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# 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 in "kit form" for use on Northern Powergrid (the Company) distribution network.

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

Ref.	Version	Title
NPS/002/014	3.0	Specification for LV Joints and Terminations

## 2. Scope

This document describes the requirements of Company, 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

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### 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 Company's 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 Company's 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 Components

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

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

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

#### 3.4 Low voltage Joints

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

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.

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### 3.5 Joint shell

For resin filled joints, the joint shell shall be horizontally split and a minimum 2.0mm thick plastic or an alternate material, alternative designs will be considered, which shall be approved by the Company. 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 10mm 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 Cable Range & Joint Requirements

The most common types of cables that will be encountered on the Company's distribution system and a range of joints required are as detailed in Appendix 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 oversheath to BS 7870.

Terminations are required for the following equipment.

- Low Voltage Fuse Boards (conductor size 185mm<sup>2</sup> and 300mm<sup>2</sup>)
- Low Voltage Overhead lines (conductor size 95mm<sup>2</sup>, 185mm<sup>2</sup> and 300mm<sup>2</sup>)

### 3.8 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.

All connectors and lugs shall be in accordance with Engineering Recommendation C79 or BS EN 61238:1. 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, heat shrink kits shall contain a yellow polythene bag with 'DANGER LIVE' printed on the outside for installation over the completed stop end.

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## 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 (ENATS) current at the time of supply.

### 4.1 External Documentation

Reference	Title
BS 6480	Specification for impregnated paper-insulated lead or lead alloy sheathed electric cables of rated voltages up to and including 33000 V
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 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 5467	Specification for 600/1000 V and 1900/3300 V armoured electric cables having thermosetting insulation
BS 6346	Specification for 600/1000 V and 1900/3300 V armoured electric cables having PVC insulation
BS EN 61238-1	Compression and mechanical connectors for power cables.
BS EN 50266	Tests on electric cables under fire conditions
BS 6234	Specification for polyethylene insulation and sheath of electric cables
BS 6360	Conductors in Insulated Cables and Cords
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 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 7889	Specification for 600/1000 V single core un-armoured electric cables having thermosetting insulation
ENATS C93	Type approval tests for mechanical connections to metallic sheaths of cables.
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 09-11	Heat Shrinkable Material for use on 600/1000v Cables & Accessories.
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.

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IEC 287	Calculation of Current Ratings.
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## 4.2 Internal documentation

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

## 4.3 Summary of Amendments

Clause	Amendments
3.5	Joint shells shall be horizontally split and the minimum thickness has increased to 2.0mm. Requirement added for 300mm branch joints to allow branch cable to enter shell alongside main cable.
3.7	Low Voltage Terminations - SNE waveform cable included
3.8	Stop Ends – Requirement for yellow polythene bag with 'Danger Live' logo included for non resin joints.
Appendix 5	Requirement added to include resin volume required for each joint
Appendix 6	Obsolete commodity codes removed for heat shrink mains stop ends, resin stop end commodity codes added.

## 5. Definitions

Term	Definition
The Company	Northern Powergrid

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## 6. Authority for issue

### 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.

		Sign	Date
Sarah Phillips	CDS Administrator	Sarah Phillips	25/02/15

### 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.

Standard CDS review of 3 years	Non Standard Review Period & Reason	
No	Period: 5 Years	Reason: Update will be dictated by contact renewal date or any significant changes in the specification or documents referenced.

		Sign	Date
Andrew Kipling	Senior Policy and Standards Engineer	Andrew Kipling	25/02/15

### 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.

		Sign	Date
Ged Hammel	Senior Policy and Standards Engineer	Ged Hammel	25/02/15

### Approval

Approval is granted for publication of this document.

		Sign	Date
Chris Holdsworth	Policy and Standards Manager	Chris Holdsworth	25/02/15

### Authorisation

Authorisation is granted for publication of this document.

		Sign	Date
Mark Nicholson	Head of System Strategy	Mark Nicholson	27/02/15

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## Appendix 1 - Cable Range and Joint Requirements

### Mains Cable Types

- 3-Core CNE / 4-Core SNE XLPE insulated concentric with aluminium or copper wire waveform neutral/earth conductors, PVC oversheath cables with solid aluminium phase conductors to BS7870.  
CNE Conductor sizes: - 70mm<sup>2</sup>, 95mm<sup>2</sup>, 120mm<sup>2</sup>, 185mm<sup>2</sup> and 300mm<sup>2</sup>  
SNE Conductor sizes: - 95mm<sup>2</sup>, 185mm<sup>2</sup> and 300mm<sup>2</sup>
- 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<sup>2</sup>
- Impregnated paper-insulated cables with aluminium sheath/neutral conductor and three shaped solid aluminium phase conductors (CONSAC)  
Conductor sizes: - 70mm<sup>2</sup>, 120mm<sup>2</sup>, 185mm<sup>2</sup>, 240mm<sup>2</sup> and 300mm<sup>2</sup>

### Service Cable Types

- 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<sup>2</sup>.
- Concentric CNE / SNE Single and three-phase PVC insulated cable with solid aluminium phase conductors and stranded copper neutral.  
Conductor size 25mm<sup>2</sup> and 35mm<sup>2</sup>.
- Concentric SNE PVC insulated cable with stranded Copper conductors.  
Conductor range 4mm<sup>2</sup>, 16mm<sup>2</sup> and 25mm<sup>2</sup>.

The table below detail's range of joints required.

Joint	First Cable	Second Cable	Joint Type
Mains to Mains	Type 1	Type 1	Resin Filled
Mains to Mains	Type 1	Type 2	Resin Filled
Mains to Mains	Type 2	Type 2	Resin Filled
Mains to Mains	Type 1	Type 3	Resin Filled
Mains to Service	Type 1	Type 5	Resin Filled / Resin Free
Mains to Service	Type 2	Type 5	Resin Filled / Resin Free
Mains to Service	Type 3	Type 5	Resin Filled / Resin Free
Mains to Double Service	Type 1	Type 5	Resin Filled / Resin Free
Mains to Double Service	Type 2	Type 5	Resin Filled / Resin Free
Service to Service	Type 4	Type 4	Resin Filled / Resin Free
Service to Service	Type 4	Type 5	Resin Filled / Resin Free
Service to Service	Type 4	Type 6	Resin Filled / Resin Free
Service to Service	Type 5	Type 5	Resin Filled / Resin Free
Service to Service	Type 5	Type 6	Resin Filled / Resin Free
Service to Service	Type 6	Type 6	Resin Filled / Resin Free



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## Appendix 2 - Addendum to Supplier requirements

Joint kits shall incorporate all the necessary components (excluding the resin) to carry out a specific joint combination. As and when required additional "module kits" shall be supplied.

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.

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

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

Northern Powergrid are looking to include QR codes on the packaging of joint kits which will detail description, commodity code and manufacturer's reference. Consideration to include a link to the relevant jointing instructions. Details of available options to be included with tender returns.

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## Appendix 3 - Logistical requirements

To enable the Company 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.

The Company will give consideration to innovative alternatives to this specification.

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.

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## 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.

### 4 Instructions for completion

- When Cs1 code is entered no remark is necessary.
- 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:**

**Details of the 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.

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Specification for LV Joints and Terminations				
	Clause / Requirements	Conformance Code	Remarks / Comments	
<b>Joint Shells:</b>  - Min 2.0mm 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 10mm Encapsulation  - To be supplied with approved JI's  - Supplied with suitable Seal Clips / Strips	NPS/002/014 Parts 3.5 & 3.8			

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	Clause / Requirements	Conformance Code	Remarks / Comments	
Mechanical Connections to Metallic Sheaths of Cables:				
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:				
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			

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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		

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## Appendix 5 - Technical Information Check List

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

Requirement	Provided (Y/N)
Full product descriptions and part number/reference against commodity complete with volume of resin required where applicable.	
Appendix 4 – completed self-certification conformance declaration	
Complete set of drawings for each variant	
Type test evidence	
Packaging/delivery information	

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## Appendix 6 - Current Range of Joint Combinations

Commodity Code	Description
	<b>Heatshrink Joints – Service</b>
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.
	<b>Resin Filled Service Straight Joints</b>
086561	Straight Joint: Single Phase CNE PVC (4mm) – Single Phase CNE up to 35mm <sup>2</sup>
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
	<b>Stop Ends – (Service and Mains)</b>
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.
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.



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	<b>Branch Joints – Service</b>
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.
	<b>Mains Straight Joints – 3 Core waveform</b>
166329	Straight Joint: up to 95mm 3-core Waveform – 95mm 3-core Waveform.
166386	Straight Joint: 95, 185mm 3-core Waveform – 185mm 3-core Waveform.
166441	Straight Joint: 95, 185, 300mm – 3-core Waveform - 300mm 3-core Waveform.
166719	Straight Joint: up to 95mm 3-core Waveform – 95mm PILC.
166831	Straight Joint: 95, 185mm 3-core Waveform – up to 185mm PILC.
166901	Straight Joint: 95, 185, 300mm 3-core Waveform - 300mm PILC.
166511	Straight Joint: up to 95mm 3-core Waveform – 95mm Consac.
166583	Straight Joint: up to 185mm 3-core Waveform – 185mm Consac.
166653	Straight Joint: 300mm 3-core Waveform – up-to 300mm Consac.
	<b>Mains Straight Joints (4-core Waveform)</b>
165012	Mains Straight Joint: 95mm 4-Core Waveform – 95mm 4-Core Waveform.
165013	Mains Straight Joint: 185mm 4-Core Waveform – 185mm 4-Core Waveform.
165014	Mains Straight Joint: 300mm 4-Core Waveform – 300mm 4-Core Waveform.
	<b>Mains Straight Joints (4 – 3-core Waveform)</b>
165015	Mains Straight Joint: 95mm 4-Core Waveform – 95mm 3-Core Waveform.
165016	Mains Straight Joint: 185mm 4-Core Waveform – 185mm 3-Core Waveform.
165017	Mains Straight Joint: 300mm 4-Core Waveform – 300mm 3-Core Waveform.

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	<b>Main Straight Joint (4-Core Waveform – PILC)</b>
165027	Mains Straight Joint: 95mm 4-Core Waveform – 95mm 4-Core PILC.
165028	Mains Straight Joint: 95mm - 185mm 4-Core Waveform – 0.3 PILC.
165029	Mains Straight Joint: 185mm - 300mm 4-Core Waveform – up to 0.5 PILC.
	<b>Mains Branch Joints – 3 Core</b>
166973	Branch Joint: up to 95mm 3-core Waveform – 95mm 3-core Waveform Main.
167035	Branch Joint: 95,185 3-core Waveform – 185mm 3-core Waveform Main.
167105	Branch Joint: 95,185 3-core Waveform – 300mm 3-core Waveform Main.
167637	Branch Joint: 300mm 3-core Waveform – 300mm 3-core Waveform Main.
167707	Branch Joint: up to 95mm 3-core Waveform – 95mm PILC Main.
167779	Branch Joint: 95,185mm 3-core Waveform - 185mm PILC Main.
167849	Branch Joint: up to 300mm 3-core Waveform – 300mm PILC Main.
168023	Branch Joint: 95, 185mm 3-core Waveform – up to 185mm Consac Main.
168080	Branch Joint: 300mm 3-core Waveform – up to 300mm Consac Main.
	<b>Main Branch Joints – 4 Core</b>
165018	Mains Branch Joint: 95mm 4-Core Waveform – 95mm 4-Core Waveform.
165019	Mains Branch Joint: 95-185 mm 4-Core Waveform – 185mm 4-Core Waveform.
165020	Mains Branch Joint: 95-300mm 4-Core Waveform – 300mm 4-Core Waveform.
165021	Mains Branch Joint: 95mm 3-Core Waveform (Branch) – 95mm 4-Core Waveform (Main).
165022	Mains Branch Joint: 95-185mm 3-Core Waveform (Branch) – 185mm 4-Core Waveform (Main).
165023	Mains Branch Joint: 185-300mm 3-Core Waveform (Branch) – 300mm 4-Core Waveform (Main).
165030	Mains Branch Joint: 95mm 4-Core Waveform (Branch) – 95mm 4-Core PILC (Main).
165031	Mains Branch Joint: 95-185mm 4-Core Waveform (Branch) – 185mm 4-Core PILC (Main).
165032	Mains Branch Joint: 95-300mm 4-Core Waveform (Branch) – 300mm 4-Core PILC (Main).

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	<b>Pole Terminations</b>
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.
	<b>Service Branch Joint 3 &amp; 4-core Waveform – PILC &amp; Consac</b>
164998	Service Branch: up to 185mm Waveform 2 x Single Phase Services up to 35mm (The 2 services from same phase)
164997	Service Branch: up to 185 Waveform with up to 4 x Single Phase CNE Services.
165646	Service Branch: 300 Waveform with up to 4 x Single Phase CNE/SNE or 1 x 3-Phase CNE/SNE Services.
165970	Service Branch: up to 95mm PILC with up to 4 x Single Phase Services.
166189	Service Branch: up to 185mm PILC with 1-2 Single Phase Services.
166259	Service Branch: up to 300mm PILC with 1 or 2 Single Phase CNE or 1 x 3-Phase CNE Services.
165788	Service Branch: 70/120mm Consac with up to 4 x Single Phase Services.
165858	Service Branch: 185/240mm Consac with up to 4 services.

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	<b>Triple Concentric Joints</b>
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)