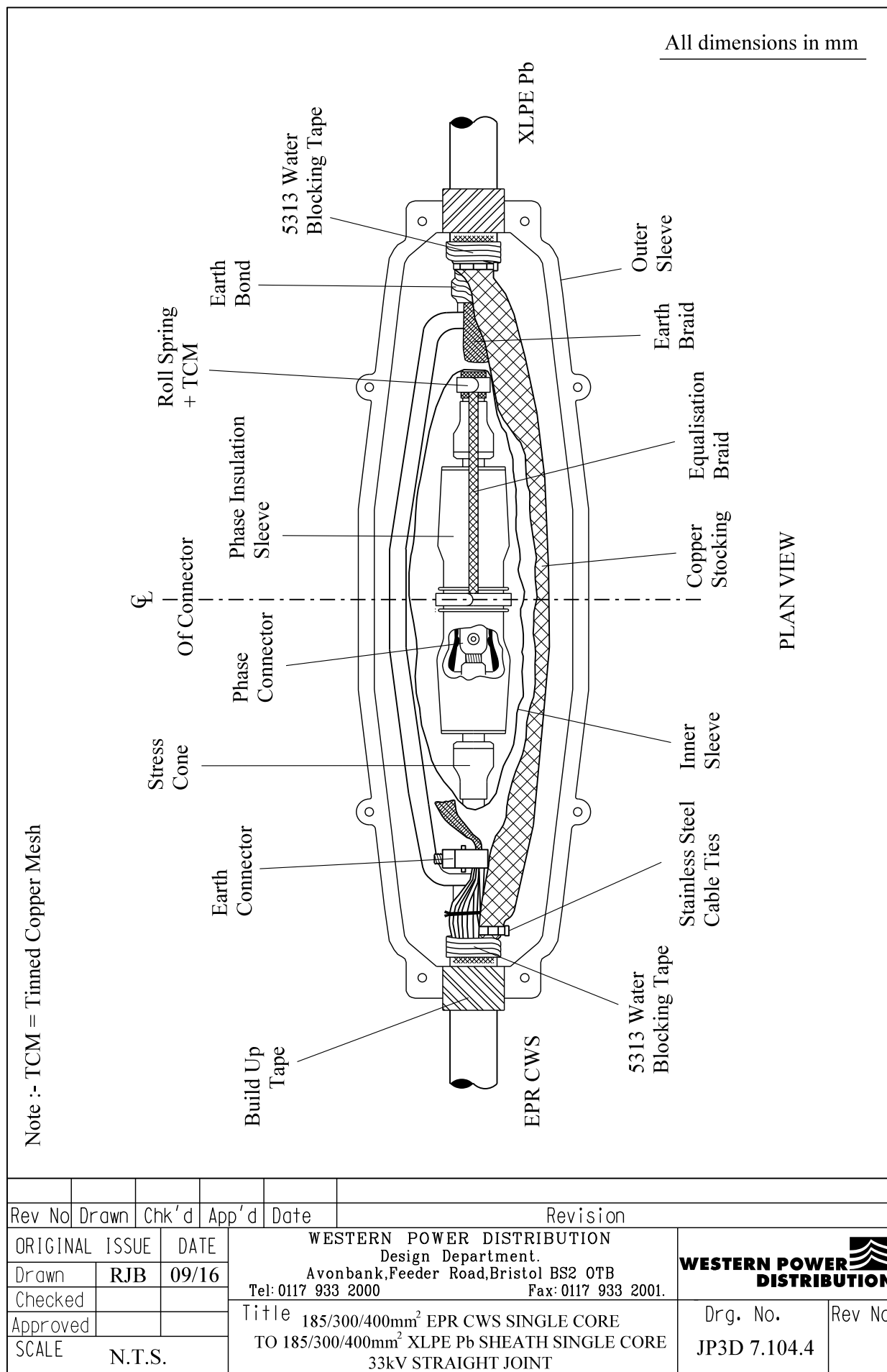
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All dimensions in mm



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				Drg. No. JP3D 7.104.3	
				Rev No	

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.105

400/500/630mm² EPR CWS SINGLE CORE to 400/500/630mm² XLPE Pb SHEATH SINGLE CORE 33KV STRAIGHT JOINT.

(This Jointing Procedure covers cable sizes up to and including 630mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.105

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
400 EPR	400 XLPE	SJ 3324
	500 XLPE	SJ 3325
	630 XLPE	SJ 3326
500 EPR	400 XLPE	SJ 3327
	500 XLPE	SJ 3328
	630 XLPE	SJ 3329
630 EPR	400 XLPE	SJ 3330
	500 XLPE	SJ 3331
	630 XLPE	SJ 3332

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.105

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE		CABLE DEPENDING MODULES				CONNECTORS	TUBE SET
	M105	B	C	CM MX105 EPR CWS300	CM MX105 EPR CWS630	CM MX105 XLPE Pb 300	CM MX105 XLPE Pb 630	VTPC36UTB	WCSM 90/25 x 250
SJ 3324	3	3	3	3	-	3	-	3	6
SJ 3325	3	3	3	3	-	-	3	3	6
SJ 3326	3	3	3	3	-	-	3	3	6
SJ 3327	3	3	3	-	3	3	-	3	6
SJ 3328	3	3	3	-	3	-	3	3	6
SJ 3329	3	3	3	-	3	-	3	3	6
SJ 3330	3	3	3	-	3	3	-	3	6
SJ 3331	3	3	3	-	3	-	3	3	6
SJ 3332	3	3	3	-	3	-	3	3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.105

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.105.1, 7.105.2, 7.105.3 and 7.105.4** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark.

XLPE CABLE – PREPARATION

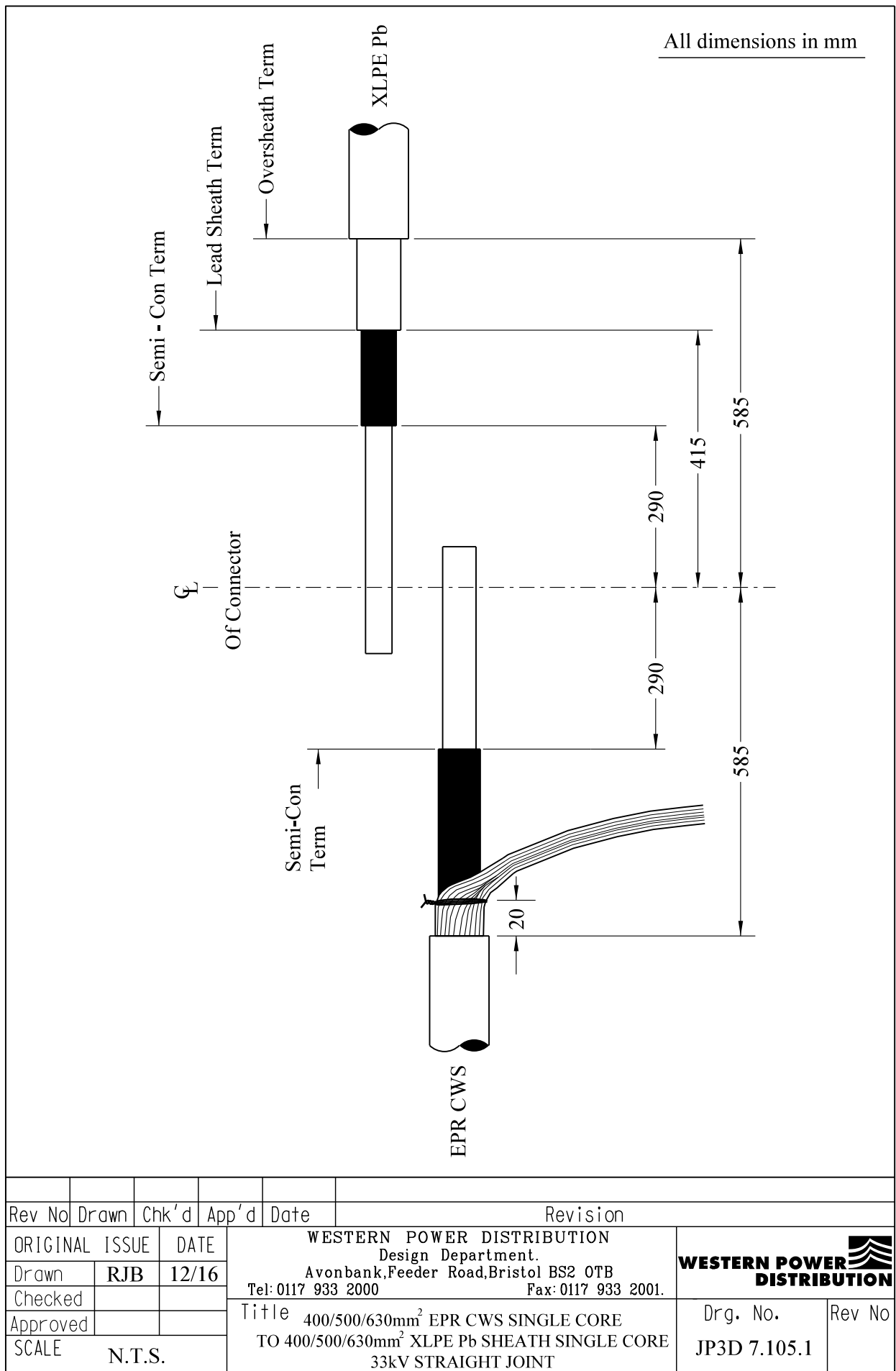
- | | | |
|-----|---|----|
| 11. | Clean oversheath for a distance of 2m. | -- |
| 12. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 13. | Park a mastic lined heat shrink tube next to temporary earth continuity bond. | -- |

JOINTING PROCEDURE 7.105 – Continued

Actions	General Requirements (ST: CA3C/2)
14. Remove oversheath, clean and abrade lead sheath.	17
15. Remove lead sheath.	19
16. Remove semi-conducting screens ensuring insulation is free from all conductive material.	25
17. Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer.	27/29
Note: - Ensure to allow for solid centre block of the split connector when cutting core from joint centre line mark.	
COMPLETION OF JOINT	
18. Position a stress cone applicator with cone over each core.	32
Note: - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator.	
19. Connect phase conductors. Do not shear connector bolts at this stage.	28/33
20. Remove connectors centre bolt applied in 20.	--
21. Apply semi-con tape to terminations of semi-con screens.	32
22. Fit a copper equalisation braid onto centre of the insulation sleeve.	34
23. Position a stress cone applicator with cone over each core.	32
24. Reconnect phase conductors ensuring correct connector set up.	33
Note: - Ensure actions 23/24/25/26/27 are complete before final shearing off connector centre bolt.	
25. Position insulation sleeve at joint centre.	34
26. Position and fit stress cones.	32

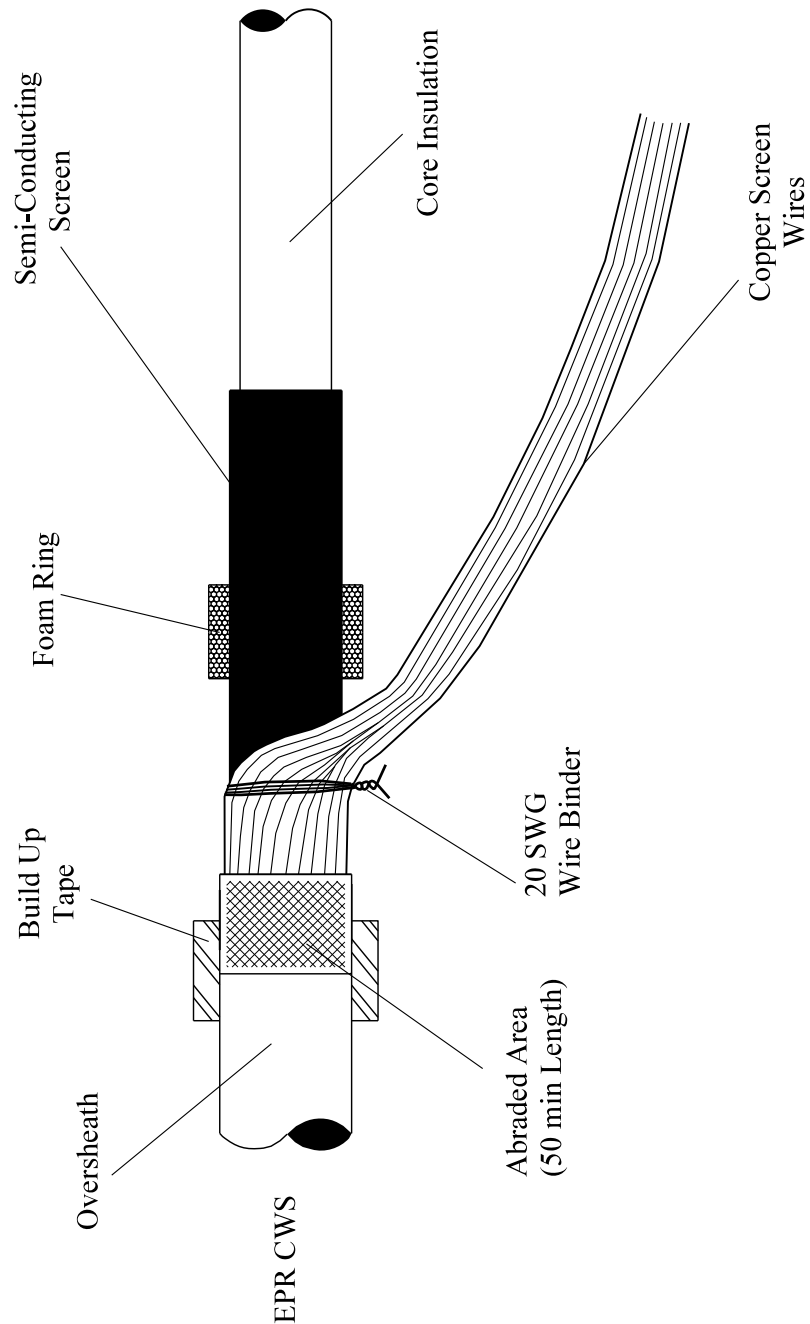
JOINTING PROCEDURE 7.105 – Continued

Actions	General Requirements (ST: CA3C/2)
27. Clean and degrease joint length.	40
28. Connect copper earth braid from insulation sleeve to semi-con screen.	--
29. Offer inner sleeve to cable, mark position and fit split foam rings.	31
30. Fit inner sleeve.	36
31. Ensure joint is level and fill with Lovisil.	38
32. Clean and degrease inner sleeve.	43
33. Form copper screen wires into one conductor and connect to copper earth bar clamp.	42
34. Apply tinned copper mesh to lead sheath and connect earth braid with a roll spring. Apply PVC tape to enclose the roll spring connection assembly.	39
35. Remove temporary earth continuity bond applied in 3 and reseal oversheaths.	11/45
36. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
37. Apply a 40mm water block to the lead sheath.	42
38. Build-up cable oversheaths.	34
39. Fit and support outer sleeve ensuring 15mm clearance.	43
40. Mix and pour resin.	44



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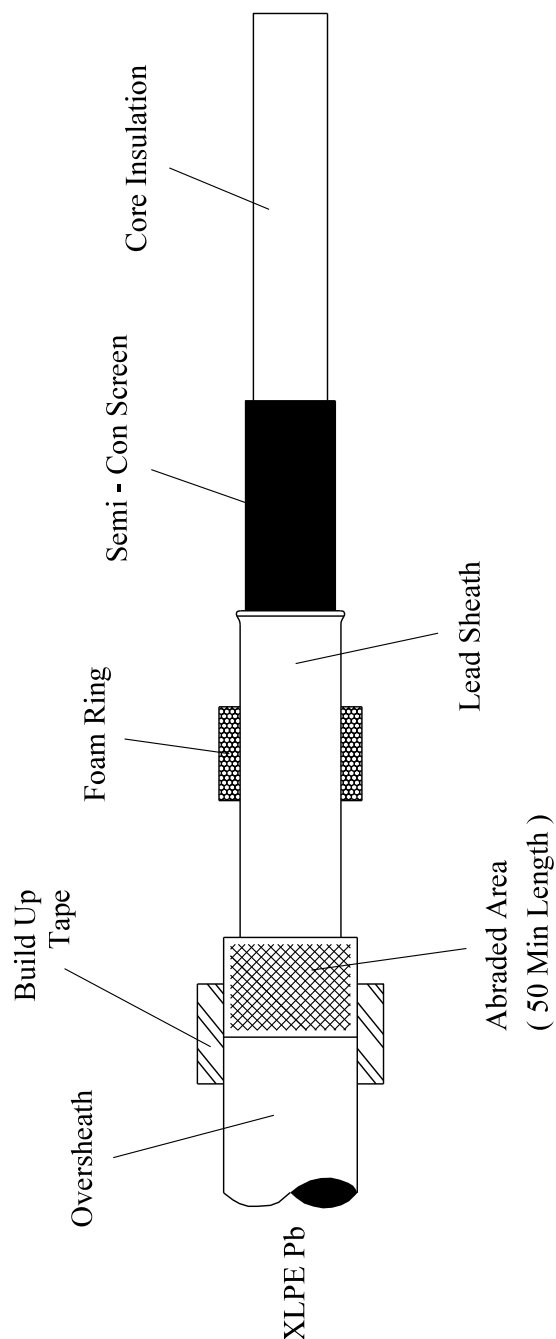
All dimensions in mm



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SCALE		N.T.S.		Title		Drg. No.	Rev No
				PREPARATION OF EPR CWS		JP3D 7.105.2	

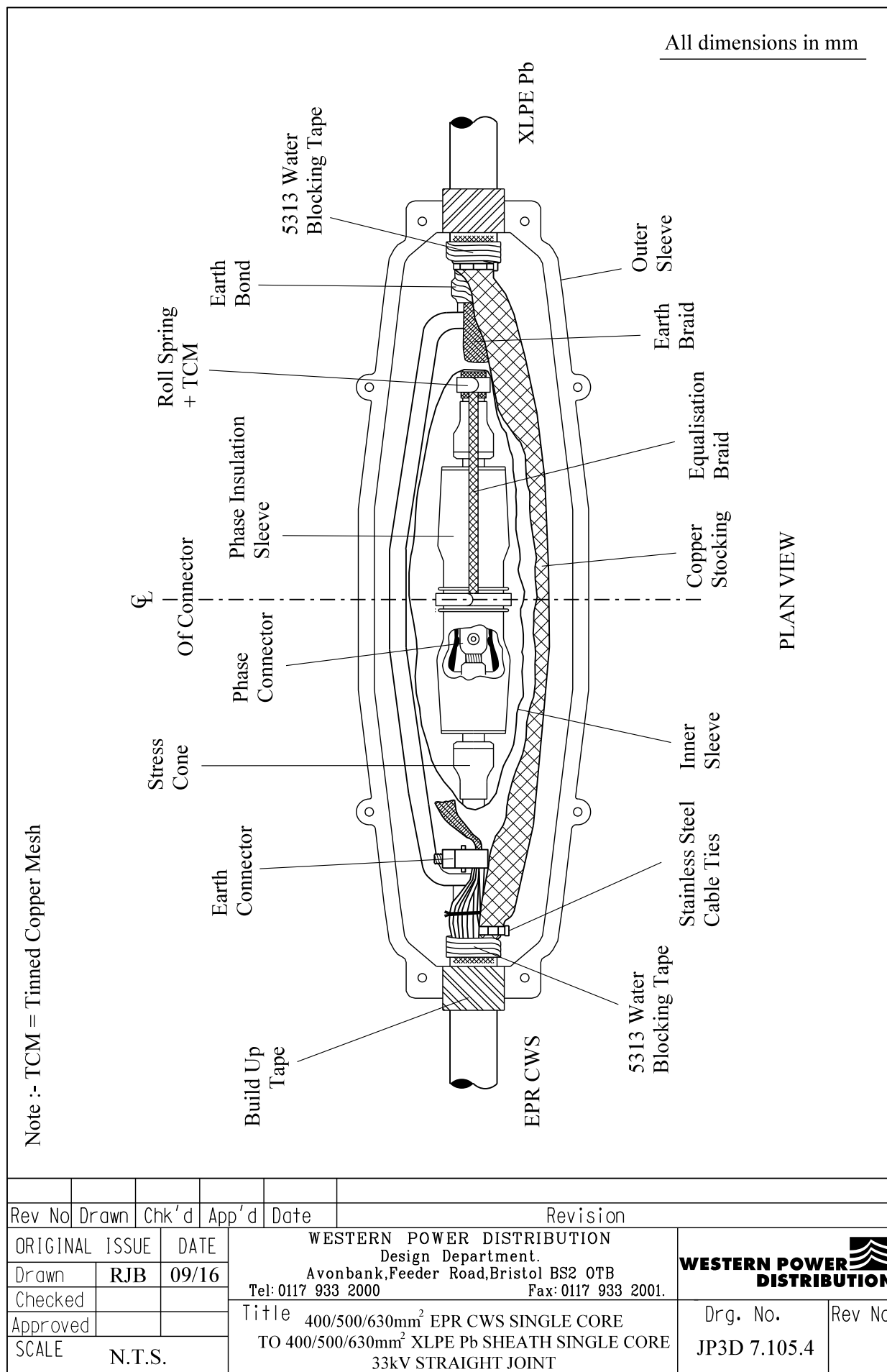
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All dimensions in mm



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SCALE N.T.S.			Title PREPARATION OF XLPE Pb			Drg. No. JP3D 7.105.3 Rev No

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.106

**800/1000mm² EPR CWS SINGLE CORE to 800/1000mm² XLPE Pb
SHEATH SINGLE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 1000mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.106

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
800	800 EPR	SJ 3333
	1000 EPR	SJ 3334

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.106

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULES		CABLE DEPENDING MODULES	CONNECTORS	TUBE SET
	M105	B	C	CM MX105 EPR CWS800	VTPC44UTB	WCSM 90/25 x 250
SJ 3333	3	3	3	3	3	6
SJ 3334	3	3	3	3	3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.106

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.106.1, 7.106.2, 7.106.3 and 7.106.4** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark.

XLPE CABLE – PREPARATION

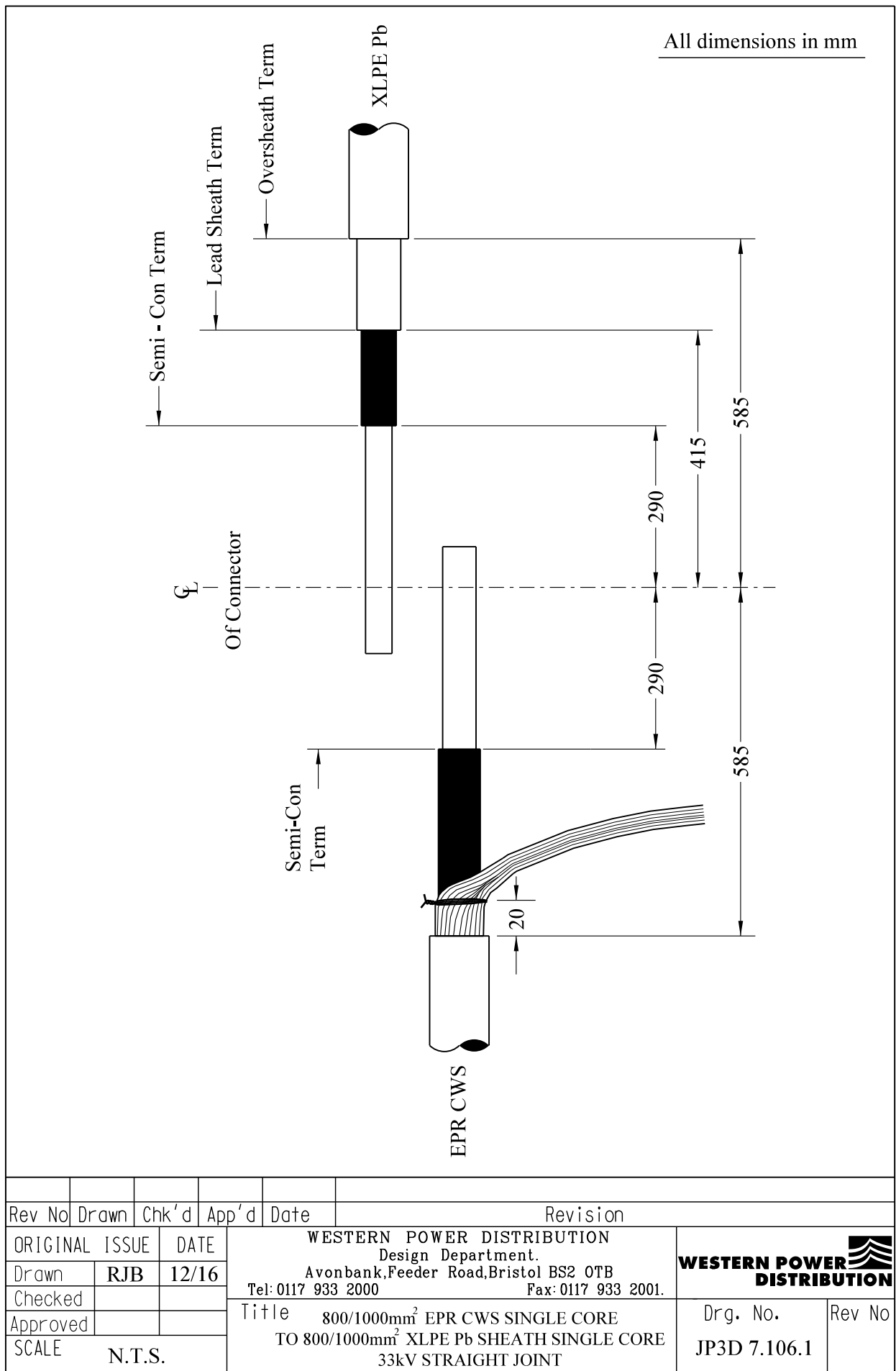
- | | | |
|-----|---|----|
| 11. | Clean oversheath for a distance of 2m. | -- |
| 12. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 13. | Park a mastic lined heat shrink tube next to temporary earth continuity bond. | -- |

JOINTING PROCEDURE 7.106 – Continued

Actions	General Requirements (ST: CA3C/2)
14. Remove oversheath, clean and abrade lead sheath.	17
15. Remove lead sheath.	19
16. Remove semi-conducting screens ensuring insulation is free from all conductive material.	25
17. Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer.	27/29
Note: - Ensure to allow for solid centre block of the split connector when cutting core from joint centre line mark.	
COMPLETION OF JOINT	
18. Position a stress cone applicator with cone over each core.	32
Note: - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator.	
19. Connect phase conductors. Do not shear connector bolts at this stage.	28/33
20. Remove connectors centre bolt applied in 20.	--
21. Apply semi-con tape to terminations of semi-con screens.	32
22. Fit a copper equalisation braid onto centre of the insulation sleeve.	34
23. Position a stress cone applicator with cone over each core.	32
24. Reconnect phase conductors ensuring correct connector set up.	33
Note: - Ensure actions 23/24/25/26/27 are complete before final shearing off connector centre bolt.	
25. Position insulation sleeve at joint centre.	34
26. Position and fit stress cones.	32

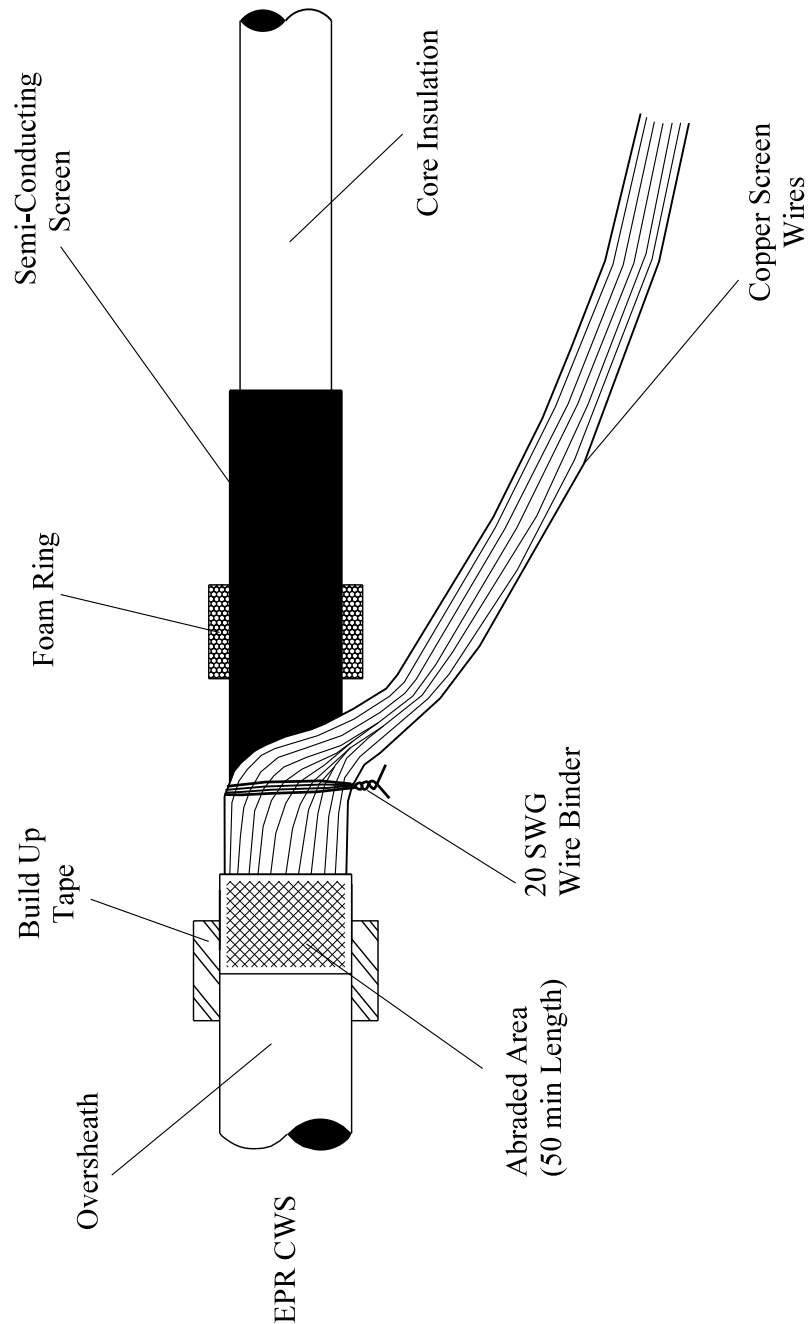
JOINTING PROCEDURE 7.106 – Continued

Actions	General Requirements (ST: CA3C/2)
27. Clean and degrease joint length.	40
28. Connect copper earth braid from insulation sleeve to semi-con screen.	--
29. Offer inner sleeve to cable, mark position and fit split foam rings.	31
30. Fit inner sleeve.	36
31. Ensure joint is level and fill with Lovisil.	38
32. Clean and degrease inner sleeve.	43
33. Form copper screen wires into one conductor and connect to copper earth bar clamp.	42
34. Apply tinned copper mesh to lead sheath and connect earth braid with a roll spring. Apply PVC tape to enclose the roll spring connection assembly.	39
35. Remove temporary earth continuity bond applied in 3 and reseal oversheaths.	11/45
36. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
37. Apply a 40mm water block to the lead sheath.	42
38. Build-up cable oversheaths.	34
39. Fit and support outer sleeve ensuring 15mm clearance.	43
40. Mix and pour resin.	44



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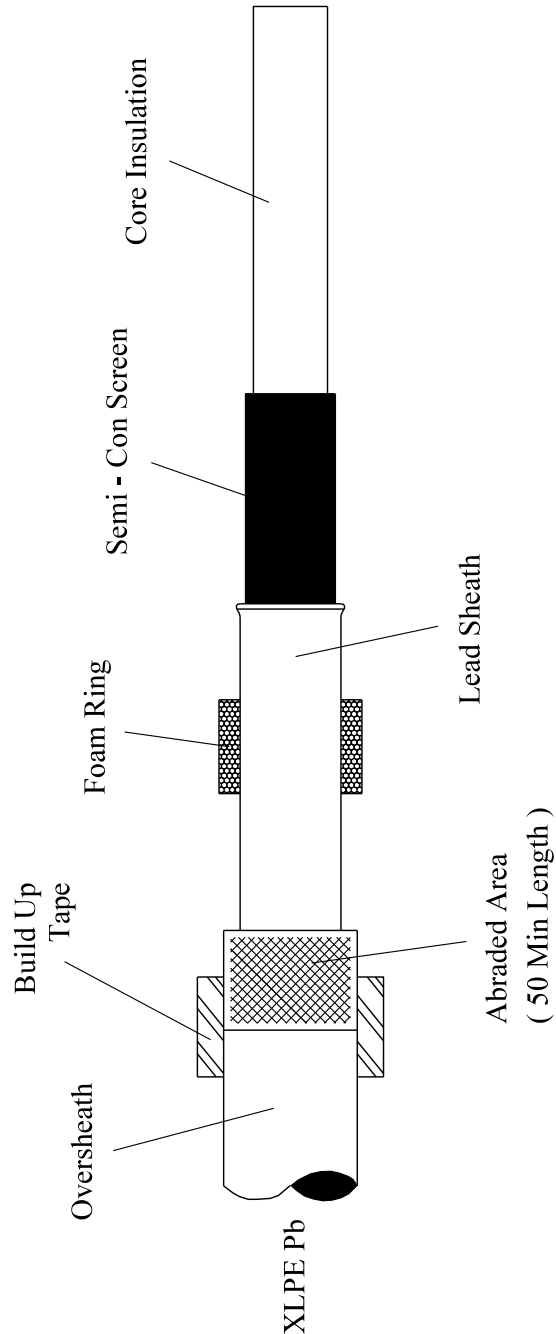
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SCALE		N.T.S.		Title	
				PREPARATION OF EPR CWS	
				Drg. No. JP3D 7.106.2	
				Rev No	

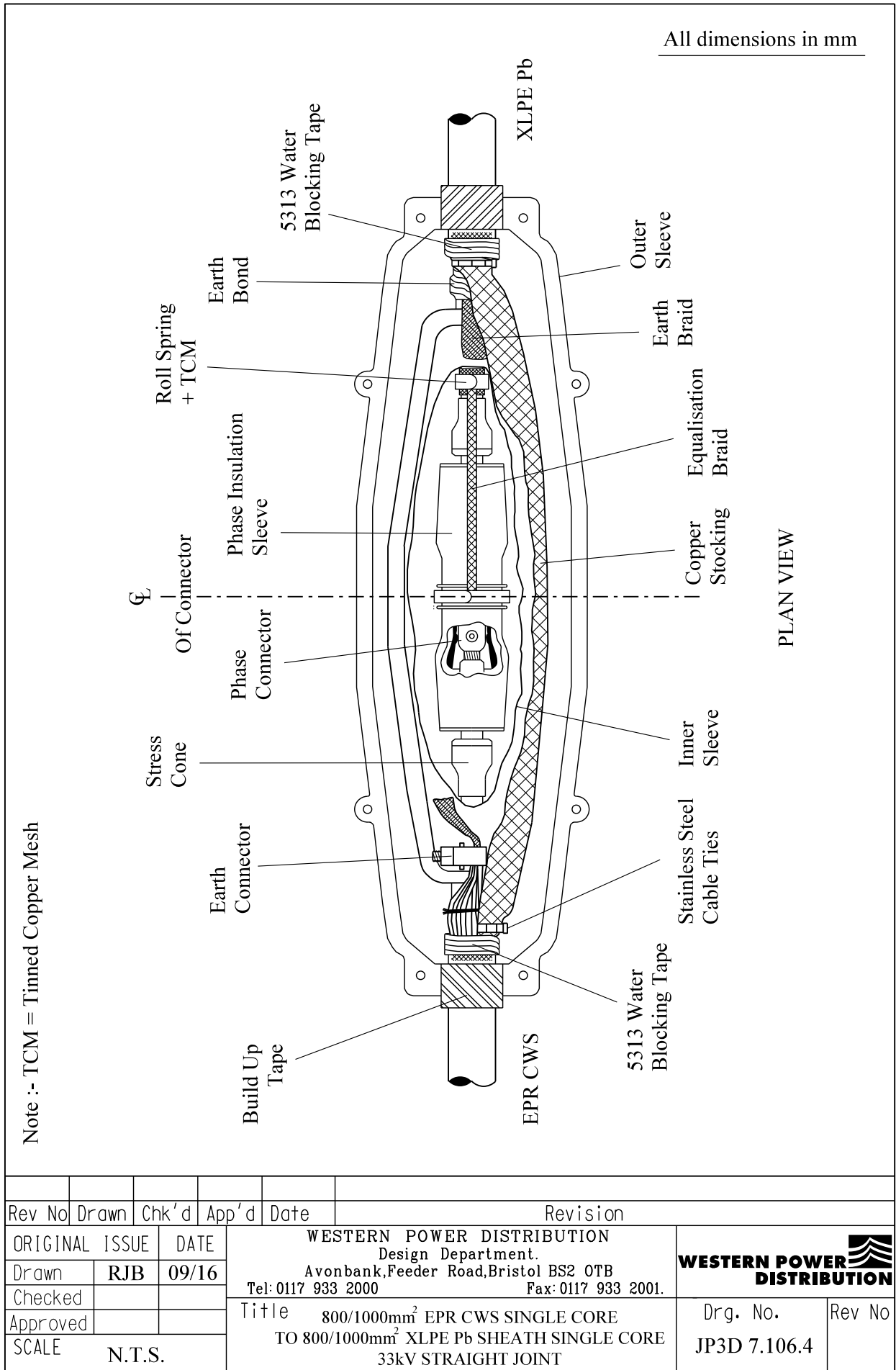
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SCALE		N.T.S.		Title		Drg. No.	Rev No
				PREPARATION OF XLPE Pb		JP3D 7.106.3	

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.107

**185/300/400mm² EPR CWS SINGLE CORE to 185/300/400mm² PILC
SINGLE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 400mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.107

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
185 EPR	0.1 PILC	SJ 3335
	0.15 PILC	SJ 3336
	0.2 PILC	SJ 3337
	0.3 PILC	SJ 3338
	0.4 PILC	SJ 3339
	0.5 PILC	SJ 3340
	0.6 PILC	SJ 3341
300 EPR	0.1 PILC	SJ 3342
	0.15 PILC	SJ 3343
	0.2 PILC	SJ 3344
	0.3 PILC	SJ 3345
	0.4 PILC	SJ 3346
	0.5 PILC	SJ 3347
	0.6 PILC	SJ 3348
400 EPR	0.1 PILC	N/A
	0.15 PILC	N/A
	0.2 PILC	SJ 3349
	0.3 PILC	SJ 3350
	0.4 PILC	SJ 3351
	0.5 PILC	SJ 3352
	0.6 PILC	SJ 3353

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.107

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE	CABLE DEPENDING MODULES					CONNECTORS			TUBE SET
	M85	B	CM MX85 EPR SCCWS185	CM MX85 EPR SCCWS300	CM MG85 PILC 0.1in ²	CM MG85 PILC 0.2in ²	CM MG85 PILC 0.4in ²	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3335	3	3	3	-	3	-	-	3	-	-	6
SJ 3336	3	3	3	-	3	-	-	3	-	-	6
SJ 3337	3	3	3	-	-	3	-	3	-	-	6
SJ 3338	3	3	3	-	-	3	-	-	3	-	6
SJ 3339	3	3	3	-	-	3	-	-	3	-	6
SJ 3340	3	3	3	-	-	-	3	-	-	3	6
SJ 3341	3	3	3	-	-	-	3	-	-	3	6
SJ 3342	3	3		3	3	-	-	-	-	-	6
SJ 3343	3	3		3	3	-	-	-	3	-	6
SJ 3344	3	3		3	-	3	-	-	3	-	6
SJ 3345	3	3		3	-	3	-	-	3	-	6
SJ 3346	3	3		3	-	3	-	-	3	-	6
SJ 3347	3	3		3	-	-	3	-	-	3	6
SJ 3348	3	3		3	-	-	3	-	-	3	6

JOINTING PROCEDURE 7.107(continued)

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE	CABLE DEPENDING MODULES					CONNECTORS			TUBE SET
	M85	B	CM MX85 EPR SCCWS185	CM MX85 EPR SCCWS300	CM MG85 PILC 0.1in ²	CM MG85 PILC 0.2in ²	CM MG85 PILC 0.4in ²	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
N/A	These two cable sizes are too small to be able to be used in the VTPC28UTB connector.										
N/A											
SJ 3349	3	3	-	3	-	3	-	-	-	3	6
SJ 3350	3	3	-	3	-	3	-	-	-	3	6
SJ 3351	3	3	-	3	-	-	3	-	-	3	6
SJ 3352	3	3	-	3	-	-	3	-	-	3	6
SJ 3353	3	3	-	3	-	-	3	-	-	3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.107

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.107.1, 7.107.2, 7.107.3 and 7.107.4** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark

PILC CABLE – PREPARATION

- | | | |
|-----|---|----|
| 11. | Clean oversheath for a distance of 2m. | -- |
| 12. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 13. | Park a mastic lined heat shrink tube next to temporary earth continuity bond. | -- |

JOINTING PROCEDURE 7.107 – Continued

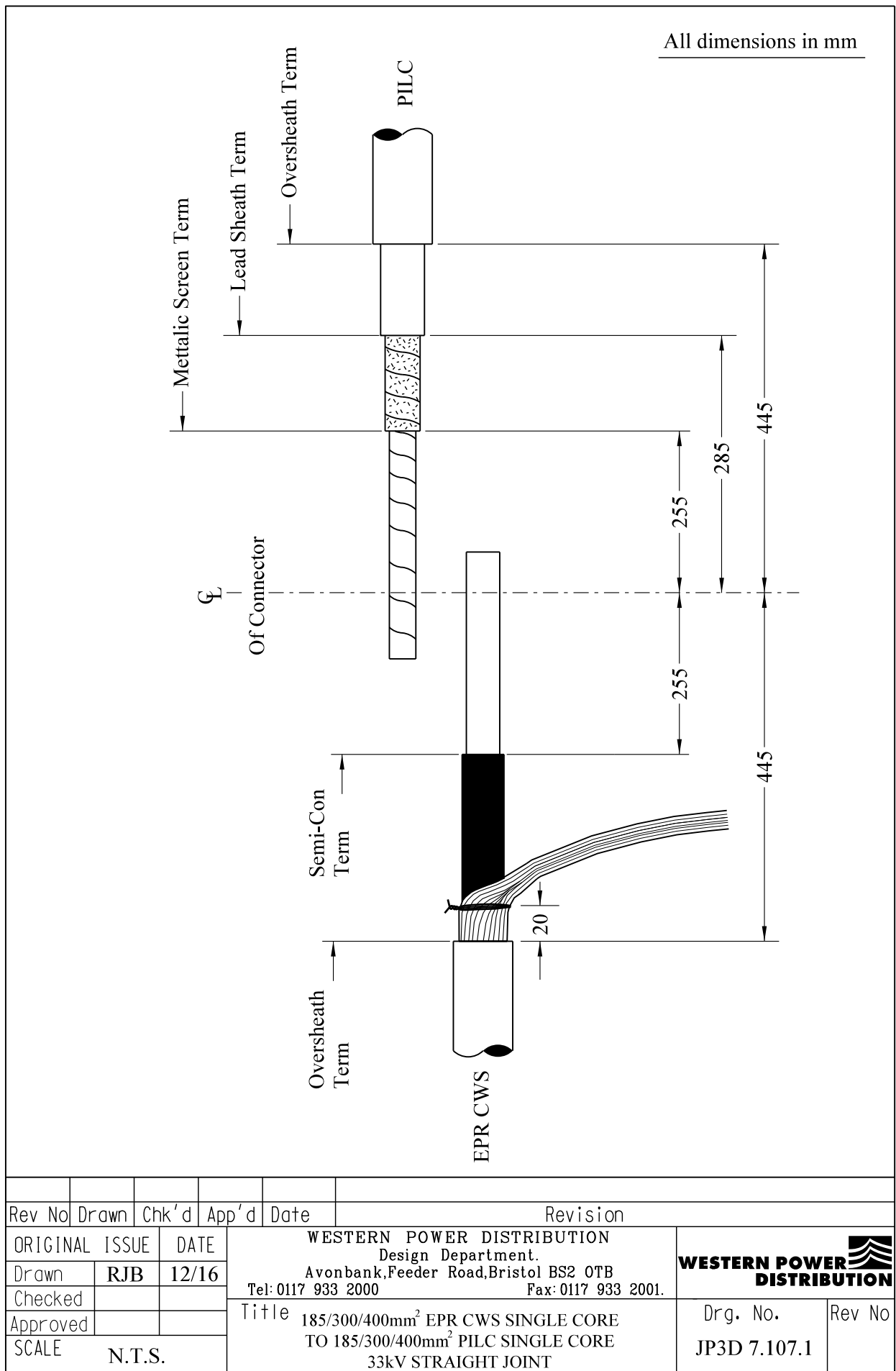
Actions	General Requirements (ST: CA3C/2)
14. Remove oversheath or hessian serving, clean and abrade lead sheath.	12
15. Remove lead sheath.	19
16. Termination of copper woven tape and carry out moisture test.	20/9
17. Remove metallic screen, carbon paper and two conductor papers.	24
18. Cut core, remove core insulation to depth of connector plus 5 mm and apply chamfer.	27/29
Note: - Ensure to allow for solid centre block of split connector when cutting core from centre line mark.	
COMPLETION OF JOINT	
19. Position a stress cone applicator with cone over each core.	32
Note: - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator.	
20. Connect phase conductors. Do not shear connector bolts at this stage.	28/33
21. Remove connectors centre bolt applied in 20.	--
22. Apply semi-con tape to terminations of semi-con screen and metallic screen.	32
23. Fit a copper equalisation braid onto centre of insulation sleeve.	34
24. Position insulation sleeve over the polymeric core of the joint.	--
25. Reconnect phase conductors ensuring correct connector set up.	33
Note: - Ensure actions 4/13/19/22/24 are complete before final shearing off connector centre bolt.	
26. Position insulation sleeve at joint centre.	36

JOINTING PROCEDURE 7.107 – Continued

Actions	General Requirements (ST: CA3C/2)
27. Position and fit stress cones.	32
28. Clean and degrease joint length.	40
29. Connect copper earth braid from insulation sleeve to semi-con screen.	34
30. Offer inner sleeve to cable, mark position and fit split foam rings.	34
31. Fit inner sleeve.	36/37
32. Ensure joint is level and fill with Lovisil.	38
33. Clean and degrease inner sleeve.	40
34. Form copper screen wire bunches into one conductor and connect to earth bar clamp.	39
35. Apply tinned copper mesh to lead sheath and connect earth braid with a roll spring. Apply PVC tape to enclose the roll spring connection assembly.	39
36. Fit and connect earth braid to copper earth bar clamp.	41
37. Wrap copper mesh earth screen around inner sleeve, connecting to copper screen wires and lead sheath at either end.	41
38. Remove temporary earth continuity bond applied in 3 and 12 and reseal oversheaths.	11/45
39. Slide and stretch copper stocking across joint and connect to copper screen wires.	41
40. Abrade PILC if PVC oversheath fitted.	16
41. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
42. Apply a 40mm water block to the lead sheath.	41
43. Build-up cable oversheaths.	43

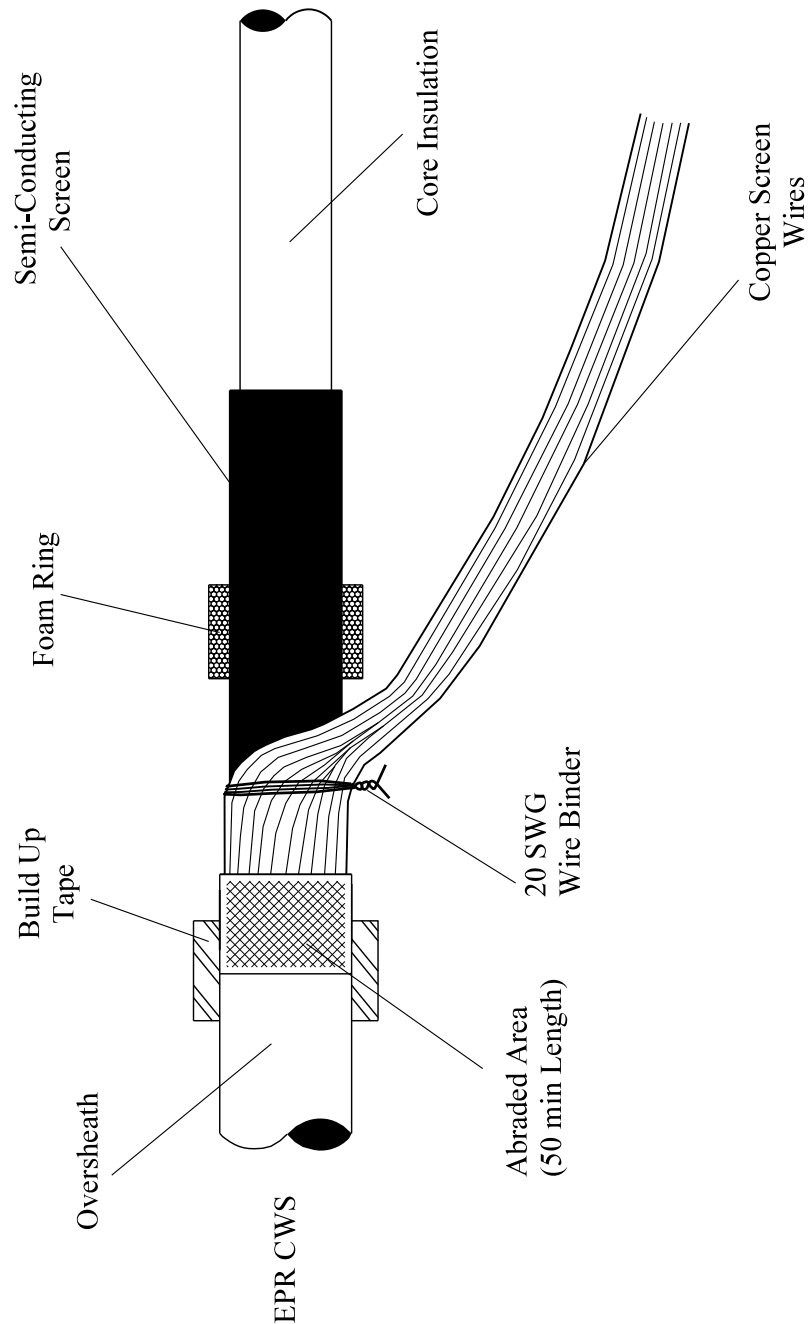
JOINTING PROCEDURE 7.107 – Continued

Actions	General Requirements (ST: CA3C/2)
44. Fit and support outer sleeve ensuring 15mm clearance.	43
45. Mix and pour resin.	44



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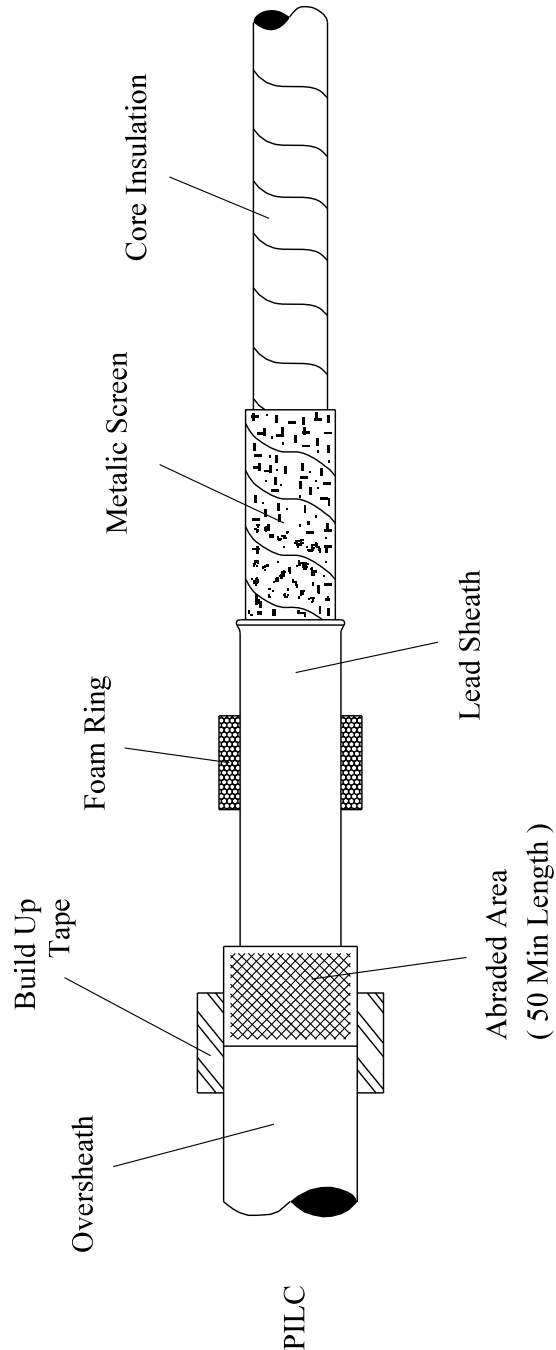
All dimensions in mm



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Checked							
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SCALE		N.T.S.		Title		Drg. No.	Rev No
				PREPARATION OF EPR CWS		JP3D 7.107.2	

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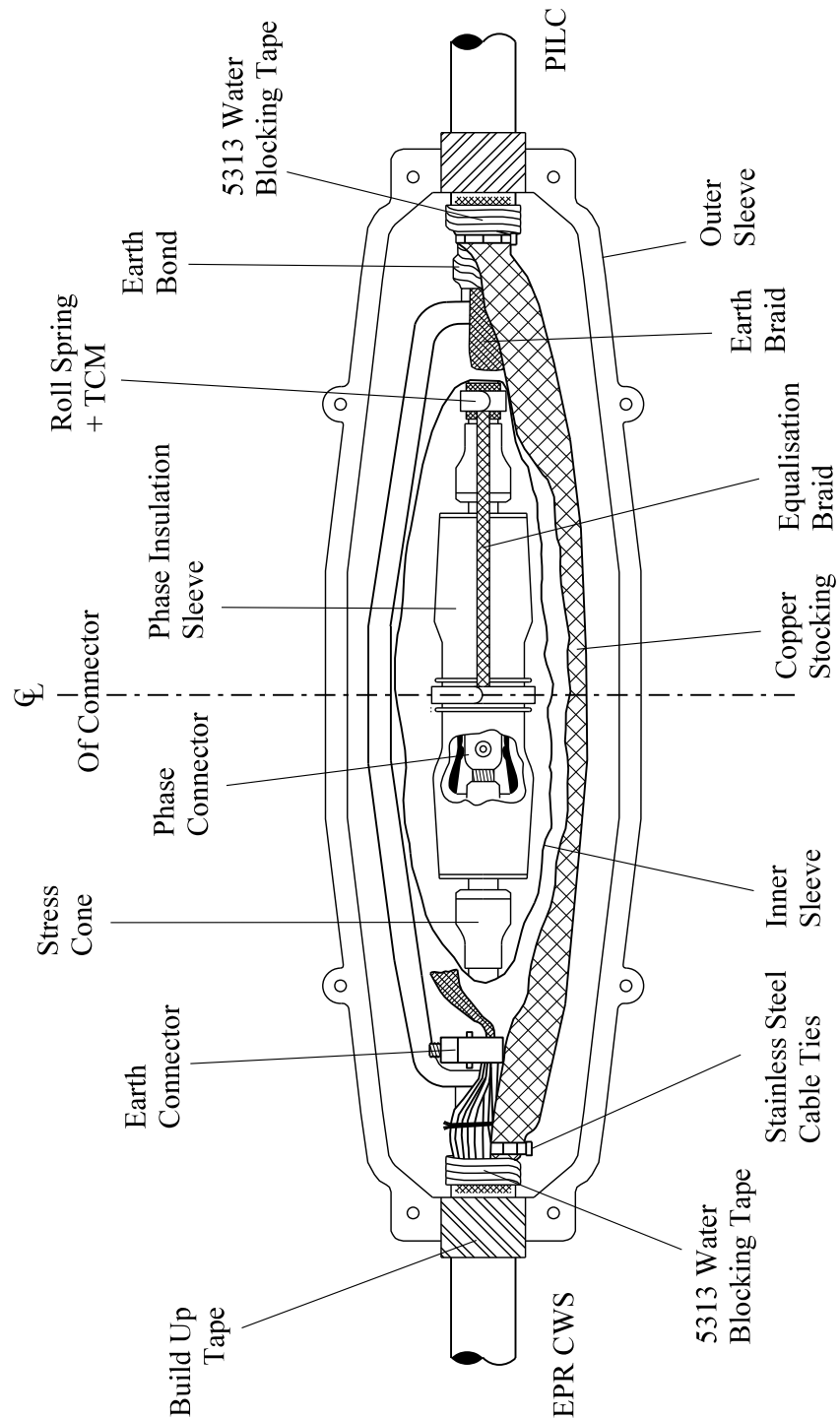
All dimensions in mm



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				PREPARATION OF PILC	
				Drg. No.	
				JP3D 7.107.3	
				Rev No	

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PLAN VIEW

Note :- TCM = Tinned Copper Mesh

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Drawn	RJB	09/16				
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Approved						
SCALE	N.T.S.		Title 185/300/400mm ² EPR CWS SINGLE CORE TO 185/300/400mm ² PILC SINGLE CORE 33kV STRAIGHT JOINT			Drg. No. JP3D 7.107.4 Rev No

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.108

**630/800mm² EPR CWS SINGLE CORE to 500/630/800/1000mm² PILC
SINGLE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 1.5in²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.108

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
630 EPR	0.6 PILC	SJ 3337
	0.75 PILC	SJ 3338
	1.0 PILC	SJ 3339
	1.25 PILC	SJ 3340
	1.5 PILC	SJ 3341
800 EPR	0.6 PILC	SJ 3342
	0.75 PILC	SJ 3343
	1.0 PILC	SJ 3344
	1.25 PILC	SJ 3345
	1.5 PILC	SJ 3346

JOINTING PROCEDURE 7.108

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE		CABLE DEPENDING MODULES					CONNECTOR	TUBE SET
	M105	B	C	CM MX105 EPR CWS630	CM MX105 EPR CWS800	CM M105PILC 0.75in ²	CM M105PILC 1in ²	CM M105PILC 1.5in ²	VTPC36UTB	WCSM 90/25 x 250
SJ 3337	3	3	3	3	-	-	-	-	3	6
SJ 3338	3	3	3	3	-	3	-	-	3	6
SJ 3339	3	3	3	3	-	-	3	-	3	6
SJ 3340	3	3	3	3	-	-	3	-	3	6
SJ 3341	3	3	3	3	-	-	-	3	3	6
SJ 3342	3	3	3	-	3	-	-	3	3	6
SJ 3343	3	3	3	-	3	3	-	-	3	6
SJ 3344	3	3	3	-	3	-	3	-	3	6
SJ 3345	3	3	3	-	3	-	3	-	3	6
SJ 3346	3	3	3	-	3	-	-	3	3	6

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.108

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.108.1, 7.108.2, 7.108.3 and 7.108.4** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

EPR CABLE - Preparation

- | | | |
|-----|--|-------|
| 2. | Clean each oversheath for a distance of 2m. | -- |
| 3. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 4. | Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core. | -- |
| 5. | Remove oversheaths and bedding tapes. | 17 |
| 6. | Abrade oversheaths. | 18 |
| 7. | Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point. | -- |
| 8. | Straighten copper screen wires and form into a bunch over the cable top. | -- |
| 9. | Remove semi-conducting screens ensuring insulation is free from all conducting material. | 25 |
| 10. | Cut core, remove core insulation depth of connector plus 5 mm and apply chamfer. | 27/29 |

Note: - Ensure to allow for solid centre block of split connector when cutting core from joint centre line mark

PILC CABLE – PREPARATION

- | | | |
|-----|---|----|
| 11. | Clean oversheath for a distance of 2m. | -- |
| 12. | Apply a temporary earth continuity bond clear of joint position. | 11 |
| 13. | Park a mastic lined heat shrink tube next to temporary earth continuity bond. | -- |

JOINTING PROCEDURE 7.108 – Continued

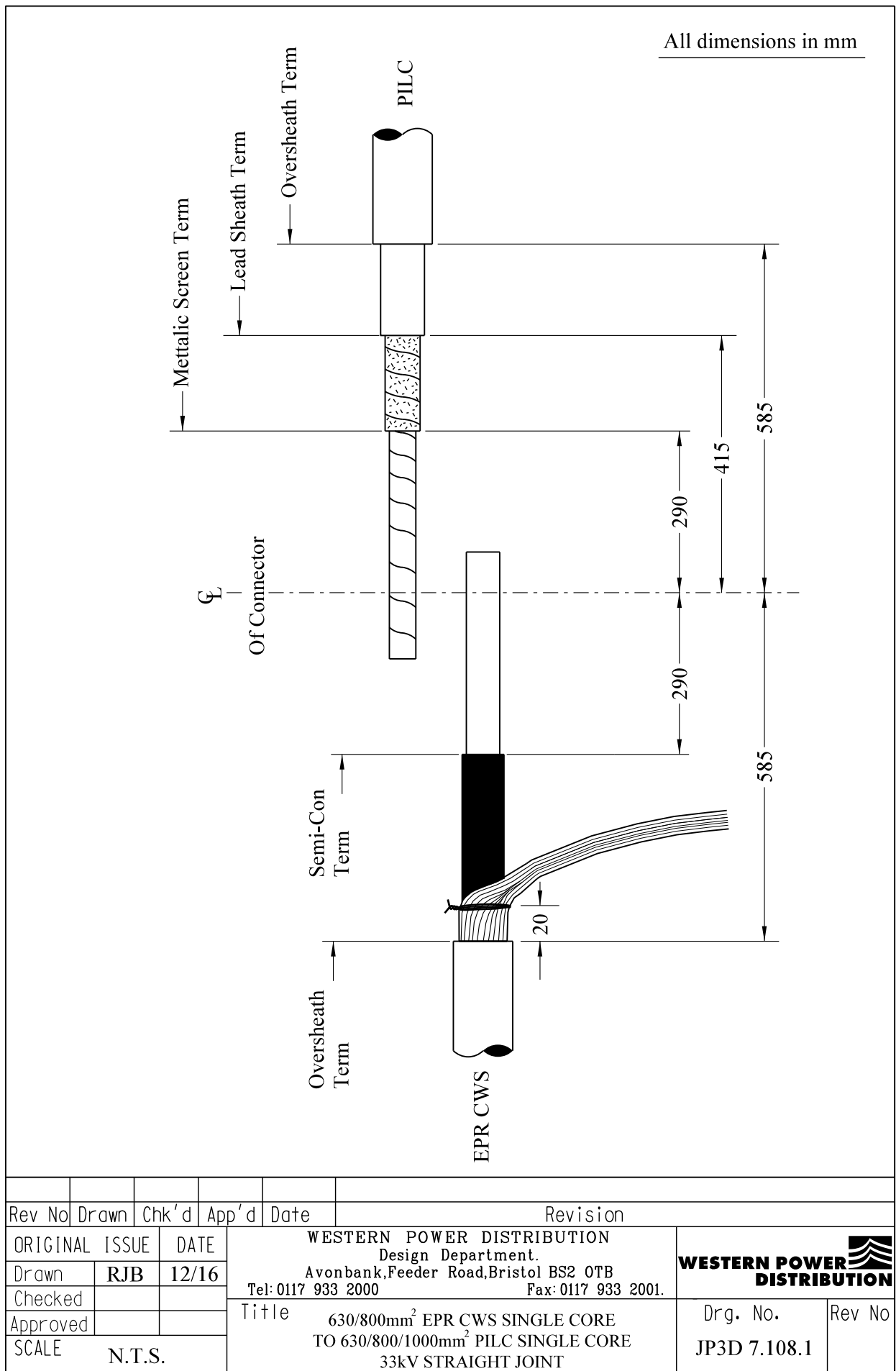
Actions	General Requirements (ST: CA3C/2)
14. Remove oversheath or hessian serving, clean and abrade lead sheath.	12
15. Remove lead sheath.	19
16. Termination of copper woven tape and carry out moisture test.	20/9
17. Remove metallic screen, carbon paper and two conductor papers.	24
18. Cut core, remove core insulation to depth of connector plus 5 mm and apply chamfer.	27/29
Note: - Ensure to allow for solid centre block of split connector when cutting core from centre line mark.	
COMPLETION OF JOINT	
19. Position a stress cone applicator with cone over each core.	32
Note: - Ensure the flared ends of the cones are facing towards the joint centre - open end of applicator.	
20. Connect phase conductors. Do not shear connector bolts at this stage.	28/33
21. Remove connectors centre bolt applied in 20.	--
22. Apply semi-con tape to terminations of semi-con screen and metallic screen.	32
23. Fit a copper equalisation braid onto centre of insulation sleeve.	34
24. Position insulation sleeve over the polymeric core of the joint.	--
25. Reconnect phase conductors ensuring correct connector set up.	33
Note: - Ensure actions 4/13/19/22/24 are complete before final shearing off connector centre bolt.	
26. Position insulation sleeve at joint centre.	36

JOINTING PROCEDURE 7.108 – Continued

Actions	General Requirements (ST: CA3C/2)
27. Position and fit stress cones.	32
28. Clean and degrease joint length.	40
29. Connect copper earth braid from insulation sleeve to semi-con screen.	34
30. Offer inner sleeve to cable, mark position and fit split foam rings.	34
31. Fit inner sleeve.	36/37
32. Ensure joint is level and fill with Lovisil.	38
33. Clean and degrease inner sleeve.	40
34. Form copper screen wire bunches into one conductor and connect to earth bar clamp.	39
35. Apply tinned copper mesh to lead sheath and connect earth braid with a roll spring. Apply PVC tape to enclose the roll spring connection assembly.	39
36. Fit and connect earth braid to copper earth bar clamp.	41
37. Wrap copper mesh earth screen around inner sleeve, connecting to copper screen wires and lead sheath at either end.	41
38. Remove temporary earth continuity bond applied in 3 and 12 and reseal oversheaths.	11/45
39. Slide and stretch copper stocking across joint and connect to copper screen wires.	41
40. Abrade PILC if PVC oversheath fitted.	16
41. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
42. Apply a 40mm water block to the lead sheath.	41
43. Build-up cable oversheaths.	43

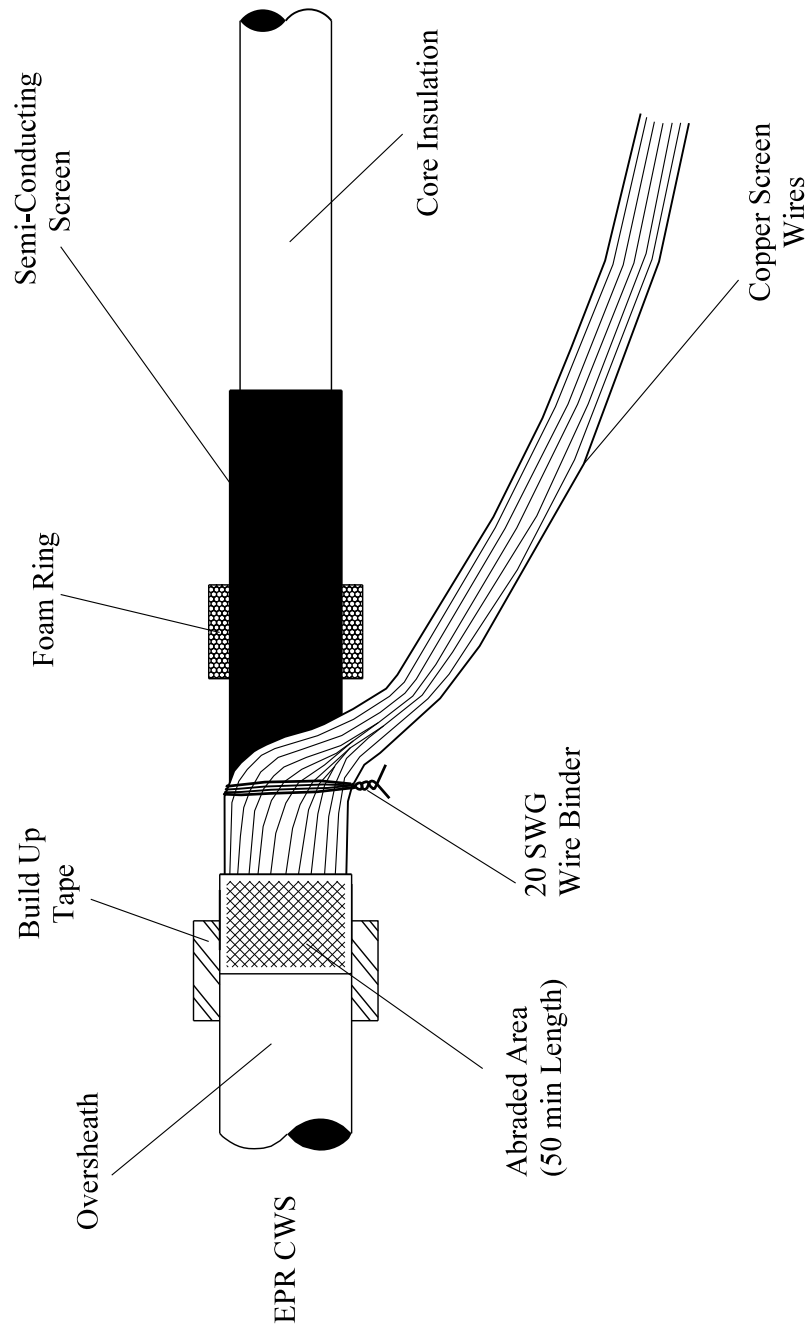
JOINTING PROCEDURE 7.108 – Continued

Actions	General Requirements (ST: CA3C/2)
44. Fit and support outer sleeve ensuring 15mm clearance.	43
45. Mix and pour resin.	44



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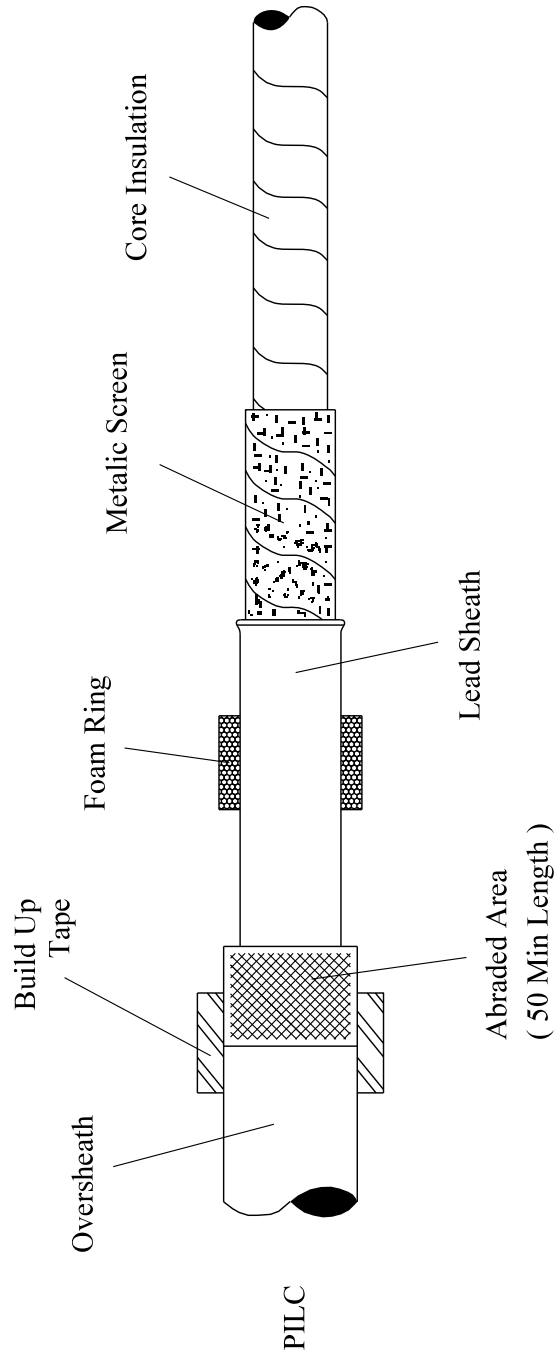
All dimensions in mm



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Drawn	RJB	09/16			
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Approved					
SCALE		N.T.S.		Title	
				PREPARATION OF EPR CWS	
				Drg. No. JP3D 7.108.2	
				Rev No	

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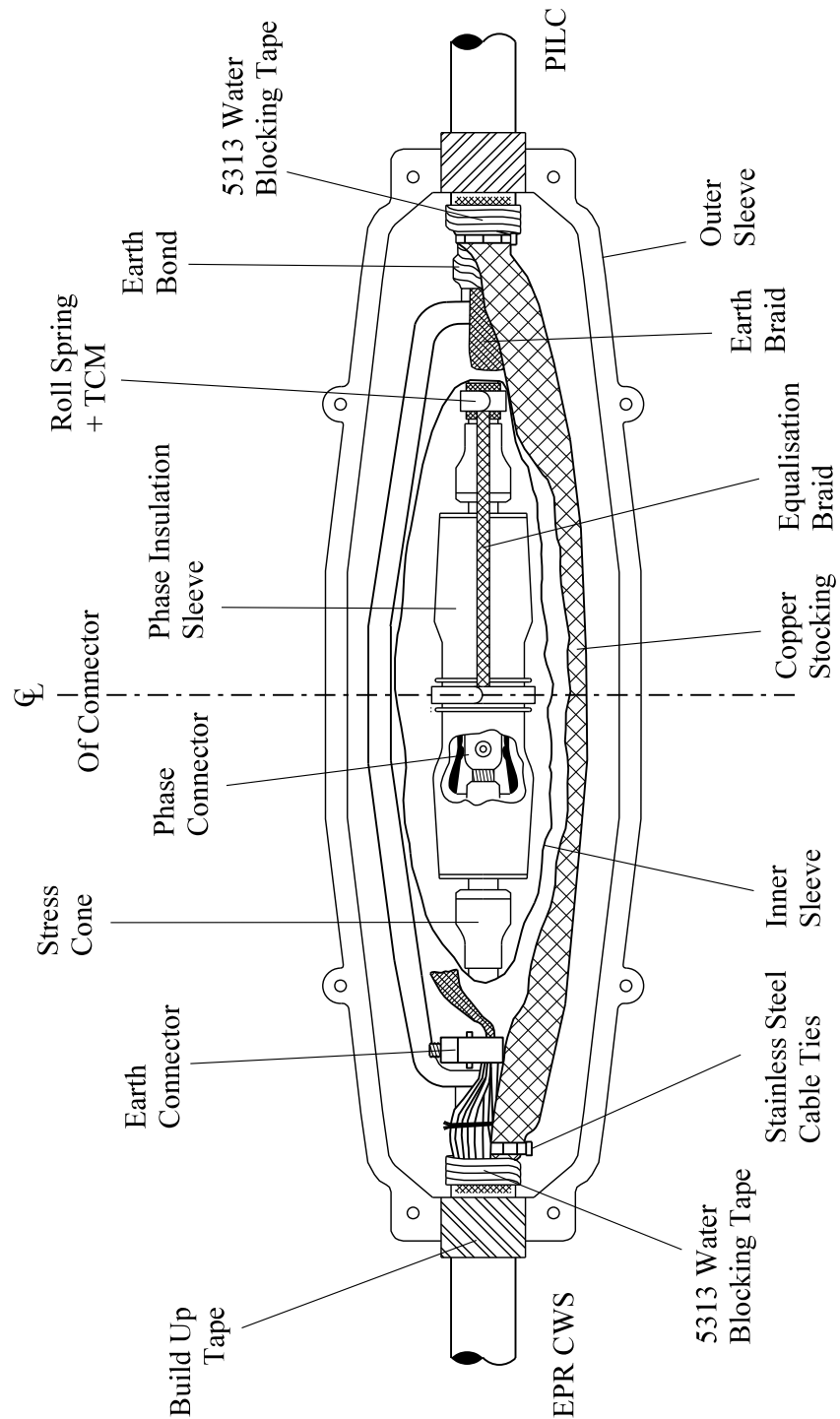
All dimensions in mm



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SCALE		N.T.S.		Title	
				PREPARATION OF PILC	
				Drg. No.	
				JP3D 7.108.3	
				Rev No	

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All dimensions in mm



Note :- TCM = Tinned Copper Mesh

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Drawn	RJB	09/16			
Checked					
Approved					
SCALE		N.T.S.		Title 630/800/1000mm ² EPR CWS SINGLE CORE TO 630/800/1000mm ² PILC SINGLE CORE 33kV STRAIGHT JOINT	
				Drg. No. JP3D 7.108.4	
				Rev No	

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.109

**185/300/400mm² EPR CWS SINGLE CORE to 185/300/400mm² H Cable
THREE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 400mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.109

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
185 EPR	0.1 H Cable	SJ 3353
	0.15 H Cable	SJ 3354
	0.2 H Cable	SJ 3355
	0.3 H Cable	SJ 3356
	0.4 H Cable	SJ 3357
	0.5 H Cable	SJ 3358
	0.6 H Cable	SJ 3359
300 EPR	0.1 H Cable	SJ 3360
	0.15 H Cable	SJ 3361
	0.2 H Cable	SJ 3362
	0.3 H Cable	SJ 3363
	0.4 H Cable	SJ 3364
	0.5 H Cable	SJ 3365
	0.6 H Cable	SJ 3366
400 EPR	0.1 H Cable	N/A
	0.15 H Cable	N/A
	0.2 H Cable	SJ 3367
	0.3 H Cable	SJ 3368
	0.4 H Cable	SJ 3369
	0.5 H Cable	SJ 3370
	0.6 H Cable	SJ 3371

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

NOTE: - IF ELIPICAL CORES ARE FOUND ON THE H CABLE THEN THE RESPECTIVE SHAPED CABLE DEPRNDING MODULES SHALL BE USED. SEE ST: CA3X FOR THE RESPECTIVE E 5 NUMBERS.

JOINTING PROCEDURE 7.109

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE		CABLE DEPENDING MODULES				CONNECTORS			TUBE SET
	M125	C	H	CM MG125EPR 3x1CWS185	CM MG125EPR 3x1CWS300	CM MG125 1x3HCab 185	CM MG125 1x3HCab 300	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3353	1	3	1	1	-	1	-	3	-	-	3
SJ 3354	1	3	1	1	-	1	-	3	-	-	3
SJ 3355	1	3	1	1	-	1	-	3	-	-	3
SJ 3356	1	3	1	1	-	1	-	-	3	-	3
SJ 3357	1	3	1	1	-	1	-	-	3	-	3
SJ 3358	1	3	1	1	-	1	-	-	-	3	3
SJ 3359	1	3	1	1	-	-	1	-	-	3	3
SJ 3360	1	3	1	-	3	1	-	-	-	-	3
SJ 3361	1	3	1	-	3	1	-	-	3	-	3
SJ 3362	1	3	1	-	3	1	-	-	3	-	3
SJ 3363	1	3	1	-	3	1	-	-	3	-	3

JOINTING PROCEDURE 7.109(continued)

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE		CABLE DEPENDING MODULES				CONNECTORS			TUBE SET
	M125	C	H	CM MG125EPR 3x1CWS185	CM MG125EPR 3x1CWS300	CM MG125 1x3HCab 185	CM MG125 1x3HCab 400	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3364	1	3	1	-	3	1	-	-	3	-	3
SJ 3365	1	3	1	-	3	1	-	-	-	3	3
SJ 3366	1	3	1	-	3	-	1	-	-	3	3
N/A	These two cable sizes are too small to be able to be used in the VTPC28UTB connector.										
N/A											
SJ 3367	1	3	1	-	3	1	-	-	-	3	3
SJ 3368	1	3	1	-	3	1	-	-	-	3	3
SJ 3369	1	3	1	-	3	1	-	-	-	3	3
SJ 3370				-	3	1	-	-	-	3	3
SJ 3371				-	3	1	-	-	-	3	3
SJ 3372				-	3	-	1	-	-	3	3

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.109

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.109.1, 7.109.2, 7.109.3, 7.109.4, 7.109.5** and **7.109.6** whilst undertaking this Jointing Procedure.

1. Set and mark cables. 5/6

2. Carry out moisture test to cable. 9

H CABLE - Preparation

3. Clean each oversheath for a distance of 2m. --

4. Remove PVC oversheath or hessian serving, armour, bedding and clean lead sheath and SWA. - **JP3D 7.109.1 – Figure 1.** 12/15

Note: - Turn back armour wires at right angles to lead sheath.

If steel tape armour fitted refer to General Requirements.

5. Abrade lead sheath from its termination point to upright SWA point - **JP3D 7.109.1 – Figure 1.** --

6. Fit tinned copper mesh to lead sheath, relay SWA and apply a worm drive clip to armour bond. 13

7. Park copper braided stocking over cable. --

Note: - Apply a plastic covering over the cable oversheath and copper stocking once applied.

8. Apply a temporary earth continuity bond to lead sheath close to armour termination. 11

9. Fit and park two foam rings over the lead sheath. **JP3D 7.109.2 – Figure 2 & 3.** --

10. Remove lead sheath. - **JP3D 7.109.1 – Figure 1.** 19

11. Tie off and remove copper woven fabric tape - **JP3D 7.109.1 – Figure 1.** 20

12. Remove core fillers. 20

13. Using a dry wipe remove excess impregnate from cores --

14. Establish and mark centre of connector on cores. --

JOINTING PROCEDURE 7.109 – Continued

Actions	General Requirements (ST: CA3C/2)
15. Fit cold applied breakout boot to cable crotch. JP3D 7.109.1 – Figure 3.	21
16. Carefully fit a temporary core spreader between paper cores.	23
Note: - The temporary spreader is fitted between the cores to assist in preparing the cores for jointing and parked on the back of the stress cone following core connection completion	
EPR CABLE – PREPARATION	
17. Clean each oversheath for a distance of 2m.	--
18. Set up single core cables ensuring correct phasing.	5/6
19. Apply a temporary earth continuity bond clear of joint position.	11
20. Park a mastic lined heat shrink tube next to temporary earth continuity bond on each core.	11
21. Slide the outer sleeve end plate over the polymeric cables.	--
Note: - Ensure the outer sleeve end plate is facing correctly - the flat face side facing towards the joint centre.	
22. Fit a outer cable spacer at 800mm from centre line of joint and a further one from the first at 400mm along the cables, locking in with large cable ties through the spacer centre hole.	--
23. Ensure the cables are straight and in line with the PILC cores, mark centre of connector on each core.	22
24. Prepare and abrade MDPE oversheaths.	17
25. Remove oversheaths and bedding tapes.	16/17
26. Apply a 20 swg binder around copper screen wires 20mm from oversheath termination point.	--
27. Straighten copper screen wires and form into a bunch over the cable top.	39

JOINTING PROCEDURE 7.109 – Continued

Actions	General Requirements (ST: CA3C/2)
28. Insert the two remaining inner sleeve end plates between the polymeric cores, secure carefully with cable ties to hold into position for cable preparation.	--
Note: - Ensure the two inner sleeve end plates are facing correctly - the flat face side facing towards the joint centre.	
COMPLETION OF JOINT	
29. Align and overlap the polymeric and paper cores, check and establish the centrelines are correct to the MDPE oversheaths/lead sheath dimensions.	22
30. Establish the joint centre line on both core sets.	--
Note: - The centre of connector is to be equal distance between the termination of the metalized screen of the paper cable and semi-con screen of the polymeric cable.	
31. H Cable - Remove metallic screens, carbon paper and two conductor papers, apply phase identification to each core.	24
32. EPR CWS - Remove semi-conducting screens ensuring insulation is free from all conductive material, apply phase identification to each core.	25
33. Check the position of core spreader between the paper insulated cores, using the inner sleeve base to give spreader location.	--
Note:- The core spreader is required to position and hold the phase cores within the inner joint sleeve and locates within the sleeve top/base stand offs. It may be removed to allow joint construction and must be replaced on inner sleeve on completion.	
34. Cut cores, remove core insulation to depth of connector plus 5 mm.	27/28
Note: - Ensure to allow for solid centre block of split connector when cutting cores from centre line mark.	
35. Apply a chamfer to each polymeric core (EPR or XLPE) .	29
36. Fit a copper equalisation braid to centre of phase insulation sleeves.	34

JOINTING PROCEDURE 7.109 – Continued

Actions	General Requirements (ST: CA3C/2)
37. Apply semi-con tape to screen termination on each paper insulated core.	32
38. H Cable - Apply a stress cone to applicator and fit to each paper metallic screen termination.	32
Note: - Ensure the stress cone is fitted correctly to the applicator, flared end towards joint centre.	
39. EPR - Apply a stress cone to applicator and park over each EPR core.	32
Note: - Ensure the stress cone is fitted correctly to the applicator, flared end towards joint centre.	
40. Fit the female vee half of the connector onto the EPR cores and shear conductor bolts.	33
Note: - The connectors are to be placed so that the shear bolts heads are 120 degrees to one another.	
41. Remove all bolts and fit the male vee half of the connector onto the female half and apply two turns of PVC tape to secure at the connector centre.	33
42. Apply a smear of 005520 Grease from the sachet supplied and apply to the connector body.	33
43. With the copper braid tail facing towards the PILC cable, slide the phase insulation sleeve onto the connector end and park over the EPR cores ensuring the sleeve is not blocking access to the connector centre bolt.	34
Note: - The parked stress cone and applicator will fit into the flared end of the of the parked insulation sleeve to gain further access for fitting of the centre bolt.	
44. Fit remaining connector halves and connect phase conductors finger tighten remaining centre bolts Do not shear connector bolts at this stage.	33

JOINTING PROCEDURE 7.109 – Continued

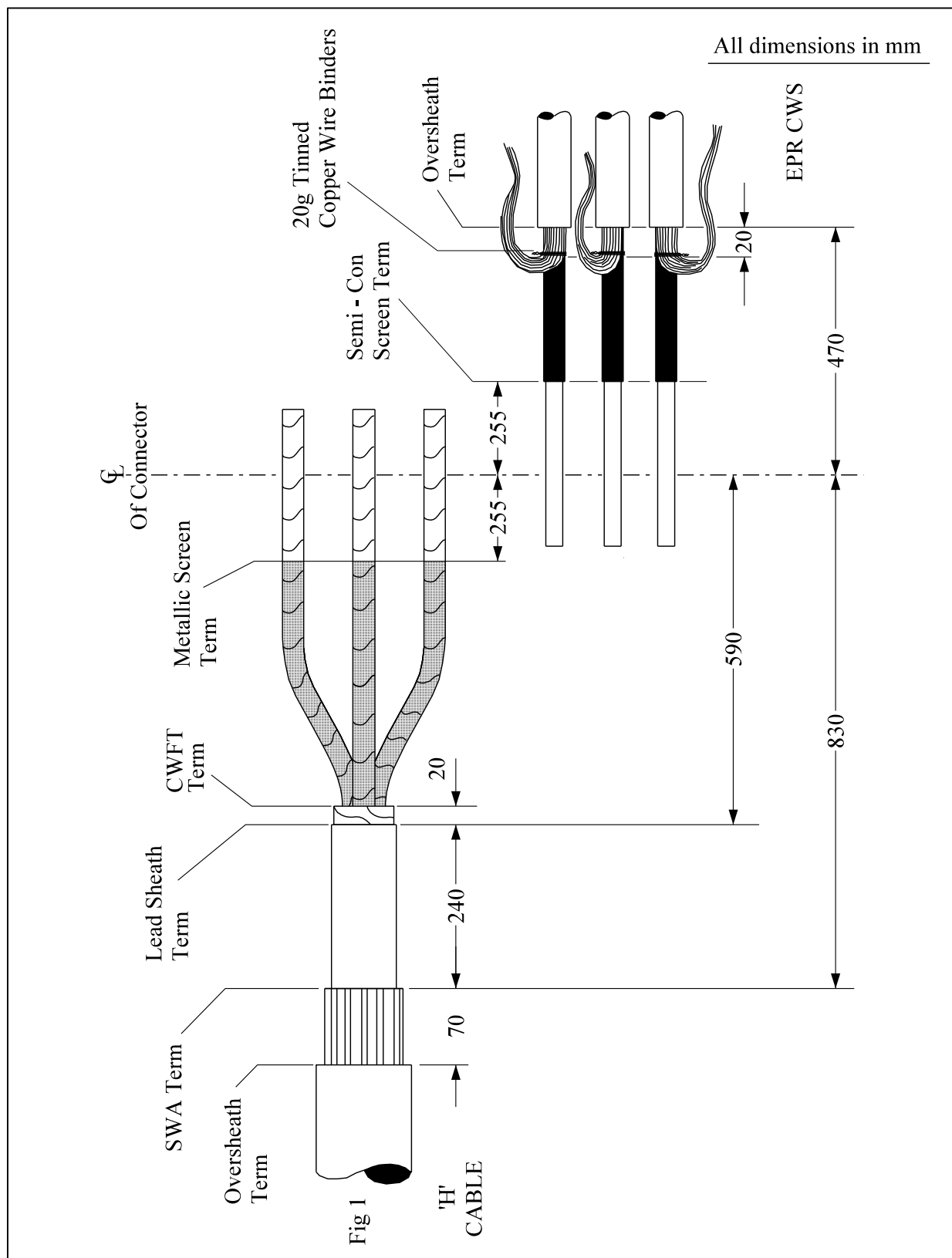
Actions	General Requirements (ST: CA3C/2)
45. Ensure the following actions have been completed before moving to next action.	
Note: - Ensure actions 7/8/9/15/19/20/21/38/39/40/43 are complete before final shearing of connector centre bolts.	
46. Shear connector centre bolts.	33
47. Position phase insulation sleeves over and central to connectors.	33
48. Apply semi-con stress control tape over the EPR semi-con. screen terminations.	25
Note: - Apply a removable mark onto the EPR insulation and semi- con screen to ensure correct positioning of stress cone.	
49. Position and fit stress cones from their applicator onto the EPR core overlapping the stress control tape and core screen.	--
50. Connect copper earth braids from insulation sleeves to metallic screens of paper cores.	34
51. Clean and degrease joint length.	40
52. Offer bottom half of inner sleeve to joint, mark positions onto lead sheath, breakout skirt and semi-con screens.	36
Note: - The insulation tubes must be central to the scarf marks, within the inner sleeve bottom	
53. Slide a foam ring over the breakout skirt and park at the position marked in action 50 – JP3D 7.109.3 Figure 4.	30/35
54. Apply a medium width cable tie around the breakout and close to the foam ring, carefully trim excess length off the breakout skirt close to the cable tie — JP3D 7.109.3 Figure 4	--
Note: - Trim of the skirt waste using a sharp knife giving care to the underlying lead sheath.	

JOINTING PROCEDURE 7.109 – Continued

Actions	General Requirements (ST: CA3C/2)
55. Move a second foam ring along the lead sheath, position to outer entry of the inner sleeve bottom - JP3D 7.109.3 Figure 5.	31
56. Apply foam build up tape to the two foam rings as shown in drawing - JP3D 7.109.4 Figure 6.	31
Note: - The foam rings require a narrow foam tape to apply an over-build as shown in the above drawing reference.	
57. Offer bottom of inner sleeve to joint and mark positions of EPR cable end plates onto single core polymeric cables.	--
58. Apply foam tape to single core cables at end plate positions to calliper size, build-up all cable oversheaths with grey foam tape ensuring tape is central to the smallest diameter of the cable entries.	29
Note: - The phase insulation tubes must be central to the scarf marks within the inner sleeve bottom	
59. Position the two cable end plates over build up tapes applied in action 56, fit end plates into entries within the bottom of the inner sleeve.	--
60. Fit top half of inner sleeve ensuring correct location of foam rings.	36
61. Fit inner sleeve to joint and fill ports with two-part Lovifit glue.	36/37
62. Ensure joint is level and fill with Lovisil.	38
63. Connect earth braid to lead sheath and copper wire screens.	39
64. Remove temporary earth continuity bond applied in action 8/19 and reseal oversheaths.	11/45
65. Clean and degrease joint length.	39
66. Slide and stretch copper stocking across joint and connect onto copper screen wires and lead sheath.	41

JOINTING PROCEDURE 7.109 – Continued

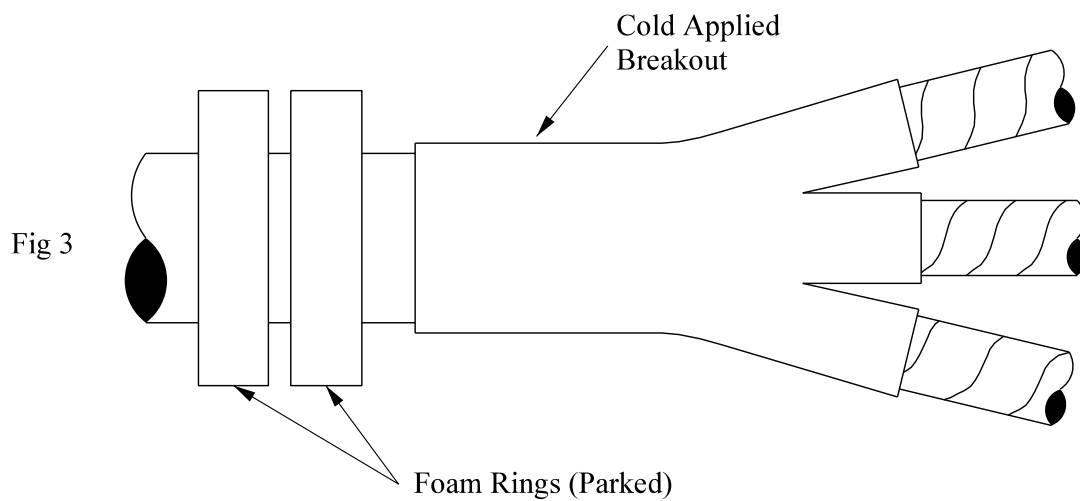
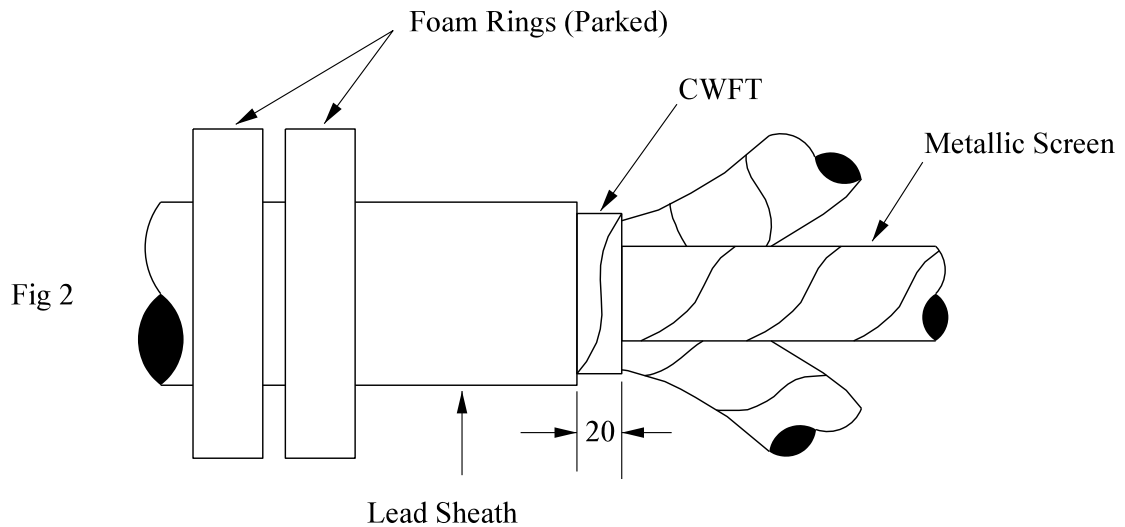
Actions	General Requirements (ST: CA3C/2)
67. Apply two half lap layers of 5313 black mastic water blocking tape over a 40mm length onto the lead sheath.	42
68. Apply 5313 black mastic water blocking tape over a length of 10mm on the oversheath and 10mm onto copper wire screen, with two half lap layers.	42
69. Offer up bottom of outer sleeve to joint and mark position of entries onto H cable outer serving/sheath and oversheath of EPR single core cables.	--
70. Build-up H cable oversheath with black self-amalgamating tape.	29
71. Offer bottom of outer sleeve to joint and mark positions of polymeric cable end plate onto single core EPR cables.	30
72. Apply foam tape to single core cables at end plate position to calliper size, build-up all cable oversheaths with grey foam tape ensuring tape is central to the smallest diameter of the cable entries.	--
73. Fit and support outer sleeve.	43
74. Remove temporary outer cable spacer applied in action 22 leaving the spacer closest to the joint sleeve end as a permanent support.	--
75. Apply large cable ties at intervals along the three cores.	--
76. Mix and pour resin.	44



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.			
Drawn	RJB	12/16	Title 185/300/400mm ² EPR CWS SINGLE CORE TO 185/300/400mm ² 'H' CABLE THREE CORE 33kV STRAIGHT JOINT		
Checked					
Approved			Drg. No. JP3D 7.109.1 Rev No		
SCALE	N.T.S.				

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All dimensions in mm

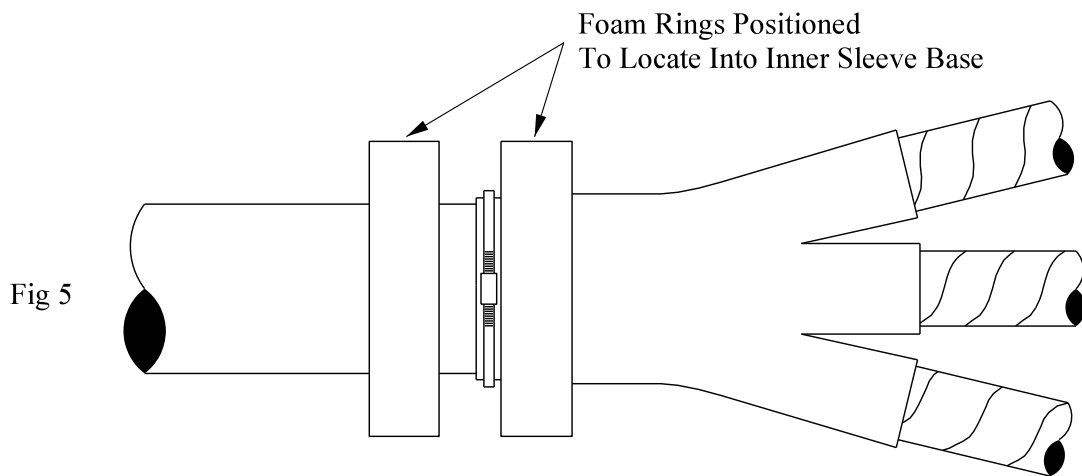
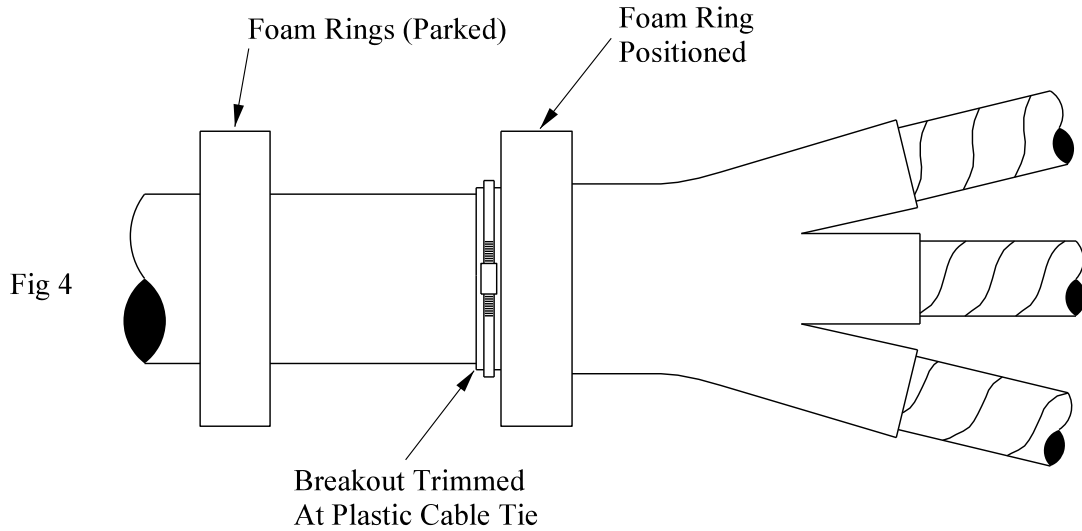


PLAN VIEW

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	01/17			
Checked				Title APPLICATION OF COLD APPLIED BREAKOUT CROTCH SEAL	
Approved					
SCALE		N.T.S.		Drg. No. JP3D 7.109.2	
				Rev No	

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All dimensions in mm

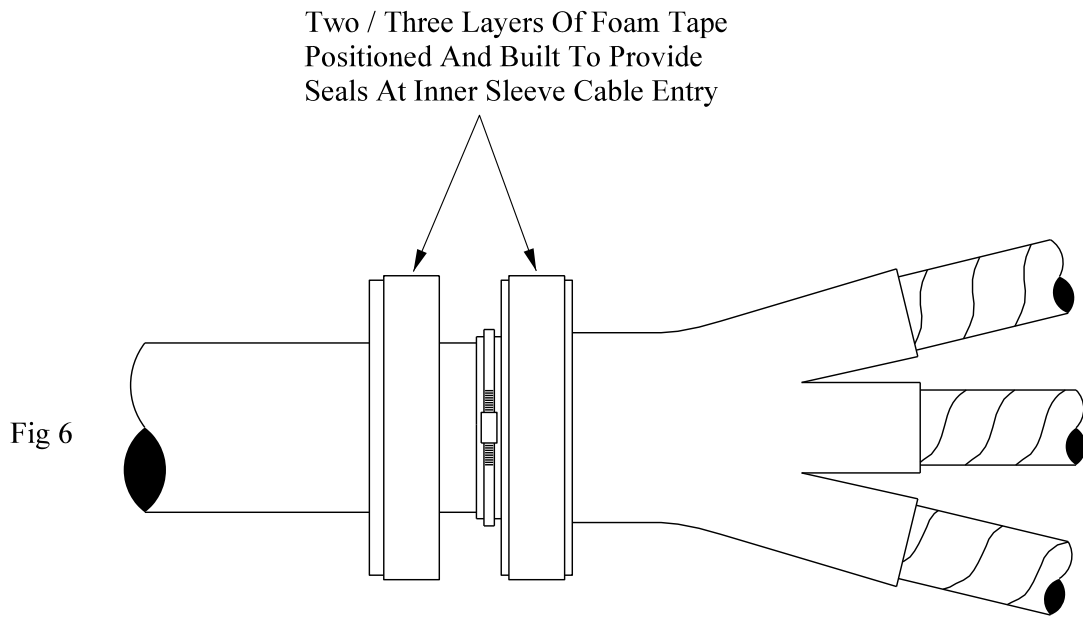


PLAN VIEW

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	01/17			
Checked				Title APPLICATION OF COLD APPLIED BREAKOUT CROTCH SEAL Drg. No. JP3D 7.109.3 Rev No	
Approved					
SCALE		N.T.S.			

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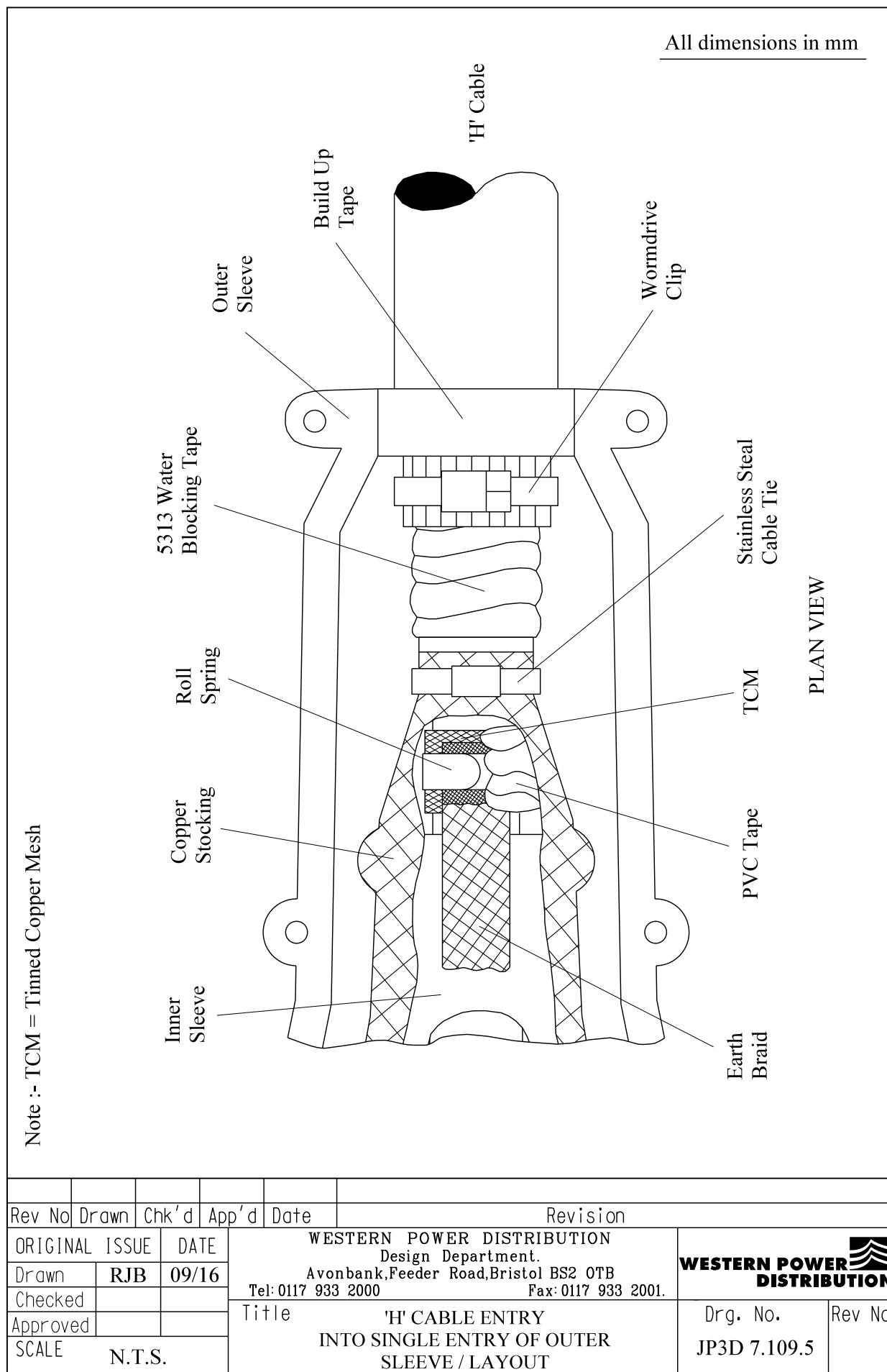
All dimensions in mm



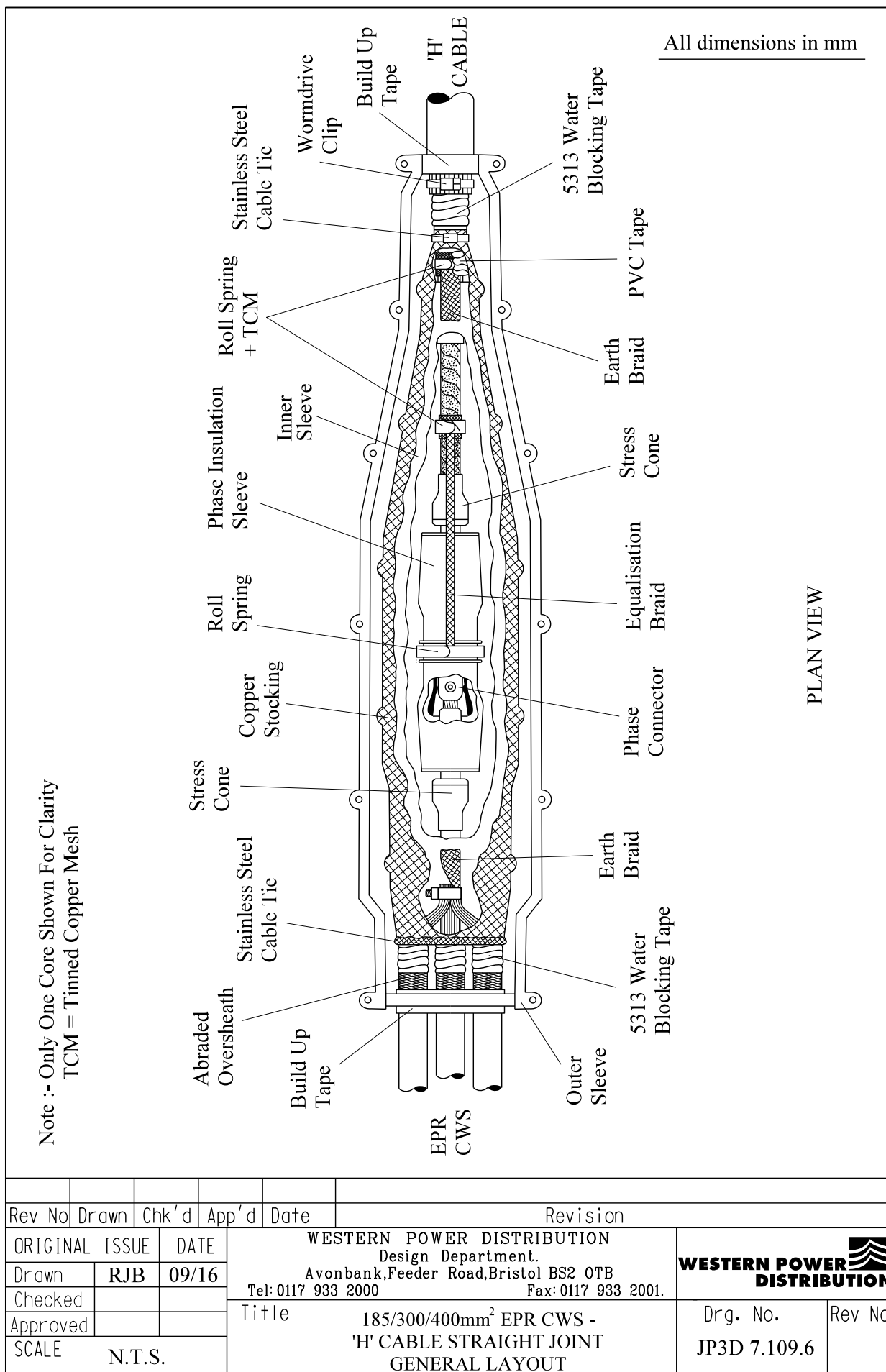
Note :- Foam Tape Build To Be
Positioned As Shown In Drawing
The Foam Rings Are Shown
Fitted In Their Final Position

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	01/17				
Checked						
Approved						
SCALE	N.T.S.		Title APPLICATION OF FOAM BUILD UP TAPE TO FOAM RINGS FITTED POSITION			Drg. No. JP3D 7.109.4
						Rev No

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.110

**185/300/400mm² EPR CWS SINGLE CORE to 185/300/400mm² HSL
Cable THREE CORE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 400mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.110

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
185 EPR	0.1 HSL Cable	SJ 3373
	0.15 HSL Cable	SJ 3374
	0.2 HSL Cable	SJ 3375
	0.3 HSL Cable	SJ 3376
	0.4 HSL Cable	SJ 3377
	0.5 HSL Cable	SJ 3378
	0.6 HSL Cable	SJ 3379
300 EPR	0.1 HSL Cable	SJ 3380
	0.15 HSL Cable	SJ 3381
	0.2 HSL Cable	SJ 3382
	0.3 HSL Cable	SJ 3383
	0.4 HSL Cable	SJ 3384
	0.5 HSL Cable	SJ 3385
	0.6 HSL Cable	SJ 3386
400 EPR	0.1 HSL Cable	N/A
	0.15 HSL Cable	N/A
	0.2 HSL Cable	SJ 3387
	0.3 HSL Cable	SJ 3388
	0.4 HSL Cable	SJ 3389
	0.5 HSL Cable	SJ 3390
	0.6 HSL Cable	SJ 3391

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.110

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE		SPLITTER KIT	CABLE DEPENDING MODULES				CONNECTORS			TUBE SET
	M125	C	H		CM MG125EPR 3x1CWS185	CM MG125EPR 3x1CWS300	CM MG125 1x3HCab 185	CM MG125 1x3HCab 300	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3373	1	3	1	1	1		1	-	3	-	-	3
SJ 3374	1	3	1	1	1		1	-	3	-	-	3
SJ 3375	1	3	1	1	1		1	-	3	-	-	3
SJ 3376	1	3	1	1	1		1	-	-	3	-	3
SJ 3377	1	3	1	1	1		1	-	-	3	-	3
SJ 3378	1	3	1	1	1		1	-	-	-	3	3
SJ 3379	1	3	1	1	1			1	-	-	3	3
SJ 3380	1	3	1	1	-	3	1	-	-	-	-	3
SJ 3381	1	3	1	1	-	3	1	-	-	3	-	3
SJ 3382	1	3	1	1	-	3	1	-	-	3	-	3
SJ 3383	1	3	1	1	-	3	1	-	-	3	-	3
SJ 3384	1	3	1	1	-	3	1	-	-	3	-	3

JOINTING PROCEDURE 7.110

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE	SPLITTER KIT	CABLE DEPENDIN G MODULES	CONNECTORS				TUBE SET			TUBE SET
	M125	C	H		CM MG125EPR 3x1CWS185	CM MG125EPR 3x1CWS300	CM MG125 1x3HCab 185	CM MG125 1x3HCab 300	VTPB21UTB	VTPB27UTB	VTPC28UTB	WCSM 90/25 x 250
SJ 3385	1	3	1	1	-	3	1	-	-	-	3	3
SJ 3386	1	3	1	1	-	3	-	1	-	-	3	3
	These two cable sizes are too small to be able to be used in the VTPC28UTB connector.											
SJ 3387	1	3	1	1	-	3	1	-	-	-	3	3
SJ 3388	1	3	1	1	-	3	1	-	-	-	3	3
SJ 3389	1	3	1	1	-	3	1	-	-	-	3	3
SJ 3390	1	3	1	1	-	3	1	-	-	-	3	
SJ 3391	1	3	1	1	-	3	-	3	-	-	3	

NOTE: - CABLES SMALLER THAN 185mm²: -

The splitter kit contains materials which are for the three standard cable sizes as stated, however, smaller cable sizes are to be found on the 33kv cable system where HSL cable are used.

If a cable smaller than 0.3in² or 185mm² requires jointing than certain materials will require changing, firstly the Company Cable engineer Peter White is to be informed who will than request further materials to be supplied by the Splitter kit manufacturer.

The following information will be required:-

1. Overall diameter of the HSL cable.
2. Overall diameter over the lead sheath of each single lead sheath core.

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.110

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.110.1, 7.110.2, 7.110.3, 7.110.4, 7.110.5, 7.110.6, 7.110.7, 7.110.8 and 7.110.9** whilst undertaking this Jointing Procedure.

- | | | |
|----|-----------------------------------|-----|
| 1. | Set and mark cables. | 5/6 |
| 2. | Carry out moisture test to cable. | 9 |

HSL CABLE - Preparation

- | | | |
|----|--|----|
| 3. | Remove outer serving refer to JP3D 7.110.1 figure 1 | 12 |
|----|--|----|

Note: - The oversheath may be of Hessian or PVC if PVC abrade.

- | | | |
|-----|---|----|
| 4. | Place a wire binder 150mm from the oversheath termination point cut and remove the wire armour refer to JP3D 7.110.1 figure 1. | 12 |
| 5. | Place a wire binder around the wire armour at the oversheath termination, lift and thoroughly clean the armour wires refer to JP3D 7.110.1 figure 1 & 2. | 12 |
| 6. | Remove the inner bedding and fillers 20mm from the armour wire termination point refer to JP3D 7.110.1 figure 1. | 12 |
| 7. | Open and straighten cores. | -- |
| 8. | Remove the fabric tape and bitumized paper (if present) 30mm from the bedding termination and thoroughly clean and degrease the lead sheaths refer to JP3D 7.110.1 figure 1. | 12 |
| 9. | Build up the inner bedding with 50mm wide hessian tape or black mastic tape to provide a tight fit to the support ring refer to JP3D 7.110.2 figure 2. | 12 |
| 10. | Position the support ring so the relayed wire armour end is in-line with the support ring end - JP3D 7.110.2 figure 3 | 12 |
| 11. | Use 50mm wide black mastic tape to fill between the support ring & up turned wire armour refer - JP3D 7.110.2 figure 2. | -- |
| 12. | Re-lay the armour wires back over the black mastic tape and secure with a binder. The mastic should protrude between the armour wires refer - JP3D 7.110.2 figure 3. | -- |

JOINTING PROCEDURE 7.110 Continued

Actions	General Requirements (ST: CA3C/2)
13. Place a mark 220mm from the SWA termination on each lead sheath – JP3D 7.110.2 figure 4	--
14. Fit and connect earth braids to lead sheaths covering the roll springs with VM tape – JP3D 7.110.2 figure 4	38
Note: - To cover the cable range required of the kit, select the correct three roll springs for cable size and discard the remaining three: - For 240/185mm cable use roll spring “G” For 400mm cable use roll spring “H”.	
15. Apply two half lapped layers of 5313 water blocking tape for a distance of 40mm spaced 30mm from the roll spring assembly on SWA cable side – JP3D 7.110.3 figure 5.	42
16. Lay and wrap the remaining length of tinned copper mesh around the armour wires – JP3D 7.110.3 figure 6.	39
17. Lay the three braids back onto the tinned copper mesh and 5313 mastic tape water block, push the braid down tight onto the mastic, spreading the braid ends out to increase braid width and position as shown – JP3D 7.110.3 figure 7.	--
18. Apply worm drive clips to braids and armour wires – refer to JP3D 7.110.4 figure 8.	39
19. Apply one half lapped layer of 5313 water blocking tape over the tinned copper braids pushing well onto the top of the black mastic and pushing well into sides to ensure a complete coverage refer to JP3D 7.110.4 figure 9.	42
20. Cut MWTM tube into three equal lengths and slide over each core taking care over the roll spring assembly and mastic tape water block applied in steps 14/15 – JP3D 7.110.4 Figure 10.	45
21. Starting at the cable crotch end shrink the heat shrink tubes into position working towards the core ends - JP3D 7.110.4 Figure 10	45
Note: - Allow to cool before next step.	

JOINTING PROCEDURE 7.110 Continued

Actions	General Requirements (ST: CA3C/2)
22. Slide the breakout down over the three cores and position over the steel wire armour bond assembly, push the breakout well into the cable crotch. Start shrinking at the turret ends working towards the SWA assembly ensuring the breakout remains in its correct position – JP3D 7.110.5 figure 11. Note: - Allow to cool before next step.	45
23. Slide a short mastic lined tube over each core to cover the breakout turrets, shrink from the turret position working towards the cable end – JP3D 7.110.5 figure 12. Note: - Ensure the tube is kept well into the breakout crotch during shrinking to prevent sliding away from the cable crotch.	45
24. Slide the remaining large mastic lined heat shrink tube over the breakout and position so the tube is central to the breakout end and any uncovered steel wire armour is covered, the tube may be moved to allow coverage. Note: - The MWTM heat shrink tube applied in action 20 is to be terminated to a minimum distance of 50mm within the single core outer joint sleeve.	45
25. The cable is to be supported with blocks and sand bags to allow support and stability along its length whilst working at a suitable height. EPR CWS CABLE – PREPARATION	--
26. Set up single core cables ensuring correct phasing.	5/6
27. Clean each oversheath for a distance of 1.5m.	--
28. Apply a temporary earth continuity bond clear of joint position.	11
29. Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core.	10
30. Slide outer sleeve end plate over the polymeric cables. Note: - Ensure the outer sleeve end plate is facing correctly - the flat face side facing towards the joint centre.	--

JOINTING PROCEDURE 7.110 Continued

Actions	General Requirements (ST: CA3C/2)
31. Ensure the cables are straight and in line with the HSL cores, mark the centre of connector on each core.	22
32. Remove oversheaths and bedding tapes.	17
33. Abrade MDPE oversheaths.	18
34. Apply a 20swg tinned copper binder around the copper screen wires 20mm from the oversheath term, bunch the individual wires into a conductor and form over the cable top.	39
35. Establish and mark centre of connector on cores.	--
36. Insert the two remaining inner sleeve end plates between the polymeric cores, secure carefully with cable ties to hold into position for cable preparation.	--
Note: - Ensure the two inner sleeve end plates are facing correctly - the flat face side facing towards the joint centre.	
COMPLETION OF JOINT	
37. Align and overlap the paper and polymeric cores.	22
38. Establish the joint centre line on both core sets.	--
Note: - The centre of connector is to be equal distance between the termination of the metalized screen of the paper cable and semi-con screen of the polymeric cable.	
39. HSL Cable - Remove metallic screens, carbon paper and two conductor papers, apply phase identification to each core.	24
40. EPR CWS - Remove semi-conducting screens ensuring insulation is free from all conductive material, apply phase identification to each core.	25
41. Cut cores and remove core insulation depth of barrel plus 5mm.	27/28
Note: - Ensure to allow for solid centre of split connector when marking and cutting core.	
42. Apply a chamfer to each polymeric core only .	29

JOINTING PROCEDURE 7.110 Continued

Actions	General Requirements (ST: CA3C/2)
43. Fit a copper equalisation braid to centre of phase insulation sleeves.	32
44. Apply semi-con tape to screen termination on each metalized paper insulated core.	32
45. Apply a stress cone to applicator and fit to each metalized paper insulated screen termination.	32
Note: - Ensure the stress cone is fitted correctly to the applicator, flared end towards joint centre.	
46. Apply a stress cone to applicator and park over each polymeric core.	32
Note: - Ensure the stress cone is fitted correctly to the applicator, flared end towards joint centre.	
47. Fit the female vee half of the connector onto the polymeric cores and shear conductor bolts.	33
Note: - The connectors are to be at 120 degrees to one another.	
48. Remove all bolts and fit the male vee half of the connector onto the female half and apply two turns of PVC tape to secure at the connector centre.	33
49. Apply a smear of 005520 Grease from the sachet supplied and apply to the connector body.	--
50. With the copper braid tail facing towards the PILC cable, slide the phase insulation sleeve onto the connector end and park over the polymeric cores ensuring the sleeve is not blocking access to the connector centre bolt.	32
Note: - The parked stress cone and applicator will fit into the flared end of the of the parked insulation sleeve to gain further access for fitting of the centre bolt.	
51. Fit remaining connector halves and connect phase conductors, finger tighten remaining centre bolts Do not shear connector bolts at this stage.	33

JOINTING PROCEDURE 7.110 Continued

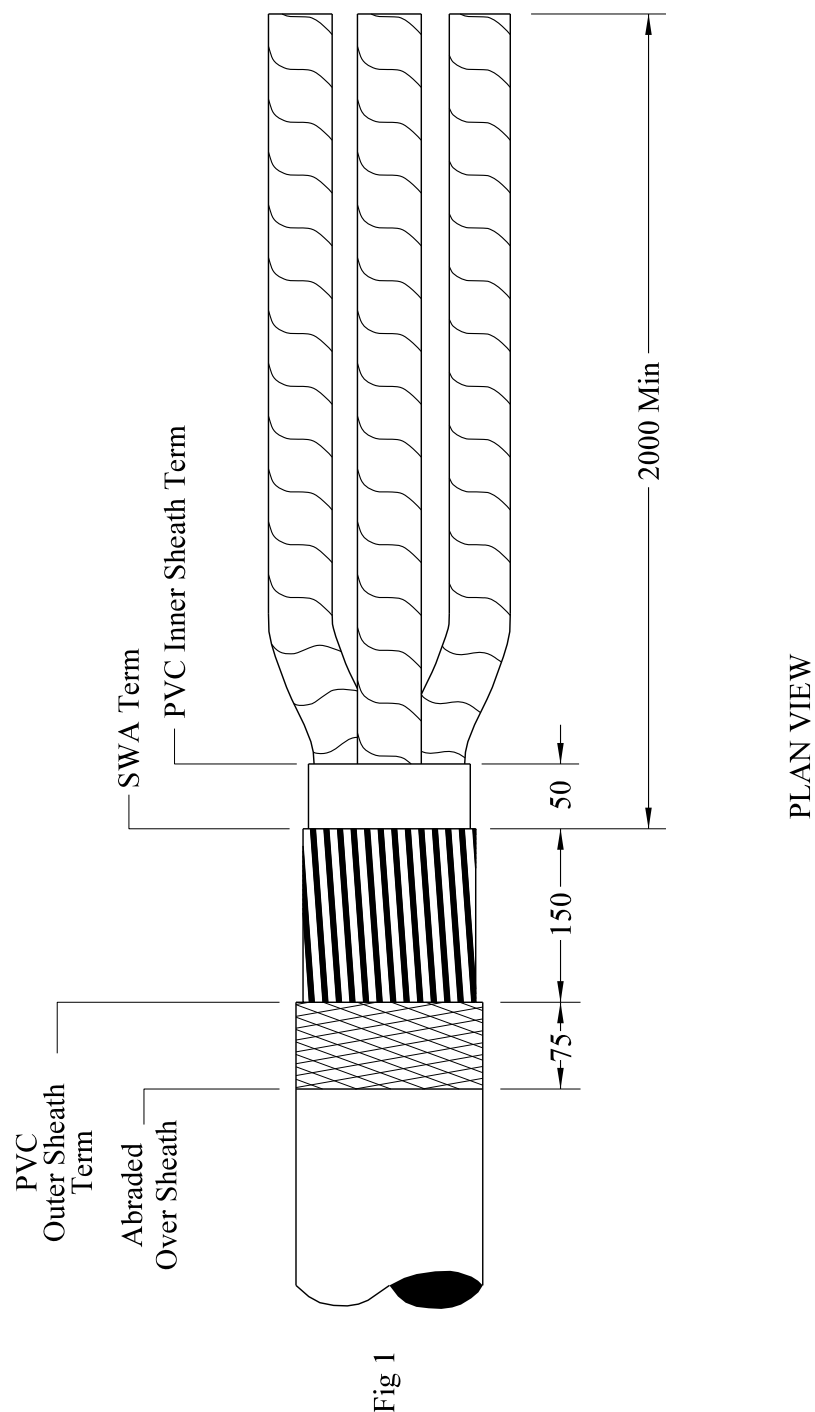
Actions	General Requirements (ST: CA3C/2)
52. Ensure the following actions have been completed before moving to next action.	--
Note: - Ensure actions 6/20/24/25/31/38/40/41/45 are complete.	
53. Reconnect phase conductors ensuring correct connector set	--
Note: - Ensure actions 28/29 are completed before final shearing of connector bolts.	
54. Slide phase insulation sleeves over and parking central to connectors.	--
55. Apply semi-con stress control tape over the polymeric EPR screen termination.	32
56. Position and fit stress cones from their applicator onto the polymeric core overlapping the stress control tape and core screen.	32
57. Apply equalisation braids from insulation sleeves to metalized screens of paper cores.	--
58. Clean and degrease joint length.	40
59. Offer bottom half of inner sleeve to joint and mark entry positions onto lead sheaths and semi-con screens.	38
Note: - The phase insulation sleeves must be central to the scarf marks, within the inner sleeve base.	
60. Ensure the foam rings/foam build up tape are positioned correctly on the foam filler piece applied in actions 19.	31/36
61. Offer bottom of inner sleeve to joint and mark entry positions of polymeric cable entry end plates.	36
62. Apply foam tape to single core cables at end plate positions to calliper size.	31
63. Offer up and support bottom half of inner sleeve to its correct position ensuring spreader is located correctly between paper cores and located into stand-off positions within bottom half of inner sleeve.	38

JOINTING PROCEDURE 7.110 Continued

Actions	General Requirements (ST: CA3C/2)
64. Fit top half of inner sleeve ensuring correct location of foam rings and core spreader.	38
65. Apply Lovifit glue to inner sleeve chambers.	37
Note: - Due to the weight of the joint the inner and outer sleeves must be supported at all times.	
66. Fill inner sleeve with Lovisil.	38
67. Connect earth braid applied in 59 to lead sheath.	34
68. Clean and degrease joint length.	40
69. Remove temporary earth continuity bond applied in 6 and 10, 51 reseal EPR oversheaths.	
70. Fit copper mesh stocking, parked in action 14.	41
71. Apply 5313 black mastic water blocking tape over oversheath ends onto copper wire screens.	42
72. Offer up bottom of outer sleeve to joint and mark position of entries onto PILC outer serving and polymeric single core cables.	43
73. Build-up all cable oversheaths.	30
74. Apply large cable ties at intervals along the three cores up to the splitter termination.	--
75. Fit and support outer sleeve.	43
76. Mix and pour resin.	44

Note :- a) The M125 33kV Straight Joint JP 7.109 Requires 2000mm To Allow For Construction And Fitting Of Earth Continuity Bonds

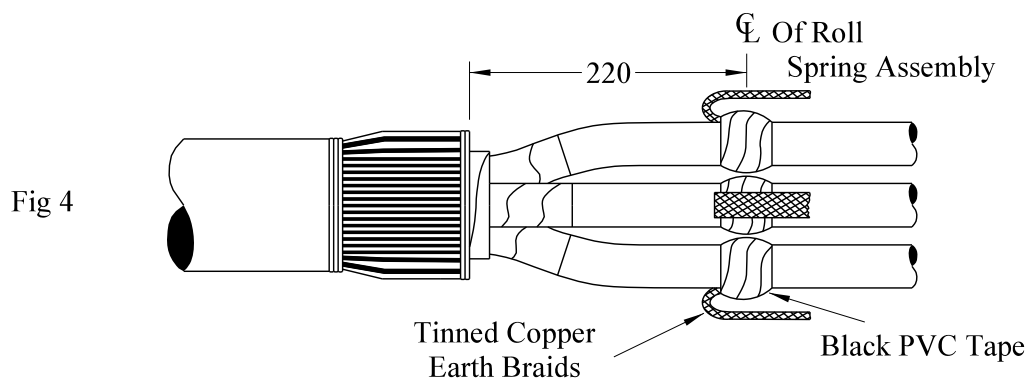
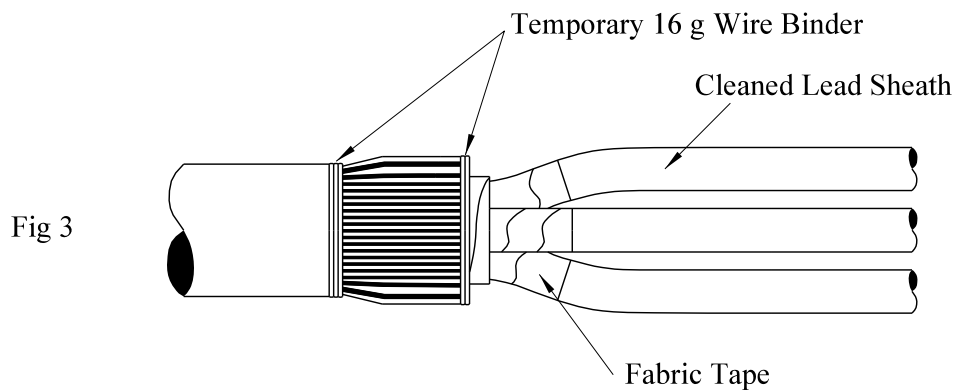
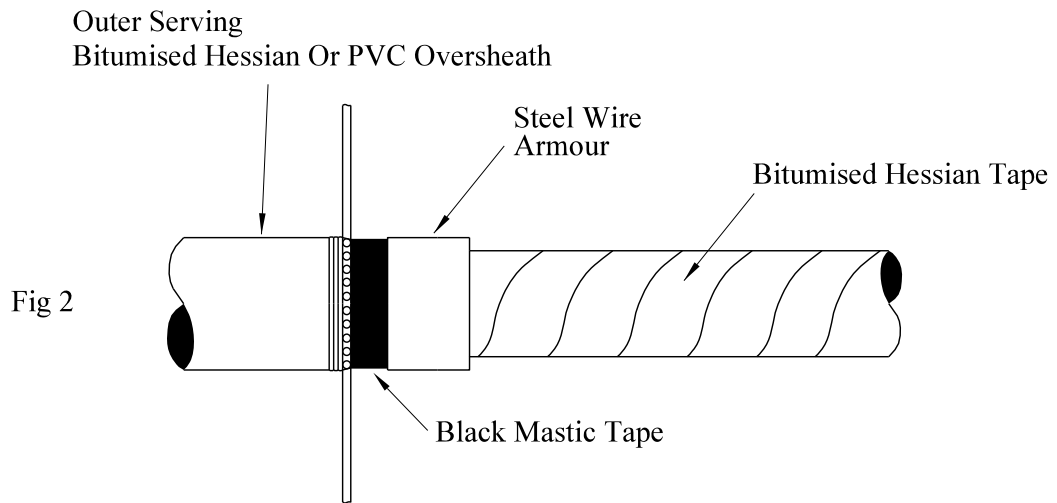
All dimensions in mm



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Drawn	RJB	09/16			
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SCALE		N.T.S.		Title	
				HSL CABLE SPLITTER	
				JOINT STRIPPING DIMENSIONS	
				Drg. No.	
				JP3D 7.110.1	
				Rev No	

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All dimensions in mm



PLAN VIEW

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All dimensions in mm

Fig 5

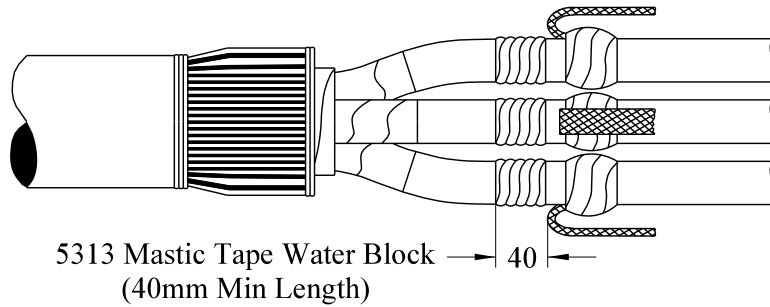


Fig 6

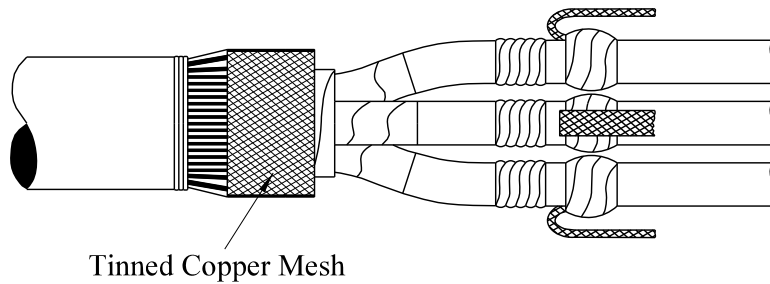
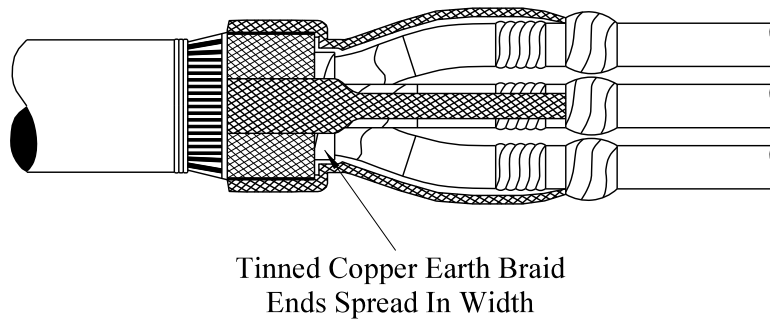


Fig 7

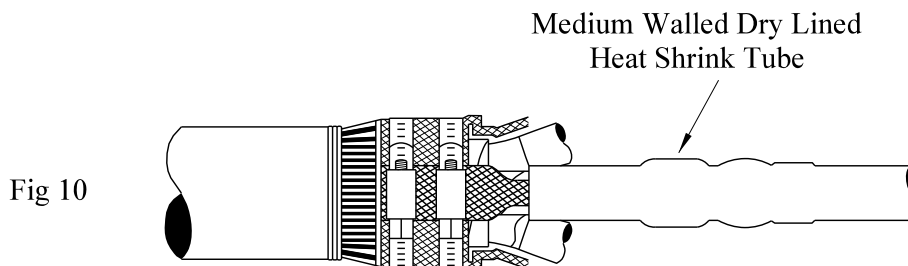
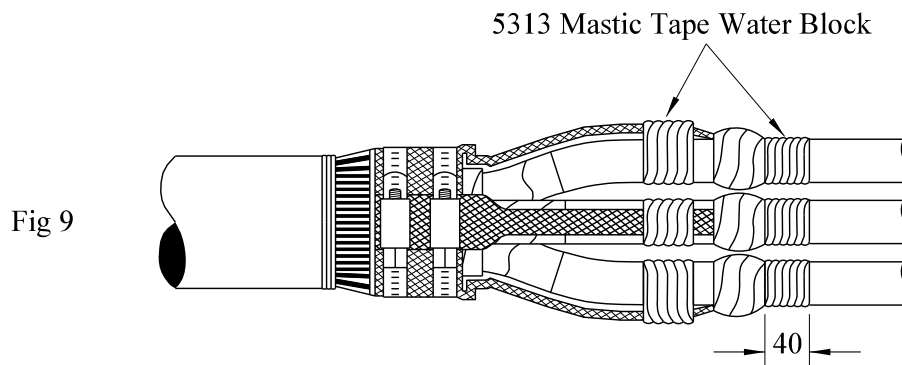
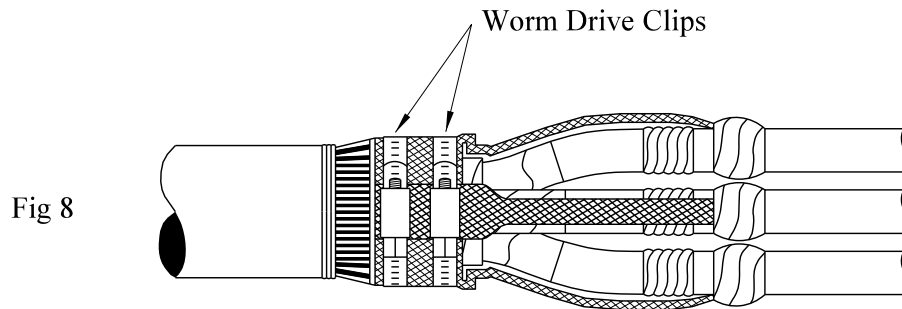


PLAN VIEW

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Drawn	RJB	09/16	Title			
Checked			HSL CABLE			
Approved			SPLITTER BOX JOINT			
SCALE		N.T.S.		Drg. No. JP3D 7.110.3		
				Rev No		

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All dimensions in mm



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Note :- If Cable Outer Oversheath Is PVC It Requires Abrading

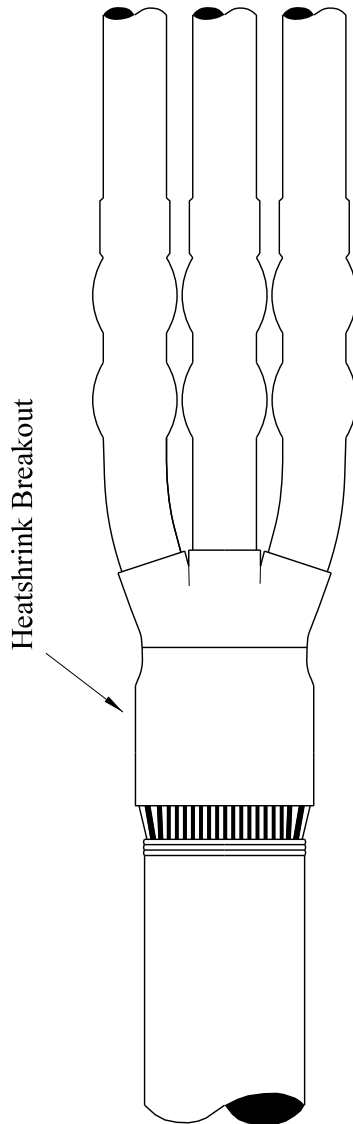


Fig 11

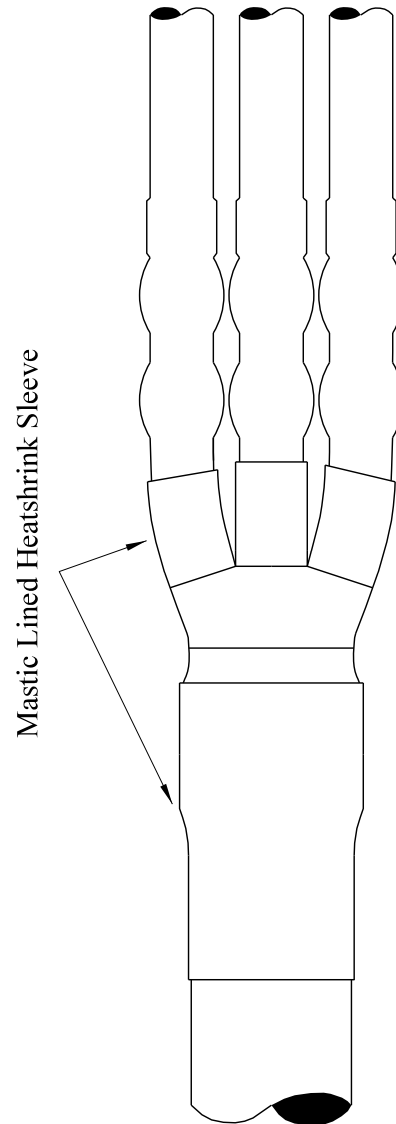
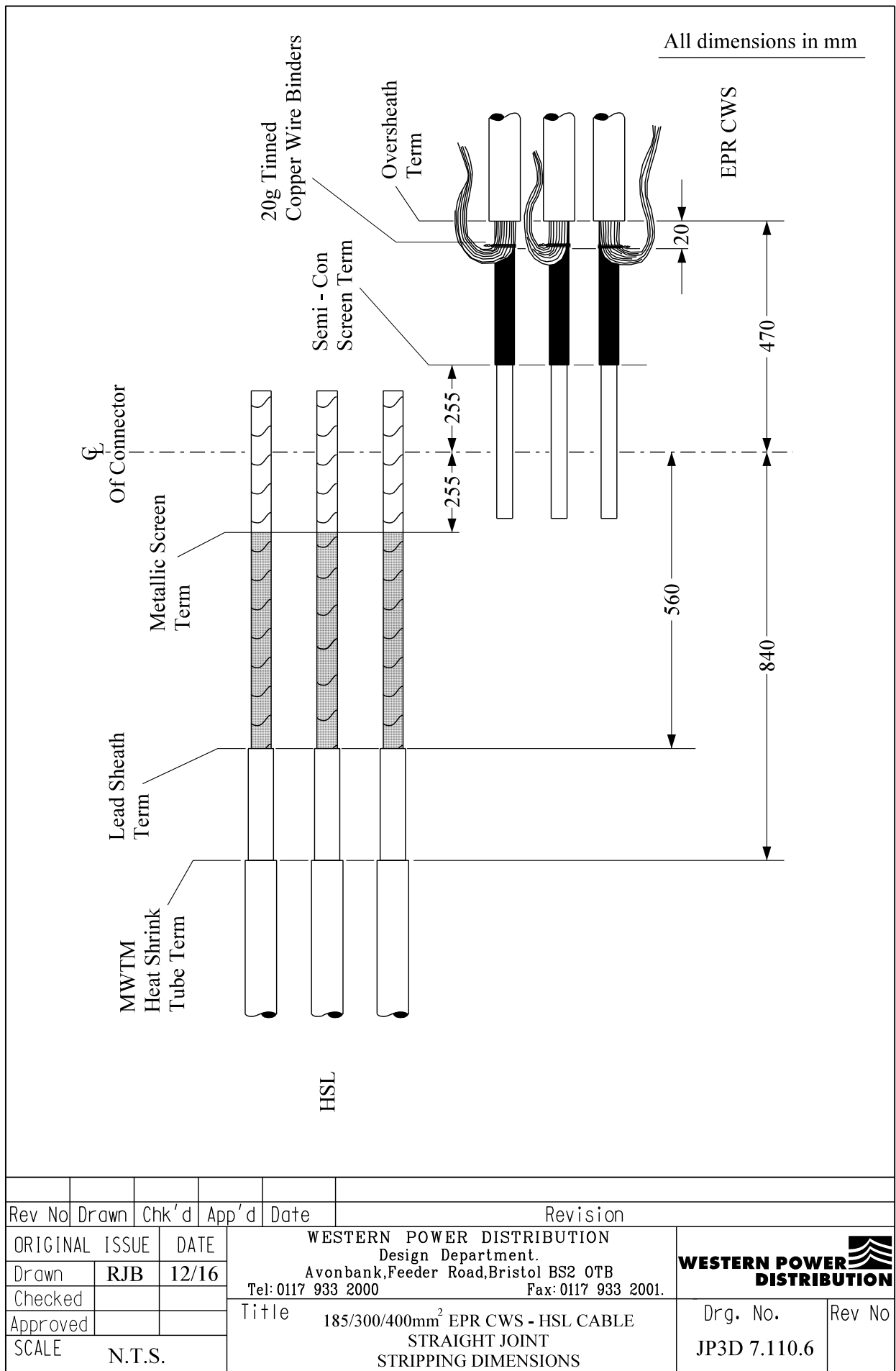


Fig 12

PLAN VIEW

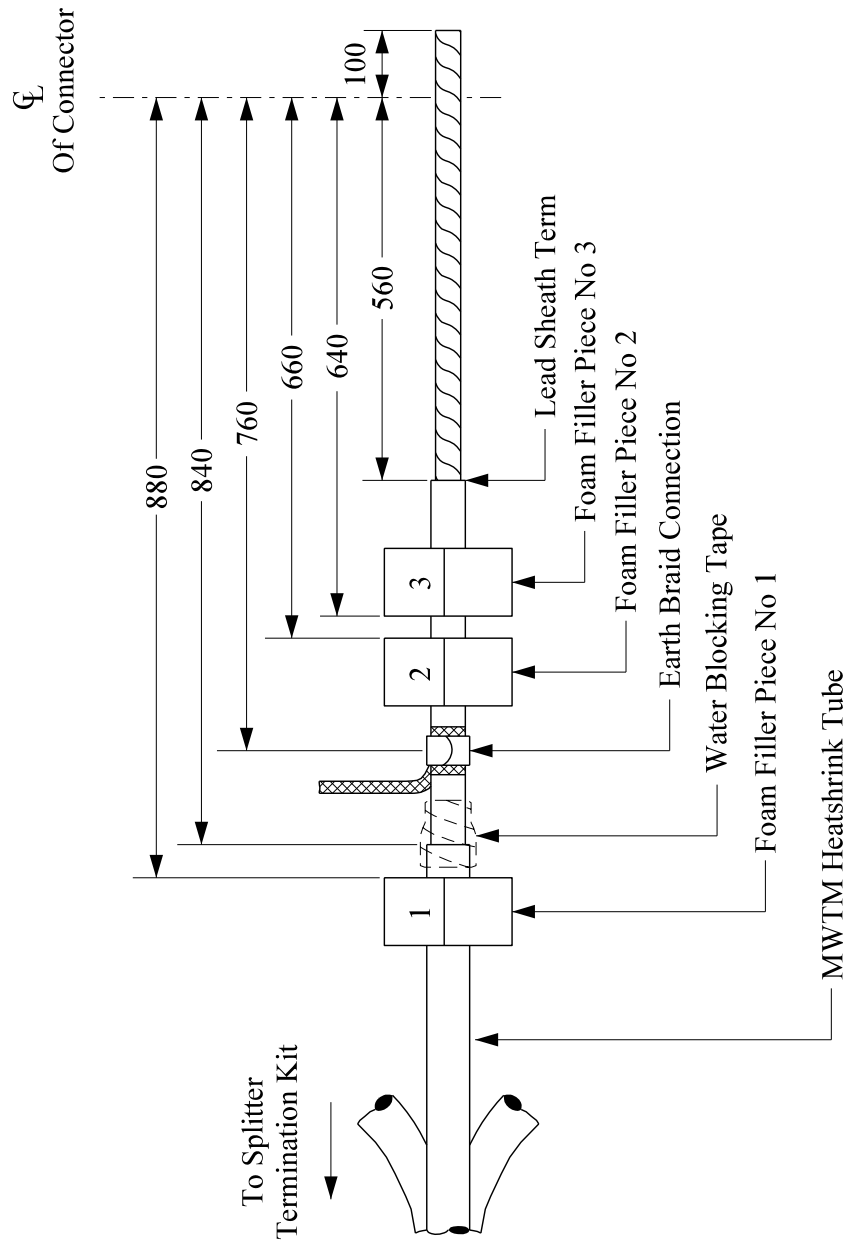
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SCALE		N.T.S.		Title HSL CABLE SPLITTER BOX JOINT STRIPPING DIMENSIONS	
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All dimensions in mm

Note :- Only One Core Shown For Clarity



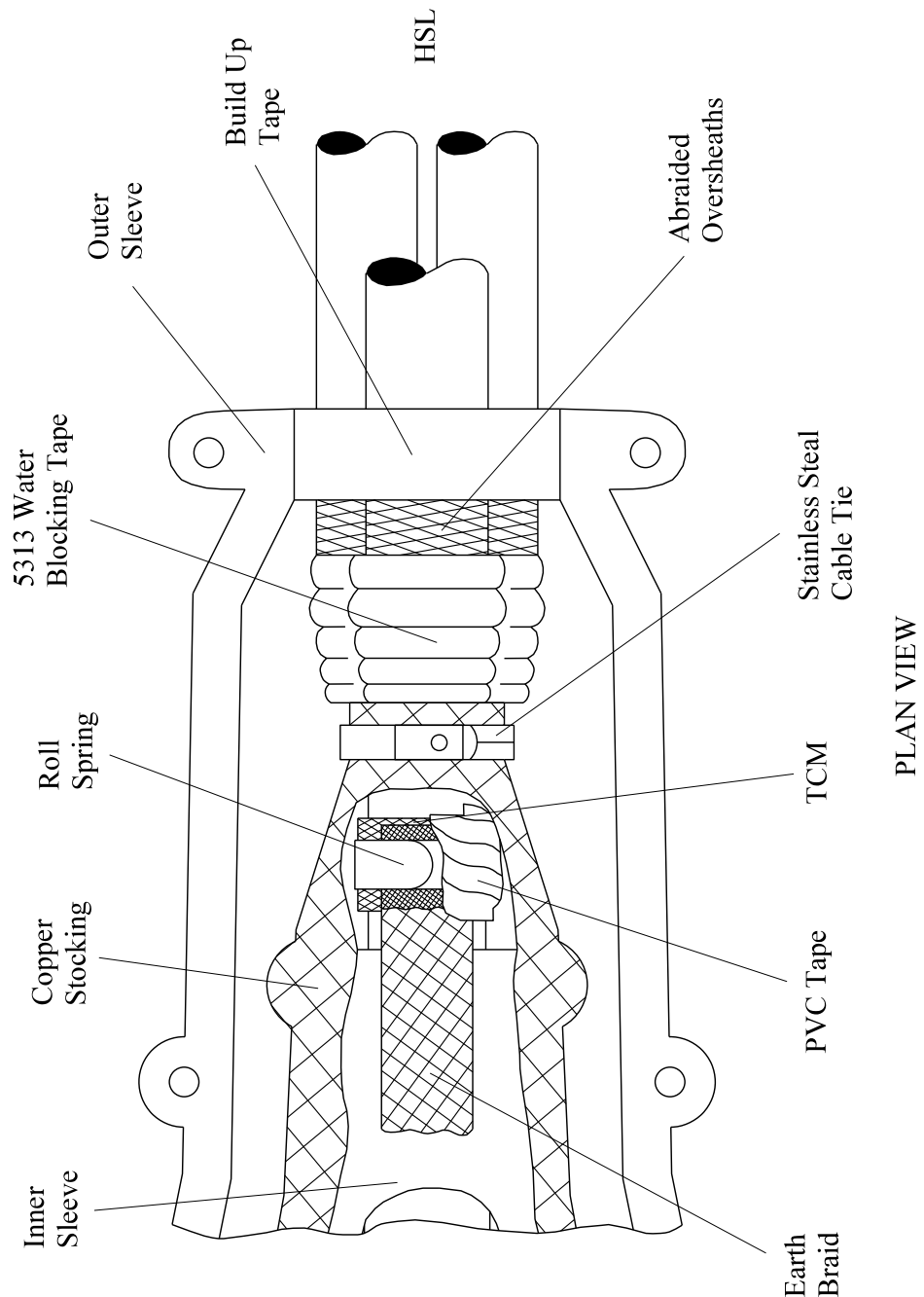
Note :- The Yellow Foam Filler Pieces Are Numbered (1-2-3) To The Sequence To Their Installation

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Drawn	RJB	01/17	WESTERN POWER DISTRIBUTION 		
Checked			Title		
Approved			FITTING OF YELLOW MASTIC VOID FILLING PIECES TO HSL CABLE WITHIN THE M125 33kV JOINT		
SCALE		N.T.S.		Drg. No. JP3D 7.110.7	
				Rev No	

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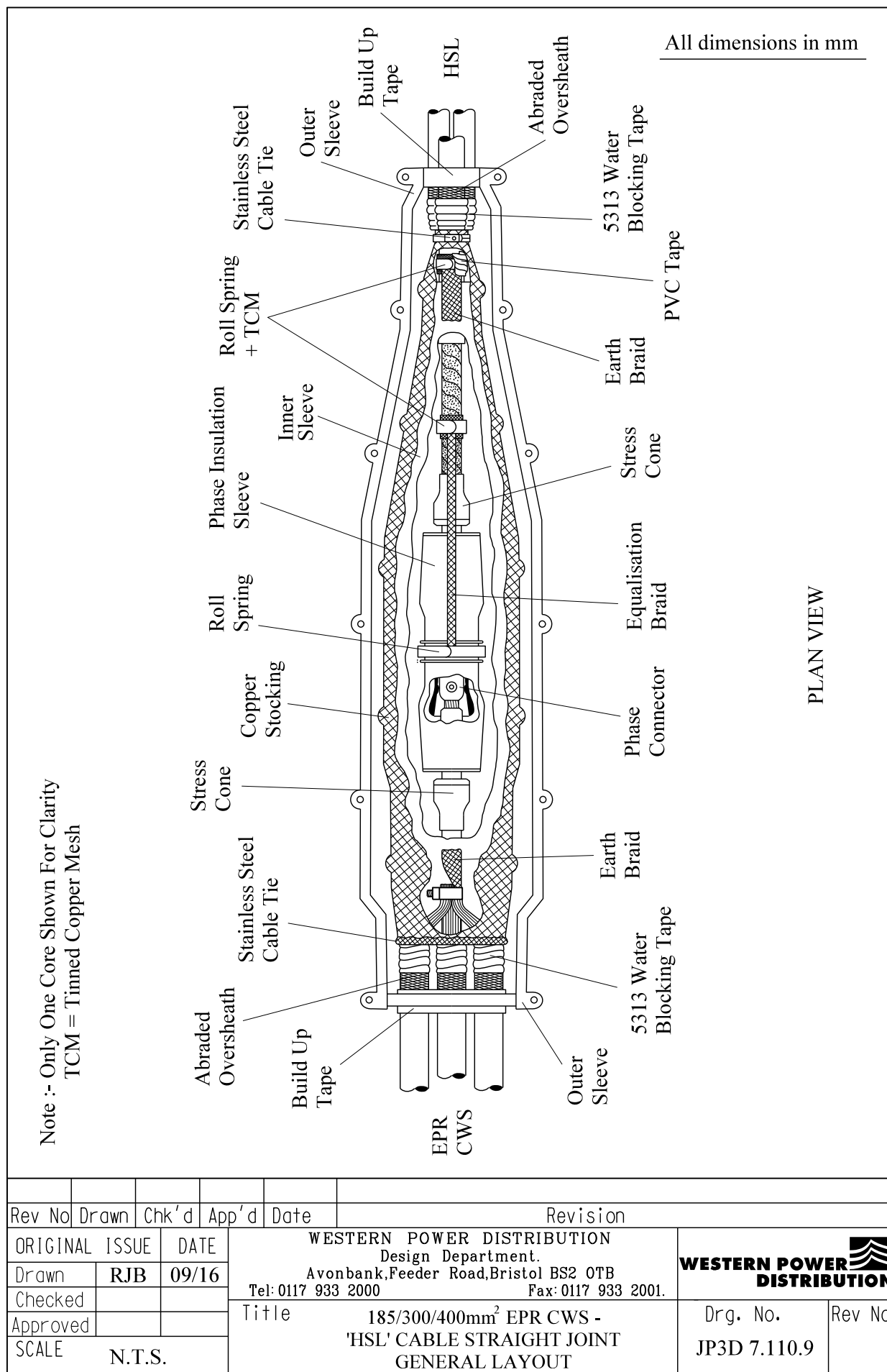
All dimensions in mm

Note :- Only One Core Shown For Clarity
TCM = Tinned Copper Mesh



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Drawn	RJB	09/16			
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Approved					
SCALE		N.T.S.		WESTERN POWER DISTRIBUTION Drg. No. JP3D 7.110.8 Rev No	

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ST CA3M/3 PROCEDURES FOR MAKING 33kV CABLE STRAIGHT JOINTS

JOINTING PROCEDURE 7.111

**185/300/400mm² EPR CWS SINGLE CORE to 185/300/400mm² 3 CORE
XLPE SWA CABLE 33KV STRAIGHT JOINT.**

(This Jointing Procedure covers cable sizes up to and including 400mm²)

**This procedure is to be read in conjunction with the appropriate
General Requirements ST: CA3C/2 Section 6
of the 33kV Jointing Manual**

JOINTING PROCEDURE 7.111

JOINT KIT REFERENCES

CABLE SIZE		JOINT KIT REFERENCES
From	To	Straight Joint
185 EPR	185 3 Core XLPE SWA	SJ 3392
	300 3 Core XLPE SWA	SJ 3393
	400 3 Core XLPE SWA	SJ 3394
300 EPR	185 3 Core XLPE SWA	SJ 3395
	300 3 Core XLPE SWA	SJ 3396
	400 3 Core XLPE SWA	SJ 3397
400 EPR	185 3 Core XLPE SWA	SJ 3398
	300 3 Core XLPE SWA	SJ 3399
	400 3 Core XLPE SWA	SJ 33100

Note: - The jointing materials for 150mm² EPR will be as for 185mm² EPR and 240mm² EPR will be as 300mm² EPR. Any reference to EPR equally applies to XLPE.

JOINTING PROCEDURE 7.111

JOINT KIT MATERIALS (for a three phase joint)

KIT REF	BASE MODULE	RESIN MODULE		CABLE DEPENDING MODULES				CONNECTORS			TUBE SET
	M125	C	H	CM MG125EPR 3x1CWS185	CM MG125EPR 3x1CWS300	CM MG125 1x3HCab 185	CM MG125 1x3HCab 300	VTPB21UTB	VTPB27UTB	VTPC28GUT B	WCSM 90/25 x 250
SJ 3392	1	3	1	1	-	1		3			3
SJ 3393	1	3	1	1	-	1			3		3
SJ 3394	1	3	1	-	1		1			3	3
SJ 3395	1	3	1	1	-	1		3			3
SJ 3396	1	3	1	1	-	1			3		3
SJ 3397	1	3	1	-	1		1			3	3
SJ 3398	1	3	1	1	-	1		3			3
SJ 3399	1	3	1	1	-	1			3		3
SJ 33100	1	3	1	-	3		1			3	3

ADDITIONAL ITEMS FOR EACH JOINT

PVC tape
Scotch 70
Tinned copper wire 16 swg
Tinned copper wire 20 swg
De-solvit 1000 FD
De-solvit 1000
Workhorse dry wipes
Emery cloth
5313 Water block tape
Cable ties
Sealing putty
Aluminium oxide cloth 320 grit
Aluminium oxide cloth 400 grit

Note: - Individual material item numbers (E 5) are to be found in Section 4 of the 33kV Jointing Manual.

JOINTING PROCEDURE 7.111

Actions

General Requirements (ST: CA3C/2)

Refer to Drawings **JP3D 7.111.1, 7.111.2, 7.111.3, 7.111.4, 7.111.5, 7.111.6, 7.111.7, 7.111.8 and 7.111.9** whilst undertaking this Jointing Procedure.

- | | | |
|----|----------------------|-----|
| 1. | Set and mark cables. | 5/6 |
|----|----------------------|-----|

3 Core XLPE SWA CABLE - Preparation

- | | | |
|----|--|----|
| 2. | Remove the PVC oversheath refer to JP3D 7.111.1 figure 1 | 16 |
| 3. | Place a wire binder 150mm from the oversheath termination point cut and remove the wire armour refer to JP3D 7.111.1 figure 1. | 16 |
| 4. | Place a wire binder around the wire armour at the oversheath termination, lift and thoroughly clean the armour wires refer to JP3D 7.111.1 figure 1 & 2. | 16 |
| 5. | Remove the inner PVC sheath and fillers 50mm from the armour wire termination point refer to JP3D 7.111.1 figure 1. | 16 |

Note: - To prevent damage to the underling copper tape screens KEVLAR sting is to be used for the circumferential cut and KNIPEX depth guarded knife for the longitudinal cut on removal.

- | | | |
|-----|---|----|
| 6. | Build up the inner bedding with 50mm wide hessian or black mastic tape to provide a tight fit to the support ring refer to JP3D 7.1111 figure 2. | 16 |
| 7. | Position the support ring so the relayed wire armour end is in line with the support ring end. | 16 |
| 8. | Use black mastic tape to fill between the support ring and upturned wire armour refer to JP3D 7.111 figure 2. | 16 |
| 9. | Re-lay the armour wires back over the black mastic tape and secure with a binder. The mastic should protrude between the armour wires refer to JP3D 7.111.1 figure 3. | 16 |
| 10. | Open and straighten cores. | 22 |

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
11. Using the copper earth braid from within the kit, cut into three equal lengths, apply a cable tie onto one end of the three braid lengths.	--
12. Taking each braid length in turn, decide the tail length required and apply a cable tie at this point, dimension X - refer to JP3D 7.111.5 figure 5.	26
13. Form a hole in one side of the braid (opposite to the tail side) sufficient to allow the core to go through. – refer to JP3D 7.111.6 figure 6.	26
14. Repeat action 15 to opposite end of the braid, lay the braid flat to ensure correct length between holes are both on the same side – refer to JP3D 7.4111.6 figure 6.	26
Note: - Due to the diameter of the core the braid may shorten on fitting therefore do not prepare for the joint until the final position has been established.	
15. Taking the braid length apply cable ties to both ends of the tails.	--
16. For application to the core, take both ends of the braid and push towards one another, this will then expand the braid diameter to form a stocking and allow fitting over the core.	--
17. Position the braid over the core with the tail towards the outer face of the core, slide the braid towards the cable crotch allowing sufficient braid tail to overlap onto the SWA and the underling compression ring. Use a heavy duty cable tie to hold in position.	--
18. Work the slack in the braid towards the joint position applying temporary cable ties to form a close fit to the copper tape screen.	--
19. Repeat to this stage on the remaining cores.	--

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
20. Working from the cable end apply a roll spring as close as fitment will allow to the copper earth braid and cover with PVC tape refer to JP3D 7.111.8 & 9 - figures 8/9. Repeat on remaining two cores.	39
Note: - To cover the cable range required of the kit select the correct three roll springs for cable size and discard the remaining three: - For 185/300mm cable use roll spring “G” For 400mm cable use roll spring “H”	
21. Taking each core in turn remove temporary cable ties and replace with PVC tape binders at 200mm intervals whilst a gentle stretch towards the joint end is given. Repeat on remaining two cores.	--
22. Once actions 21/22 are completed adjust the copper braids to ensure the core outlets are in line with one another. Apply a roll spring as shown in JP3D 7.111.8 & 9 figures 8/9 to each core maintaining the dimensions given.	39
23. Cut the MWTM heat shrink into three equal lengths, and slide over each core taking care over the roll spring assembly and mastic water block applied in step 25. – refer to JP3D 7.111.10 figure 10.	--
24. Starting at the cable crotch, shrink into position working towards the core ends.	45
Note: - Should the heat shrink tube require trimming, knives are not to be used due to possible damage to the underling copper braid and copper tape screen. A cable tie is to be used as a guide and KEVLAR string used as a garrotte to cut through the MWTM tube.	
25. Apply a half lapped layer of 5313 water blocking tape over the inner PVC sheath – refer to JP3D 7.111.5 figure 5.	42
26. Wrap tinned copper mesh over the SWA covering the width of the support ring.	13
27. Spread and lay the braid ends out to increase braid width, position as shown in in Fig 14, pushing braid down tight onto the mastic. tape water block applied in action 17. – refer to JP3D 7.111.7 figure 7.	13

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
---------	--------------------------------------

- | | | |
|-----|--|----|
| 28. | Apply a plastic cable tie around the three braids to maintain a right angle position to the support ring – refer to JP3D 7.111.11 figure 11. | 13 |
| 29. | Lay the three braids back onto the tinned copper mesh and spread the braid ends out to increase braid width and position refer to JP3D 7.111.11 – figure 11. | 13 |
| 30. | Apply worm drive clips to braids and armour wires – refer to JP3D 7.111.11 figure 11. | 13 |
| 31. | Apply a one half lapped layer of 5313 water blocking tape onto the copper braids pushing in well onto the top and sides of the black mastic to ensure a complete coverage – Fig 11. | 42 |
| 32. | Starting at the cable crotch end shrink the heat shrink tubes into position. | 45 |
| 33. | Slide the breakout down over the three cores and position over the steel wire armour bond assembly, push the breakout well into the cable crotch. Start shrinking at the turret ends working towards the SWA assembly ensuring the breakout remains in its correct position. | |

Note: - Allow to cool before next step.

- | | | |
|-----|--|----|
| 34. | Slide the remaining three mastic lined heat shrink tubes over each core down over the breakout turrets pushing well into the breakout crotch. Start shrinking from the breakout turrets working towards the cable SWA end. | 45 |
| 35. | Slide the remaining large mastic lined heat shrink tube over the breakout and position so the tube is central to the breakout end and any uncovered steel wire armour covered, the tube may be moved to allow coverage. | |

Note: - The outer serving is a continuous PVC oversheath is: -

a) PVC oversheath is to be abraded.

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
---------	--------------------------------------

XLPE CABLE - PREPARATION

36.	Identify and mark core phasing clear of joint position	--
37.	Apply earth continuity bonds clear of the joint position.	11
38.	Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core.	11
39.	Establish centre line of joint on copper tape screens.	--
Note: - The MWTM heat shrink tubing applied in action 32 must be a minimum of 50mm within the outer sleeve for resin contact and sealing, therefore consideration is to be given to the joint centre line position.		
40.	Mark the position of the copper tape screen removal point, 60 mm from the termination of the MWTM heat shrink tube and remove copper tape screens.	26
41.	Apply 3 turns of tinned copper mesh folded in half around the copper tape screen, centre being 35mm from the copper tape screen removal point.	--
42.	Apply a earth braid and roll spring over the tinned copper mesh to each to each core and cover with PVC tape.	39
Note: - Ensure the earth braid tails are positioned so as to make contact with the joint main earth braid.		
43.	Apply a earth braid and roll spring over the tinned copper mesh to each to each core and cover with PVC tape.	39
Note: - Ensure the earth braid tails are positioned so as to make contact with the joint main earth braid.		
44.	Apply two half lapped layers of 5313 black mastic water blocking tape starting 20mm on the MWTM heat shrink tubing with 20m onto the copper tape screens, and return to the start point.	42
45.	Establish and mark centre of connectors on cores.	--

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
46. Fit a foam filler piece between single core cables at the outer sleeve entry position.	31
Note: - a) The foam filler piece for the outer sleeve may require cutting to 50mm in length.	
47. Fit the foam filler piece between the cable cores at the inner sleeve entry position.	31
Note: -The foam filler piece for the inner sleeve may require cutting to 90mm in length followed by two foam rings/tape to build up to the required diameter.	
48. Fit two large cable ties either side of the foam filler piece to hold the cores straight and inline whilst constructing the joint..	--
Note: - Cable ties are to be removed before closure of the inner and outer sleeves.	
49. Position copper braided stocking over cable cores.	--
EPR CWS CABLE – PREPARATION	
50. Set up single core cables ensuring correct phasing.	5/6
51. Clean each oversheath for a distance of 1.5m.	--
52. Apply a temporary earth continuity bond clear of joint position.	11
53. Park a mastic lined heat shrink tube next to temporary earth continuity bond of each core.	10
54. Slide outer sleeve end plate over the polymeric cables.	--
Note: - Ensure the outer sleeve end plate is facing correctly - the flat face side facing towards the joint centre.	
55. Ensure the cables are straight and in line with the XLPE cores, mark the centre of connector on each core.	22

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
56. Remove oversheaths and bedding tapes.	17
57. Abrade MDPE oversheaths.	18
58. Apply a 20swg tinned copper binder around the copper screen wires 20mm from the oversheath term, bunch the individual wires into a conductor and form over the cable top.	39
59. Establish and mark centre of connector on cores.	--
60. Insert the two remaining inner sleeve end plates between the polymeric cores, secure carefully with cable ties to hold into position for cable preparation.	--
Note:- Ensure the two inner sleeve end plates are facing correctly - the flat face side facing towards the joint centre.	
COMPLETION OF JOINT	
61. Align and overlap the EPR cores, check and establish the centrelines are correct to the oversheaths.	--
62. Align and overlap the EPR and XLPE cores.	22
63. Establish the joint centre line on both core sets.	--
Note: - The centre of connector is to be equal distance between the termination of the metalized screen of the paper cable and semi-con screen of the polymeric cable.	
64. 3 Core XLPE SWA Cable - Remove semi-con screens, ensuring insulation is free from all conductive material, apply phase identification to each core.	25
65. EPR CWS - Remove semi-conducting screens ensuring insulation is free from all conductive material, apply phase identification to each core.	25
66. Cut cores and remove core insulation depth of barrel plus 5mm.	27/28
Note: - Ensure to allow for solid centre of split connector when marking and cutting core.	

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
67. Apply a chamfer to each polymeric core only .	29
68. Fit a copper equalisation braid to centre of phase insulation sleeves.	32
69. Apply semi-con tape to screen termination on each XLPE insulated cores.	32
70. Apply a stress cone to applicator and fit to each XLPE insulated screen termination.	32
Note: - Ensure the stress cone is fitted correctly to the applicator, flared end towards joint centre.	
71. Apply a stress cone to applicator and park over each EPR core.	32
Note: - Ensure the stress cone is fitted correctly to the applicator, flared end towards joint centre.	
72. Fit the female vee half of the connector onto the polymeric cores and shear conductor bolts.	33
Note: - The connectors are to be at 120 degrees to one another.	
73. Remove all bolts and fit the male vee half of the connector onto the female half and apply two turns of PVC tape to secure at the connector centre.	33
74. Apply a smear of 005520 Grease from the sachet supplied and apply to the connector body.	--
75. With the copper braid tail facing towards the PILC cable, slide the phase insulation sleeve onto the connector end and park over the polymeric cores ensuring the sleeve is not blocking access to the connector centre bolt.	32
Note: - The parked stress cone and applicator will fit into the flared end of the of the parked insulation sleeve to gain further access for fitting of the centre bolt.	
76. Fit remaining connector halves and connect phase conductors, finger tighten remaining centre bolts Do not shear connector bolts at this stage.	33

JOINTING PROCEDURE 7.111 Continued

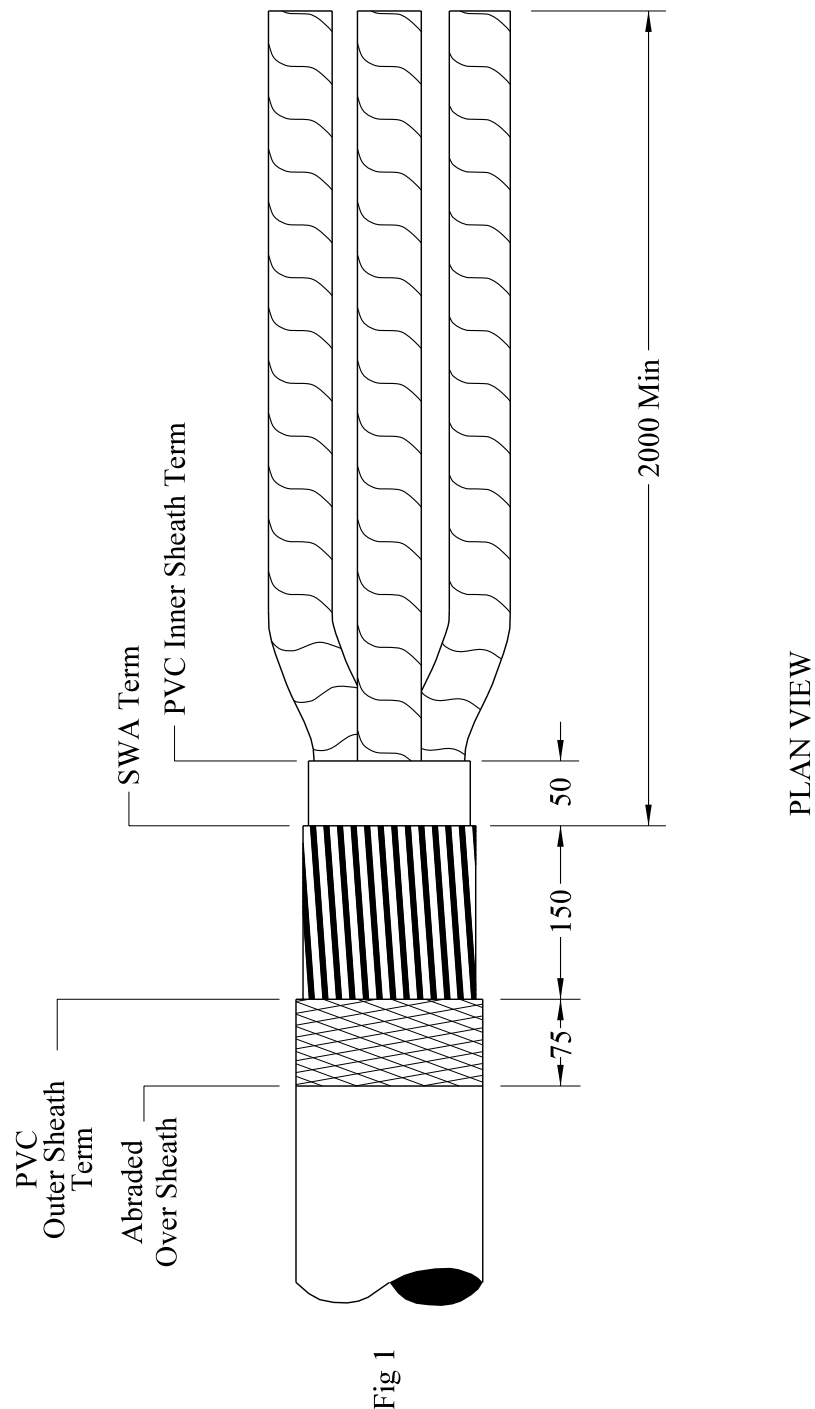
Actions	General Requirements (ST: CA3C/2)
77. Ensure the following actions have been completed before moving to next action.	--
Note: - Ensure actions 6/20/24/25/31/38/40/41/45 are complete.	
78. Reconnect phase conductors ensuring correct connector set	--
Note: - Ensure actions 20/26/27/34/35/39 are completed before final shearing of connector bolts.	
79. Slide phase insulation sleeves over and parking central to connectors.	--
80. Apply semi-con stress control tape over the polymeric EPR screen termination.	32
81. Slide phase insulation sleeves over and parking central to connectors.	34
82. Position and fit stress cones from their applicator onto the polymeric core overlapping the stress control tape and core screen.	32
83. Apply equalisation braids from insulation sleeves to metalized screens of paper cores.	--
84. Clean and degrease joint length.	40
85. Offer bottom half of inner sleeve to joint and mark entry positions onto lead sheaths and semi-con screens.	36
Note: - The phase insulation sleeves must be central to the scarf marks, within the inner sleeve base.	
86. Ensure the foam rings/foam build up tape are positioned correctly on the foam filler piece applied in actions 19.	36
87. Offer bottom of inner sleeve to joint and mark entry positions of polymeric cable entry end plates.	36
88. Apply foam tape to single core cables at end plate positions to calliper size.	36

JOINTING PROCEDURE 7.111 Continued

Actions	General Requirements (ST: CA3C/2)
89. Offer up and support bottom half of inner sleeve to its correct position ensuring spreader is located correctly between paper cores and located into stand-off positions within bottom half of inner sleeve.	36
90. Fit top half of inner sleeve ensuring correct location of foam rings and core spreader.	36
91. Apply Lovifit glue to inner sleeve chambers.	37
Note: - Due to the weight of the joint the inner and outer sleeves must be supported at all times.	
92. Fill inner sleeve with Lovisil.	38
93. Connect earth braid to lead sheath earth applied in ? braids and copper wire screens.	39
94. Clean and degrease joint length.	40
95. Remove temporary earth continuity bond applied in 6 and 10, 51 reseal EPR oversheaths.	
96. Fit copper mesh stocking.	--
97. Apply 5313 black mastic water blocking tape over oversheath ends onto copper wire screens.	42
98. Offer up bottom of outer sleeve to joint and mark position of entries onto PILC outer serving and polymeric single core cables.	43
99. Build-up all cable oversheaths.	32
100. Apply large cable ties at intervals along the three cores up to the splitter termination.	--
101. Fit and support outer sleeve.	46
102. Mix and pour resin.	44

All dimensions in mm

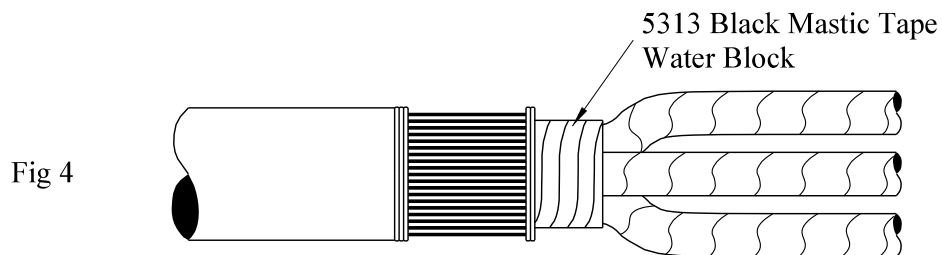
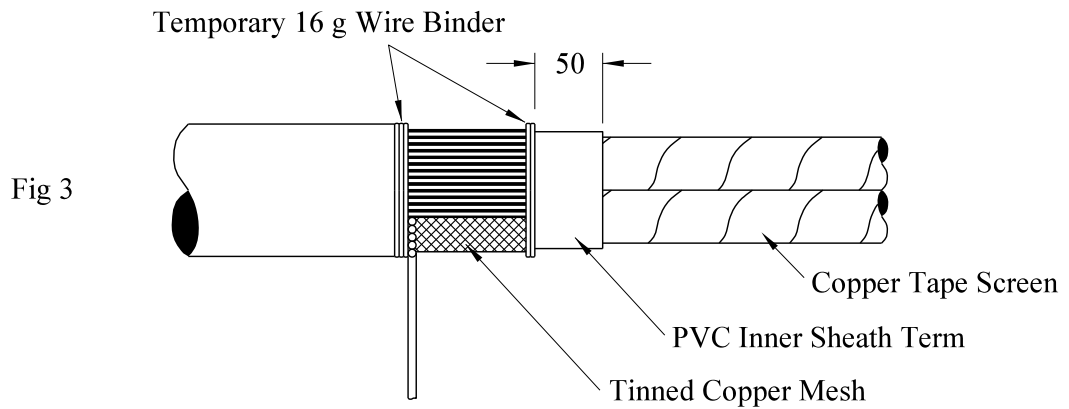
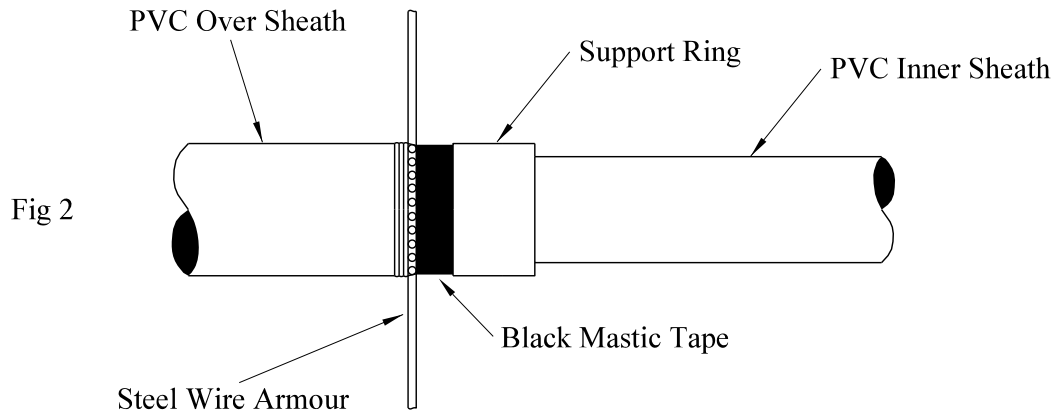
Note :- a) The M125 33kV Straight Joint JP 7.110 Requires 2000mm To Allow For Construction And For Fitting Of Earth Continuity Bonds



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SCALE		N.T.S.		Title	
				PVC SWA CTS XLPE SINGLE CORE CABLE SPLITTER JOINT STRIPPING DIMENSIONS	
				Drg. No. JP3D 7.111.1	
				Rev No	

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All dimensions in mm



PLAN VIEW

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Note:- Only One Core Shown For Clarity

All dimensions in mm

Fig 5

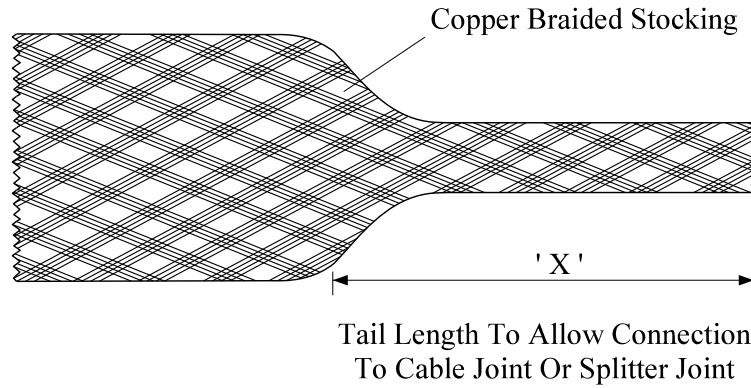


Fig 6

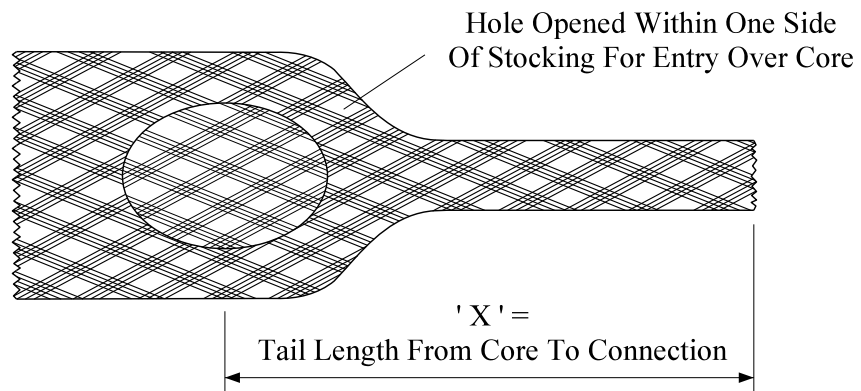
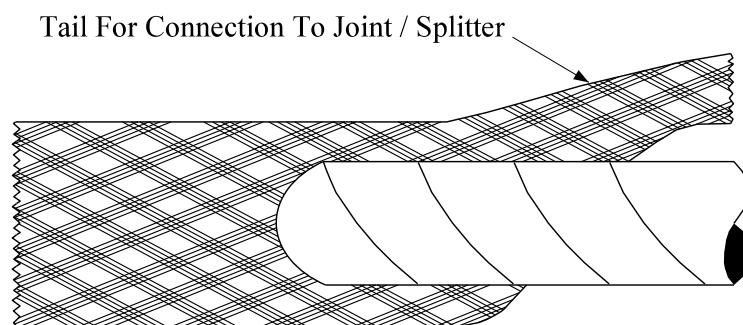


Fig 7



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Note:- Only One Core Shown For Clarity

All dimensions in mm

Fig 8

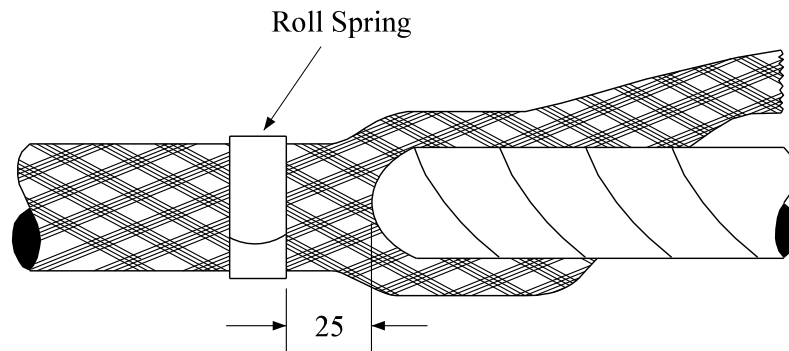


Fig 9

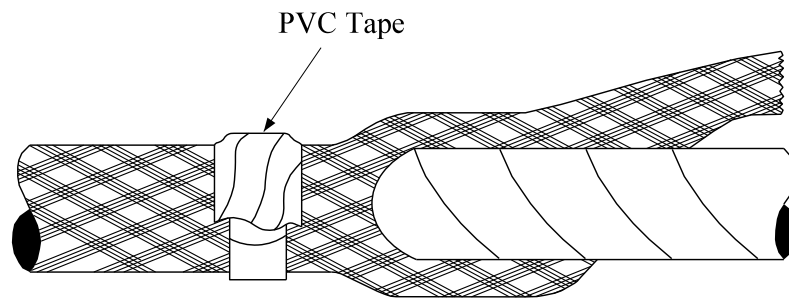
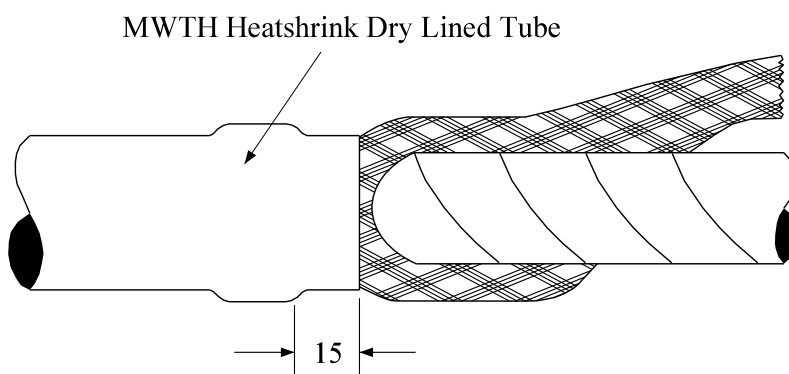


Fig 10



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All dimensions in mm

Fig 11

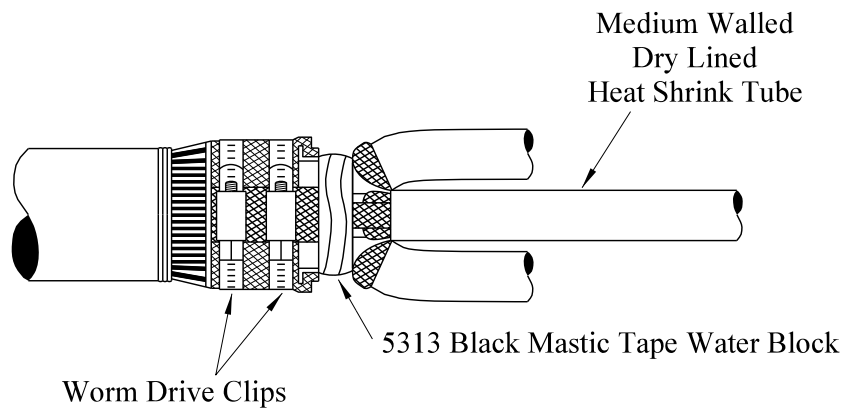


Fig 12

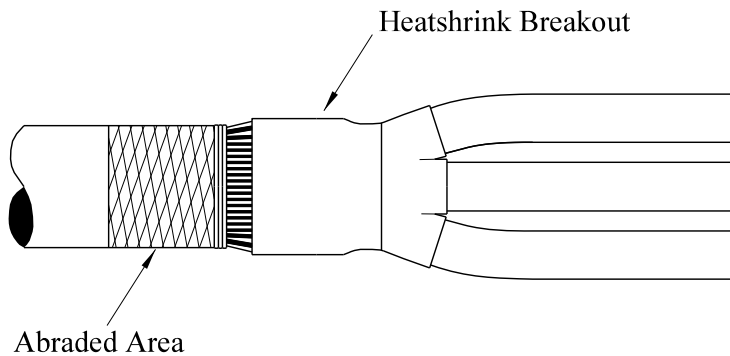
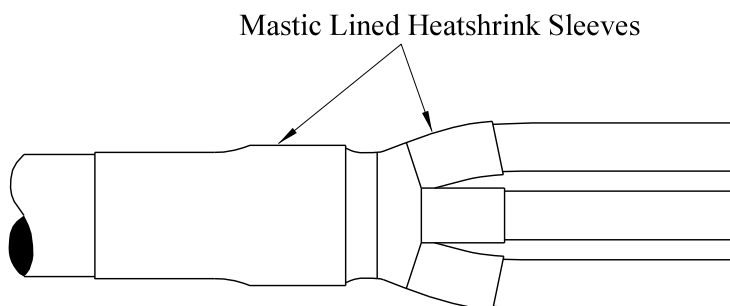


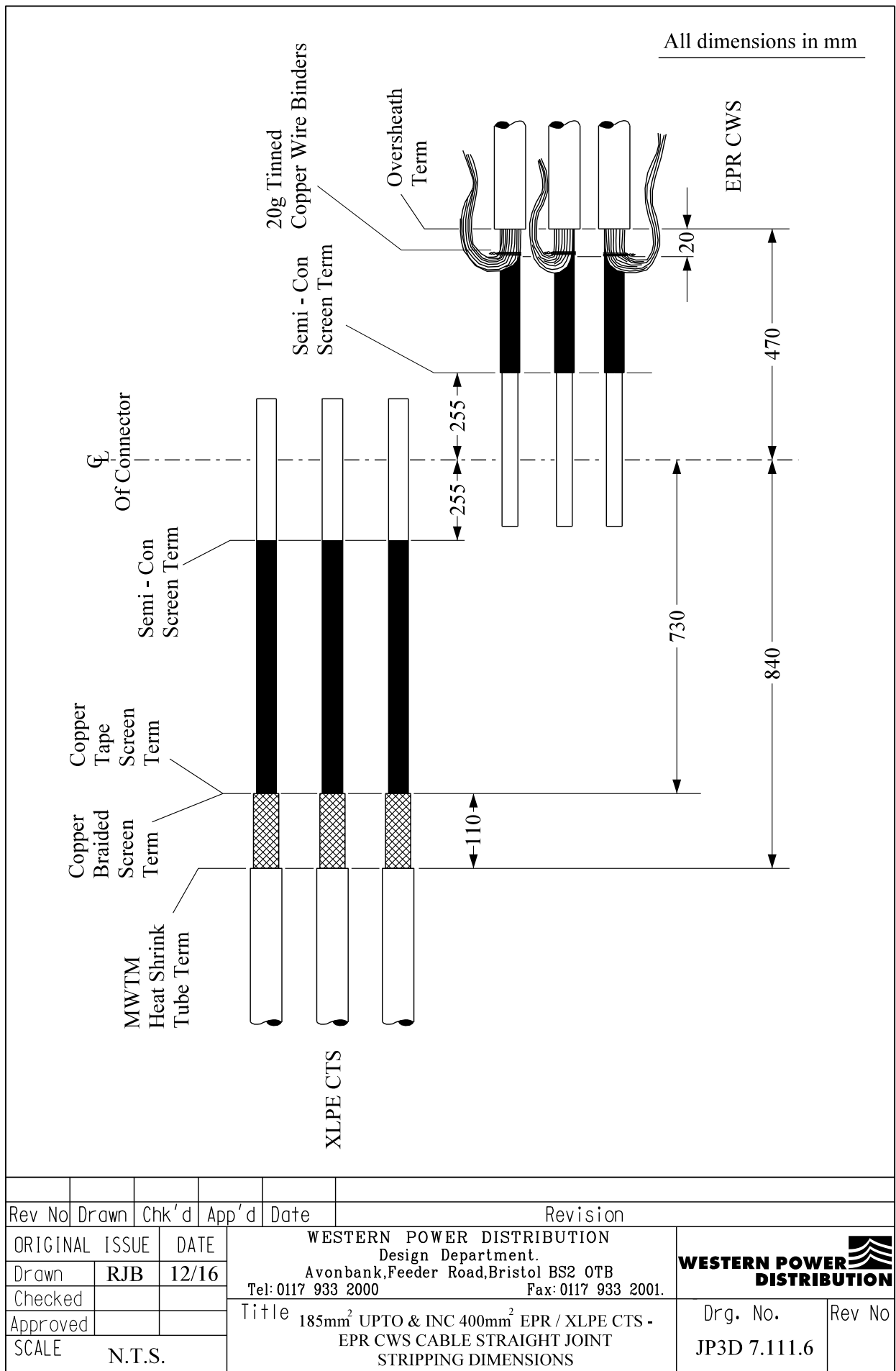
Fig 13



PLAN VIEW

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SCALE		N.T.S.		Title	
				PVC SWA CTS XLPE	
				SINGLE CORE CABLE SPLITTER JOINT	
				Drg. No.	
				JP3D 7.111.5	
				Rev No	

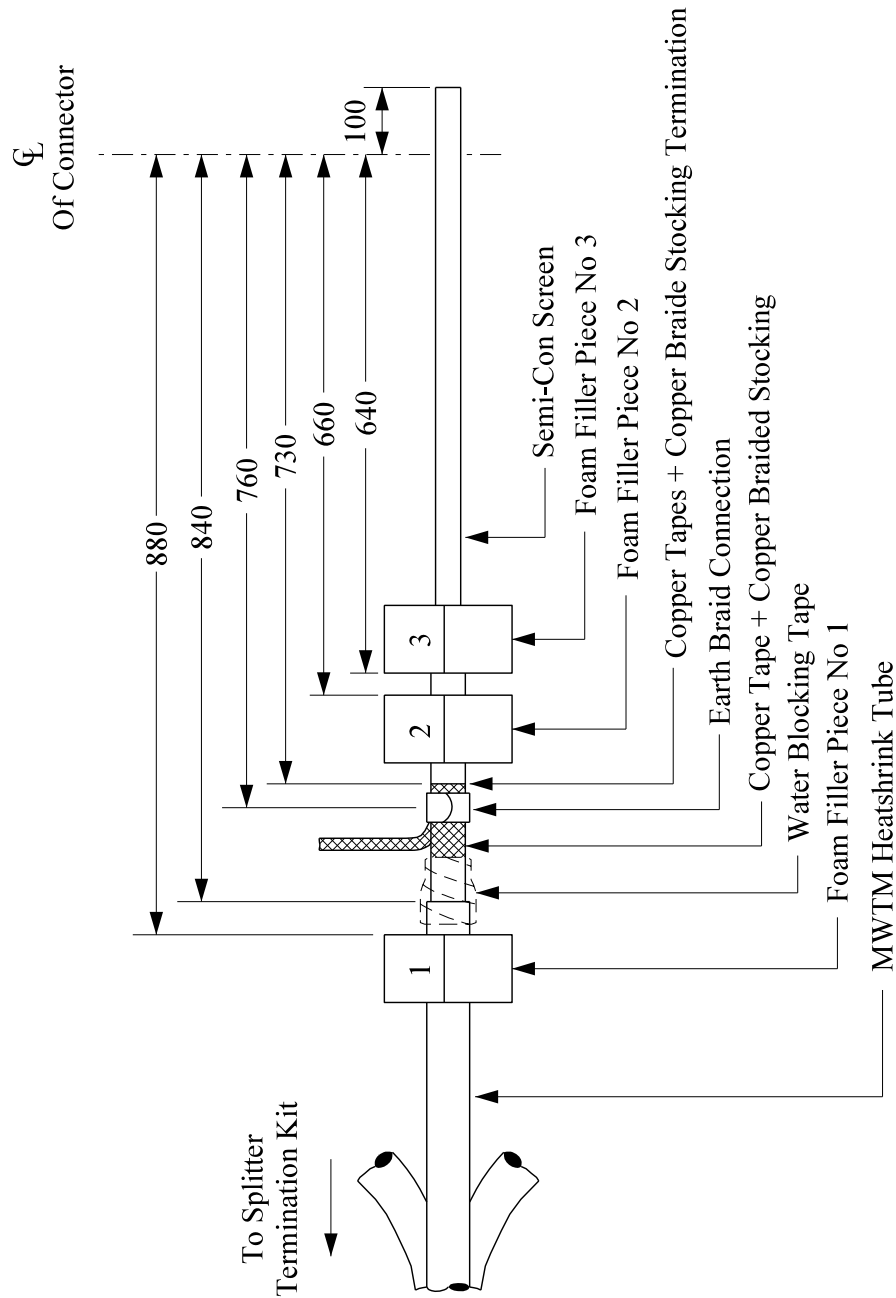
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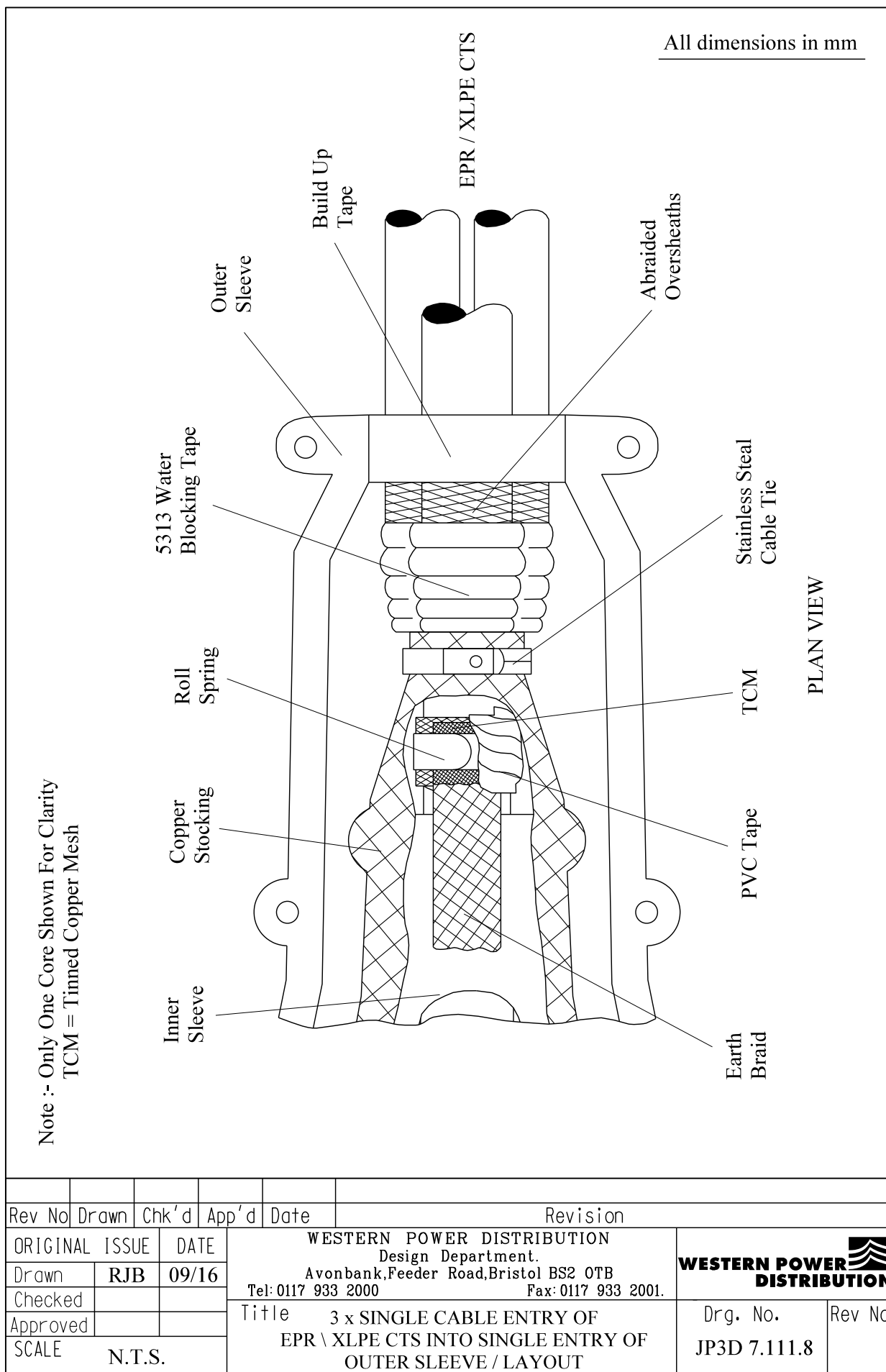
Note :- 1 - Only One Core Shown For Clarity
2 - The Copper Braided Stocking And Copper Tape Screen
Are Terminated At The 730mm Point



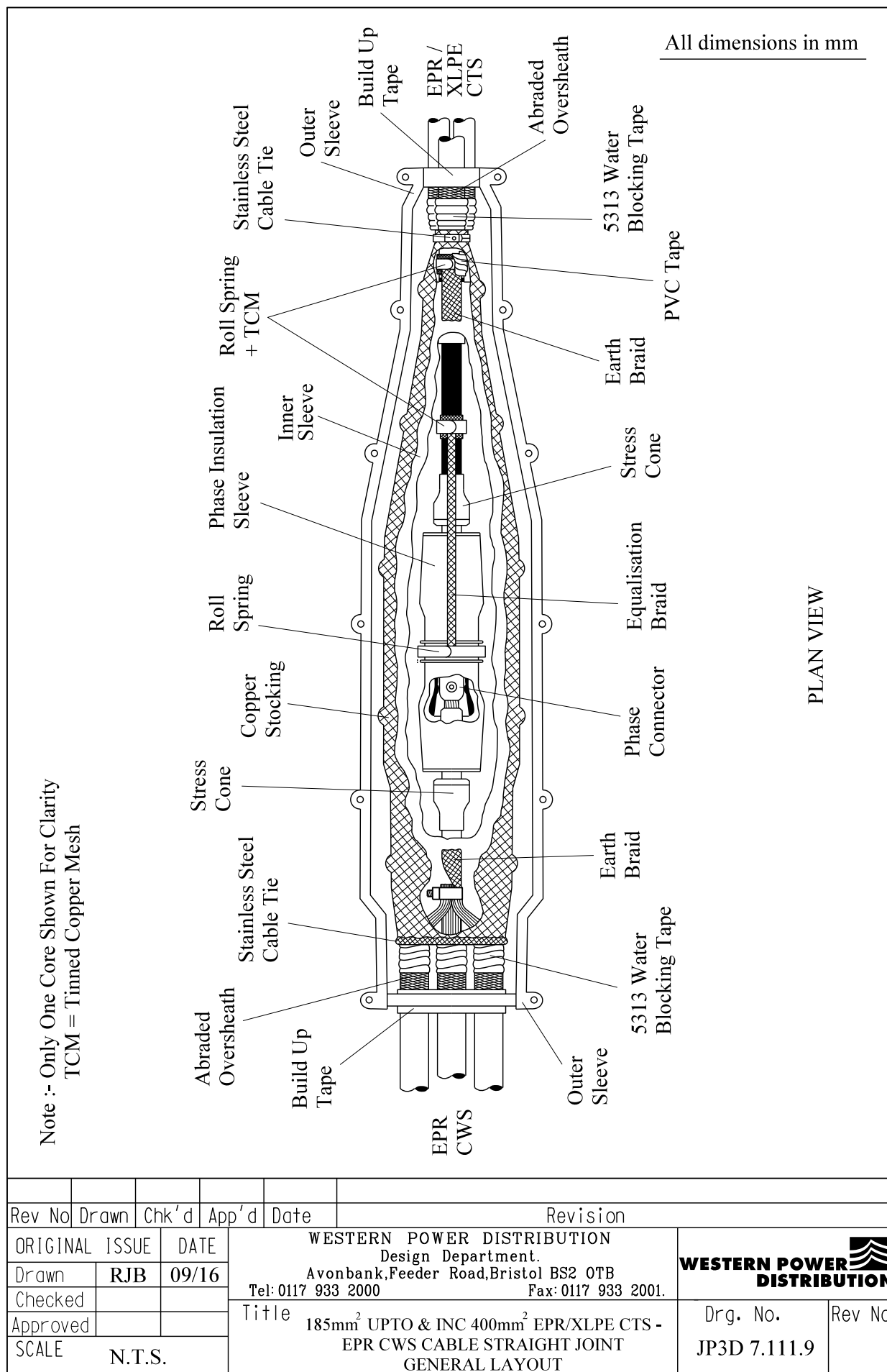
Note :- The Yellow Foam Filler Pieces Are Numbered
(1-2-3) To The Sequence To Their Installation

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SCALE		N.T.S.	Title FITTING OF YELLOW VOID FILLING PIECES TO CTS SWA CABLE WITHIN THE M125 33kV JOINT			Drg. No. JP3D 7.111.7	Rev No

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APPENDIX A

SUPERSEDED DOCUMENTATION

This document supersedes ST: CA3M/2 dated March 2017 which should now be withdrawn.

APPENDIX B

ASSOCIATED DOCUMENTATION

ST: CA3A, ST: CA3C/2, ST: CA3L/2, ST: CA3M/3, ST: CA3N/2, ST: CA3O, ST: CA3S, ST: CA3V, ST: CA7D.

APPENDIX C

KEY WORDS

Straight joint jointing procedures for the 33kV jointing manual.