

GRIDKEY SMART JOINT TO WAVEFORM CABLE (3 CORE AND 4 CORE)

1. PRELIMINARY OPERATIONS

The following points should be ensured before work commences:

- (i) The appropriate jointing procedures and associated drawings together with mains records are on-site.
- (ii) All materials, tools and equipment required for the work are on-site and in sound condition.
- (iii) All safety clothing is on-site and in sound condition.
- (iv) Any fittings are drilled to the correct size for the conductor to be jointed.
- (v) Where relevant all safety documents have been issued.

2. Any water should be bailed or pumped out of the joint hole and any remaining sludge should be dug out, leaving a firm platform from which to work. If water persists to enter the joint hole a sump hole must be dug in the lowest corner, which will enable the water to be bailed out at intervals to ensure that at no point does the rubber mat become submerged.

3. At least one side of the joint hole must be free from spoil to ensure a safe entry and exit, this area will also be used for a platform for the jointers tools and equipment.

4. Joint holes exceeding 1.2mts in depth must not be entered unless adequate shuttering is in place. Should the joint hole be less than 1.2mts in depth but conditions exist that could make collapse of a joint hole more likely, and death could occur as a result, then the joint hole must be shuttered.

Examples of conditions that might make collapse of part of a joint hole more likely are:

- (i) The hole is to be dug against a wall.
- (ii) The nature of the ground is unstable e.g. the ground is wet.
- (iii) An unstable mound of spoil builds up as digging proceeds.

It is essential that all spoil is placed at least one metre from the joint hole to prevent accidental collapse of the joint hole sides.

5. If there is a possibility of rain during jointing a tent must be erected, one end of which must be open to ensure good entry and exit and good ventilation for fumes. The joint position must be kept dry.

6. Examine each cable carefully prior to cleaning to check for physical damage.

7. Clean the cable thoroughly over the covered length that is to be worked on or otherwise come into contact with.

8. Re-examine each cable and report any physical damage.

9. The following is related to live jointing:

- (i) The approved rubber mat must be placed in the bottom of the joint hole, but it may be necessary for it to be placed in after the cables have been set.
- (ii) Exposed steel pipes must be covered with approved rubber shrouding and exposed plastic pipes must be covered with SILTEMP if there is a possibility it may be subjected to heat.

The supervisor must ensure:

- (a) All documents and drawings are the current issue.
- (b) Any joint hole which is pre-excavated complies with 2 and 4 above.
- (c) Any special tools required for the work are issued to the joiner

2. SETTING UP AND CUT CABLES

Note: Approved protective equipment must be worn (See Section 2)

1. The cables should be in a position such that they can be adequately supported without placing undue strain at any point.
2. Sufficient room all round including underneath of the joint must be available to carry out the jointing procedure safely and effectively.
3. All cable 'ends' should have sufficient overlays to enable setting to be carried out easily.
4. Cable should not exceed their maximum bending radius.(See Module 27)
5. Mark the position of the datum line. (Position of where measurement is taken on each cable).
6. Cut the proved Dead cable 'ends' to length ensuring there is enough cable to overlap the datum line by at least the distance shown on the drawing.
7. Ensure that the overlaps of the waveform branch, cable is sufficient to enable neutral earth wires to be terminated at their relevant position.
8. For a Live cable, the procedure for opening a through cable must be followed. Once opened, live working procedures and safety precautions, detailed in Electricity North West's Safety Rules section 8 must be adhered to.

3. PREPARATION AND REMOVAL OF PVC OVERSHEATH

Note: Approved protective equipment must be worn (See Section 2)

As detailed in Electricity North West's operation manual ECP 606 Section B8, if an insulated sheath cable is faulty/suspected of being faulty then the neutral earth conductor should be treated as live.

Removal of PVC Oversheath from Waveform Cable

1. Select a position as near to the centre of the joint as possible and mark the oversheath 100mm apart.
2. Using a string, make two circumferential cuts, through the oversheath at its removal position.
3. Make a longitudinal cut in the oversheath between the two circumferential cuts with a pairing knife, and carefully remove. This will then expose the waved formation of the neutral/earth wires. The centre of the joint can now be established.
4. The oversheath can now be marked and two circumferential cuts made in accordance with the appropriate drawing.
5. Abrade the PVC oversheath at the cable entry positions in accordance with **Module 31**.
6. The remaining PVC sheath between the two circumferential cuts can now be removed.

4. PREPARE WAVEFORM EARTH/NEUTRAL EARTH WIRES

All Neutral / Earth wires for a 3 core cable must be enclosed by the CT for correct operation. Prepare each wire to be bunched as if it was one conductor. See drawing.

5. REMOVAL OF ANTI-CORROSIVE BEDDING AND PREPARE CORES

Note: Approved protective equipment must be worn (See Section 2)

- 1.1. Apply two layers of Blackley tape to form a crutch binder over the anti-corrosive bedding as per drawing.
- 1.2. Make the circumferential cut by cutting the bedding with a core peg or HEPNYF.
- 1.3. Pare away the anti-corrosive bedding using a core peg.
- 1.4. Carry out the above procedure on the other side of the joint.
- 1.5. Remove the core protection tape taking care to cut away from the cable when trimming off at Blackley tape binder.
- 1.6. Open out cores in accordance with **Module 12**.
- 1.7. Degrease the XLPE insulation to remove anti-corrosive bedding stuck to core insulation.

Note: On all cable cut ends, i.e. straight joints, terminations etc., carry out the above procedure but commence cutting from the end of the cable.

6. TEST FOR NEUTRAL USING NON-INTRUSIVE TESTER -

7. INSTALLATION OF CT`S

The Leads are to be connected into the Control Panel First. Mark up Phase Colours.

- 1/ Mark each lead for Phase identification.
- 2/ Use draw wire to pull the CT leads through the duct.
- 3/ Connect the CT plug ends into the Gridkey Control Panel.
- 4/ Fit CT`s around each phase conductor and Neutral (Neutral Earth). Note that the CT`s are to be positioned correctly. The arrow on the CT indicates "source" & "load". A click indicates the secured catch has been made. The Neutral CT is to be made off first, then each Phase conductor.

8. APPLY CABLE MOISTURE SEALS

Note: Approved protective equipment must be worn (See Section 2)

The application of the moisture seals must be diligently and effectively carried out, as the adherence of the resin depends on this.

Applying the moisture seal for PVC oversheath cables

- 2.1 At the position where abrading is to be carried out, clean the PVC oversheath with degreasant and an approved wiper as detailed in **Module 32**.
- 2.2 Abrade the PVC oversheath at the point where the cables enter the shell and extending inwards to the PVC oversheath termination. This distance should be a minimum of 40mm. The 60s grit abrasive cloth in strip form should be used in a manner to ensure that the smooth polished finish is removed. Any embossing in the vicinity of the area of the abrading should be removed using a half round rasp or bastard file.
- 2.3 Degrease in accordance with **Module 32**.

DEGREASING APPLICATION

Note: Approved protective equipment must be worn (See Section 2)

1. The degreasing application must be carried out prior to fitting the outer shell and after abrading all outer sheaths and the bending and setting of the aluminium sheath or copper wires.
2. The degreasing solvent is supplied in pre-soaked wipes contained in a bucket.
3. Firstly thoroughly degrease all metal sheaths, plumbs and neutral/earth bond connections. The solvent impregnated wipe must be used firmly either longitudinally or circumferentially dependent on the joint configuration and must be replaced as and when it becomes contaminated.
4. Again using an impregnated pad, circumferential degrease all previously abraded cable outer sheaths. Care should be taken not to get the solvent on patch insulation or impregnated paper insulation.

5. The bucket lid should be kept closed at all times and the wipes withdrawn through the centre lid cap to prevent evaporation.

9. APPLY MOISTURE SEAL TO CT CABLES.

1/ Using 5313 Mastic, apply around each of the CT leads to form a 50mm long sleeve which is 34mm in diameter.

2/ Insert into the end of the duct. Apply more mastic necessary for a tight fit.

10. PREPARE AND FIT JOINT SHELL

Notes: Approved protective equipment must be worn (See Section 2)

Make sure the moisture seals have been abraded and degreased before fitting shell.

In resin filled joints the joint shell serves only the purpose of containing the resin mix whilst it is in its liquid form. It is essential therefore that the box is carefully fitted and adequately sealed and supported to prevent leakage.

1. Clean and dry the inside of the shell.
2. Temporary position shell to check that there is sufficient clearance around the joint to effect complete resin coverage. A minimum clearance of 10mm between the shell and any part of the joint is required.
3. Remove backing from adhesive strips and apply around joint shell by sticking these along the mating flanges of one half of the shell. (This may already have been carried out by the supplier.)
4. Build up cable diameters at the point of entry into the shell with Blackley tape, to coincide with the diameter of the joint shell entry.
 - 4.1 When more than one service cable enters through one hole, commence sealing with two turns of Blackley tape around each cable before building up the overall diameter.
 - 4.2 Bottle-end joints with services only - bind service cables and earth wire with Blackley tape and build up to diameter to coincide with the diameter of the joint shell entry.
 - 4.3 Certain joint shells will require trimming for cable entry.
5. Fit the two halves of the shell together and secure in place by sliding the sealing clips over the mating flanges, checking that there is a **MINIMUM CLEARANCE OF 10mm** between the shell and any internal part of the joint. If necessary adjust the set of the neutral/earth wires, close up slightly the phase cores, etc. and re check.
6. Support the shell in position by packing soil underneath it. This is especially important on mains joints which contain large amounts of resin.
7. Apply sealing compound around the cable entries. (PO N° 2 Compound)

11. GRIDKEY CABINET

As per procedure P3-501.

12 CARRY OUT COMMISSIONING REGISTRATION AND CHECKS

As per procedure P3 – 501.

13. MIXING AND POURING RESIN

Thoroughly mix the resin components.

1.1.4 Fully mix the resin by kneading the pack with both hands, paying particular attention to the corners of the pack until fully mixed.

1.1.5 When fully mixed, cut one corner off the pack and pour the resin into the joint shell.

1.1.6 Return the empty foil pack to skip at the depot for disposal. **DO NOT** leave the empty foil pack in the joint hole.

Normal resin mixing safety procedures must be employed.

See Module 34

THE HYGIENE REGIME MUST BE STRICTLY FOLLOWED.

8.2 Pour the resin into the joint shell as soon as mixing is completed.

8.3 Check for leaks. Apply more sealing compound where necessary.

8.4 Fit the filling hole cover.

