

Electricity

Specification

400 J3

Low Voltage Cable Joints:
Plastic Shells for resin encapsulation

Issue 3

July 2026

Amendment summary

Issue No/Date	Description
3 March 2023	The new template for Engineering Specification Documents has been applied. All information has been reviewed and updated where appropriate. Prepared by: Philip Howell Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Asset & Technology Director
4 July 2026	Document updated to new SP format Preference for vertically split mains cable joint shells added Prepared by: Philip Howell Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chairperson

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2. Scope

This Electricity Specification (ES) document covers the supply of suitable plastic joint shells to be used as enclosures during encapsulation with a hard setting, cold pour resin compound in low voltage joints installed on the electricity distribution network (Network) owned by Electricity North West Limited, as Distribution Licensee, herein referred to as SP Electricity North West.

The specification covers a range of moulded plastic shells supplied in two shaped matched halves which are designed for use on the range of low voltage (LV) cable joints used on the SP Electricity North West network.

The shells will provide a suitably sized cavity when positioned around the joint to ensure the cold pour resin compound can fill the shell and provide sufficient mechanical and moisture protection for the joint when it cures.

To cover the wide range of cable sizes and joint arrangements, several different sized shells are required. This specification provides mandatory requirements relating to the materials, rigidity and thickness, and also guidance on the dimensions for different types of shells to cover the various joint configurations.

The Tenderer shall offer a range of shells which will cover the full range of cable size and joint combinations, but preference will be given to solutions which use a minimum number of unique shells without compromising on excessive resin volumes.

The shells are supplied as “kits” which include all necessary components to enable the shell to be fitted around the cable joint. Connectors and the Encapsulating Resins which are used in the LV joints together with these shells are covered in the following separate ES documents:

- ES400 J4 – Mechanical Connectors for LV Joints
- ES400 R10 –Resin Compound for encapsulation of cable joints up to 33kV

3. Definitions

ABS	Acrylonitrile Butadiene Styrene.
Approval	Sanction by the SP Electricity North West Circuits Policy Manager that specified criteria have been satisfied
Contract	The agreement between SP Electricity North West and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.
Contractor	The person or person's firm or company, including personal representatives, successors and permitted assigns, who's Tender has been accepted by SP Electricity North West.
CNE	Concentric Neutral Earth
HIPS	High Impact Polystyrene
PET-G	Polyester Terephthalate Glycol
PILCSTA/ PILCDSTA/PILC SWA	Paper Insulated, lead covered, steel tape armoured Paper Insulated, lead covered, double steel tape armoured Paper Insulated, lead covered, steel wire armoured
Specification	The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.
Supplier	Any person or person's firm or company who supplies goods to SP Electricity North West or to its Contractor.
SCNE	Split (or Separate) Concentric Neutral Earth
Tender	An offer in writing to execute work or supply goods at a fixed price.
Tenderer	The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by SP Electricity North West to submit a Tender.

4. General Requirements for Approvals and Testing

4.1. Product not to be Changed

Compliance with this clause shall be in accordance with ES001.

4.2. SP Electricity North West Limited Technical Approval

Compliance with this clause shall be in accordance with ES001.

4.3. Quality Assurance

Compliance with this clause shall be in accordance with ES001.

4.4. Formulation

Compliance with this clause shall be in accordance with ES001.

4.5. Identification Markings

Compliance with this clause shall be in accordance with ES001.

4.6. Minimum Life Expectancy

The products detailed within this specification is 60 years.

4.7. Product Conformity

Compliance with this clause shall be in accordance with ES001.

4.8. Confirmation of Conformance

The Tenderer shall complete the conformance declaration sheets in [Appendix B](#).

Failure to complete these declaration sheets may result in an unacceptable bid.

5. Requirements for Type and Routine Testing

5.1. Requirement for Type Tests at Suppliers Premises

Compliance with this clause shall be in accordance with ES001.

5.2. Requirement for Routine Tests at the Supplier's Premises

Compliance with this clause shall be in accordance with ES001.

6. Technical Requirements

6.1. General Requirements

The joint shells shall be suitable for use with the cables listed in [Section 6.2](#) of this specification.

The joint shells shall consist of two matched halves and can be either vertically or horizontally split, however, it is the preference of SP Electricity North West for shells for mains straight, service off a mains and mains branch joint configurations to be vertical split with any branched cable entering at the top.

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For horizontal split shells, the upper shell shall incorporate one or more openings of a sufficient size to allow easy access during filling.

For Vertically split shells the openings shall be incorporated into the top edges of both halves. These openings shall be provided with suitably sized lids made of same materials as the shells.

The joint shells shall be supplied with suitable accessories to enable the two halves of the shell to be securely held together so that a leak-proof joint is ensured when filled with the Approved cold pour resin compound.

The shells and fixing accessories shall be suitable to enable the approved resin compound to cure and set hard after which point the completed joint will be backfilled using materials as per ES400 R5.

The joint shells shall be manufactured from a plastic material such as Virgin HIPS, Virgin ABS, PETG or other similar material which is compatible with all types of encapsulating resins, cable materials and jointing sundries as listed in [Clause 6.3](#).

The shells shall be black in colour, or alternatively preference will be given to shells from clear materials if there is no significant cost premium.

The joint shells may be manufactured from either sheet material vacuum forming methods or by an injection moulding process. The finished joint shells shall be suitably contoured and free from sharp edges which may give rise to undue thinning of the material. The minimum thickness at any point on the shell shall be as per [Clause 6.4](#).

The shell material shall be mechanically strong enough to support the total weight of the cold pour encapsulation resin compound, whilst still in its liquid state and sufficiently resilient to withstand the maximum curing temperature of the material or exposure to direct sunlight without any deformation. Joint shells shall pass the rigidity test in [Clause 6.5](#) and the cold weather stress cracking test in [Clause 6.6](#).

Joint shells shall also have the manufacturer's reference number stamped on one or both of the two halves.

All joint shells shall be designed for range taking applications and shall be provided with stepped cable entry positions to minimise cable movement and strengthen entry positions. The cable entry orifices shall be of sufficient length to allow a seal to be applied between the outer sheath of the cable and the shell to prevent leakage of the cold pour encapsulation resin compound. The stepped entry should be adequate for trimming and removal of steps by use of a junior hacksaw or other suitable tool without cracking or splitting around the entry positions.

The shell design will provide for a minimum radial thickness of 10 mm of cured resin between all parts of the joint and the inner surface of the shell after the shell is filled with the cold pour encapsulation resin.

It is anticipated a number of shell designs will be required to cover the entire scope of joints and [Clause 6.7](#) details the outline size and range of joints. However, the Tenderer shall offer a range of shells which will fully meet the criteria but may either reduce or increase the number of unique shell kits whilst not incurring excessive resin volumes.

Preference will be given to a proposed joint shell range which optimises the number of kits required and the resin volumes of resin per joint type.

6.2. Cable range covered

The shells shall be suitable for use with the following types of cables and their combinations:

- Paper-insulated, lead sheathed cables to BS 6480 with Steel Tape Armour, two and four cores with cross sections between 0.007 in² and 0.5 in². This may also include “legacy twin lead” and concentric lead sheathed types.
- Paper-insulated, aluminium sheathed Consac cables to ENATS 09-8 with three cores of conductor cross sections between 95mm² and 300mm².
- PVC or XLPE insulated CNE cables to BS7870-3.1, single or three cores with cross sections between 4mm² and 35mm².
- PVC or XLPE insulated SCNE cables to BS7870-3.2, single or three core with cross sections between 4mm² and 35mm².
- PVC or XLPE insulated steel wire armoured cables to BS5467, two or three core with cross sections between 4mm² and 300mm².
- Waveform polymeric insulated cables to BS7870-3.4 with concentric copper waveform wires, 3 or 4 core with cross sections between 70mm² and 300mm².

6.3. Compatibility

All components in the shell kits shall not be adversely affected when they come into contact with materials used in the construction of any Cable or preparation for jointing.

All components specified shall be fully compatible with the following:

- Approved Methacrylate resins used for cable joint encapsulation
- Approved Polyurethane resins (filled or unfilled) used for cable joint encapsulation
- Approved Mastics and Tapes
- Approved Installation greases
- Approved Pre-soaked PF Solvent Degreasing Wipes

6.4. Material Thickness

The joint shells supplied shall be manufactured using material of sufficient wall thickness and formed using adequate reinforcing ribs to withstand the encapsulating weight of compound without significant deformation.

The minimum thickness of the shell material at any point shall be as follows;

Empty Shell Volume in litres	Vacuum formed shells	Injection moulded shells
Up to 10 litres	2mm	1.5mm
Greater than 10 litres	3mm	1.5mm

6.5. Rigidity Test

All joint shells with empty volumes greater than 10 litres shall pass the Rigidity Test as described below:

The shell shall be fitted around a cable within the usable diameter range of the shell and sealed using the standard clips or sliders and foam strips which are supplied with the kit. Additional sealing putty and tape can be applied around the cable exit points to replicate normal procedures.

The cable shall be supported at either side of the shell such that the bottom of the shell is raised at a minimum height of 300mm to the ground. The shell is then filled with the Approved Encapsulating Resin until completely filled and then left to cure.

The shell shall not display any evidence of distortion or resin leakage from around the flanges before the resin is fully cured. Any initial leakage around cable ports is acceptable as long as it is sealed with tape or putty immediately during the test.

The test shall be carried out at ambient temperature.

The Tenderer shall provide a test report detailing the result of the Rigidity Test for each shell offered, including details of any independent witnesses, at the time of Tender.

6.6. Environmental Stress Cracking (Cold Weather Test)

The joint shells shall pass the Cold Weather Test as described below:

All tendered plastic joint shells shall be tested to prove they are compatible with the Company's current Approved encapsulation resin during cold weather and will not split in these conditions due to Environmental Stress Cracking. The Tendered shells and Approved resin should be put into an environmental chamber and left for minimum 12 hours to chill to -20°C.

Once the materials have fully acclimatised to -20°C, the resin shall be mixed, and the shells filled while still inside the environmental chamber. During the mixing, pouring and waiting stage the temperature shall be kept between -5° and -10°C.

The shells shall be left for 2 hours after filling and then inspected. No evidence of any cracking or other damage to the shells shall be observed.

The Tenderer shall provide a test report detailing the result of the Cold Weather Test for each shell offered, including details of any independent witnesses, at the time of Tender.

6.7. Outline Dimensions for Joint Range

[Appendix A](#) gives details of the outline dimensions for a range of 12 shells as follows;

- Service Cable Bottle End
- Small 1-phase Service Cable Straight Joint
- Large 1-phase service cable straight joint
- 3-phase service cable straight joint/1ph service cable branch joint
- 3-phase service cable branch joint
- Mains Cable Bottle End
- Small Mains straight joint
- Medium Mains Cable straight joint / Service of a Mains joint
- Large Mains Cable straight joint / Service of a Mains Cable Joint
- Small Mains Branch / Loop Joint
- Medium Mains Branch / Loop Joint
- Large Mains Branch / Loop Joint

The Tenderer shall use the information given in [Appendix A](#) on the 12 joint types to propose a range of joint shells which will cover the cable types, sizes and configurations for all the joints stated. This may be less, or more than 12 different shells and the Tenderer shall fully detail the intended application for each shell offered.

7. Packaging

Joint shells shall be supplied in an individual kit form i.e. including any required accessories to hold the shell halves together and seal all cable entries and filling openings.

Shell Kits including accessories shall be individually packed in suitable robust materials in order to prevent damage in normal handling.

Preference will be given to environmentally sustainable solutions for packaging.

Each Shell kit shall be labelled to indicate the empty volume of resin required to fill the shell.

8. Information to be supplied with Tender

The Tenderer shall provide the following:

- Drawings complete with dimensions for every joint shell offered.
- Details of test results as detailed in [Section 6.5](#) and [Section 6.6](#).
- Details of the joint/cable configurations, which can be accommodated in each joint shell, offered
- Details of the packaging for each type of joint shell kit.
- Details of any special tools or equipment necessary to attach both sides of the shell together.

9. Samples

The manufacturer, if requested, shall submit samples of all offered products in support of their Tender response.

In order to ensure products are fit for all applications, further samples may be required at the request of the SP Electricity North West Circuits Policy Manager. The quantity of samples required, and delivery location shall be agreed at the time of Tender product Approval.

10. Technical Support

During the Contract period questions will arise regarding unusual or non-standard applications where advice will be required on matters such as jointing non-standard cable types or arrangements etc. The successful Tenderer(s) will be expected to support SP Electricity North West with technical advice on these matters.

In addition, the successful Tenderer(s) will be expected to assist and provide suitable documentation in order to produce any required drawings or other documents which will be included in SP Electricity North West's LV Code of Practice for LV Cable Jointing CP411-1.

11. Kitting

The schedule of items required is detailed in [Appendix B](#) of this document. In general shells are supplied as kits with two halves and all associated fixings, lids and sealing materials.

12. Packaging

Components shall be capable of being stored without deterioration within the temperature range -20°C to +40°C when protected from direct sunlight.

Packaging shall be designed to protect against mechanical damage and the ingress of dirt and moisture.

Packaging shall be clearly labelled with the SP Electricity North West Commodity Code (CC) number in their immediate packaging in a prominent position together with the manufacturer's or Supplier's name, product reference and product batch identification number to allow traceability.

Components with a shelf life shall have the final date of use prominently and indelibly displayed on the packaging.

Preference will be given to environmentally sustainable packaging solutions.

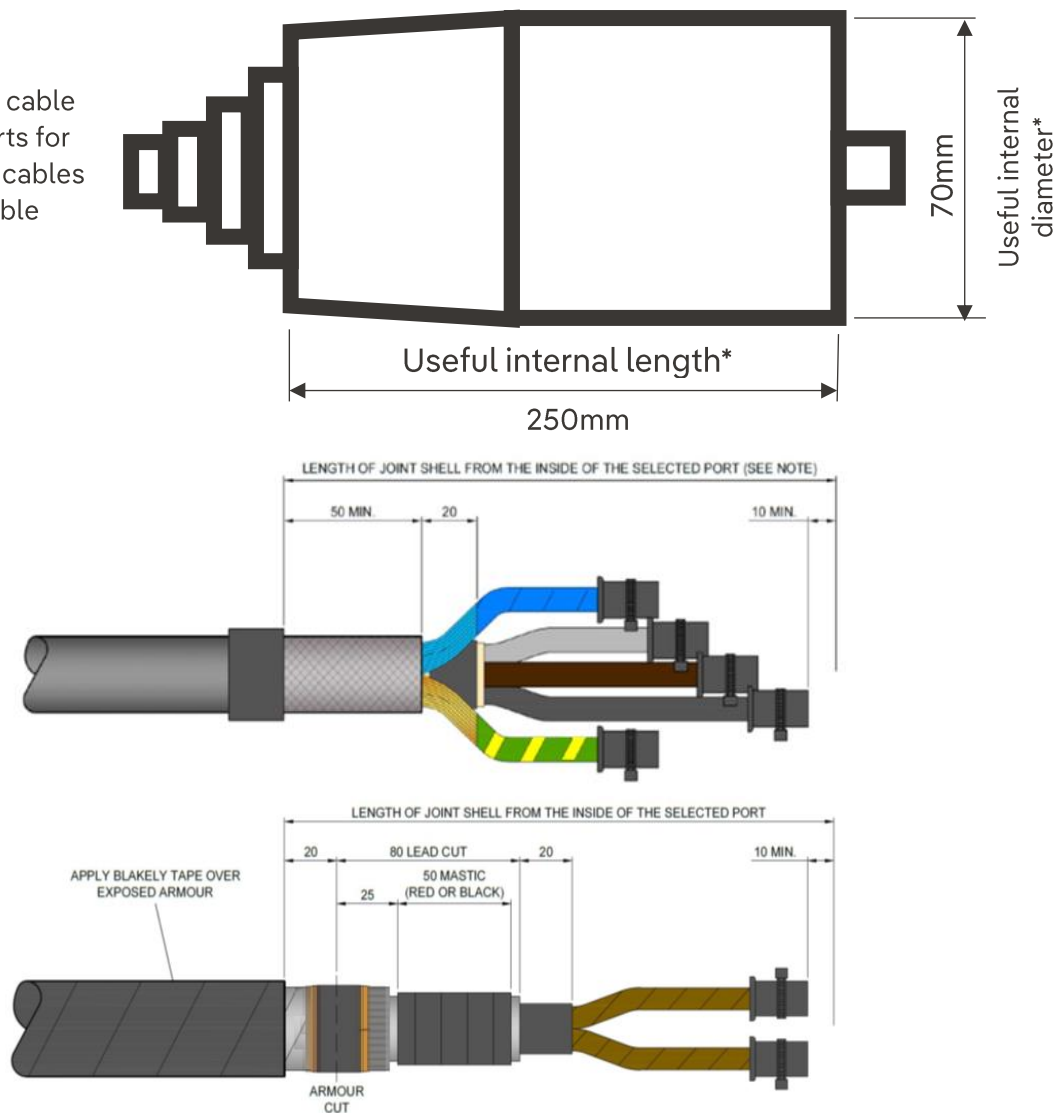
13. Documents Referenced

All references to documents listed below are to the latest versions, unless stated otherwise.

Health and Safety at Work Act	
Control of Substances Hazardous to Health Regulations	
Manual Handling Operations Regulations	
BS EN ISO 9000	Quality management systems.
BS EN ISO 14001	Environmental Management Systems.
BS 5593	Impregnated Paper Insulated Cables with Aluminium Sheath / Neutral Conductor and Three Shaped Solid Aluminium Phase Conductors (CONSAC), 600/1000 V, for Electricity Supply.
BS 6480	Specification for impregnated paper-insulated lead or lead alloy sheathed electric cables of rated voltages up to and including 33000 V.
BS 7870	LV and MV polymeric insulated cables for use by distribution and generation
CP311	SP Electricity North West Code of Practice for Approval Policy and Process
CP411-1	SP Electricity North West Code of Practice for LV Jointing
CP410	SP Electricity North West Code of Practice for General Installation Practice for Cables up to 132kV
ES400 J4	SP Electricity North West Specification for LV Joint Connectors
ES400 R5	SP Electricity North West Specification for restoration materials
ES400 R10	SP Electricity North West Specification for Resin Compounds for joint encapsulation up to 33kV

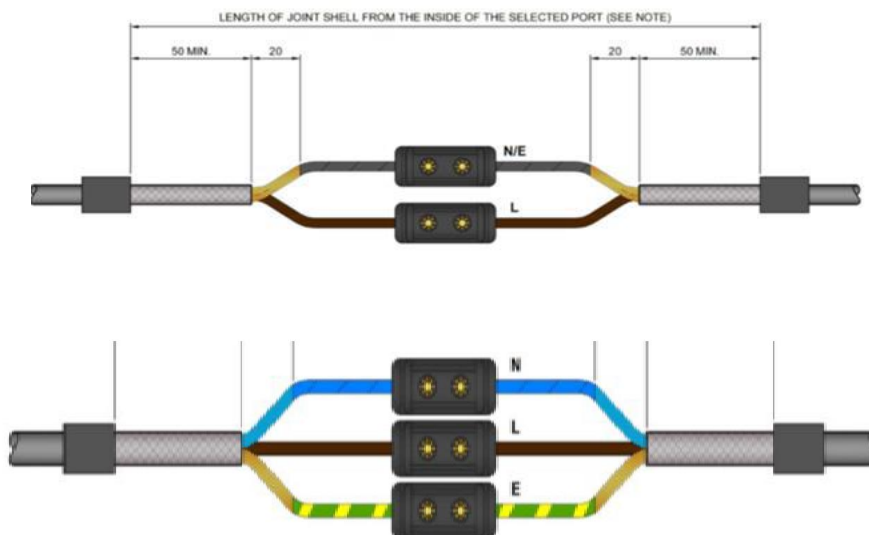
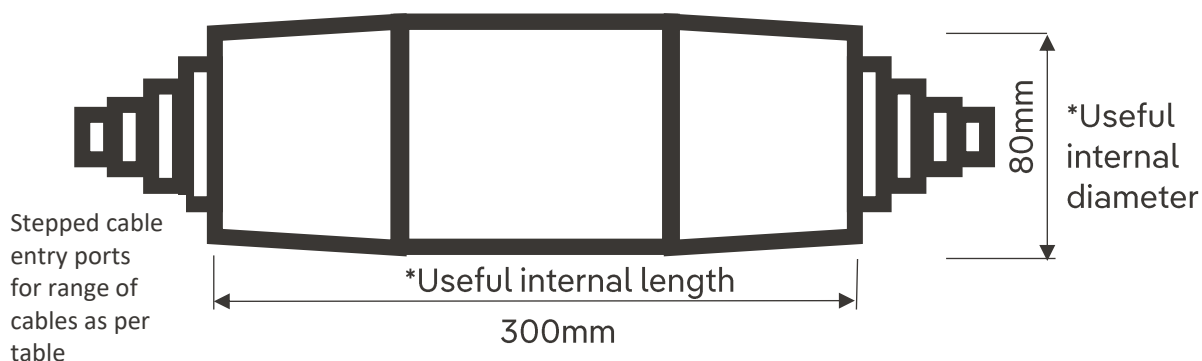
Appendix A – Shell drawings

Stepped cable entry ports for range of cables as per table below



Cable	Size Range	Joint Type	Strip length
CNE Plastic	4 – 35mm ²	Pot End	As shown
SCNE Plastic	4 – 35mm ²	Pot End	As shown
PILC 2c	0.007"-0.06"	Pot End	As shown
PILC 4c	0.007"-0.06"	Pot End	As shown

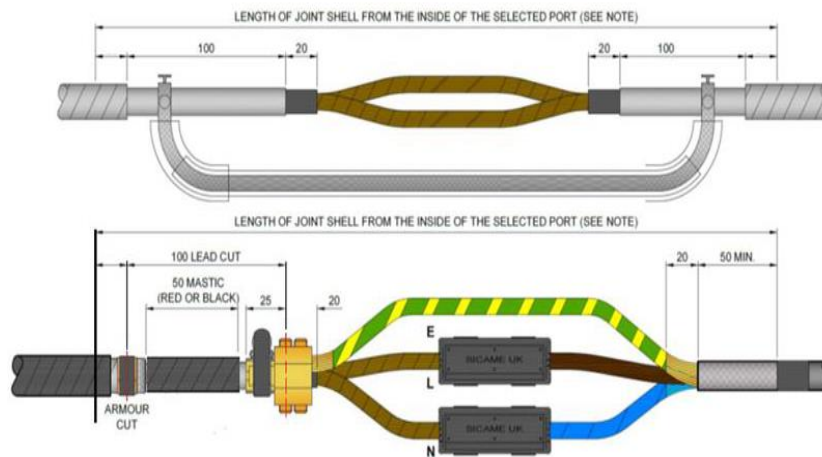
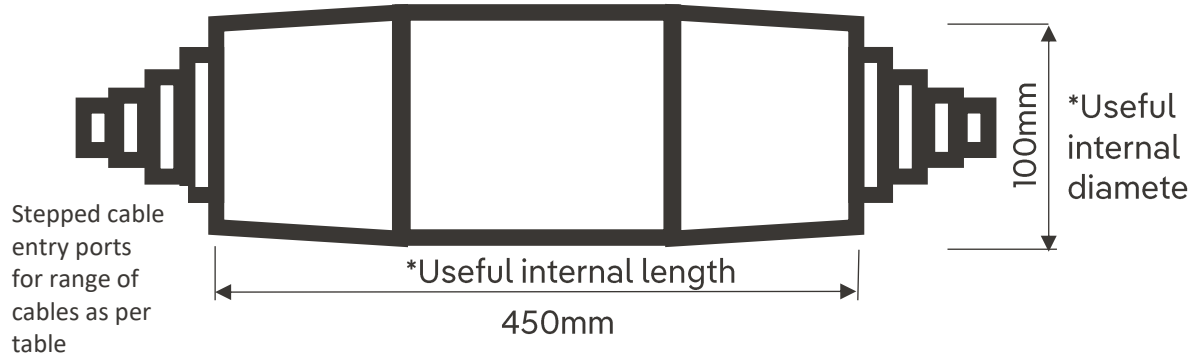
*Dimensions are "guide" only –
Tenderer to propose shells
which can accommodate the
range of cable sizes shown



Cable	Size Range	Joint Type	Strip length
CNE Plastic	4 – 35mm ²	1ph Straight	200mm
SCNE Plastic	4 – 35mm ²	1ph Straight	200mm

*Dimensions are “guide” only. Tenderer to propose shells which can accommodate the range of cable sizes shown

Small 1ph Service Straight –Shell

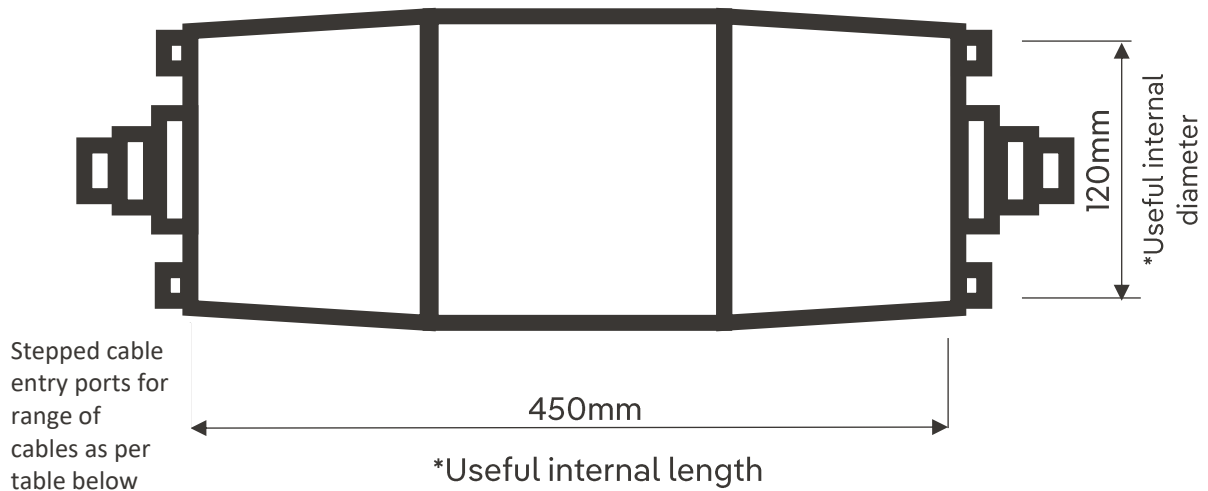


Cable	Size Range	Joint Type	Strip length
CNE Plastic	16 – 35mm ²	1ph Straight	200-300mm
SCNE Plastic	16 – 35mm ²	1ph Straight	200-300mm
PILC 2core	0.007 – 0.0.06"	1ph Transition Straight	400mm

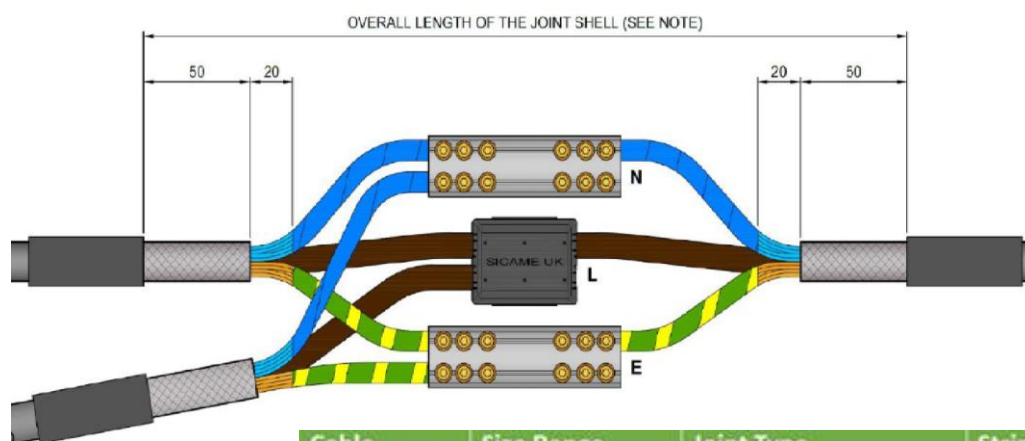
*Dimensions are "guide" only.

Tenderer to propose shells which can accommodate the range of cable sizes shown

Large 1ph Service Straight –Shell



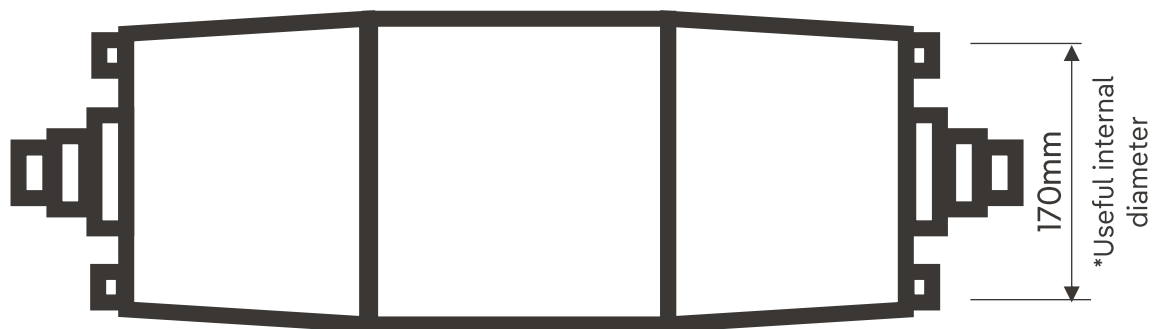
Shell to have one branch cable entry port located at each corner



*Dimensions are "guide" only. Tenderer to propose shells which can accommodate the range of cable sizes shown

Cable	Size Range	Joint Type	Strip length
CNE Plastic	16 – 35mm ²	1ph Branch	300mm
SCNE Plastic	16 – 35mm ²	1ph Branch	300mm
PILC 2core	0.007 – 0.06"	1ph Transition Branch	300mm
CNE Plastic	25 – 35mm ²	3ph Straight	300mm
SCNE Plastic	25 – 35mm ²	3ph Straight	300mm
PILC 4 core	0.007 – 0.06"	3ph Transition Straight	300mm

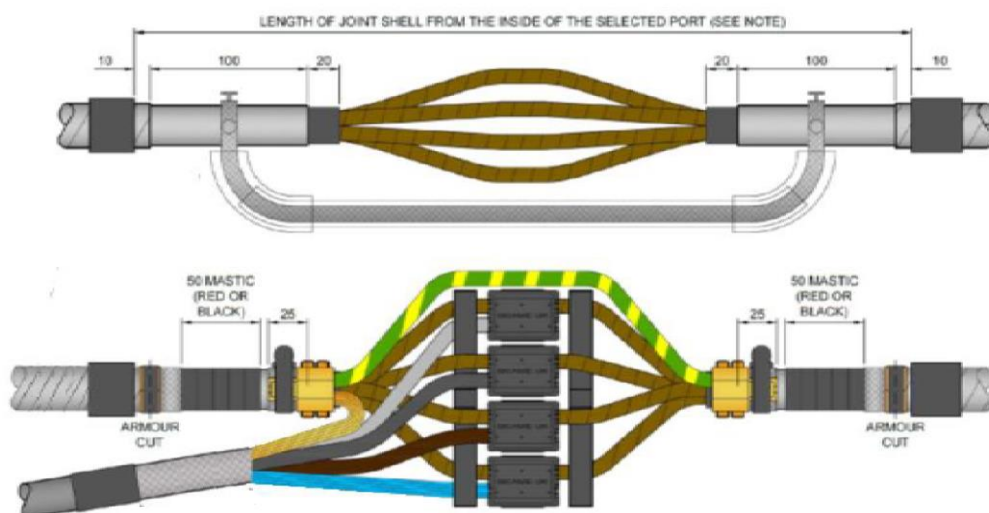
1ph Branch/3ph straight Shell



Stepped cable entry ports for range of cables as per table below

*Useful internal length

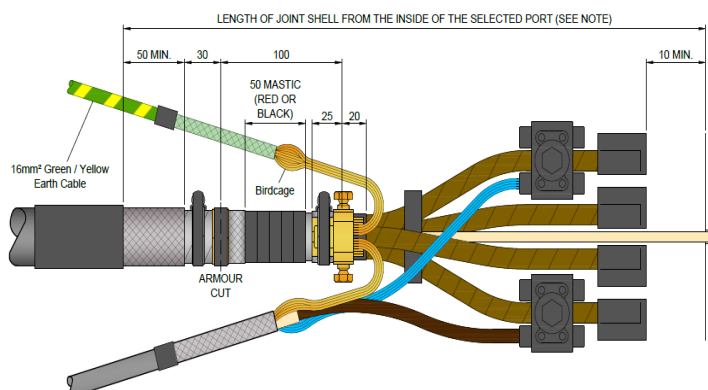
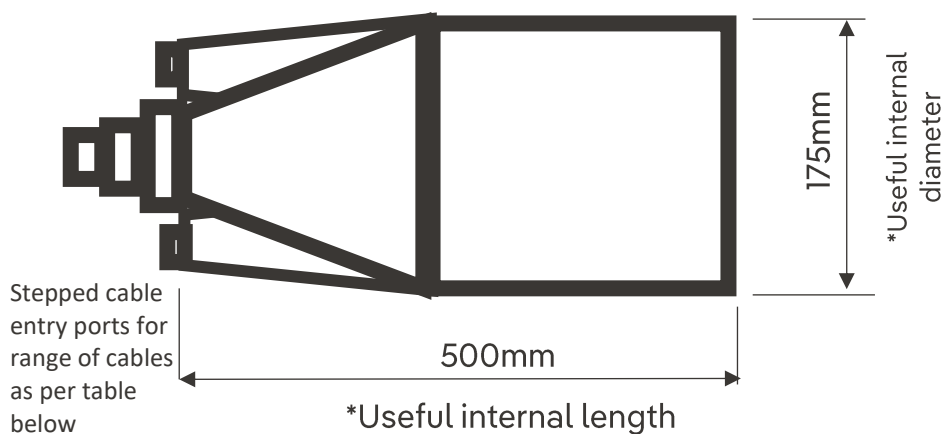
Shell to have one branch cable entry port located at each corner.



Cable	Size Range	Joint Type	Strip length
Waveform	95-300mm ²	Bottle End	-
Consac	95-300mm ²	Bottle End	-
PILC	0.06 – 0.5"	Bottle End	-

*Dimensions are "guide" only.
Tenderer to propose shells which can accommodate the range of cable sizes shown

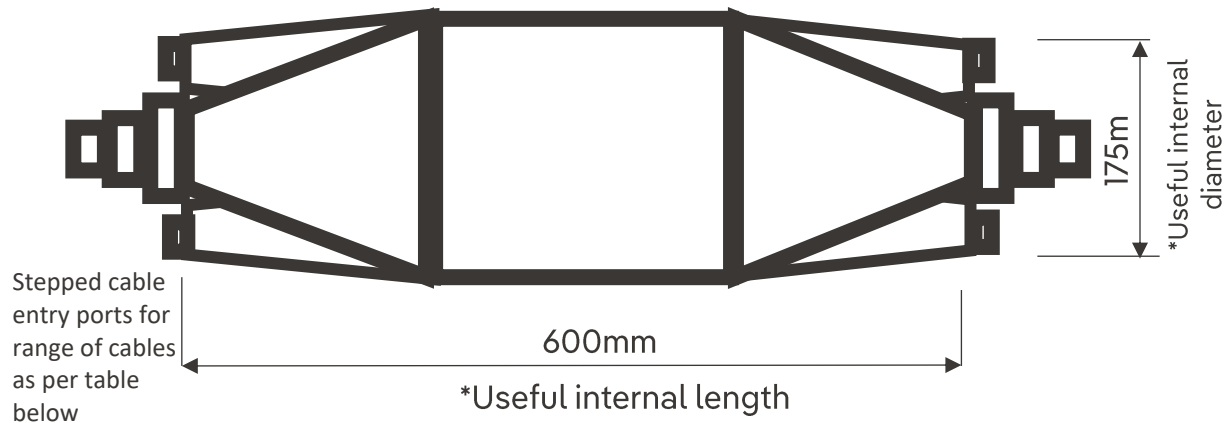
3ph Service Branch Shell Kit Dimensions



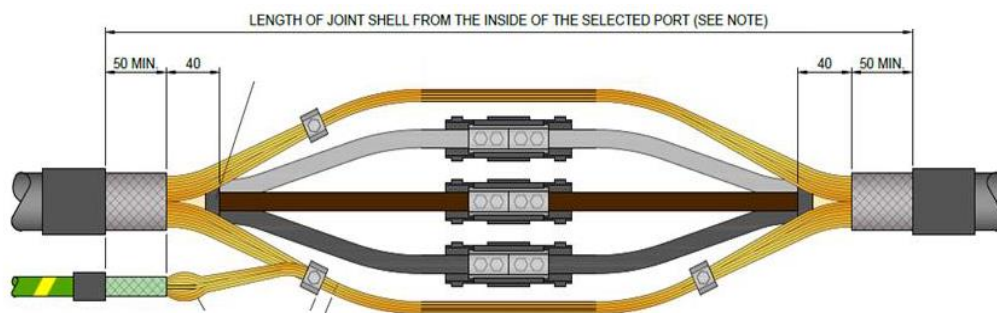
Cable	Size Range	Joint Type	Strip length
CNE Plastic	16 – 35mm²	3ph Branch	400mm
SCNE Plastic	16 – 35mm²	3ph Branch	400mm
PILC 4core	0.0225 – 0.06"	3ph Transition Branch	400mm

*Dimensions are "guide" only. Tenderer to propose shells which can accommodate the range of cable sizes shown

Mains Bottle End Shell Dimensions



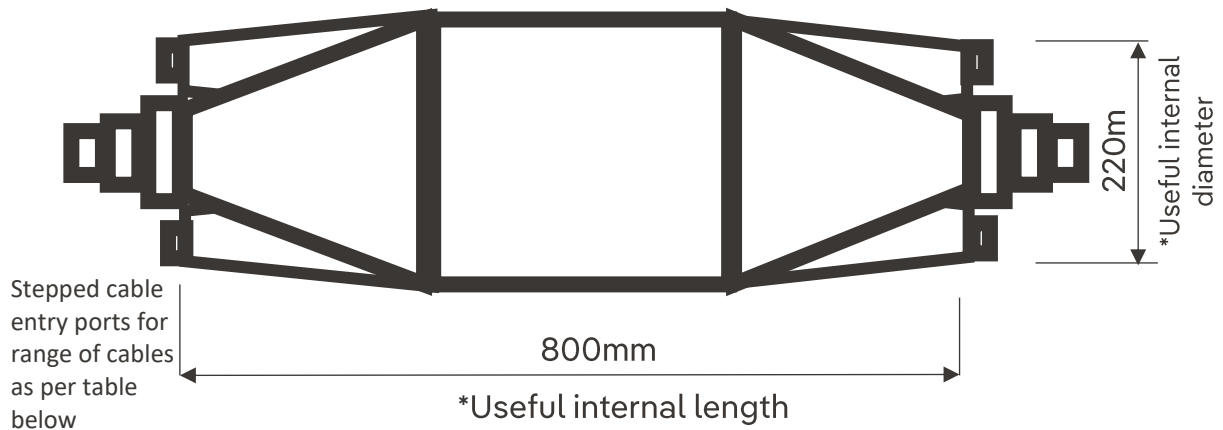
Shell to have one branch cable entry port located at each corner.



*Dimensions are "guide" only. Tenderer to propose shells which can accommodate the range of cable sizes shown.

Cable	Size Range	Joint Type	Strip length
Waveform	95mm ²	Straight	500mm
Waveform	95mm ²	Service from Mains	500mm

Small Mains Straight Shell Dimensions



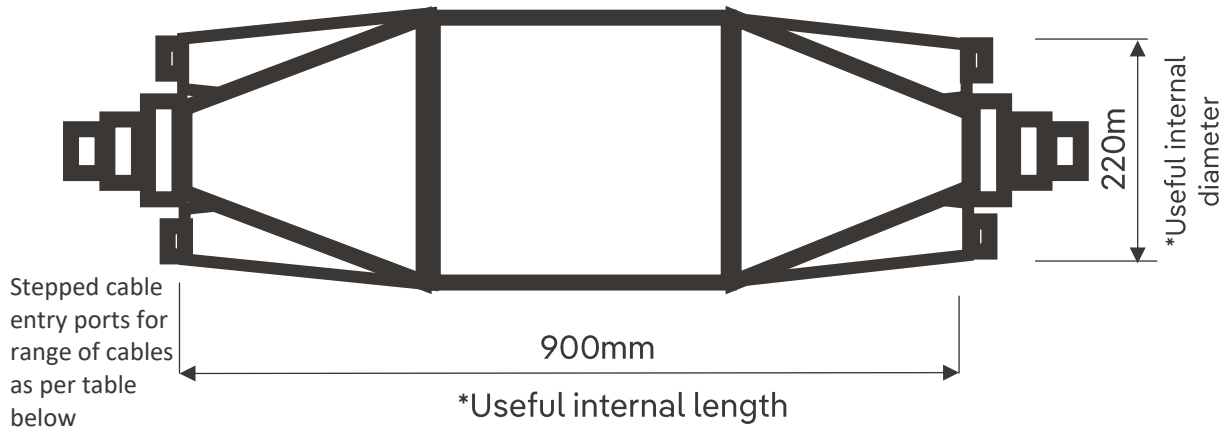
Shell to have one branch cable entry port located at each corner.



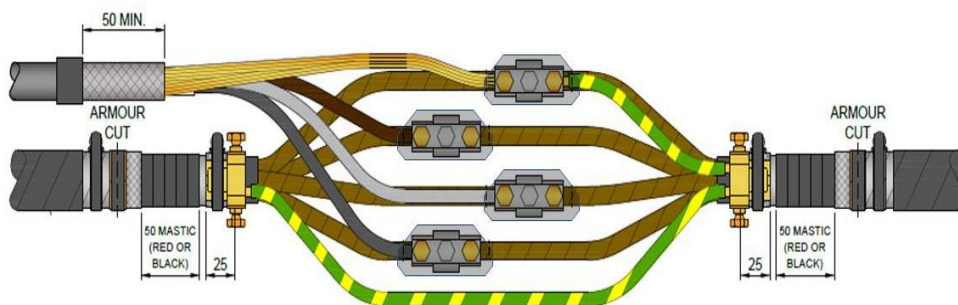
Cable	Size Range	Joint Type	Strip length
Waveform	185mm ²	Straight	600mm
Consac	95-185mm ²	Straight	700mm
PILC	0.06 – 0.3"	Straight Transition	700mm
Waveform	95-185mm ²	Service from Mains	600mm
Consac	95-185mm ²	Service from Mains	700mm

*Dimensions are "guide" only. Tenderer to propose shells which can accommodate the range of cable sizes shown.

Medium Mains Straight Shell Dimensions



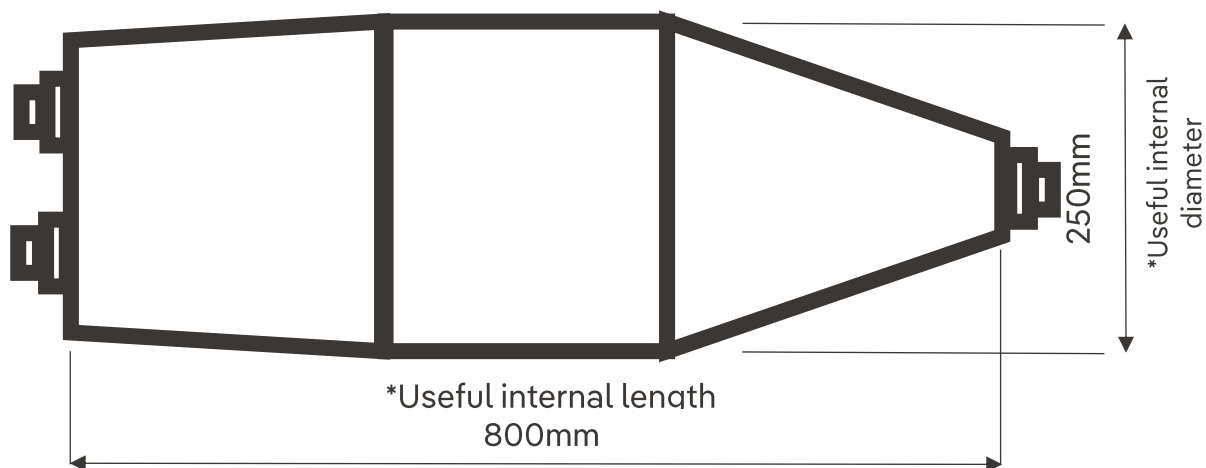
Shell to have one branch cable entry port located at each corner.



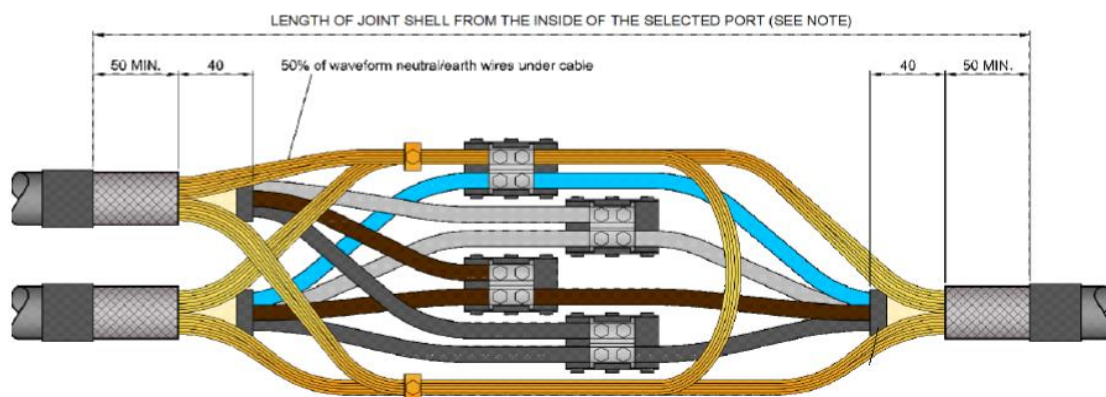
Cable	Size Range	Joint Type	Strip length
Waveform	300mm ²	Straight	700mm
Consac	185-300mm ²	Straight	700mm
PILC	0.3 – 0.4"	Straight Transition	750mm
Waveform	185-300mm ²	Service from Mains	700mm
Consac	185-300mm ²	Service from Mains	750mm
PILC	0.06" – 0.5"	Service from Mains	750mm

*Dimensions are "guide" only. Tenderer to propose shells which can accommodate the range of cable sizes shown.

Large Mains Straight Shell Dimensions



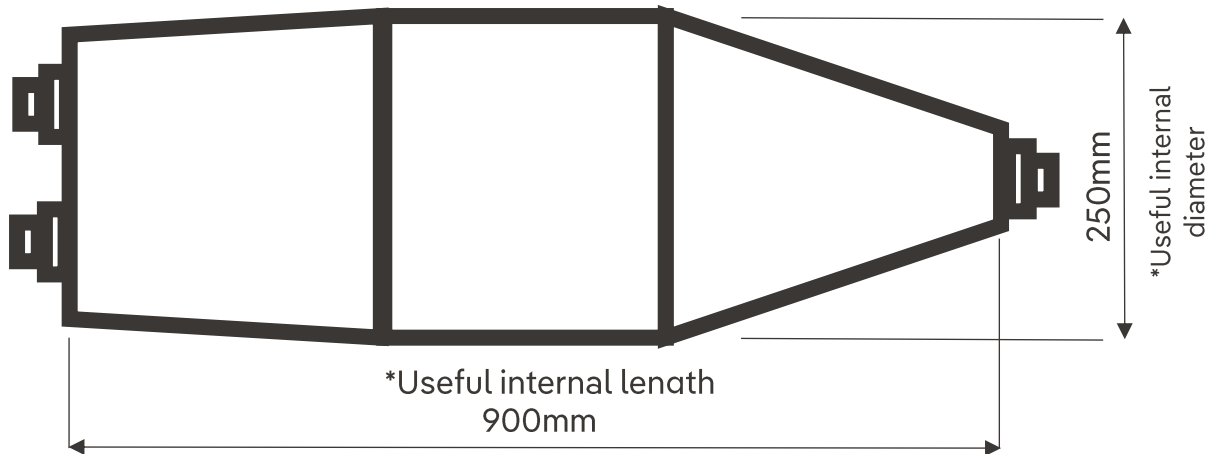
Stepped cable entry ports
for range of cables as per
table below



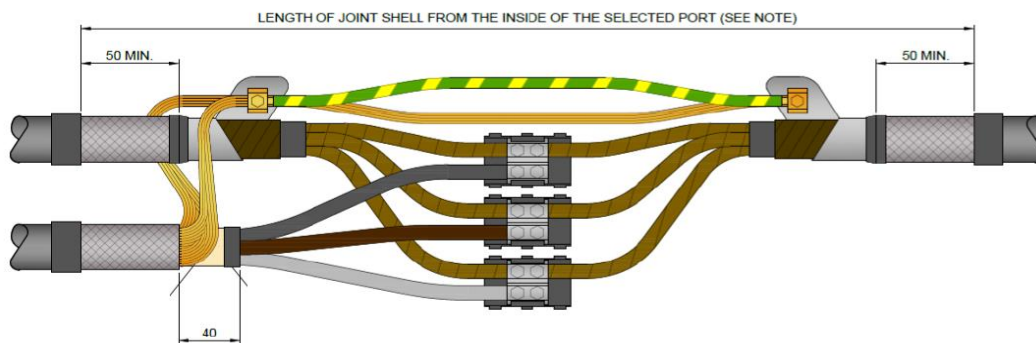
Cable	Size Range	Joint Type	Strip length
Waveform	95mm ²	Branch/Loop	700mm

*Dimensions are "guide" only.

Tenderer to propose shells which can accommodate the range of cable sizes shown.



Stepped cable entry ports
for range of cables as per
table below

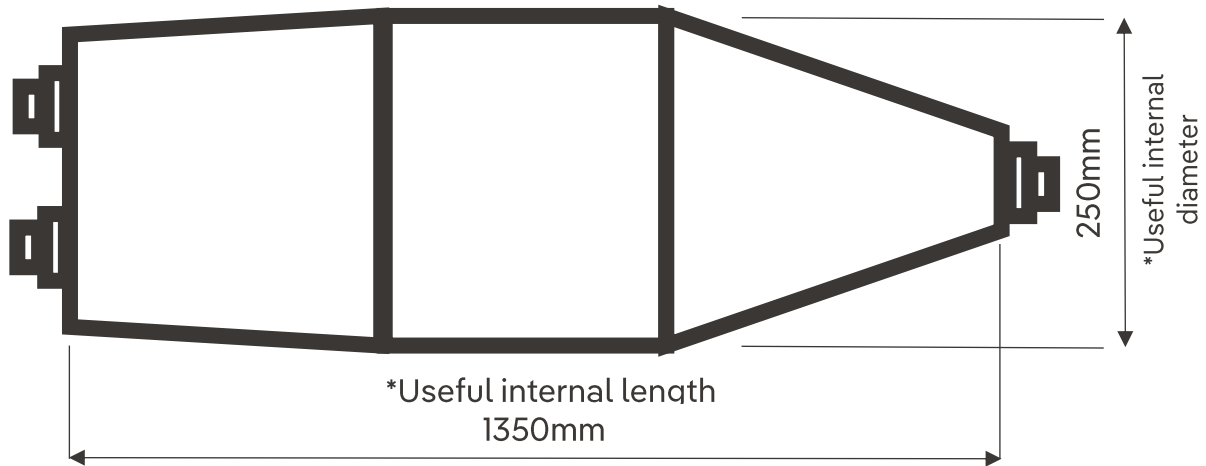


Cable	Size Range	Joint Type	Strip length
Waveform	185mm ²	Branch/Loop	750mm
Concsac	95 – 185mm ²	Branch/Loop	750mm
PILC	0.06" – 0.15"	Branch/Loop	750mm

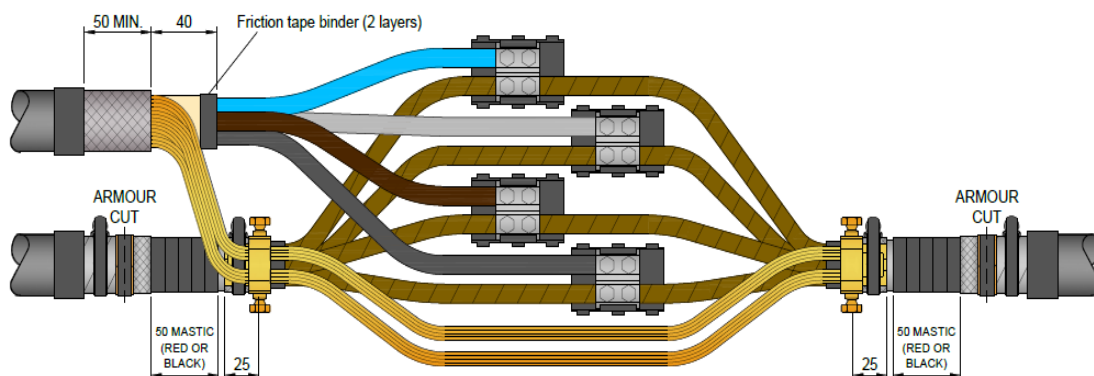
*Dimensions are "guide" only.

Tenderer to propose shells which can accommodate the range of
cable sizes shown.

Medium Mains Branch Shell Dimensions



Stepped cable entry ports
for range of cables as per
table below



Cable	Size Range	Joint Type	Strip length
Waveform	300mm ²	Branch/Loop	1000mm
Concsac	185-300mm ²	Branch/Loop	1000mm
PILC	0.2 - 0.5"	Branch/Loop	1000mm

*Dimensions are "guide" only.

Tenderer to propose shells which can accommodate the range of cable sizes shown.

Large Mains Branch Shell Dimensions

Appendix B – Conformance Declaration

Section-By-Section Conformance With Specification

The Tenderer shall declare conformance or otherwise for each product/service or range of products/services, section-by-section, using the following Conformance Declaration Codes.

Conformance Declaration Codes:

N/A =	Clause is not applicable/appropriate to the product/service.
C1 =	The product/service conforms fully with the requirements of this clause.
C2 =	The product/service conforms partially with the requirements of this clause.
C3 =	The product/service does not conform to the requirements of this clause.
C4 =	The product/service does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Manufacturer:

Product/Service Description:

Product/Service Reference:

Name:

Company

Signature:

Section-By-Section Conformance

Section	Section Topic	Conformance Declaration Code	Remarks * (must be completed if code is not C1)
1	Introduction		
2	Scope		
4.1	Product not to be Changed		
4.2	SP Electricity North West Technical Approval		
4.3	Quality Assurance		
4.4	Formulation		
4.5	Identification Markings		
4.6	Minimum Life Expectancy		
4.7	Product Conformity		
4.8	Confirmation of Conformance		
5.1	Requirements for Type Tests at the Supplier's Premises		
5.2	Requirement for Routine Tests at the Supplier's Premises		
6.1	General Requirements		
6.2	Cable Range Covered		

6.3	Compatibility		
6.4	Material Thickness		
6.5	Rigidity Test		
6.6	Environmental Stress Cracking Test		
6.7	Outline Dimensions for Shells		
7	Packaging		
8	Information to be supplied with Tender		
9	Samples		
10	Technical Support		