

## Scope/Application

This jointing instruction applies to jointing of a 3-core Steel Wire Armoured cable to an existing 2-core PILCSTA single phase service cables in the range of 0.06in<sup>2</sup> to 0.0225in<sup>2</sup>.

This joint is required if the SWA cable is used to provide a service alteration such as unlooping as described in CP226 , Section 6.5.

Some of the stated Standard Techniques are for general guidance only and may not cover SWA cable , but the fundamental aspects apply.

**The formation of the primary moisture seal is a fundamentally important part of the joint.**

**Plastic cable sheaths should be correctly abraded and degreased for at least 50mm beyond the sheath cut as this area forms the primary moisture seal.**

**Any Lead sheath surface should be scraped and degreased prior to fitting a mastic sealing tape layer applied correctly for minimum of 50mm to form the primary moisture seal.**

**The reliability of the jointing system relies on cleanliness and dimensional accuracy, always check any relevant stripping dimensions and keep the joint assembly as clean as possible.**

### Core Colours

The 3-core SWA cable is available in two different core colour options – depending on the actual cable used it may be necessary to tape up the cores with correct colour ID as follows;

**Single core version – no additional taping necessary**

Live = Brown

Neutral = Blue

Earth = Green/Yellow

**Three phase version – apply tapes to cores as follows;**



Live = Brown – no taping required.

Neutral = Grey – tape cores in blue PVC tape

Earth = Black – tape up in green/yellow PVC tape

**Ensure same colour ID is used at the cut-out end**

## Safety Information

| SAFETY INFORMATION  |   |
|---|---|
|  | <b>CAUTION: LIVE LV ELECTRICAL SYSTEMS – USE LIVE WORK TECHNIQUES/PROCEDURES</b>  |
|  | <p>Work shall be carried out in accordance with:</p> <ul style="list-style-type: none"> <li>• Electricity North West Distribution Safety Rules</li> <li>• General Requirements in Section 1</li> </ul> <p><b>Only approved Insulated Tools shall be used</b><br/> <b>Only approved Shrouding shall be used</b><br/> <b>Basic hygiene requirements, as specified in Section 1 – General Requirements, shall be followed</b><br/> <b>Approved PPE and workwear as specified in the relevant Standard Technique shall be worn</b><br/> <b>Refer to Standard Technique No.1 before commencing any jointing operations</b></p> |

## Kit/Parts Selection

| KIT /PARTS SELECTION             |                   | ITEM              | COMM CODE  |
|----------------------------------|-------------------|-------------------|--|
| SINGLE PHASE 3-CORE SWA CU CABLE | 16mm <sup>2</sup> | Connectors        | 161015<br>161012   |
|                                  |                   | Conversion Module | 2 x 161040   |
|                                  |                   | Suggested Shell   | 161023   |
|                                  |                   |                   | 0.06 in <sup>2</sup><br>0.04 in <sup>2</sup><br>0.0225 in <sup>2</sup> |

The following additional parts are required from stores to make this joint.

| PARTS REQUIREMENTS   |     |                   |                    |
|--|-----|-------------------|--------------------|
| Component  | Qty | Supplier Part Ref | ENW Commodity Code |
| Shrouded J Type Connector (4-35mm <sup>2</sup> )   | 1   | MF19/2/SHR        | 161015             |
| Shrouded Anchor Connector  | 1   | MB21/1A/SHR       | 161012             |
| Mechanical Earth Bond Kit  | 1   | ME(T)35/ENWL      | 161040             |
| Shear off torque limiter device (5Nm.) Bag of 10   | 2   | TLD10/ENWL        | 366155             |
| *Suggested Joint Shell + Fixings (Volume = 3.4 litres)   | 1   | MS26              | 161023             |
| 16mm <sup>2</sup> stranded copper Green/Yellow insulated cable   | 1   | -                 | 356409             |
| Jem Resin (contains 3 x 2L bag)  | A/R | -                 | 174350             |
| Sealing Putty (No2 compound 3.5kg pack) , or ;<br>Sealing Putty (250g stick Sicame)  | A/R | -<br>-            | 158984<br>161056   |
| ALTERNATIVES   |     |                   |                    |
| *Alternative shells can be used for the selected joint, providing all minimum dimensions and clearances are maintained at all times. |     |                   |                    |
| The following Connectors can be used as alternative to the J type connector for the phase and neutral ;                              |     |                   |                    |
| Moulded shroud tunnel connector (Range 4-35mm <sup>2</sup> )   |     | MF4/23I           | 161010             |
| Moulded shroud tunnel connector (Range 4-50mm <sup>2</sup> )   |     | MF4/28I           | 161011             |

## Jointing Sequence

### TESTING REQUIREMENTS

**Before any work is undertaken complete the steps a) and b) on proven dead cable;**

**a) Continuity Test (Standard Technique 14 Section 6.1)**

A continuity test shall be carried out to every new cable prior to any jointing work being undertaken.

**b) Insulation Test (Standard Technique 14 Section 6.2)**

An insulation test must be carried out prior to jointing on:

- I. All new cables.
- II. All other cables that have been dead prior to work commencing.
- III. Cables which have been live up to the commencement of work need not have an insulation test carried out prior to jointing unless defective insulation is suspected.

**c) Additional Testing on live cables**

- I. Prior to making any phase connections ensure there is no voltage difference between the two cores.
- II. Prior to making any PME bond in a joint, a test should be made to establish there is zero potential across both earth and neutral conductors where appropriate.
- III. If the above test conditions are not met, then cease any **further** work and **immediately** consult supervisor.

**Note**

When a cable is to be made **live** for the first time by jointing, it shall be confirmed by appropriate tests such as insulation and continuity tests have been completed as above, and any remote ends have been terminated in an **approved** manner, such that it is safe to energise. When a cable is being re-energised by jointing, then before making the cable **live**, consider if further checks are required on the remote end(s) of the cable to ensure it is safe to proceed

| Existing Live PILC Cable  | Standard Technique No. |
|---|------------------------|
| 1. Preliminary operations.  | 1                      |
| 2. In preparation for jointing, remove any debris/material stuck around cable by gentle scraping away.<br>Remove any degraded Hessian serving at same time. | 5                      |

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| <p><b>3. Removal of Steel Tape armours</b><br/>Mark the position of the proposed steel tape armour terminations using the shell as a guide using a chinagraph pencil or scoring with approved hacksaw.<br/>Apply binders consisting of 2 turns of 1.2mm diameter (18 swg) tinned copper wire at positions of 110mm back along the cable from the proposed armour cuts – this will act as a reference guide and provides room to unwind armour tapes back sufficiently and rewind.</p>  | 5 |
| <p><b>4.</b> From the centre of the joint, in order to break the armour tapes, carefully score halfway through the top layer of steel tape armours by means of a light hacksaw cut using an approved junior hacksaw. Break and lift the steel tape armours and wind back sufficiently to enable the armour termination marks previously made in step 3 to be seen. If armours do not break, deepen the score mark as necessary.<br/>Cut and remove the armours completely at the marks on both ends. It may be necessary to re-mark the armour cut position on the lower armour.<br/>Repeat the same procedure on the lower armours.</p> | 5 |
| <p><b>5.</b> Clean, return and rewind the armours back to the original proposed armour termination positions as marked in step 3.<br/>Using multi-grips to wrap the tape armours firmly back onto the bedding (use additional cable ties and worm drive clamps to ensure the armours are firmly in place without obstructing the fitting of the shell).<br/>Check the armour cut position is at original positions by measuring 110mm back from the wire binder reference point.</p>   | 5 |
| <p><b>6.</b> Remove any bedding and bituminous layer to expose the lead sheath between the armour terminations using a gas torch.</p>  | 5 |
| <p><b>7.</b> Clean the lead sheath between the armour terminations.<br/>Abrade the lead sheath adjacent to the armour for at least 130mm</p>   | 5 |
| <p><b>8.</b> Mark the lead sheath using a china-graph pencil, 20mm from armour cut (as a guide for the armour bond mesh) and also at 100mm for the lead cut position according to the drawing, at both ends.</p>   | 5 |
| <p><b>9. Fit temporary earth continuity bond on the lead sheath</b><br/>Ensure the bonds are positioned so they will allow the lead sheath to be removed and are correctly tightened and the clear sleeve is in correct position at both sides.</p>  | 5 |
| <p><b>10.</b> Remove the lead sheath between the 100mm marks made in step 8 using one of the approved insulated Hepnyfs, to the point where the belt papers are accessible.<br/>The mini Hepnyf can be also be used for these cable sizes.</p>   | 5 |

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| <p>11. Remove top layer of belt paper from centre of joint and unwrap towards the lead sheath.<br/>Apply 10 layers of Blakely tape to form a crutch binder over the belt insulation. The first lap of Blakely Tape should be applied under the top layer of belt papers to enable the binder to be put on tight.<br/>Continue removing belt papers on both sides until the paper cores are exposed.<br/>Repeat on opposite side.</p> | 5   |
| <p>12. Remove any jute or string fillers to the point where the neutral and phase core are accessible. Wipe off excess oil using approved degreasing wipes.</p>  | 5   |
| <p>13. Fit the core spacers supplied in earth bond kit if required</p>   | -   |
| <p>14. Prepare and access the conductors for testing</p>   | 5   |
| <p>15. <b>Test cable for live and healthy (confirm polarity)</b><br/>Testing should take place in the vicinity of where the jointing work is to take place, to minimize damage to the insulation. If a hole is left in the insulation, cover with minimum of 2 layers of PVC insulating tape.</p>  | 14  |
| <p>16. Apply impregnated string binders or alternatively suitable cable ties either side of the proposed core cutting positions. Ensure the binder / cable tie will not interfere with shrouds of connector.</p>   | 5   |
| <p>17. Temporarily shroud all exposed metalwork including clamps of the earth continuity bond. and any adjacent metalwork within the joint bay.</p>  | 5<br>Section 1<br>General<br>Requirements<br>Clause 3.7 |
| <p>18. Set, mark and cut phase core (test to establish which side(s) is live) using core guard as a guide</p>  | 5   |
| <p>19. Insulate the cores on both live and dead sides using red insulating fingers/rubber patch.</p>   | Section 1<br>General<br>Requirements<br>Clause 3.7      |
| <p>20. Set, mark and cut neutral core using core guard as a guide.</p>   | 5   |
| <p>21. Insulate the neutral core on both sides using red insulating fingers/rubber patch.</p>  | Section 1<br>General<br>Requirements<br>Clause 3.7      |
| <p>22. <b>Removal of temporary earth continuity bond</b><br/>Remove and clean the temporary earth continuity bond from the lead sheaths on both sides of the cable. This can be done in the reverse order as previously fitted.<br/>Move redundant cable away from jointing position.</p>  | 5   |

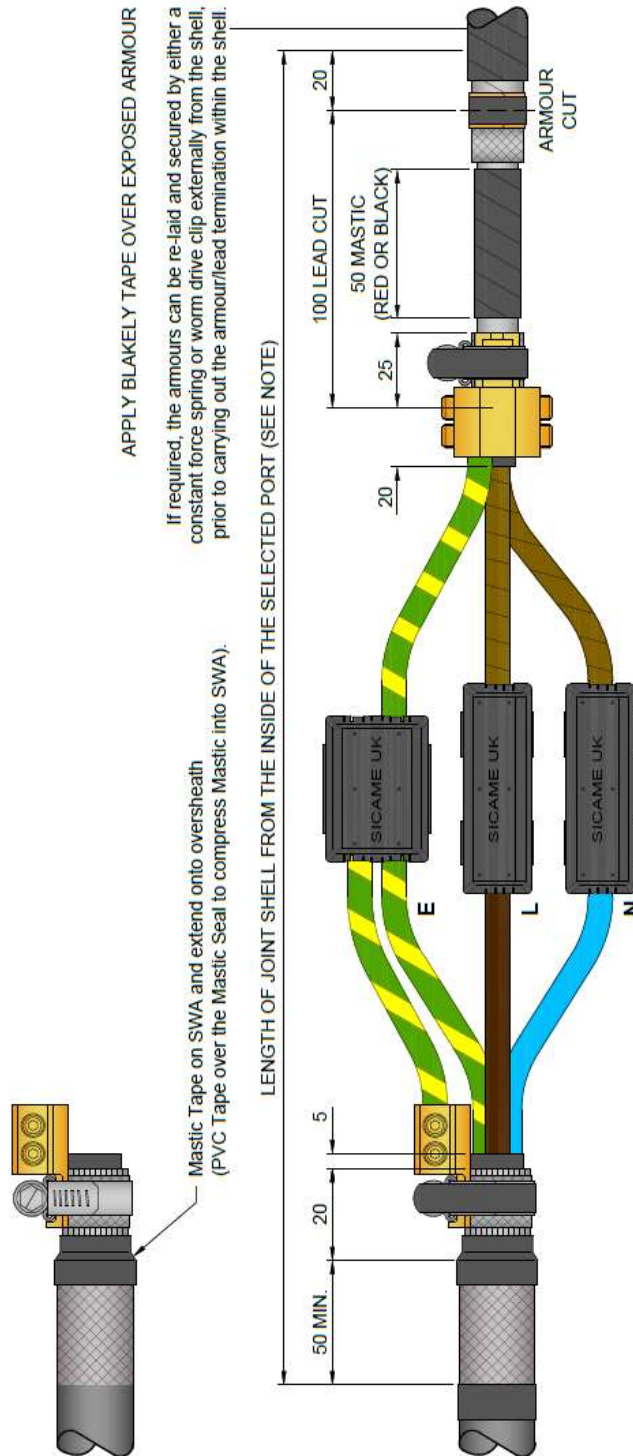
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|--|---------|
| <p><b>23. Apply armour bond to lead bond to live side</b><br/>Apply the supplied longer length of knit-mesh (or alternatively work off the roll if supplied) around the lead sheath adjacent to the armour termination, stretched to 20mm wide to build up slightly above the diameter of the armours. The previously made mark will act as a guide to correct tension width.<br/>Make the permanent armour bond onto the lead sheath using the constant force springs.</p>  | 5       |
| <p><b>24. Fit brass saddle earth clamp to live side</b><br/>Ensure lead sheath is clean and mark 25mm back from the lead cut.<br/>Apply the supplied shorter length of knit-mesh from the kit (or alternatively work off the roll if supplied) around the lead sheath between the mark and the lead cut and secure.<br/>The knit mesh will create a good electrical interface between the lead and the brass saddle clamp.<br/>Position the brass saddle clamp connector over the knit-mesh to the position as per drawing dimensions.</p> | 5       |
| <p><b>25. Secure the brass saddle clamp on the lead sheath using the provided worm drive clip, at a convenient orientation.</b><br/>Tighten the worm drive clip to the correct torque by using the approved ratchet lever and socket with shear off torque limiter supplied in the kit.<br/>Trim end or apply PVC tape around any excess worm drive strap.</p>   | 5 / 7   |
| <p><b>Completion of straight joint</b></p>   |         |
| <p><b>26. Ensure that before preparing any new SWA cable for jointing, the remote end is correctly identified if pre-laid , terminated and safe to energise.</b><br/>Set the new cable into the final jointing position using the plastic joint shell as a guide for the sheath cut position, ensuring there is adequate overlap to reach the connector positions and pilc cable saddle clamps.</p>  | 13<br>3 |
| <p><b>27. Mark the position of the proposed PVC sheath cuts using the shell as a guide, then make circumferential cut at the sheath removal position using a garrotte.</b></p>   | 3       |
| <p><b>28. Abrade the outer sheath of the new cable to create the moisture seal (50mm from the sheath cut),<br/>Strip the outer sheath from the SWA cable.</b></p>  | 3       |

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| <p><b>29. Remove Armour Wires</b><br/>Apply several layers of PVC tape on the armour wires at 30mm from the sheath cut position to use as a guide for cutting.<br/>Alternatively , use the roll spring from the service bond kit as a cutting guide.<br/>At the 30mm guide, using an approved insulated junior hacksaw lightly score around the armour wires to a depth which will allow the wires to be snapped off.<br/>Lift and break off the wires at the roll spring edge to leave 30mm of armours exposed, ensuring that the armour wires are kink free.</p> | -  |
| <p><b>30.</b> Apply a 20mm Blakely tape friction binder over the manufacturers binder tapes/fillers at the armour cut position.<br/>Then carefully remove the inner sheath by carefully scoring around the Blakely tape binder with a garrotte avoiding damage to insulation layer and pull off the cores.</p>   | 3  |
| <p><b>31.</b> Carry out insulation resistance and continuity test (dead cable only)</p>  | 14   |
| <p><b>32. Fit brass saddle earth clamp to SWA</b><br/>Ensure steel armour wires are clean.<br/>Mark the armour wires at 25 mm which will be the landing position for the saddle clamp<br/>Wrap the supplied knit mesh roll around the armour wires at the saddle position back to the sheath cut for minimum of three to four layers and tie off.</p>  | 5  |
| <p><b>33.</b> Secure the brass saddle clamp on the armours using the provided worm drive clip, at a convenient orientation.<br/>Tighten the worm drive clip to the correct torque by using the approved ratchet lever and socket with shear off torque limiter supplied in the kit.<br/>Trim end or apply PVC tape around any excess worm drive strap.</p>   | 5  |
| <p><b>34. Make earth connection</b><br/>Set, mark and strip the insulated earth core as required to make connection across the joint to the pilc cable saddle clamp. Fit shrouded anchor connector in centre of joint.</p>   | 7  |
| <p><b>35.</b> Prepare and strip a short length of 16mm<sup>2</sup> stranded copper, green/yellow insulated cable and connect into one of the terminal ports on the saddle clamp on the SWA cable. Connect other end to the anchor connector and fit shrouds.</p>   | .7   |
| <p><b>36.</b> Apply 2 layers of PVC tape at half overlap to exposed earth wires if required, as shown in drawings.</p>   | Section 1<br>General<br>Requirements<br>Clause 3.8 |

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| <p><b>37. Make neutral connection</b><br/>Set, mark and strip the insulated neutral core as required to make connection to the pilc cable neutral wires using the shrouded J type connector and ensure snap on upper cover is fitted correctly.</p>          | 7  |
| <p>38. Temporarily shroud all exposed metalwork around saddle clamps.</p>  | 3 & Section 1<br>General<br>Requirements<br>Clause 3.7 |
| <p><b>39. Make mechanical phase connection</b><br/>Set, mark and strip the insulated phase core as required to make connection to the pilc cable phase conductor using the shrouded J type connector and ensure snap on upper cover is fitted correctly.</p> | 7  |
| <p>40. Remove temporary shrouding.</p>   | Section 1<br>General<br>Requirements<br>Clause 3.7     |
| <p>41. Thoroughly degrease all of the completed joint.</p>   | 8  |
| <p>42. Prepare and fit joint shell, ensuring the joint shell is adequately supported. Do not attempt to interfere with any internal joint construction arrangements in order to gain radial clearance once the joint shell is fitted.</p>                    | 8  |
| <p>43. At the cut -out position, carry out polarity and earth loop impedance tests and phase rotation where appropriate.</p>   | 14   |
| <p>44. Mix and pour the approved resin, ensure lids are fitted correctly to the filling port.</p>  | 8  |
| <p>45. Ensure joint is not disturbed or interfered with after completion of pouring until resin has set.</p>   | 8  |
| <p>46. Joint completed – fill in any necessary paperwork/drawings records.</p>   | -  |
| <p>47. Remove all waste from site and dispose of correctly where relevant</p>  | Section 1<br>General<br>Requirements<br>2.11           |







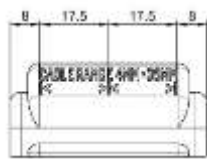

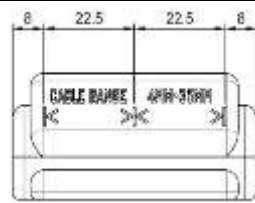
**Construction & Dimensions**



Connections to be made in the following order:-  
SNE Cable - Earth, then Neutral followed by Phase  
Note:- Birdcage neutral/earths to allow resin penetration.

Note:- All connectors to be jointed within the joint shell to allow a minimum of 10mm clearance, no connection must be made in the joint crutch area. Moisture seals to begin from the inside of the selected cable port. **Ensure the joint shell is adequately supported prior to filling with resin.**

## Connectors – Standard & Alternative options

| ENWL Comm Code<br>Sicame Part No.   | Range/Notes   | Image  |
|---|---|--|
| <b>161015</b><br>MF19/2/SHR.  | 4 - 35mm <sup>2</sup> shrouded J type connector<br>0.007 – 0.06in <sup>2</sup><br>When using on 0.007in <sup>2</sup> /4mm <sup>2</sup> , double up to<br>achieve necessary cross sections or overlap both<br>conductors into one side only<br><b>Tooling Requirement</b><br>3mm A/F T BAR<br>(788386/787777/067050) |                             |
| <b>161012</b><br>MB21/1A/SHR  | 4-35mm <sup>2</sup> Shrouded Anchor Connector<br><b>Tooling Requirement</b><br>3mm A/F T BAR<br>(788386/787777/067050)  |                             |
| <b>161040</b><br>ME(T)35/<br>ENWL   | Mechanical Armour Bond Kit<br>Includes brass saddle clamp, mastic, mesh and<br>worm drive clamp / torque limiter<br>For connecting lead sheath to up to 2 x 35mm <sup>2</sup><br>conductors.<br><b>Tooling Requirement</b><br>3mm A/F T BAR<br>(788386/787777/067050)   | <br><br>Brass Saddle Clamp |
| <b>Alternative connectors</b>   |   |  |
| <b>161010</b><br>MF4/23I<br> | 4 - 35mm <sup>2</sup> moulded shroud tunnel connector<br>0.007 – 0.06in <sup>2</sup><br><b>Tooling Requirement</b><br>3mm A/F T BAR<br>(788386/787777/067050)   |                           |
| <b>161011</b><br>MF4/28I<br> | 4 - 50mm <sup>2</sup> moulded shroud tunnel connector<br>0.007 – 0.06in <sup>2</sup><br><b>Tooling Requirement</b><br>3mm A/F T BAR<br>(788386/787777/067050)   |                           |