W T HENLEY LIMITED

JOINTING INSTRUCTION

No.1778M

11kV UNIVERSAL PARALLEL BRANCH M I R P (MOULDED INSULATION, RESIN PROTECTED) JOINT FOR 3-CORE PILC, PICAS (BELTED AND SCREENED) 3 CORE XLPe/SWA AND SINGLE CORE XLPe CABLES UP TO AND INCLUDING 300mm2 USING MECHANICAL CONNECTORS

ASSOCIATED DRAWING No 73727

(ALL DIMENSIONS QUOTED IN THIS INSTRUCTION ARE IN MILLIMETRES)

FOR USE WITH DEAD (DE- ENERGISED) CABLES ONLY THIS JOINT MUST BE INSTALLED BY A SKILLED CABLE JOINTER WHO IS FULLY CONVERSANT WITH THE REQUIRED INSTALLATION TECHNIQUES

IT IS ESSENTIAL TO THE CORRECT WORKING OF THIS JOINT THAT THE RUBBER SLEEVES BE KEPT DRY AND FREE FROM DUST AND DIRT SHOULD A SLEEVE BECOME CONTAMINATED THE OUTSIDE SURFACE AND ENDS OF THE BORE MAY BE CLEANED WITH A CLEAN RAG MOISTENED WITH A SUITABLE SOLVENT *DO NOT IMMERSE THE SLEEVE IN ANY SOLVENT AS EXCESSIVE SOLVENT MAY DAMAGE THE RUBBER*

HEALTH AND SAFETY

All personnel should observe the relevant Health and Safety Regulations that are in force

ELECTROMAGNETIC COMPATIBILITY

Ensure that all electrical connections, both load current and earth bonding, are securely made in accordance with this instruction When connections are made on to high voltage terminals avoid sharp projections and very small diameter connecting wires as these can cause corona discharges and therefore electromagnetic interference

These steps are necessary for safe and reliable operation and to prevent electromagnetic interference

Prepared by panel

R A CHALLIS

R HARDEN

K BOTTING

Issued by:-

W I HENLEY LIMITED GRAVESEND KENT Tel 01474 564466

PREPARATION

Ascertain that the correct plastic joint shell is available:

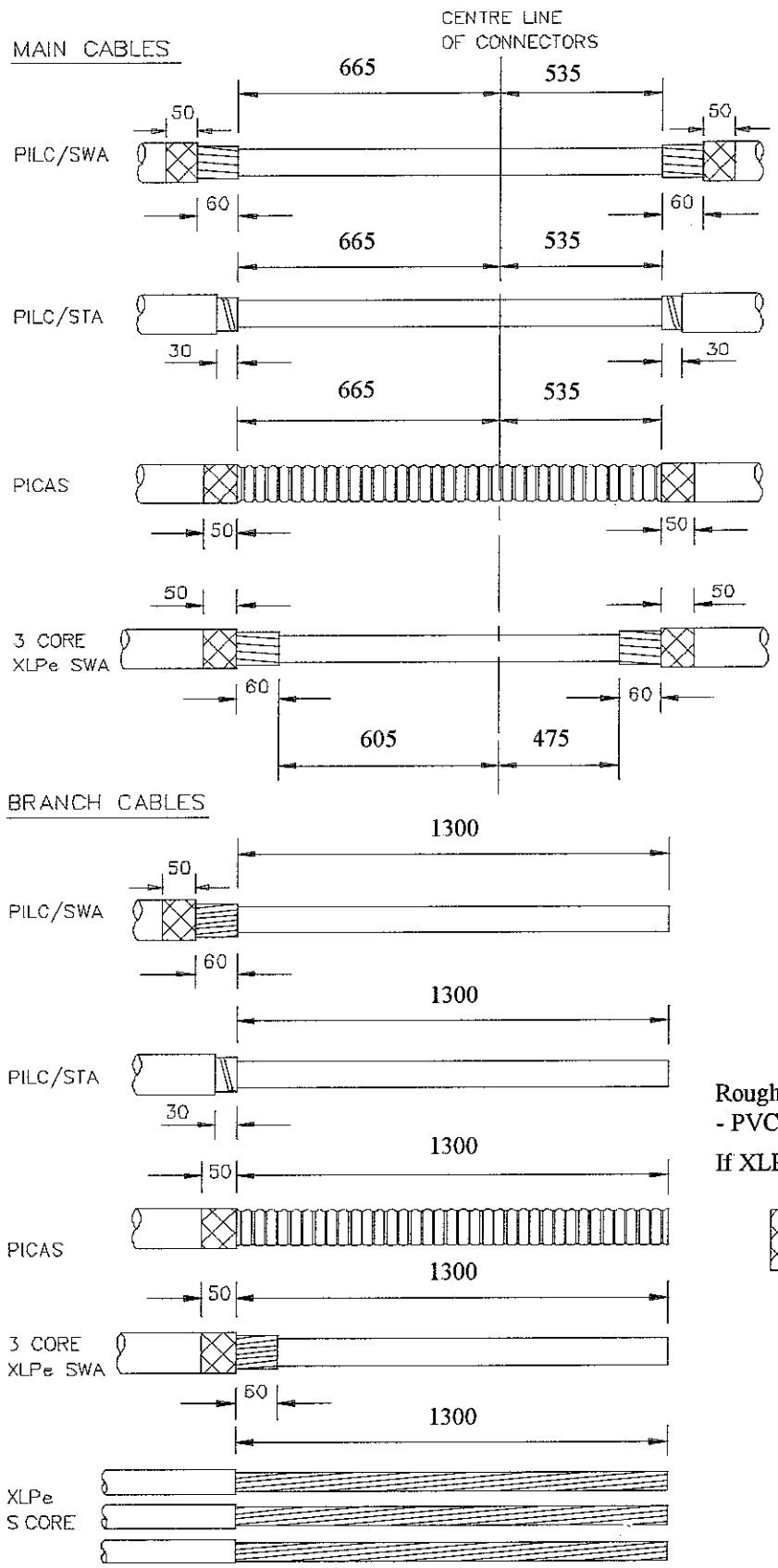
For cables up to and including 185mm2 the joint shell is marked 3789-040 / 041

For cables 240mm2 and 300mm2 the joint shell is marked 3789-046 / 047

Straighten and set all cables to the final jointing position Make a centre mark on both cables (Note this mark will be the centre line of the conductor connectors)

Cut the main cable at this mark

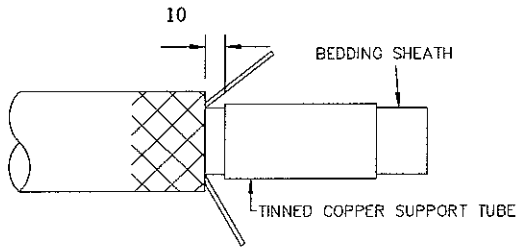
Strip the cables to the dimensions shown below:-



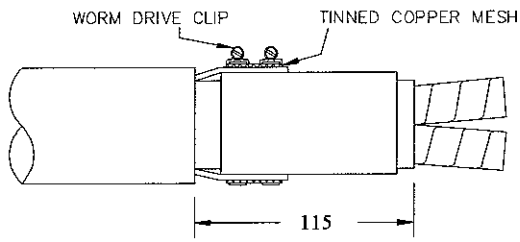
Roughen outer sheath where shown thus - PVC only.

If XLPe 'Flame' for 200mm

XLPe CABLES (3 CORE) - PREPARATION



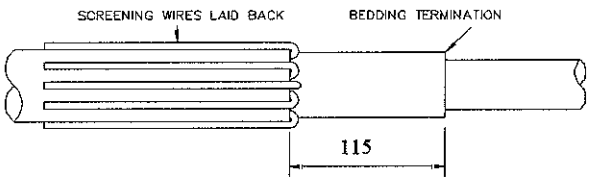
1 Carefully splay the armour/copper screening wires Slide the tinned support tube over the cable and position it 10mm from the outer sheath termination (If necessary the bedding sheath may be built up using PVC tape until the tube is a tight fit).



2. Relay the wires down onto the tube Wrap the tinned copper mesh tape over the wires, install the two worm drive clips and fully tighten.

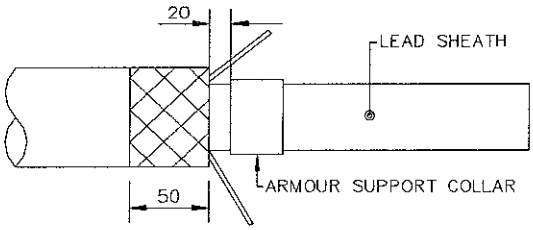
3 Remove the bedding sheath to a point 115mm from the outer sheath termination

XLPe CABLES (SINGLE CORE) - PREPARATION



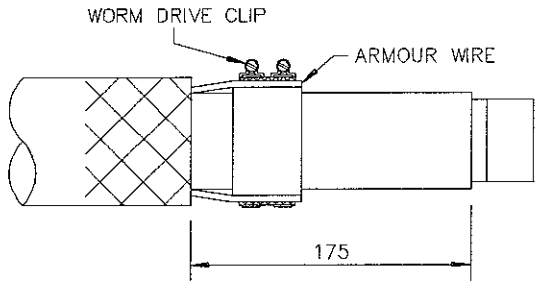
Carefully unwind the copper screening wires and lay them back over the outer sheath Remove any bedding to a point 115mm from the oversheath termination.

P.I.L.C STEEL WIRE ARMOUR CABLES - PREPARATION



1. Carefully splay the armour wires and clean the lead sheath

2 Slide the armour support collar over the lead and position it 20mm from the outer sheath termination. (If necessary the lead sheath may be built up using PVC tape until the collar is a tight fit).

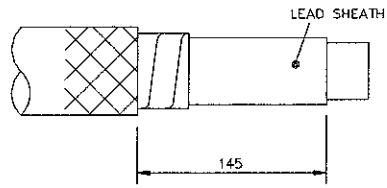


3 Relay the armour wires down onto the collar.

4 Wrap the tinned copper mesh tape over the wires, install the two worm drive clips and fully tighten.

5. Remove the lead sheath to a point 175mm from the outer sheath termination

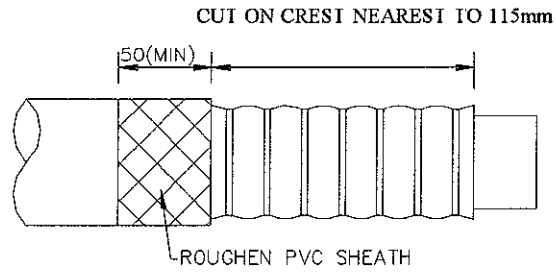
PILC STEEL TAPE ARMOUR CABLES - PREPARATION



Clean the surface of the steel tape and the exposed lead sheath

Remove the lead sheath to a point 145mm from the outer sheath termination

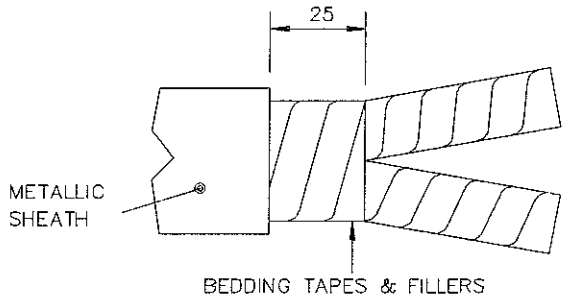
P.I.C.A.S. CABLE - PREPARATION



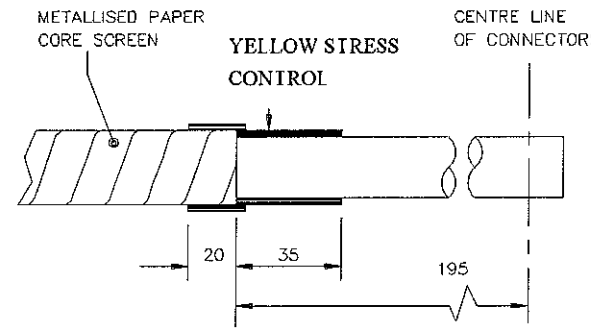
Clean the exposed corrugated aluminium sheath over a distance of approximately 150mm from the outer sheath termination.

Remove the corrugated aluminium sheath to a point 115mm from the outer sheath termination. (Note: The CAS sheath MUST be cut on the crest of a corrugation. Choose the corrugation nearest to the dimension of 115mm TAKE CARE NOT TO DAMAGE THE PAPERS BENEATH THE SHEATH)

PILC/PICAS PREPARING THE CORES - SCREENED CABLES



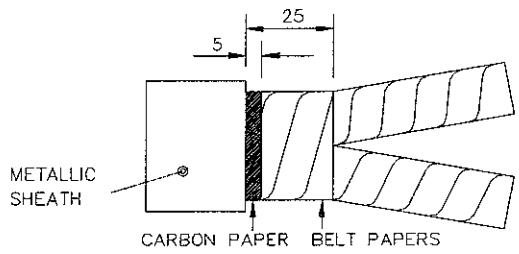
1 Remove the bedding tape and fillers 25mm from the metallic sheath



2 Place a wire binder on each core 195mm from the connector centre line Remove the core screens at the binder by tearing off against the binder DO NOT USE A KNIFE Remove the wire binder

3 Starting 20mm on the screen apply a half lap layer of yellow stress control mastic up the core to a point 35mm beyond the screen termination, then tape back down to the start position. (Apply with slight tension)

PILC/PICAS PREPARING THE CORES - BELTED



1 Remove any excess compound and metallic particles from the surface of the carbon paper screen

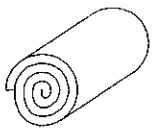
2 Remove the carbon paper screen 5mm from the metallic sheath by tearing off against a wire binder.

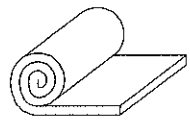
3. Tie a second wire binder around the insulating belt papers 25mm from the metallic sheath termination

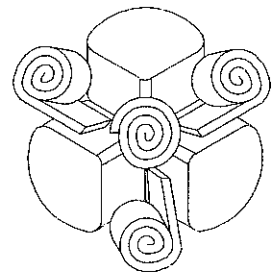
4. Remove the belt papers by tearing off against the binder. Remove the cable wormings. Remove the wire binders

PILC/PICAS CABLES - HEATSHRINK CROTCH SEAL

1 Pass the **CLEAR** heat shrink tubes down over the cores and shrink down starting at the crotch. Allow to cool before sealing the crotch

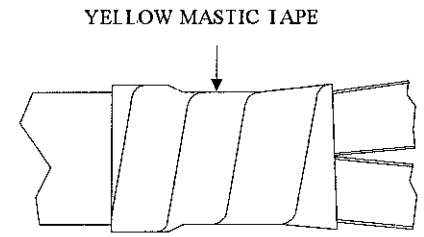

ROD


ROD WITH TAG



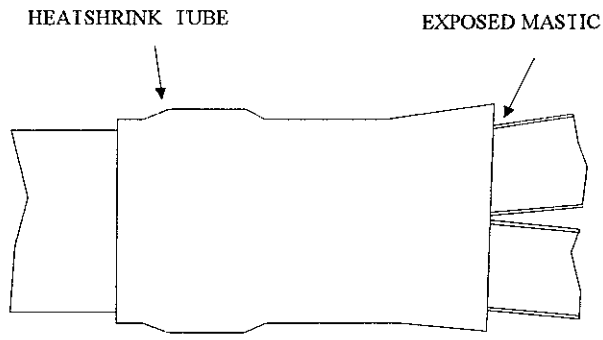
2 Cut a 50mm length of yellow mastic, roll into a rod and place in the cable crotch as close to the centre filler as possible

3. Cut 3 pieces of mastic 55mm long, roll up 2/3 of each length to produce 3 rods with tags. Insert the tags between the cores as close to the belt paper termination as possible.



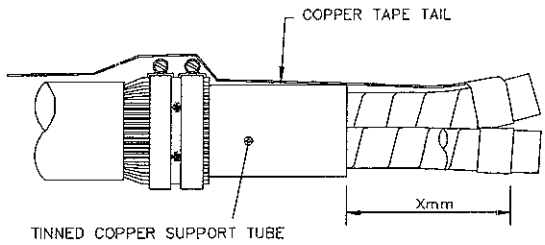
4. Set the cores back into their original lay and tape together. Remove all wire binders.

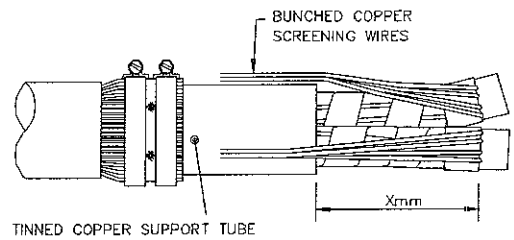
5 Apply the remaining mastic over the belt papers starting 25mm onto the cores and taping back over the metallic sheath at a half lap and with minimal tension



6. Pass the black heat shrink tube down over the mastic and shrink down ensuring that the mastic remains protruding in front of the shrunk down tube

XLPe CABLES - TERMINATION OF COPPER TAPES/WIRES





	X mm
Short side	150
Long side	275

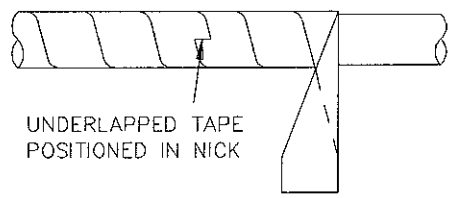
FOR COPPER TAPE SCREEN.

Place a temporary binder, around each core, Xmm from the bedding termination and tighten so as to crease the copper tape.

Remove the temporary binder and unwind the copper tape. DO NOT CUT Wrap around the core to give a square edge when the copper tape starts to spiral towards the cable crotch carefully fold such that the tape lays back along the core Repeat on the other cores.

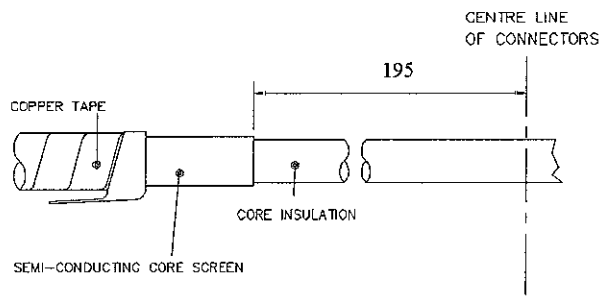
FOR COPPER WIRE SCREEN.

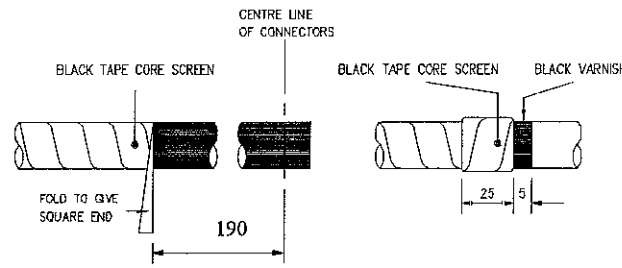
Place a permanent binder around each core at Xmm. Remove the open spiral copper tapes, if present, against the binder. Bend back the copper wires against the binder and bunch them together. Lay the wires back down the cores towards the cable crotch



NOTE: For under lapped copper tape, unwind two or three turns past the screen position, carefully slot the edge as shown above and re-apply overlapped

XLPe CABLES - TERMINATION OF SEMI-CONDUCTING CORE SCREEN



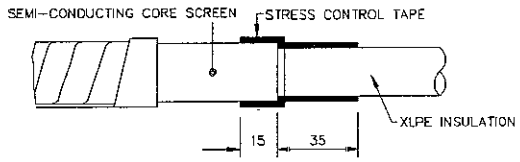


FOR EXTRUDED SCREENS: Remove the semi-conducting core screen in an approved manner to a position 195mm from the connector centre line.

FOR TAPE AND VARNISH SCREENS: Remove the semi-conducting tape to a position 190mm from the connector centre line by folding back the tape and applying back down the core for 25mm Terminate the varnish 5mm infront of the semi-conducting tape.

ALL TRACES OF SEMI-CONDUCTING MATERIALS MUST BE REMOVED FROM THE EXPOSED INSULATION.

XLPe CABLES - APPLYING THE STRESS CONTROL

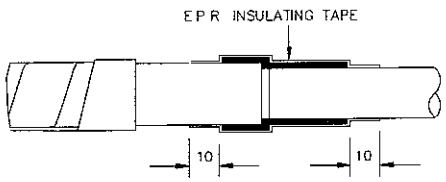


NOTE: Apply the stress control tape with sufficient tension to reduce its width by 10%. Remove the backing as taping proceeds.

1. Starting 15mm onto the core screen apply one half lapped layer of stress control tape extending 35mm onto the cleaned insulation

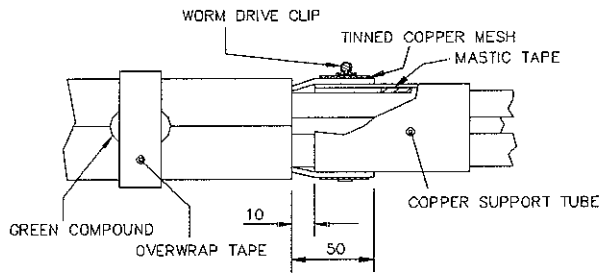
2. Without cutting the tape continue back to the start and terminate.

For tape and varnish screens treat the end of the varnish as the end of the screen.



3. Starting a further 10mm on to the core screen apply 2 x 1/2 lapped layer of E.P.R. tape over the stress control tape extending 10mm onto the cleaned insulation. Remove the backing as taping proceeds

XLPe SINGLE CORE CABLES - FITTING THE COPPER SUPPORT TUBE



1. Pull the three single cores together into a three core formation.

2. Using the bottom half of the joint shell. Mark the position of the entry of the cables.

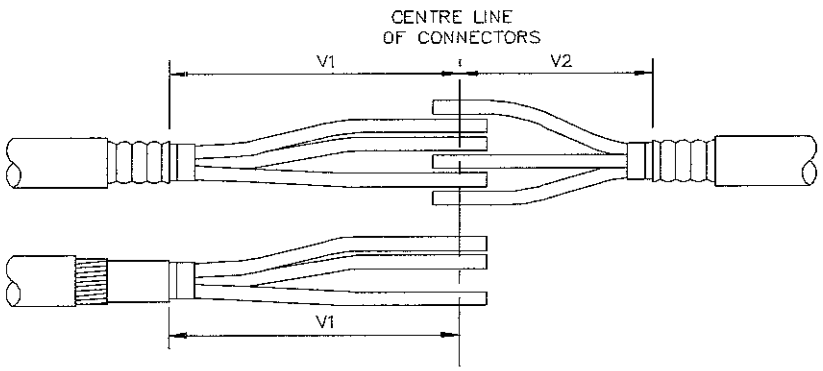
3. Insert green plastic compound between the cables to seal and overrap with tape to circularise the cables at the shell entry position. Tie the cables together.

4 Build up the cable bedding to the inside diameter of the copper tube. Slide the tube over the cores and position 10mm from the oversheath termination.

5 Relay the copper wires onto the support tube and cut to length (50mm approx)

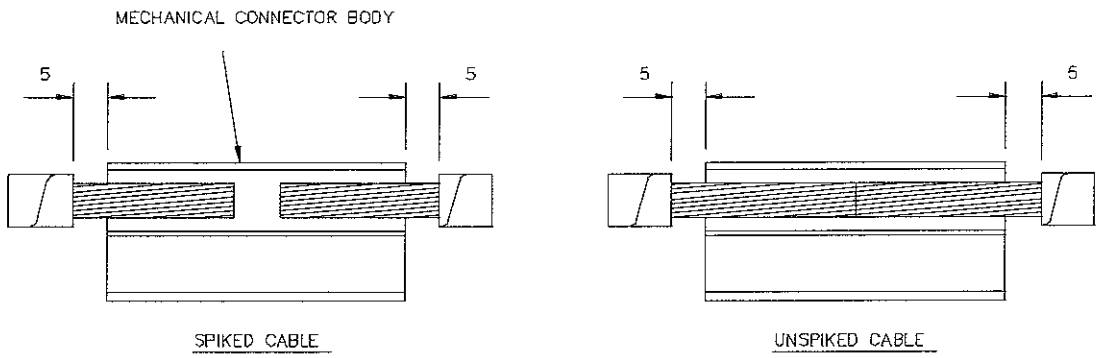
6 Wrap the tinned copper mesh over the wires, install the worm drive clip and fully tighten.

ALL CABLES - PREPARATION FOR FITTING THE CONNECTORS



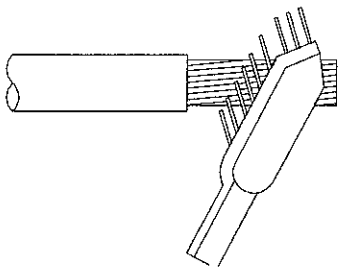
CABLE SIZES	V 1	V 2
UP TO 300mm2	550	420

1. Set the cores in their correct jointing position and re-establish the centre line as shown above. Ensure the cables are straight and level.

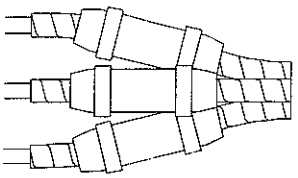


2. Using the connector as a template and making any allowances for cable spiking, strip the insulation from each of the main cores for a distance equal to 1/2 length of connector + 5mm.

3. Offer the branch core up to the connector to occupy the **FULL** length of the connector. Cut to length and strip the insulation for a distance equal to the full length of the connector + 5mm

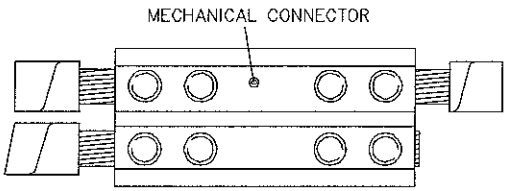


4 Abrade the surface of the conductors



5 Slide a moulded rubber housing over the cable cores at the single end of the joint as shown above

ALL CABLES - FITTING THE CONNECTORS



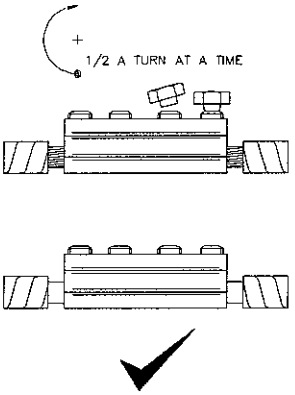
1. Dismantle the connectors

Wrap brass gauze around any **COPPER** conductors

2. Position the conductors in the connector.

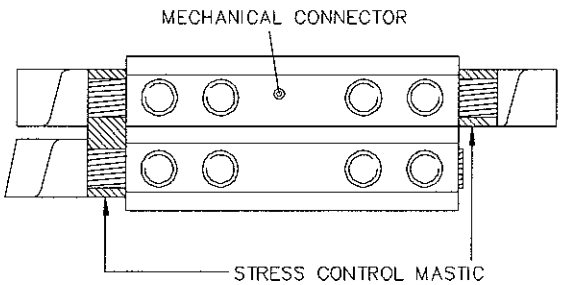
3. Position the pressure plate on top of the conductors.

4 Slide the bridge pieces into the connector body.



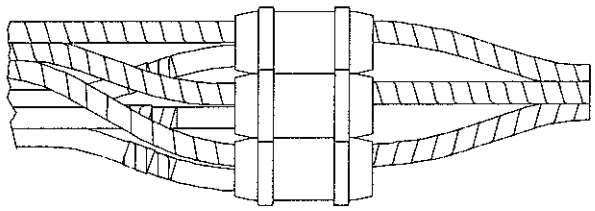
5 Tighten the screws consecutively half a turn at a time until all the heads have sheared

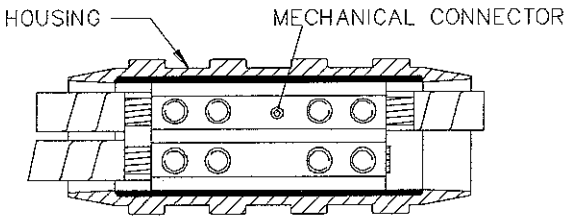
THE CONNECTOR MUST BE HELD FIRMLY IN POSITION USING A SUITABLE TOOL WHILST THE SCREW HEADS ARE BEING SHEARED



6 Infill between the core insulation and connector with yellow stress control mastic

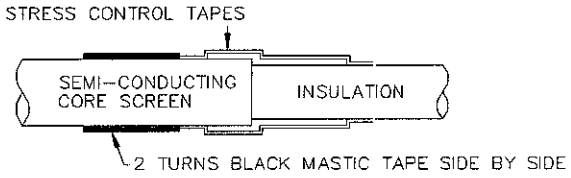
ALL CABLES - FITTING THE RUBBER HOUSINGS



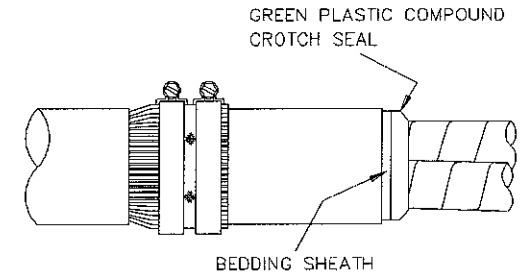


Slide the moulded rubber housings back over the connectors. Ensure that each connector is positioned centrally in the housing.

ALL XLPe CABLES - PREPARATION FOR THE ALUMINIUM SCREEN

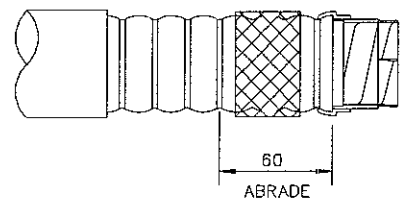


1. Apply two turns of black mastic tape, side by side, over the semi-conducting core screen



2 Make a crotch seal between the cable cores and the bedding sheath using the green plastic compound

PICAS CABLES - PREPARATION FOR THE ALUMINIUM SCREEN



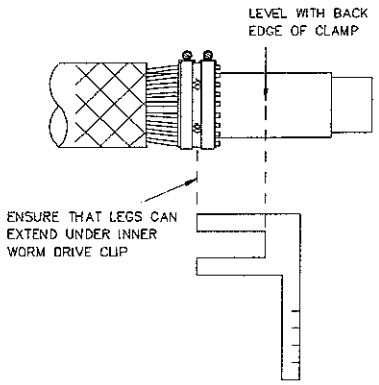
1. Clean the corrugated aluminium sheath and place a mark on the nearest trough 60mm from the aluminium sheath termination.

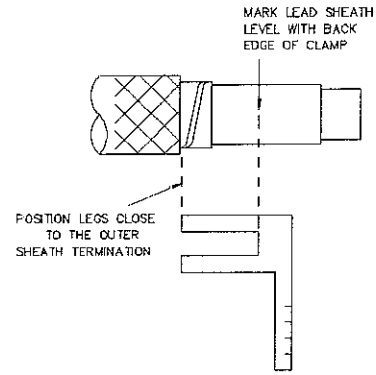
2 Abrade the corrugated sheath over a distance of 60mm

3 Apply a suitable jointing paste over the abraded area

4. Wrap a length of TC mesh over the abraded area ensuring that at least two troughs are covered

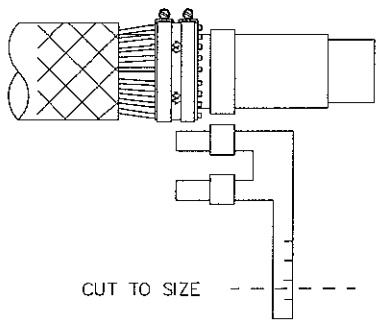
PILC CABLES - PREPARATION FOR THE ALUMINIUM SCREEN





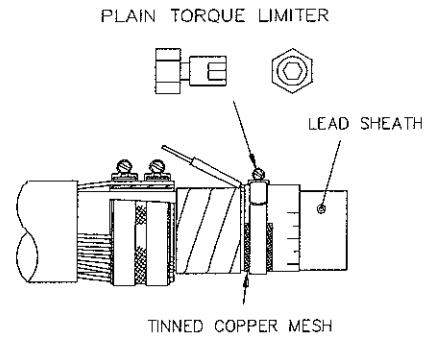
1. Offer the Pi clamp into position with the legs facing the armour termination such that the legs can locate under the inner worm drive clip for a steel wire armoured cable or touching the over sheath for tape armoured cables

2 Mark the lead level with back edge of the clamp



3. Cut the clamp to suit the diameter of the lead sheath

4. Apply black mastic tape over the lead between the mark and the armour termination and on the legs of the Pi clamp for an equal distance

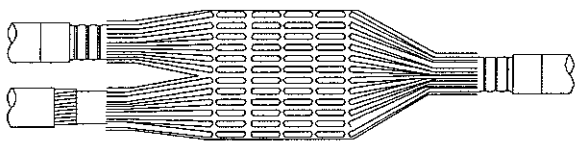


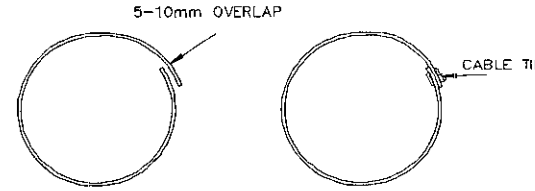
5 Wrap the tinned mesh around the lead sheath level with the mark & forward for 50mm

6 Bend the clamp around the sheath over the mesh

7. Fit the worm drive clip on the clamp as shown and fully tighten using the **PLAIN** torque limiter

ALL CABLES - FITTING THE PERFORATED ALUMINIUM SCREEN





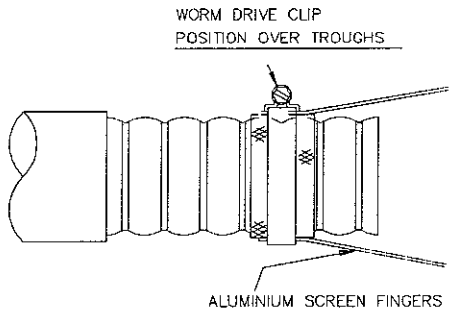
Wrap the perforated screen round the joint. Adjust the screen so that the centre section of the screen is over the housings and the ends of the fingers overlap the metallic sheaths by **EQUAL** amounts

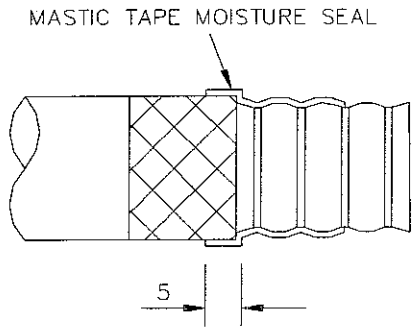
WARNING!! THE CENTRE OF THE SCREEN IS OFFSET AND THEREFORE MUST BE FITTED CORRECT WAY ROUND - LONGER FINGER SECTION TO THE BRANCH END OF THE JOINT

Secure the edges of the screen together using the two small plastic cable ties.

At the branch end separate the fingers into two bunches. Dress down the fingers onto the metallic sheaths/copper tubes.

PICAS CABLES - FITTING THE ALUMINIUM SCREEN





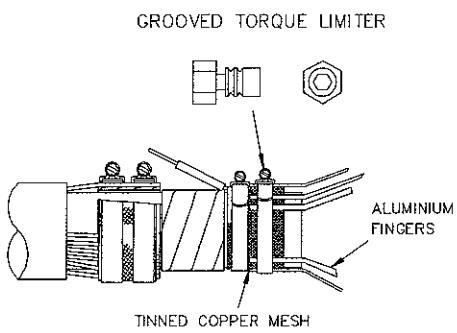
1. Bend the ends of the fingers onto the mesh Secure the fingers using the worm drive clips

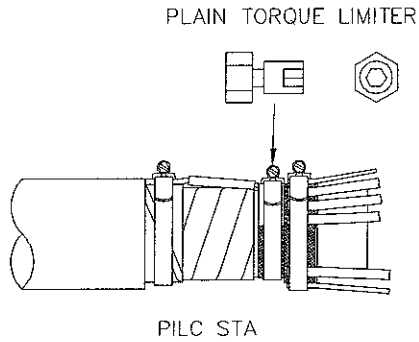
2 Final tightening should be done using the torque limiter provided

NOTE : THE WORM DRIVE CLIPS MUST BE LOCATED OVER THE TROUGHS OF THE ALUMINIUM SHEATH

3 Apply black mastic tape over all exposed aluminium sheath and 5mm onto the outer sheath

PILC CABLES - FITTING THE ALUMINIUM SCREEN





1. Wrap a length of tinned mesh over the Pi clamp adjacent to the previously fitted wormdrive clip.

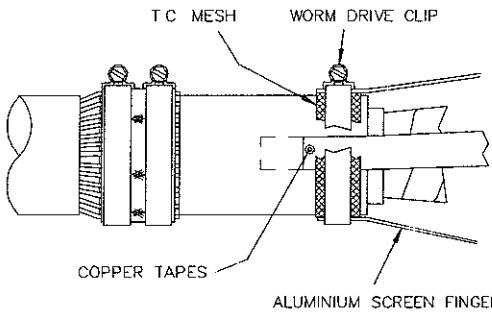
2 Dress the fingers of the aluminium screen down onto the mesh.

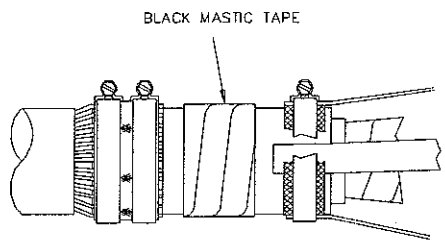
3. Fit the second worm drive clip and fully tighten using the **GROOVED** torque limiter.

4. Using the final PLAIN torque limiter re-tighten the first worm drive clip

5. Clamp the legs of the Pi clamp into the armour wires/tapes

XLPe CABLES - FITTING THE ALUMINIUM SCREEN





1. Lay the copper tapes/wires down onto the copper support tube

2. Wrap a length of T.C. mesh around the end of the tube trapping the copper tapes/wires.

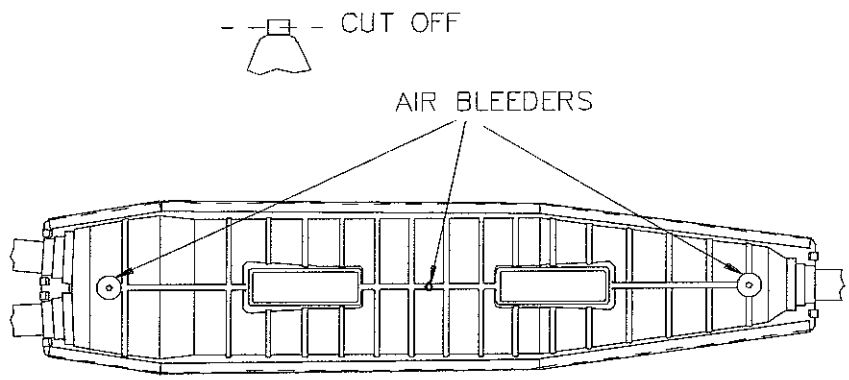
3 Bend the fingers of the aluminium screen down onto the mesh. Secure the fingers using the worm drive clip.

4 Final tightening should be carried out using the torque limiter provided.

5. Remove any surplus tapes/wires

6 Apply black mastic tape over the copper support tube extending up onto the ends of the screen fingers

COMPLETING THE JOINT



1. Apply sufficient foam strip to the sheaths at the plastic shell entry positions to ensure a compound seal Position the two halves of the shell around the joint and secure them by fitting the metal clips adjacent to the cable entries and the edge strips along the flanges. Pierce the air bleeders located at each end on the top half of the joint shell

2. ENSURE THAT THE CABLES AND JOINT SHELL ARE FIRMLY SUPPORTED Mix the compound in accordance with the instructions provided and pour STEADILY into the joint through ONE of the filling holes for as long as possible before switching to the other filling hole. Pour the final bucket through both of the filling holes until the joint is full. Care should be taken to avoid trapping air in the shell at the cable crotch or at the centre of the joint

NOTE: Where more than one pack of compound is required each additional pack must be mixed and poured immediately following the previous pack.

3. When the shell is completely full, fit the plastic lids

BACK FILLING

Care should be taken to ensure that the joint shell is not disturbed, particularly when back filling before the compound has set

Ensure that no stones or other sharp objects are included in the vicinity of the joint. The soil should be packed firmly around the joint before completing back filling.

W T HENLEY LIMITED GRAVESEND KENT DA11 9DA © 1998 3988-412

PARTS LIST

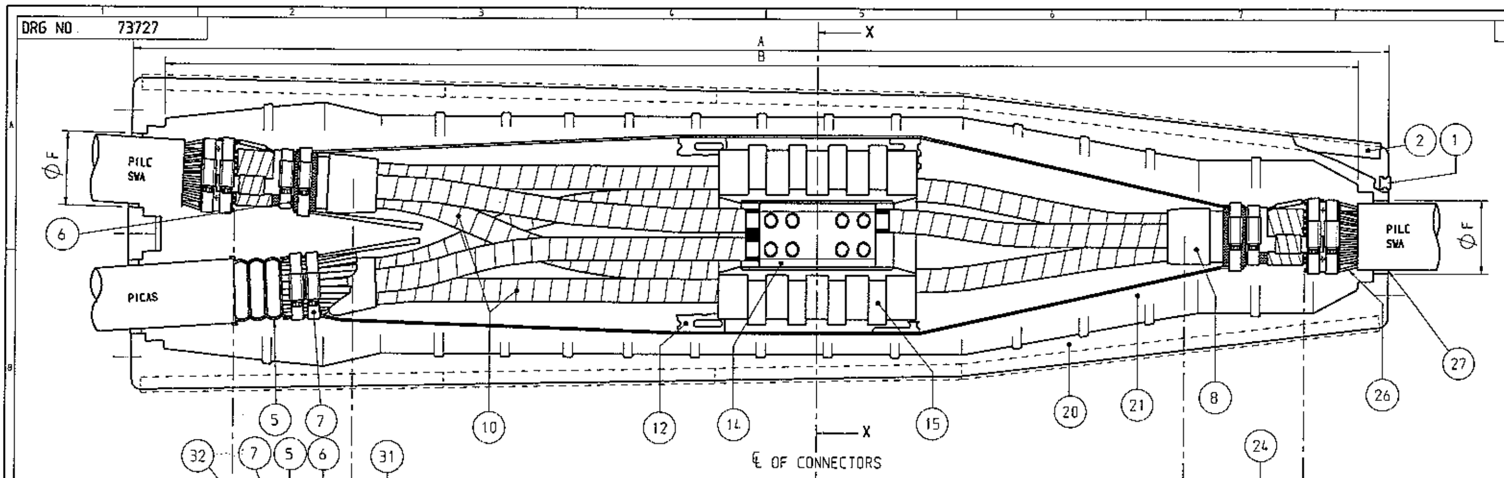
FOR

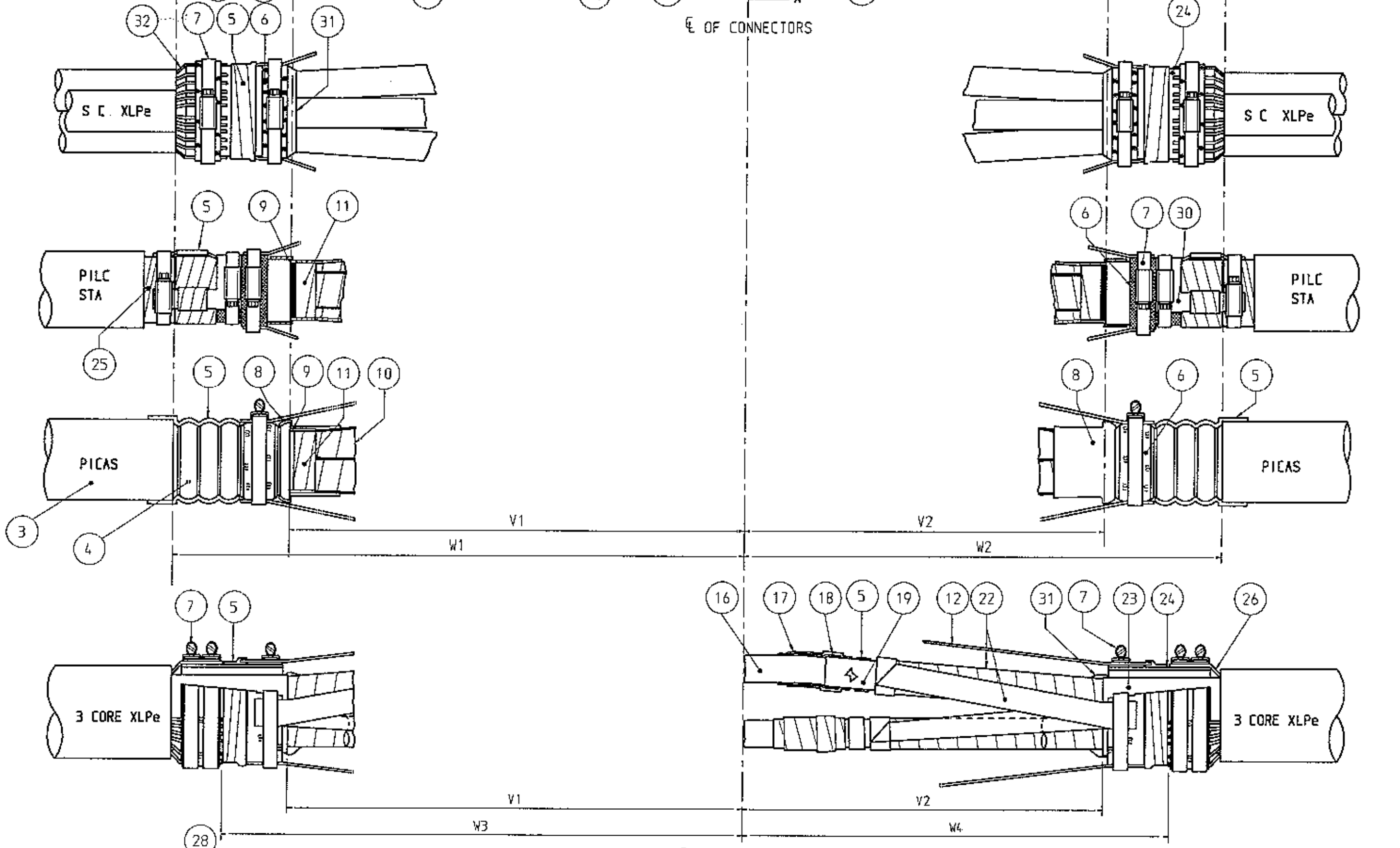
11kV UNIVERSAL PARALLEL BRANCH M I R.P (MOULDED INSULATION, RESIN PROTECTED) JOINT FOR 3-CORE PILC, PICAS (BELTED AND SCREENED) 3 CORE XLPe/SWA AND SINGLE CORE XLPe CABLES UP TO AND INCLUDING 300mm2 USING MECHANICAL CONNECTORS.

ASSOCIATED DRAWING No.73727

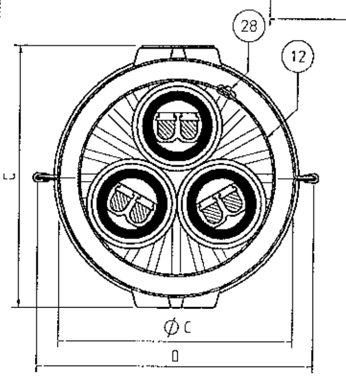
COMPONENT	JOINT SIZE & QUANTITY			
	Up to 185mm2	QTY	185 to 300mm2	QTY
PLASTIC JOINT SHELL SET	3789-040/041	1 SET	3789-046/047	1 SET
EDGE STRIP	365mm	8	365mm	8
JOINT SHELL ACCESSORIES COMPRISING: EDGE CLIPS FOAM STRIP, CABLE TIE	4857-155	1	4857-155	1
EARTH SCREEN	1080mm long	1	1080mm long	1
SCREEN FINGER TERMINATION KIT	4857-224	1	4857-225	1
MECHANICAL CONNECTOR	52483-20	3	52483-21	3
CONVERSION KIT	4857-192	2	4857-193	2
MIRP INSULATION TUBE	3888-074	3	3888-075	3
ARMOUR TERMINATION KIT XLPe	4857-206	3	4857-207	3
ARMOUR TERMINATION KIT PILC	4857-113	3	4857-126	3
PI CLAMP	4857-239	3	4857-240	3
HEATSHRINK CROTCH KIT	4857-275	3	4857-274	3
STRESS CONTROL MASTIC	4857-233	3	4857-233	3
SUPPLEMENTARY STRESS CONTROL MASTIC	52481-05	3	52481-05	3
BLACK MASTIC TAPE	0 5M ROLL	12	0 5M ROLL	12
XLPe TAPE KIT 4857-273 COMPRISING:-				
EPR TAPE 2517	10M ROLL	1	10M ROLL	1
STRESS CONTROL TAPE 2527	5M ROLL	1	5M ROLL	1
CORE PREPARATION KIT	4857-231	1	4857-231	1
GREEN PLASTIC COMPOUND	53653-09	3	53653-09	3
JOINTING INSTRUCTION 1778M	3988-412	1	3988-412	1
MK 6 (3) POLYURETHANE COMPOUND (SUPPLIED SEPARATELY)	7.5 litres	6	7 5 litres	8

DRG NO. 73727

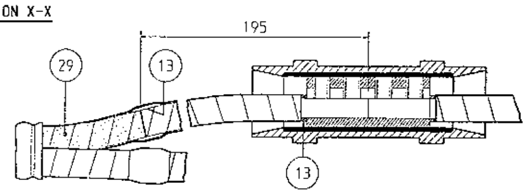




℄ OF CONNECTORS



SECTION X-X



FOR SCREENED PAPER CABLES ONLY

CABLE SIZE	JOINT SHELL REF No	DIMENSIONS												NOMINAL COMP VOL.
		V 1	V 2	W 1	W 2	W 3	W 4	A	B	ØC	D	E	ENTRY DIA'S F	
UP TO & INCL 185mm^2	3789-040/041	530	420	665	535	605	475	1460	1350	205	241	230	55/70/85/100	45 LITRES
240/300mm2	3789-046/047	530	420	665	535	605	475	1460	1350	225	270	250	70/80/100	60 LITRES

1. EDGE CLIPS
2. EDGE STRIP
3. OUTER SHEATH
4. CORRUGATED ALUMINIUM SHEATH
5. BLACK MASTIC TAPE MOISTURE BARRIER
6. T C MESH
7. WORM DRIVE CLIP
8. HEAT SHRINK & YELLOW MASTIC TAPE CROTCH SEAL
9. CARBON PAPER
10. PAPER INSULATED CORE COVERED WITH HEATSHRINK TUBING
11. BELT PAPERS
12. PERFORATED ALUMINIUM SCREEN
13. YELLOW STRESS CONTROL MASTIC
14. MECHANICAL TYPE CONNECTOR
15. MOULDED RUBBER HOUSING
16. POLYMERIC INSULATION
17. E P R SELF-AMALGAMATING INSULATING TAPE
18. SELF-AMALGAMATING STRESS CONTROL TAPE
19. SEMI-CONDUCTING CORE SCREEN
20. PLASTIC JOINT SHELL
21. POLYURETHANE COMPOUND Mk 6(3)
22. COPPER SCREENING TAPES
23. BEDDING SHEATH
24. COPPER SUPPORT TUBE
25. STEEL TAPE ARMOURS
26. ARMOUR WIRES
27. FOAM STRIP
28. PLASTIC CABLE TIE
29. METALLISED PAPER
30. PT CLAMP
31. GREEN COMPOUND
32. COPPER SCREEN WIRES

NOTES

1) FOR FURTHER DETAILS REFER TO JOINTING INSTRUCTION JI77780
2) OUTER CABLE SHEATHS TO BE ROUGHENED FOR A DISTANCE OF 50mm
3) CABLES SHOWN 3C XLPE/SWA; 3x S/C XLPE; PILC STA; PILC SWA; PICAS

DRAWN AMR
DATE ISSUED 15/10/98

THIRD ANGLE PROJECTION
DO NOT SCALE — DIMENSIONS IN MILLIMETRES

W T HENLEY LIMITED

11 kV UNIVERSAL PARALLEL BRANCH MIRP JOINT FOR UP TO 300mm2 CABLES

DRG NO. 73727