NPS/002/014 – Technical Specification for LV Joints and Terminations

1. Purpose

The purpose of this document is to detail the requirements for low voltage cable joints and terminations for use on Northern Powergrid distribution network.

This document supersedes the following documents, all copies of which should be destroyed;

Document Reference	Document Title	Version	Published Date
NPS/002/014	Technical Specification for LV Joints and Terminations	4.0	March 2015

2. Scope

This document describes the requirements of Northern Powergrid, with respect to:

- Mains and Service Straight Joints
- Mains and Service Branch Joints
- Mains and Service Stop Ends
- Pole and LV board Terminations

Joints, stop ends and terminations may be either cold applied or require the application of heat.

The following appendices form part of this technical specification:

- Appendix 1: Cable range and Joint Requirements
- Appendix 2: Addendum to Supplier requirements
- Appendix 3: Logistical requirements
- Appendix 4: Self Certification Conformance Declaration
- Appendix 5: Technical Information Check List
- Appendix 6: Current Range of joints and Terminations

2.1. Table of Contents

3. Technical Requirements

3.1. Conditions of Installation

Joints and terminations specified in this document shall be installed on cables laid in accordance with the Northern Powergrid policy document for the installation of cables NSP/002. During storage and after installation cable joints are subjected to the full range of climatic conditions encountered in the UK. Cable joints may be surrounded by ground water for most of its operating life. Where cable is installed in ducts, flooding of ducts can occur resulting in permanently wet sections along the cable route.

Cable joints installed above ground will be supported by means of cleats either vertically or horizontally and these cables may be exposed to direct sunlight for significant periods. Cable terminations will be installed on wood poles and therefore in contact with a pole preservation medium such as creosote or AC500.

3.2. Conditions of Operation for Cable Joints

LV joints and terminations purchased in accordance with this specification are required to operate under conditions stipulated in the Northern Powergrid policy document IMP/001/911. The following are the general conditions under which cable joints purchased in accordance with this specification are required to operate:

- Nominal system voltages: 400/230 volts.
- The working voltage of any part of the system does not normally exceed the normal system voltage by more than 10%.
- Nominal system frequency: 50Hz
- The system operates with the neutral point earthed directly at one or more points.

3.3. Range of Cables to be Jointed

The most common types of cables that will be encountered on the Northern Powergrid distribution system and a range of joints required are as detailed in Appendix 1.

3.4. General Requirements

Components specified shall be suitable for use with impregnated paper insulated cables including those to BS 6480, polymeric insulated cables including those to BS 7870, BS 6004, BS 6007, BS 5467, BS 6346, HD 603, ENATS 09-7 and 09-9 or LSF cables to BS 7870 3.50 .

They shall be compatible with other materials normally used in the construction of cable joints, terminations or stop ends, and shall not increase the rate of corrosion of any metal with which they come into contact.

Assembled components forming part of a cable system shall be capable of operating under the normal and fault temperature conditions specified in the relevant cable specifications.

Cable joint shall be installed underground so must be able to withstand impact damage and moisture ingress. This applies to heat shrink and joints with an outer shell

All joints and stop ends shall be impact tested in accordance with ENA TS C81, or BS EN 50393 Clause 8.5.

Heat shrink materials used within any joints stop ends or terminations shall be in accordance with ENA TS 09-11 Heat Shrinkable Material for use on 600/1000v Cables & Accessories

3.5. Joint Shell

For resin filled joints, the joint shell shall be horizontally split and with a minimum 1.5mm thick plastic or an alternate material, alternative designs will be considered, which shall be approved by Northern Powergrid. In the case of the mains branch joints the shell design shall allow the branch cable to enter the shell alongside the main cable at the same level within the trench. The shell shall have stepped cable entry ports for varying cable diameters as detailed in Appendix 1. The joint shell shall be compatible with a cold pour natural or synthetic oil based polyurethane resin and so designed to allow at a minimum 15mm encapsulation at every point within its internal length. The shell assembly shall be supplied complete with sealing clips/strips and a means of sealing the cable entry ports.

3.6. Connectors and Lugs

The rated voltage of the components covered by this specification shall be in accordance with BS7888. All components must have at least an equal current rating to the cables to which they are connected.

Current ratings shall be calculated in accordance with IEC 287, using standard UK ground conditions and an installation depth of 450mm.

All completed joints shall be tested to BS 7888, with connector's tested to BS EN 61238; and/or C93 as required.

Insulation Piercing along with mechanical phase and neutral/earth connectors shall be used within the relevant joint kits.

Phase connectors shall be fully insulated.

Phase and neutral convectors shall be tested in accordance with IEC 61238-1, and 61238-1-2 for IPC connector's.

Mechanical connections to the metallic earth screen of cables shall be tested in accordance with Engineering Recommendation C93.

All lugs shall be in accordance with Engineering Recommendation C79 or BS EN 61238:1.

3.7. Low Voltage Terminations

In general terminations will be carried out on 3-phase, CNE / SNE, XLPE insulated concentric copper wire waveform neutral/earth with solid aluminium phase conductors and PVC over sheath to BS 7870.

Terminations are required for the following equipment:

- Low Voltage Fuse Boards (conductor size 185mm2 and 300mm2)
- Low Voltage Overhead lines (conductor size 95mm2, 185mm2 and 300mm2)

3.8. Low Voltage Stop Ends

Stop ends, which shall be supplied in kit form, are required for each cable type and size as detailed in Appendix 1. The stop end kits shall contain all the necessary components to carry out the joint.

Mechanical connections to the metallic earth screen of the cable shall be tested in accordance with Engineering Recommendation C93.The earthing conductor shall be suitably designed to prevent water ingress along the conductor into the joint.

Resin stop ends shall meet the requirements of the relevant parts of Engineering Recommendation C81/3 and any heat shrinkable materials used shall be in accordance with ENATS 09-11.

3.9. Kitting

The schedule of joints and terminations required by Northern Powergrid is detailed in Appendix 6 of this document. In general joints are supplied in a kit containing all components required to complete the joint. The exception to this is joints that are required for LV MAINS applications. For these joints base kits are specified for standard 3 core XLPE joints with a separate schedule of modules required when the joint application includes a 4^{th} core, connections to PILC cables, Consac or additional services. There are also several additional connectors listed within Appendix 6 that are required for repair and testing applications (extended and claw mains connectors).

All joint kits shall be supplied with appropriate jointing instructions that have been approved by Northern Powergrid (see Appendix 2 for further detail).

4. References

The products described within this specification shall comply with all current versions of the relevant International Standards, British Standard Specification and all relevant Energy Network Association Technical Specifications (ENA TS) current at the time of supply.

4.1. External Documentation

Reference	Title
BE 7870-3.12	LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors, having low emission of smoke and corrosive gases when affected by fire
BS 5467	Specification for 600/1000 V and 1900/3300 V armoured electric cables having thermosetting insulation
BS 6004	PVC insulated electric cables, non-armoured, up to and incl 450/750v.
BS 6007	Electric cables unsheathed, heat resisting, up to and incl 450/750v.
BS 6346	Specification for 600/1000 V and 1900/3300 V armoured electric cables having PVC insulation
BS 6360	Conductors in Insulated Cables and Cords
BS 6480 (Archived)	Specification for impregnated paper-insulated lead or lead alloy sheathed electric cables of rated voltages up to and including 33000 V
BS 6724	Specification for 600/1000 V and 1900/3300 V armoured electric cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire
BS 7629	Electric cables. Specification for 300/500 V fire resistant, screened, fixed installation cables having low emission of smoke and corrosive gases when affected by fire.
BS 7870 3.40	LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated, copper wire waveform concentric cables with solid aluminium conductors
BS 7870 3.50	LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated, copper wire waveform concentric cables with solid aluminium conductors, With a LSF outer sheath
BS 7870-3.10	LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. PVC insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors
BS 7888	LV and MV accessories for power cables with rated voltage from 0.6/1kV (Um = 1.2 kV) up to and including 20.8/36 kV (Um = 42kV)
BS 7889	Specification for 600/1000 V single core un-armoured electric cables having thermosetting insulation
BS EN 50266	Tests on electric cables under fire conditions
BS EN 61238-1	Compression and mechanical connectors for power cables.
ENA TS C93	Type approval tests for mechanical connections to metallic sheaths of cables.
ENATS 09-11	Heat Shrinkable Material for use on 600/1000v Cables & Accessories.
ENATS 09-7	PVC & XLPE Insulated and Concentric Service cables.
ENATS 09-9	XLPE Insulated CNE Cable with Solid Al Phase Conductors & Concentric Waveform Al Neutral Earth.
ENATS C79	Type Approvals tests for Connectors and Terminations for Aluminium conductors of insulated power cables.
ER-C81/3	Type Approvals tests for Joints for 600/1000v Cable Systems.
HD 603	Distribution Cables of rated Voltage 0.6/1 kV.
IEC 287	Calculation of Current Ratings.

4.2. Internal Documentation

Reference	Title
IMP/001/911	Code of Practice for the Economic Development of the LV System
NSP/002	Policy for the Installation of Distribution Power Cables

4.3. Amendments from Previous Version

Reference	Description
3.9 Kitting	New section added
4.1 External Documentation	Quoted documentation confirmed and amended where necessary. Additional documents listed
Appendix 1 – Cable Range and Joints Required	Stranded copper mains added for phase conductors
Appendix 1 – Cable Range and Joints Required	Table removed and added to Appendix 6
Appendix 2 - Addendum to Supplier requirements	Statement added relating to technical support
Appendix 4 - Self Certification Conformance Declaration	Table updated
Appendix 6 - Current Range of Joint Combinations	Schedule updated

5. Definitions

Term	Definition
n/a	

6. Authority for Issue

6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Date
Liz Beat	Governance Administrator	09/03/2021

6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

Review Period - This document should be reviewed within the following time period;

Standard CDS review of 3 years?	Non Standard Review Period & Reason	
No	Period: 5	Reason: In alignment with contract award
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Steven Salkeld	Policy and Standards Engineer	09/03/2021

6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Date
David Gazda	Senior Policy and Standards Engineer	09/03/2021
Joseph Helm	Policy and Standards Engineer	11/03/2021

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Greg Farrell	Head of System Engineering	27/04/2021

Appendix 1 - Cable Range and Joint Requirements

Mains Cable Types

1. 3-Core CNE / 4-Core SNE XLPE insulated concentric with aluminium or copper wire waveform neutral/earth conductors, PVC over sheath cables with solid aluminium phase conductors to BS7870 or stranded copper phase conductors to BS7870.

   CNE Conductor sizes: - 70mm^2, 95mm^2, 120mm^2, 185mm^2 and 300mm^2

   SNE Conductor sizes: - 95mm^2, 185mm^2 and 300mm^2

2. 4-Core Paper insulated, lead sheathed steel tape armoured served cables with stranded aluminium or stranded copper conductors to BS 6480. Conductor sizes up to and including 0.3in^2

3. Impregnated paper-insulated cables with aluminium sheath/neutral conductor and three shaped solid aluminium phase conductors (CONSAC)
   Conductor sizes: - 70mm^2, 120mm^2, 185mm^2, 240mm^2 and 300mm^2

Service Cable Types

1. 4-Core Paper insulated, lead sheathed steel tape armoured served cables with stranded aluminium or stranded copper conductors to BS 6480.
   Conductor sizes up to and including 0.06in^2.

2. Concentric CNE / SNE Single and three-phase PVC insulated cable with solid aluminium phase conductors and stranded copper neutral.
   Conductor size 25mm^2 and 35mm^2.

3. Concentric SNE PVC insulated cable with stranded Copper conductors.
   Conductor range 4mm^2, 16mm^2 and 25mm^2.

Appendix 2 - Addendum to Supplier requirements

Joint kits shall incorporate all the necessary components (excluding the resin) to carry out a specific joint combination. Modules will be required for the LV MAINS range of joints.

When resin free type joints are proposed, they will meet the requirements of the relevant parts of Engineering Recommendation C81/3. Any heat shrinkable materials used shall be in accordance with ENATS 09-11.

Each individual joint, termination and stop end kit shall include the relevant jointing instruction/drawing and a kit contents list. The volume of resin required to complete the joint (where applicable) shall clearly be displayed. A label shall be attached to the outer packaging of all commodity codes detailing the part description, application, batch number/date and the NPg commodity code.

The production of the jointing instruction is the responsibility of the supplier and subject to approval by the Northern Powergrid. Any amendments required shall be agreed and approved by the Northern Powergrid.

The supplier shall provide with the tender full technical details of the equipment offered and shall indicate any divergence from these standards or specifications.

Suppliers should provide details of how they will provide technical support to NPg. For example provision of training, online hosted support or telephone support etc.

Appendix 3 - Logistical Requirements

To enable the Northern Powergrid to store the product(s) in accordance with the manufacturer's recommendations the Tenderer shall provide details of the recommended storage environment with respect to each tendered product.

Details shall be provided where relevant, in respect of the minimum and maximum exposure levels, frequency of exposure and duration of exposure of the packaged item with respect to;

*Ambient temperature	*Atmospheric corrosion	Humidity
Impact	Water	Vibration
*Dust	* Solar radiation	Shelf Life

The Tenderer shall ensure that each item is suitably packaged and protected to enable storage in an outdoor environment whilst maintaining the product and packaging as "fit for service" prior to installation.

All packaging shall be sufficiently durable giving regard to the function, reasonable use and contents of the packaging. Where product packages tendered are made up of sub packages all the sub packages shall unless varied by this specification, be supplied securely packaged together. Where items are provided in bagged/boxed form the material from which the bags are manufactured shall be capable of sustaining the package weight and resisting puncture by the materials within.

Tenderer shall submit at the time of tendering the details of the proposed packaging (i.e. materials composition and structure) to be used for each product. Where the Tenderer is unable to provide packaging suitable for outdoor storage then this should be stated at the time of tender.

In order to maximise storage space all palletised goods shall be supplied in standard returnable box pallets with the following specification. Where applicable, suppliers shall also indicate the maximum number of units of each product that are storable per box pallet.

Size - 1200mm (w) x 1000mm (d) x 750mm (h)

Weight (empty) – Up to 33kg

Load Capacity – Up to 450kg

Maximum Stacking Capacity – 10 High

Suppliers shall also include details of the type of material used to manufacture the box pallets.

Clearly legible, easily identifiable, durable and unambiguous labelling shall be applied to each individual and where relevant, multiple package of like products. Where products packages tendered are made up of sub packages each sub packages shall be marked. As a minimum requirement the following shall be included;

* Manufacturer's trademark or name
* Supplier's trademark or name
* Description of item
* Date of packaging and/or batch number
* Northern Powergrid product code
* Weight

Tenderer shall submit at the time of tendering a sample of the proposed labelling for each product package type.

Appendix 4 - Self Certification Conformance Declaration

LV joints and terminations required to be supplied against this specification shall comply with the latest issues of the relevant ENATS, British and International Standards specified. The following tables are intended to amplify and/or clarify the requirements of elements of these Standards but do not preclude meeting all requirements of the standards.

The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes

N/A = Clause is not applicable/ appropriate to the product

Cs1 = the product conforms fully with the requirements of this clause

Cs2 = the product conforms partially with the requirements of this clause

Cs3 = the product does not conform to the requirements of this clause

Cs4 = the product does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Instructions for completion

- When Cs1 code is entered provide the reference of the document providing evidence.
- When any other code is entered the reason for non-conformance shall be entered.
- Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate.

Manufacturer:

Product Reference:

Description of LV Joint Type (Voltage, Conductor Type and Size):

Name:

Signature:

Date:

NOTE: Applicable sections shall be completed for each size / range of joints and connectors offered.

	Specification for LV Joints and Terminations				
		Clause / Requirements	Conformance Code	Evidence Reference	Remarks / Comments
+	**General requirements**				
+	Impact test	NPS/002/014 Parts 3.4 The impact test prescribed in BS EN 50393 Clause 8.5.			
	Joint Shells:	NPS/002/014 Parts 3.5 & 3.8			
+					
	- Min 12.50mm thick Plastic or equivalent Material				
	- Horizontally Split				
	- Stepped Cable Entry Ports				
	- Range of Sizes (to fit cables as specified in Appendix 1)				
	- Compatible with Cold Pour or Synthetic Oil Based Polyurethane Resin				
	- Provide min 10mm15mm Encapsulation				

- To be supplied with approved JI's					
- Supplied with suitable Seal Clips / Strips					

Specification for LV Joints and Terminations					
		Clause / Requirements	Conformance Code	Evidence Reference	Remarks / Comments
	Mechanical Connections	NPS/002/014 Parts 3.6			
	Test Specimens	BS EN 61238-1 Part 5			
	Initial Resistance Checks	C79 Part 5			
		C93			
	Short Circuit Tests	C79 Part 6			
		BS EN 61238-1 6.3.4			
		C93			
	Load Cycling Tests	C79 Part 7			
		BS EN 61238-1 Part 6.5			
		C93			
	Tensile Tests	C79 Part 8			
		BS EN 61238-1 Part 7			
	Heat Shrink Materials:	NPS/002/014 Parts 3.4			

	Visual Examination	ENATS 09-11 Test A			
	Dimensions & Longitudinal Shrinkage	ENATS 09-11 Test B			
	Tensile Strength & Ultimate Elongation	ENATS 09-11 Test C			
	Heat Shock-Tubing	ENATS 09-11 Test D			
	Heat Shock-Moulded Parts	ENATS 09-11 Test E			
	Hot Modulus	ENATS 09-11 Test F			
	Electrical Strength	ENATS 09-11 Test G			
	Secant Modulus	ENATS 09-11 Test H			
	Flame Retardant	ENATS 09-11 Test J			
	Water Absorbance	ENATS 09-11 Test K			
	Low Temperature Flexibility	ENATS 09-11 Test L			
	Stiffness	ENATS 09-11 Test M			
	Heat Ageing	ENATS 09-11 Test N			
	Corrosion Resistance	ENATS 09-11 Test O			
	Solvent Resistance	ENATS 09-11 Test P			

	Adhesive Peel Strength	ENATS 09-11 Test Q			
	Low Temperature Flexibility of Adhesive	ENATS 09-11 Test R			
	Flow of Adhesive at Elevated Temperature	ENATS 09-11 Test S			
	Weather Resistance	ENATS 09-11 Test T			

Appendix 5 - Technical Information Check List

The following information shall be provided by the supplier for technical review by Northern Powergrid. Additional information shall be provided if requested.

Requirement	Provided
Full product descriptions and part number/reference against commodity codes complete with volume of resin required where applicable.	
Appendix 4 – completed self-certification conformance declaration	
Complete set of drawings and/or jointing instructions for each variant	
Type test evidence	
Production quality plan (example)	
Packaging/delivery information	
Provide details of technical support provided to Northern Powergrid during the term of the contract	

Appendix 6 - Current Range of Joint Combinations

Commodity Code	Description
	Heatshrink Joints – Service
174505	Straight Joint: Heatshrink: Single Phase CNE-CNE / SNE up to 35mm.
174506	Straight Joint: Heatshrink: Single Phase SNE - SNE up to 35mm.
174507	Straight Joint: Heatshrink: Three Phase CNE - CNE up to 35mm.
174508	Straight Joint: Heatshrink: Single Phase up to 35mm CNE - PILC (up to 0.04in).
174510	Straight Joint: Heatshrink: Single Phase SNE - PILC up to 35mm.
174509	Straight Joint: Heatshrink: Three Phase CNE up to 35mm – 4-Core PILC up to 0.04in.
	Resin Filled Service Straight Joints
086561	Straight Joint: Single Phase CNE PVC (4mm) – Single Phase CNE up to 35mm^2
174492	Single Phase PILC Concentric - Single Phase SNE/CNE XLPE Transition Straight Joint
174488	Straight Joint: Single Phase Pilc – Single Phase Pilc (.0225 – 0.06)
174489	Straight Joint: Three Phase Pilc – Three Phase Pilc (.0225 – 0.06)
174471	Straight Joint: Three Phase 4-core PILC – Three Phase SNE up to 35mm
	Stop Ends – (Service and Mains)
174361	Stop End: Service: Heatshrink: Single Phase CNE/SNE up to 35mm.
174365	Stop End: Service: Heatshrink: 3 Phase CNE up to 35mm.
174384	Stop End: Service: Heatshrink: Single Phase PILC up to 0.06in.
174385	Stop End: Service: Heatshrink: 3 Phase PILC up to 0.06in.
174611	Stop End: 35mm 3-Phase SNE: Resin Filled
174698	Stop End: Resin Filled: 70mm - 185mm 3 and 4 core Waveform.
174700	Stop End: Resin Filled: 185mm 300mm 3 and 4 core Waveform.
174664	Stop End: Mains: Resin Filled: 50mm - 95mm (0.06 - 0.15in) PILC.
174679	Stop End: Mains: Resin Filled: 120mm - 300mm (0.2in – 0.5in) PILC.
174645	Stop End: Mains: Resin Filled: 70mm - 300mm CONSAC.
086686	2 Core PILC Breakout Termination Kit
	Branch Joints – Service
174511	Branch Joint: Single Phase CNE Main - CNE Branch up to 35mm.
174490	Branch Joint: Single Phase SNE - SNE cables up to 35mm.

174512	Branch Joint: Three Phase CNE Main - Three Phase CNE Branch: up to 35mm.
174513	Branch Joint: Single Phase: PILC Main - CNE Branch: up to 35mm.
174514	Branch Joint: Three Phase PILC Main - 3 Phase CNE Branch: up to 35mm.
	Pole Terminations
086652	Pole Termination 25sqmm PILC.
086678	Pole Termination 95sqmm PILC.
086637	Pole Termination 185sqmm PILC.
164682	Pole Termination 35sqmm 3-core Concentric CNE
086645	Pole Termination 120-185sqmm 3-core Waveform.
086660	Pole Termination 300sqmm 3-core Waveform.
165000	Pole Termination: 185mm 4-Core Waveform.
165001	Pole Termination: 95mm 4-Core Waveform.
165002	Pole Termination: 300mm 4-Core Waveform.
	Triple Concentric Joints
168289	Stop End: Paper Lead Triple Concentric up to 0.12Sq in
168291	Service Breeches Joint: Triple Concentric Paper Lead up to 0.12in with 3-Core CNE Branch up to 35mm
168291	Service Breeches Joint: Single Phase Concentric Paper Lead up to 0.15in with Single Phase CNE Branch up to 35mm
168290	Straight Joint: Transition; Triple Concentric up to 0.12Sqin to Waveform Cable up to 95mm (with single phase service if required)
	Earth Kits and Components
065722	LV Service Mechanical Earth Bond Kit
164540	Earthing kit for redundant PILC Mains/Service Joint (Resin Version)
164541	Earthing kit for redundant Service stop End Joint
164542	External Earthing Kit containing coiled earth rod and connector for use as an external earth for joints
164455	LV Joint – Earthing Kit for Redundant PILC Cable (Heat Shrink)

LV Mains Straight Base Kits

Commodity Code	Description	Cable 1	Cable 2	Size	Connector Module	Earth Bond Module	Consac Module
164460	LV Mains Straight Joint for 95mm 3C and 4C Waveform (Base Kit).	3-Core WAVEFORM	3-Core WAVEFORM	95mm²	-	-	-
		4-Core WAVEFORM	4-Core WAVEFORM	95mm²	165820 x 1	-	-
		3-Core WAVEFORM	4-Core WAVEFORM	95mm²	165825 x 1	-	-
164461	LV Mains Straight Transition Joint for 95mm 4C PILC or 3C CONSAC to 95mm 3C or 4C Waveform (Base Kit)	3-Core WAVEFORM	3-Core CONSAC	95mm²	-	-	168358 x 1
		3-Core WAVEFORM	4-Core PILC	95mm²	165820 x 1	165773 x 1	-
		4-Core WAVEFORM	4-Core PILC	95mm²	165820 x 1 165824 x 1	165773 x 1	-
164462	LV Mains Straight Joint for 185mm 3C and 4C Waveform (Base Kit).	3-Core WAVEFORM	3-Core WAVEFORM	185mm²	-	-	-
		4-Core WAVEFORM	4-Core WAVEFORM	185mm²	165821 x 1	-	-
		3-Core WAVEFORM	4-Core WAVEFORM	185mm²	165826 x 1	-	-
164463	LV Mains Straight Transition Joint for 185mm 4C PILC or 3C CONSAC to 185mm 3C or 4C Waveform (Base Kit)	3-Core WAVEFORM	3-Core CONSAC	185mm²	-	-	168358 x 1
		3-Core WAVEFORM	4-Core PILC	185mm²	165821 x 1	165843 x 1	-
		4-Core WAVEFORM	4-Core PILC	185mm²	165821 x 1 165825 x 1	165843 x 1	-
164464	LV Mains Straight Joint for 300mm 3C and 4C Waveform (Base Kit).	3-Core WAVEFORM	3-Core WAVEFORM	300mm²	-	-	-
		4-Core WAVEFORM	4-Core WAVEFORM	300mm²	165822 x 1	-	-
		3-Core WAVEFORM	4-Core WAVEFORM	300mm²	165826 x 1	-	-
164465	LV Mains Straight Transition Joint for 300mm 4C PILC or 3C CONSAC to 300mm 3C or 4C Waveform (Base Kit)	3-Core WAVEFORM	3-Core CONSAC	300mm²	-	-	168358 x 1
		3-Core WAVEFORM	4-Core PILC	300mm²	165822 x 1	165909 x 1	-
		4-Core WAVEFORM	4-Core PILC	300mm²	165822 x 1 165825 x 1	165909 x 1	-

LV Mains Branch Base Kit

Commodity Code	Description	Cable 1	Cable 2	Size	Connector Module	Earth Bond Module	Consac Module
164466	LV Mains Branch Joint for 95mm 3C and 4C Waveform (Base Kit).	3-Core WAVEFORM	3-Core WAVEFORM	95mm²	-	-	-
		4-Core WAVEFORM	4-Core WAVEFORM	95mm²	165824 x 1	-	-
		3-Core WAVEFORM	4-Core WAVEFORM	95mm²	165824 x 1	-	-
164467	LV Mains Transition Branch Joint for 95mm Waveform to 95mm 4C PILC or 3C CONSAC (Base Kit)	3-Core WAVEFORM	3-Core CONSAC	95mm²	-	-	168358 x 1
		3-Core WAVEFORM	4-Core PILC	95mm²	165824 x 1	165773 x 2	-
		4-Core WAVEFORM	4-Core PILC	95mm²	165824 x 2	165773 x 2	-
164468	LV Mains Branch Joint for 185mm 3C and 4C Waveform (Base Kit).	3-Core WAVEFORM	3-Core WAVEFORM	185mm²	-	-	-
		4-Core WAVEFORM	4-Core WAVEFORM	185mm²	165825 x 1	-	-
		3-Core WAVEFORM	4-Core WAVEFORM	185mm²	165825 x 1	-	-
164469	LV Mains Transition Branch Joint for 185mm Waveform to 185mm 4C PILC or 3C CONSAC (Base Kit)	3-Core WAVEFORM	3-Core CONSAC	185mm²	-	-	168358 x 1
		3-Core WAVEFORM	4-Core PILC	185mm²	165825 x 1	165843 x 2	-
		4-Core WAVEFORM	4-Core PILC	185mm²	165825 x 2	165843 x 2	-
164470	LV Mains Branch Joint for 300mm 3C and 4C Waveform (Base Kit).	3-Core WAVEFORM	3-Core WAVEFORM	300mm²	-	-	-
		4-Core WAVEFORM	4-Core WAVEFORM	300mm²	165826 x 1	-	-
		3-Core WAVEFORM	4-Core WAVEFORM	300mm²	165826 x 1	-	-
164471	LV Mains Transition Branch Joint for 300mm Waveform to 300mm 4C PILC or 3C CONSAC (Base Kit)	3-Core WAVEFORM	3-Core CONSAC	300mm²	-	-	168358 x 1
		3-Core WAVEFORM	4-Core PILC	300mm²	165826 x 1	165909 x 2	-
		4-Core WAVEFORM	4-Core PILC	300mm²	165826 x 2	165909 x 2	-

LV Mains Service Base Kit

Commodity Code	Description	Cable 1	Cable 2	Size	Connector Module	Earth Bond Module	Consac Module
164472	LV Mains Service Branch Joint for 25/35mm Service to 95mm 3C and 4C Waveform (Base Kit)	3-Core WAVEFORM	95mm²	1 x 1Ø	-	-	-
		3-Core WAVEFORM	95mm²	1 x 3Ø	168216 x 2	-	-
		4-Core WAVEFORM	95mm²	1 x 1Ø	168216 x 1	-	-
164473	LV Mains Service Branch Joint for 25/35mm Service to 95mm 4C PILC or 3C CONSAC (Base Kit)	3-Core CONSAC	95mm²	1 x 1Ø	-	-	367408 x 1
		3-Core CONSAC	95mm²	1 x 3Ø	168216 x 2	-	367408 x 1
		4-Core PILC	95mm²	1 x 1Ø	165825 x 1	165843 x 2	-
164474	LV Mains Service Branch Joint for 25/35mm Service to 185mm 3C and 4C Waveform (Base Kit)	3-Core WAVEFORM	185mm²	1 x 1Ø	-	-	-
		3-Core WAVEFORM	185mm²	1 x 3Ø	168216 x 2	-	-
		4-Core WAVEFORM	185mm²	1 x 1Ø	168216 x 1	-	-
164475	LV Mains Service Branch Joint for 25/35mm Service to 185mm 4C PILC or 3C CONSAC (Base Kit)	3-Core CONSAC	185mm²	1 x 1Ø	-	-	367408 x 1
		3-Core CONSAC	185mm²	1 x 3Ø	168216 x 2	-	367408 x 1
		4-Core PILC	185mm²	1 x 1Ø	165825 x 1	165843 x 2	-
164476	LV Mains Service Branch Joint for 25/35mm Service to 300mm 3C and 4C Waveform (Base Kit)	3-Core WAVEFORM	300mm²	1 x 1Ø	-	-	-
		3-Core WAVEFORM	300mm²	1 x 3Ø	168288 x 2	-	-
		4-Core WAVEFORM	300mm²	1 x 1Ø	168288 x 1	-	-
164477	LV Mains Service Branch Joint for 25/35mm Service to 300mm 4C PILC or 3C CONSAC (Base Kit)	3-Core CONSAC	300mm²	1 x 1Ø	-	-	367408 x 1
		3-Core CONSAC	300mm²	1 x 3Ø	168288 x 2	-	367408 x 1
		4-Core PILC	300mm²	1 x 1Ø	165826 x 1	165909 x 2	-

LV Mains Joint Base Kit – Additional Modules and Repairs Connectors

Commodity Code	Description
165820	LV Mains Joint Module - 95mm Straight Connector
165821	LV Mains Joint Module - 185mm Straight Connector
165822	LV Mains Joint Module - 300mm Straight Connector
165773	LV Mains Joint Module - 95mm 4C PILC Earth Bond Kit.
165843	LV Mains Joint Module - 185mm 4C PILC Earth Bond Kit.
165909	LV Mains Joint Module - 300mm 4C PILC Earth Bond Kit.
168358	LV Mains Joint Module - Consac Mains Straight and Branch Joints
367408	LV Mains Joint Module - Consac Mains Service Joints
168216	LV Mains Joint Module - 95mm / 185mm Mains Service Connector
168288	LV Mains Joint Module - 300mm Mains Service Connector
165824	LV Mains Joint Module - 95mm Branch Connector
165825	LV Mains Joint Module - 185mm Branch Connector
165826	LV Mains Joint Module - 300mm Branch Connector
065904	LV Mains Connector - 95mm with Extended Length for Cut and Test Repairs
065888	LV Mains Connector - 185mm with Extended Length for Cut and Test Repairs
065912	LV Mains Connector - 300mm with Extended Length for Cut and Test Repairs
168748	LV Mains Connector - 95mm Claw Type Insulated Connector
168790	LV Mains Connector - 185mm Claw Type Insulated Connector
168786	LV Mains Connector - 300mm Claw Type Insulated Connector

Additional Connectors to Support Cable Connections and Terminations

Commodity Code	Description
086694	3 Phase LV Board Termination Connectors
168343	Neutral Earth Connector - suitable for 25 - 150mm2 stranded conductor
168413	Neutral Connector. kit ref NE14
262348	MF15/2 Mechanical Splice connectors for connecting 185/300mm WNE NEUTRAL conductor to 95mm Insulated and Sheathed cond or 95/120mm ABC
169223	Mechanical tunnel connector for 16 - 25mm copper neutral/earth conductors of hybrid service cables