NPS/002/019 – Technical Specification for LV Distribution and Service Cables

1. Purpose

The purpose of this document is to detail the requirements of Northern Powergrid (the Company) in relation to low voltage (LV) distribution and service cables for use on the Company's distribution network.

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

Document Reference	Document Title	Version	Published Date
NPS/002/019	Technical Specification for LV Distribution and Service Cables	5.2	Jan 2019

2. Scope

This document describes the company requirements for LV distribution and service cables for use on the Company's distribution network. These are:

- Single phase CNE and SNE service cables with PVC and LSOH oversheath,
- Three phase CNE and SNE service cables with PVC and LSOH oversheath,
- Waveform cables (3 and 4-Core) with PVC and LSOH oversheath, and
- LV single core cables for substations

The following appendices form part of this technical specification:

- Appendix 1 - Cable types utilised,
- Appendix 2 - Self certification conformance declaration,
- Appendix 3 - Addendum to supplier requirements,
- Appendix 4 - Pre-commission testing, routine inspection and maintenance requirements,
- Appendix 5 - Logistical requirements, and,
- Appendix 6 - Technical information check list.

2.1. Table of Contents

3. Technical Requirements

3.1. Conditions of Installation

Cables specified in this document shall be installed in accordance with the Company's policy NSP/002 – Policy for the Installation of Distribution Power Cables. Cables will be laid "direct" into the ground, pulled into buried ducts, open trenches or installed in air. During storage and after installation cables can be expected to be subjected to the full range of climatic conditions encountered in the UK.

Cables laid "direct", in ducts or trenches may be surrounded by ground water for most of their operating lives. Cables installed above ground will be supported by means of cleats either vertically or horizontally and may be exposed to direct sunlight for significant periods. Where installed on wood poles these cables may come into contact with a pole preservation medium such as creosote.

Cables installed on wood poles may require the removal of their oversheath materials to allow connections with other apparatus. Where this occurs it can result in possible long term exposure of the insulating materials covering the phase or neutral conductors. Manufacturers shall ensure that the polymers used to manufacture these materials will not suffer from UV degradation.

Accessories required to joint onto the cable may be cold applied or require the application of heat.

3.2. Conditions of Operation

Power cables purchased in accordance with this specification are required to operate under conditions stipulated in:

- IMP/001/911 – Code of Practice for the Economic Development of Low Voltage Networks, and,
- IMP/001/909 – Code of Practice for Distribution System Parameters.

The following are general conditions of operation and represent the minimum requirements for low voltage power cables:

- Nominal system voltages: 400 - 230 Volt.
- All cables and associated equipment for use on the system shall be rated at a minimum of 1kV.
- Nominal system frequency: 50Hz.
- The system operates with the neutral point earthed either directly or through a resistance or reactance at one or more points.

3.3. Low Voltage Distribution Cables

3.3.1. 3 and 4 Core Waveform Cable for CNE/SNE Systems

Three phase distribution cables for CNE/SNE systems shall comply with the requirements of BS 7870 part 3 Clause 3.40.

Phase conductors shall be sectoral shaped solid aluminium or stranded copper as applicable. Solid aluminium conforms to Class 1 requirements as specified in BS EN 60228. The conductors shall also conform to the dimensional requirements specified in BS 3988.

Stranded annealed copper phase conductors shall meet the requirements of Class 2 as detailed in BS EN 60228.

Phase insulation shall be XLPE type DIX3 complying with the requirements of BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

Cores shall be laid up with a right hand direction of lay in the sequence Brown, Black, Grey (& Blue – for 4c cable).

The concentric Neutral/Earth wires shall be plain annealed copper bedded on a single rubber layer.

The oversheath shall be black PVC type DMV 23 complying with the requirements of BS 7870-1 Annex B and applied so that there is no internal protrusion of the oversheath material between or around the Neutral/Earth wires.

The cable ends should be sealed to prevent ingress of moisture during transport and storage.

Cable ends should be firmly attached to the drum during transport and storage.

The range of conductor sizes required is detailed in Appendix 1.

3.3.2. 3 and 4 Core Waveform Cable for CNE/SNE Systems with LSOH Oversheath

Three phase distribution cables for CNE/SNE systems shall comply with the requirements of BS 7870 part 3 Clause 3.50.

Phase conductors shall be sectoral shaped solid aluminium or stranded copper as applicable. Solid aluminium conforms to Class 1 requirements as specified in BS EN 60228. The conductors shall also conform to the dimensional requirements specified in BS 3988.

4-Core stranded copper, steel wire armoured (SWA) cable with an LS0H oversheath shall comply with the requirements of BS 6724. The minimum CPR classification for LS0H cables shall be Euro class “B” as detailed in BS EN 50575. A certification of compliance shall be provided with each drum or batch.

Phase insulation shall be XLPE type DIX3 complying with the requirements of BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

Cores shall be laid up with a right hand direction of lay in the sequence Brown, Black, Grey (& Blue – for 4c cable).

The concentric Neutral/Earth wires shall be plain annealed copper bedded on a single rubber layer.

The oversheath shall be ORANGE compound type DMZ 4 complying with the requirements of BS 7870-1 Annex B and applied so that there is no internal protrusion of the oversheath material between or around the Neutral/Earth wires.

The cable ends should be sealed to prevent ingress of moisture during transport and storage.

Cable ends should be firmly attached to the drum during transport and storage.

The range of conductor sizes required is detailed in Appendix 1.

3.4. Single Phase Distribution Cables for Substation Connections

3.4.1. Cables with Stranded Copper Conductor

Armoured cables shall comply with the requirements of BS 5467.

The conductors shall be either compacted or un-compacted circular stranded copper (class 2).

Phase insulation shall be XLPE type DIX3 complying with the requirements of BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

The oversheath shall be black PVC type DMV 23 complying with the requirements of BS 7870-1 Annex B and applied so that there is no internal protrusion of the oversheath material between or around the armour strands.

The range of conductor sizes and requirements for armoured versions are detailed in Appendix 1.

3.4.2. Cables with Sectoral Solid Aluminium Conductor

These cables shall comply with the requirements of BS 6346.

Phase insulation shall be XLPE type DIX3 complying with the requirements of BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

The oversheath shall be black PVC type DMV 23 complying with the requirements of BS 7870-1 Annex B.

The range of conductor sizes and requirements for non-armoured versions are detailed in Appendix 1.

3.5. Low Voltage Service Cables

3.5.1. Single and Three Phase CNE Service Cables

Single-phase and three-phase CNE service cables shall comply with the requirements of BS 7870 part 3 Clause 3.11.

The conductors shall be circular solid aluminium (class 1) or circular stranded copper (class 2). Copper conductors may be compacted or un-compacted. Aluminium conductors in accordance with BS EN 60228, Class 1 shall also conform to the dimensional requirements specified in BS 3988.

Phase insulation shall be XLPE type DIX 3 complying with BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

CNE Three phase service cables shall have the cores laid up with a right hand direction of lay in the sequence Brown, Black, Grey.

The neutral conductor shall be manufactured from plain annealed copper wires.

The oversheath shall be an extruded layer of PVC compound type DMV 23, conforming to the requirements given in BS 7870-1, Annex B. The oversheath shall be applied so that there is no internal protrusion of the oversheath material between or around the Neutral/Earth wires.

The cable ends should be sealed to prevent ingress of moisture during transport and storage.

Cable ends should be firmly attached to the drum during transport and storage.

The range of conductor sizes and materials required is detailed in Appendix 1.

3.5.2. Single and Three Phase CNE Service Cables with LSOH Oversheath

Single-phase and three-phase CNE service cables with LSOH oversheath shall comply with the requirements of BS 7870 part 3 Clause 3.12.

The conductors shall be circular solid aluminium (class 1) in accordance with BS EN 60228; Class 1 shall also conform to the dimensional requirements specified in BS 3988.

Single phase, stranded copper, steel wire armoured (SWA) cable with an LS0H oversheath shall comply with the requirements of BS 6724. The minimum CPR classification for LS0H cables shall be Euro class “B” as detailed in BS EN 50575. A certification of compliance shall be provided with each drum or batch.

Phase insulation shall be XLPE type DIX 3 complying with BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

CNE Three phase service cables shall have the cores laid up with a right hand direction of lay in the sequence Brown, Black, Grey.

The neutral conductor shall be manufactured from plain annealed copper wires.

The oversheath shall be an extruded layer of ORANGE compound type DMZ 4, conforming to the requirements given in BS 7870-1, Annex B. The oversheath shall be applied so that there is no internal protrusion of the oversheath material between or around the Neutral/Earth wires.

The cable ends should be sealed to prevent ingress of moisture during transport and storage.

Cable ends should be firmly attached to the drum during transport and storage.

The range of conductor sizes and materials required is detailed in Appendix 1.

3.5.3. Single and Three Phase SNE Service Cables

Single-phase and three phase split-concentric SNE service cables shall comply with the requirements of BS 7870 part 3 Clause 3.21.

The conductors shall be circular solid aluminium (class 1) or circular stranded copper (class 2). Copper conductors may be compacted or un-compacted. Aluminium conductors in accordance with BS EN 60228, Class 1 shall also conform to the dimensional requirements specified in BS 3988.

Phase insulation shall be XLPE type DIX 3 complying with BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

Three phase service cables shall have the cores laid up with a right hand direction of lay in the sequence Brown, Black, and Grey.

The neutral conductor shall be manufactured from plain annealed copper wires.

To distinguish the neutral conductor from the earth continuity conductor, each wire shall be covered by extrusion with a blue polymeric compound, conforming to the requirements of BS 7870-3.21 section 17.3, to a diameter approximately the same as that of the individual wires in the earth continuity conductor.

The concentric layer shall be applied with a right-hand direction of lay. The wires forming the neutral conductor and earth continuity conductor shall be applied in individual groups over the insulation with non-hygroscopic string separators.

Either one or two non-hygroscopic string separator(s) shall be located on either side of the group of bare copper wires to separate it from the group of covered wires.

The oversheath shall be an extruded layer of PVC compound type DMV 23, conforming to the requirements given in BS 7870-1, Annex B. The oversheath shall be applied so that there is no internal protrusion of the oversheath material between or around the Neutral and Earth wires.

The cable ends should be sealed to prevent ingress of moisture during transport and storage.

Cable ends should be firmly attached to the drum during transport and storage.

The range of conductor sizes and materials required is detailed in Appendix 1.

3.5.4. Single and Three Phase SNE Service Cables with LSOH Oversheath

Single-phase and three-phase SNE service cables with LSOH oversheath shall comply with the requirements of BS 7870 part 3 Clause 3.22.

The conductors shall be circular solid aluminium (class 1) in accordance with BS EN 60228; Class 1 shall also conform to the dimensional requirements specified in BS 3988.

Single phase, stranded copper, steel wire armoured (SWA) cable with an LS0H oversheath shall comply with the requirements of BS 6724. The minimum CPR classification for LS0H cables shall be Euro class “B” as detailed in BS EN 50575. A certification of compliance shall be provided with each drum or batch.

Phase insulation shall be XLPE type DIX 3 complying with BS 7870-1 Annex B, however, the maximum permissible shrinkage shall be 2%.

SNE Three phase service cables shall have the cores laid up with a right hand direction of lay in the sequence Brown, Black, Grey.

The neutral conductor shall be manufactured from plain annealed copper wires.

To distinguish the neutral conductor from the earth continuity conductor, each wire shall be covered by extrusion with a blue polymeric compound, conforming to the requirements of BS 7870-3.21 section 17.3, to a diameter approximately the same as that of the individual wires in the earth continuity conductor.

The oversheath shall be an extruded layer of ORANGE compound type DMZ 4, conforming to the requirements given in BS 7870-1, Annex B. The oversheath shall be applied so that there is no internal protrusion of the oversheath material between or around the Neutral/Earth wires.

The cable ends should be sealed to prevent ingress of moisture during transport and storage.

Cable ends should be firmly attached to the drum during transport and storage.

The range of conductor sizes and materials required is detailed in Appendix 1.

4. References

4.1. External Documentation

Reference	Title
BS 3988	Specification for wrought aluminium for electrical purposes. Solid conductors for insulated cables.
BS 5467 +A3	Electric cables. Thermosetting insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V
BS 6346	Electric cables — PVC insulated, armoured cables for voltages of 600/1 000 V and 1900/3 300 V
BS 6724	Thermosetting insulated armoured cables - 600/1000V to 1900/3300V - with low emission of smoke and corrosive gases when affected by fire.
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 or helical concentric cables with solid aluminium conductors, having low emission of smoke and corrosive gases when affected by fire
BS 7870-1	LV and MV polymeric insulated cables for use by distribution and generation Utilities Part 1: General
BS 7870-3.11	LV and MV Polymeric insulated cables for use by distribution and generation utilities – XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors
BS 7870-3.12	LV and MV Polymeric insulated cables for use by distribution and generation utilities – XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors having low emission of smoke and corrosive gases when effected by fire
BS 7870-3.21	LV and MV Polymeric insulated cables for use by distribution and generation utilities – XLPE insulated split concentric cables with copper or aluminium conductors
BS 7870-3.22	XLPE insulated split concentric cables with copper or aluminium conductors, 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 – XLPE insulated, copper wire waveform concentric cables with solid aluminium conductors
BS EN 50575	Power, control and communication cables - cables for general applications in construction works subject to reaction to fire requirements
BS EN 60228	Conductors of insulated cables

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

4.2. Internal Documentation

Reference	Title
IMP/001/909	Code of Practice for Distribution System Parameters
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
3.0 Technical Requirements	Specific requirements for SWA cables added
4.1 External Documentation	Reference to additional documents added
6.0 Authority for Issue	List updated
Appendix 1 – Cable Types Utilised	Additional items added in relation to rising lateral mains projects
Appendix 5 – Logistical Requirements	Additional items added in relation to rising lateral mains projects

5. Definitions

Term	Definition
CNE	Combined neutral and earth
CPR	Construction Product Regulations
LS0H	Low smoke zero halogen (or LSZH)
LV	Low voltage (50 to 1000 V ac)
PVC	Polyvinyl chloride
SNE	Separate neutral and earth
SWA	Steel wire armour
The Company	Northern Powergrid
XLPE	Cross-linked polyethylene

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	31/01/2022

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 Years**	**Reason:** To align with proposed contract period of 5 years
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Steven Salkeld	Policy and Standards Engineer	31/01/2022

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
Joseph Helm	Policy and Standards Manager	07/02/2022

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	System Engineering Manager	14/02/2022

Appendix 1 – Cable Types Utilised

Cable Type	Commodity Code
3-Core Waveform	
95mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110960
185mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110963
300mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110978
185mm^2 - 3 x Stranded Copper XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110920
300mm^2 - 3 x Stranded Copper XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110921
3-Core Waveform - LSOH	
95mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Concentric Copper Neutral/Earth Conductor, Orange LSOH Oversheath.	114271
185mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Concentric Copper Neutral/Earth Conductor, Orange LSOH Oversheath.	114269
300mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Concentric Copper Neutral/Earth Conductor, Orange LSOH Oversheath.	114270
4-Core Waveform	
95mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110965
185mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110964
300mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110966
185mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110922
300mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110923
4-Core Waveform - LSOH	
95mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110969
95mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110930
185mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110967
185mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110931
300mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110968
4-Core Waveform – LSOH - SWA	
95mm2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Steel Wire Armour (SWA), Orange LSOH Oversheath.	110932
185mm2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Steel Wire Armour (SWA), Orange LSOH Oversheath.	110933
Low Voltage Single Core Cables for Substations	
800mm^2 - Single Core 600/1000 Volt, Armoured: Stranded Copper Core: XLPE Insulated: PVC Oversheath.	102134

Cable Type	Commodity Code
480mm^2 – Single Core (Sectoral 4 x 120mm^2) 600/1000 Volt, Solid Aluminium Conductor XLPE Insulated & Sheathed.	014100
Single Phase CNE Service Cables	
16mm2 – XLPE Insulated Circular Stranded Copper Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	012260
25mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	114837
35mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	114856
35mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and Orange LSOH Oversheath.	114273
25mm2 – XLPE Insulated Stranded Copper Conductor, Helical Concentric Copper Neutral Conductors, Steel Wire Armour (SWA) and Orange LSOH Oversheath.	110934
Three-Phase CNE Service Cables	
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	114911
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and Orange LSOH Oversheath.	114910
Single Phase SNE Service Cables	
16mm^2 – XLPE Insulated Circular Stranded Copper Conductor, Helical Split Concentric Copper Neutral Earth Conductors and PVC Oversheath.	012088
25mm^2 – XLPE Insulated Circular Stranded Copper Conductor, Helical Split Concentric Copper Neutral Earth Conductors and PVC Oversheath.	012104
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors and Orange LSOH Oversheath.	114914
25mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors, Steel Wire Armour (SWA) and Orange LSOH Oversheath.	110935
Three- Phase SNE Service Cables	
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors and PVC Oversheath.	114912
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors and Orange LOSH Oversheath.	114913

Appendix 2 – Self Certification Conformance Declaration

LV distribution and service cables 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, where appropriate indicating if tests are type or routine tests.

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 the supplier shall provide the document reference to provide evidence of conformance.
- When any other code is entered the reason and supporting evidence for non - conformance shall be entered.
- Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate.
- Provide technical data sheets and associated drawings for each product.

Manufacturer / Supplier:

Manufacturer / Supplier Product Reference:

Northern Powergrid Product Reference (Commodity Code):

Details of the Cable Type (Voltage, Conductor Type and Size):

Name:

Signature:

Date:

NOTE: One sheet shall be completed for each type of cable offered.

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – 3 and 4 Core Waveform Cables – BS 7870 Part 3 – 3.40				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 7870 3.40 Clause 3			
- Phase Conductor	• BS 7870 3.40 Clause 4			
	• BS 7870 3.40 Clause 14.2			
Insulation				
- Insulation Type	• BS 7870 3.40 Clause 5 (XLPE Type DIX3)			
- Insulation Application	• BS 7870 3.40 Clause 14.4			
- Insulation Test	• BS 7870 3.40 Clause 15.2			
- Insulation Shrinkage	• Requirement in Clause 3.3.1 of NPS Document States 2%			
- Assembly of Cores	• BS 7870 3.40 Clause 6			
Rubber Layer				
- Rubber Layer Material	• BS 7870 3.40 Clause 7.3			
- Conformity	• BS 7870 3.40 Clause 14.5			
- Compatibility Test	• BS 7870 3.40 Clause 15.6			
- Concentric Conductor	• BS 7870 3.40 Clause 7.1			
	• BS 7870 3.40 Clause 7.2			
Oversheath				
- Oversheath Material	• BS 7870 – 3.40 Clause 8 Type DMV23			
- Oversheath Spark Test	• BS 7870 3.40 Clause 13.4			
- Oversheath Application	• BS 7870 3.40 Clause 14.6			
- Marking	• BS 7870 3.40 Clause 9.1			
	• BS 7870 3.40 Clause 13.5			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – 3 and 4 Core Waveform Cables – BS 7870 Part 3 – 3.40				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Cable End Sealing	• BS 7870 3.40 Clause 10			
- Dimensions	• BS 7870 3.40 Clause 11 Tables 1 (3-Core 3-Phase)			
	• BS 7870 3.40 Clause 11 Tables 2 (4-Core 3-Phase)			
Tests				
- Schedule of Tests	• BS 7870 3.40 Clause 12 Table 3			
- Conductor Resistance	• BS 7870 3.40 Clause 13.2			
- Voltage Test on Completed Cable	• BS 7870 3.40 Clause 13.3			
- Spark Tests	• BS 7870 3.40 Clause 13.4			
- Compatibility	• BS 7870 3.40 Clause 15.6 Table 4			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – 3 and 4 Core Waveform Cables with LSOH Oversheath – BS 7870 Part 3 – 3.50				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 7870 3.50 Clause 3			
- Phase Conductor	• BS 7870 3.50 Clause 4			
	• BS 7870 3.50 Clause 14.2			
Insulation				
- Insulation Type	• BS 7870 3.50 Clause 5 (XLPE Type DIX3)			
- Insulation Application	• BS 7870 3.50 Clause 14.3			
- Insulation Test	• BS 7870 3.50 Clause 15.3			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – 3 and 4 Core Waveform Cables with LSOH Oversheath – BS 7870 Part 3 – 3.50				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Insulation Shrinkage	• Requirement in Clause 3.3.2 of NPS Document States 2%			
- Assembly of Cores	• BS 7870 3.50 Clause 6			
Rubber Layer				
- Rubber Layer Material	• BS 7870 3.50 Clause 7.3			
- Conformity	• BS 7870 3.50 Clause 14.4.1			
- Compatibility Test	• BS 7870 3.50 Clause 15.8			
- Concentric Conductor	• BS 7870 3.50 Clause 7.1			
	• BS 7870 3.50 Clause 7.2			
Oversheath				
- Oversheath Material	• BS 7870 – 3.50 Clause 8 Type DMZ4			
- Oversheath Spark Test	• BS 7870 3.50 Clause 13.4			
- Oversheath Application	• BS 7870 3.50 Clause 14.6			
- Flame Propagation	• BS7870 3.50 Clause 14.7			
- Smoke Emission	• BS7870 3.50 Clause 14.8			
- Marking	• BS 7870 3.50 Clause 9.1			
	• BS 7870 3.50 Clause 13.5			
- Cable End Sealing	• BS 7870 3.50 Clause 10			
- Dimensions	• BS 7870 3.50 Clause 11 Tables 1 (3-Core 3-Phase)			
	• BS 7870 3.50 Clause 11 Tables 2 (4-Core 3-Phase)			
Tests				
- Schedule of Tests	• BS 7870 3.50 Clause 12 Table 3			
- Conductor Resistance	• BS 7870 3.50 Clause 13.2			
- Voltage Test on	• BS 7870 3.50 Clause 13.3			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – 3 and 4 Core Waveform Cables with LSOH Oversheath – BS 7870 Part 3 – 3.50				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Completed Cable				
- Spark Tests	• BS 7870 3.50 Clause 13.4			
- Compatibility	• BS 7870 3.50 Clause 15.8 Table 4			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase CNE Service Cables – BS 7870 Part 3 – 3.11				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 7870 3.11 Clause 3			
- Phase Conductor	• BS 7870 3.11 Clause 4			
	• BS 7870 3.11 Clause 14.2			
	• BS 7870 3.11 Clause 15.2			
Insulation				
- Insulation Type	• BS 7870 3.11 Clause 5 (XLPE Type DIX3)			
- Insulation Conformity	• BS 7870 3.11 Clause 15.4			
- Insulation Shrinkage	• Requirement in Clause 3.5.1 of NPS Document States 2%			
- Insulation Spark Test	• BS7870 3.11 Clause 14.4			
- Assembly of Cores	• BS 7870 3.11 Clause 6			
- Bedding for 3-Phase Cables	• BS 7870 3.11 Clause 7			
- Concentric Neutral/Earth Conductors	• BS 7870 3.11 Clause 8			
- Concentric Neutral/Earth Conductors Material & Construction	• BS 7870 3.11 Clause 15.3			
Oversheath				
- Oversheath Material	• BS 7870 – 3.11 Clause 9 Type DMV23			
- Oversheath Spark Test	• BS 7870 3.11 Clause 14.4			
- Oversheath Application	• BS 7870 3.11 Clause 15.5			
- Oversheath Test	• BS 7870 3.11 Clause 16.3			
- Marking	• BS 7870 3.11 Clause 10			
	• BS 7870 3.11 Clause 14.5			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase CNE Service Cables – BS 7870 Part 3 – 3.11				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Cable End Sealing	• BS 7870 3.11 Clause 11			
- Flame Propagation	• BS 7870 3.11 Clause 15.6			
- Dimensions	• BS 7870 3.11 Clause 12 Table 1 (1Ø Cu)			
	• BS 7870 3.11 Clause 12 Table 2 (1Ø Al)			
	• BS 7870 3.11 Clause 12 Table 3 (3Ø Cu)			
	• BS 7870 3.11 Clause 12 Table 4 (3Ø Al)			
Tests				
- Schedule of Tests	• BS 7870 3.11 Clause 13 Table 5			
- Conductor Resistance	• BS 7870 3.11 Clause 14.2			
- Voltage Test	• BS 7870 3.11 Clause 14.3			
- Insulation Resistance	• BS 7870 3.11 Clause 14.4 Table 6			
- Spark Tests	• BS 7870 3.11 Clause 14.5			
- Cable Markings	• BS 7870 3.11 Clause 14.6			
- General	• BS 7870 3.11 Clause 15.1 / 3.1.16.1 Table 5			
- Compatibility	• BS 7870 3.11 Clause 16.4 Table 7			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase CNE Service Cables with LSOH Oversheath BS 7870 Part 3 - 3.12				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 7870 3.12 Clause 3			
- Phase Conductor	• BS 7870 3.12 Clause 4			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase CNE Service Cables with LSOH Oversheath BS 7870 Part 3 - 3.12				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
	• BS 7870 3.12 Clause 14.2			
	• BS 7870 3.12 Clause 15.2			
Insulation				
- Insulation Type	• BS 7870 3.12 Clause 5 (XLPE Type DIX3)			
- Insulation Conformity	• BS 7870 3.12 Clause 15.4			
- Insulation Shrinkage	• Requirement in Clause 3.5.2 of NPS Document States 2%			
- Insulation Spark Test	• BS7870 3.12 Clause 14.4			
- Assembly of Cores	• BS 7870 3.12 Clause 6			
- Bedding for 3-Phase Cables	• BS 7870 3.12 Clause 7			
- Concentric Neutral/Earth Conductors	• BS 7870 3.12 Clause 8			
- Concentric Neutral/Earth Conductors Material & Construction	• BS 7870 3.12 Clause 15.3			
Oversheath				
- Oversheath Material	• BS 7870 – 3.12 Clause 9 Type DMZ4			
- Oversheath Spark Test	• BS 7870 3.12 Clause 14.4			
- Oversheath Application	• BS 7870 3.12 Clause 16.5			
- Oversheath Test	• BS 7870 3.12 Clause 16.4			
- Marking	• BS 7870 3.12 Clause 10			
	• BS 7870 3.12 Clause 14.5			
- Cable End Sealing	• BS 7870 3.12 Clause 11			
- Flame Propagation	• BS 7870 3.12 Clause 15.6			
- Dimensions	• BS 7870 3.12 Clause 12 Table 1 (1Ø Cu)			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase CNE Service Cables with LSOH Oversheath BS 7870 Part 3 - 3.12				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
	• BS 7870 3.12 Clause 12 Table 2 (1Ø Al)			
	• BS 7870 3.12 Clause 12 Table 3 (3Ø Cu)			
	• BS 7870 3.12 Clause 12 Table 4 (3Ø Al)			
Tests				
- Schedule of Tests	• BS 7870 3.12 Clause 13 Table 5			
- Conductor Resistance	• BS 7870 3.12 Clause 14.2			
- Voltage Test	• BS 7870 3.12 Clause 14.3			
- Insulation Resistance	• BS 7870 3.12 – 16.7 Table 6			
- Spark Tests	• BS 7870 3.12 – 14.4			
- Cable Markings	• BS 7870 3.12 – 14.5			
- General	• BS 7870 3.12 – 15.1 / 3.1.16.1 Table 5			
- Compatibility	• BS 7870 3.12 – 16.7 Table 6			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables – BS 7870 Part 3 – 3.21				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 7870 3.21 Clause 3			
- Phase Conductor	• BS 7870 3.21 Clause 4			
	• BS 7870 3.21 Clause 14.2			
	• BS 7870 3.21 Clause 16.2			
Insulation				
- Insulation Type	• BS 7870 3.21 Clause 5 (XLPE Type DIX3)			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables – BS 7870 Part 3 – 3.21				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Insulation Conformity	• BS 7870 3.21 Clause 16.4			
- Insulation Shrinkage	• Requirement in Clause 3.53 of NPS Document States 2%			
- Insulation Spark Test	• BS7870 3.21 Clause 15.4			
- Assembly of Cores	• BS 7870 3.21 Clause 6			
- Bedding for 3-Phase Cables	• BS 7870 3.21 Clause 7			
- Concentric Neutral Conductors	• BS 7870 3.21 Clause 8.1			
- Concentric Neutral Conformity	• BS 7870 3.21 Clause 15.2			
- Blue polymeric compound on Neutral Conductors	• BS 7870 3.21 Clause 17.3			
- Concentric Neutral Conductor Lay Length Conformity	• BS 7870 3.21 Clause 16.3			
- Earth Continuity Conductor	• BS 7870 3.21 Clause 8.2			
- Earth Continuity Conductor Conformity	• BS 7870 3.21 Clause 16.3			
- Application of Concentric Layer	• BS 7870 3.21 Clause 8.4			
Oversheath				
- Oversheath Material	• BS 7870 – 3.21 Clause 10 Type DMV23			
- Oversheath Spark Test	• BS 7870 3.21 Clause 15.4			
- Oversheath Application	• BS 7870 3.21 Clause 16.5			
- Oversheath Test	• BS 7870 3.21 Clause 17.4			
- Marking	• BS 7870 3.21 Clause 11			
	• BS 7870 3.21 Clause 15.5			
- Cable End Sealing	• BS 7870 3.21 Clause 12			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables – BS 7870 Part 3 – 3.21				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Flame Propagation	• BS 7870 3.21 Clause 16.6			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables – BS 7870 Part 3 – 3.21				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Dimensions	• BS 7870 3.21 Clause 13 Table 1 (1Ø Cu)			
	• BS 7870 3.21 Clause 13 Table 2 (1Ø Al)			
	• BS 7870 3.21 Clause 13 Table 3 (3Ø Cu)			
	• BS 7870 3.21 Clause 13 Table 4 (3Ø Al)			
Tests				
- Schedule of Tests	• BS 7870 3.21 Clause 14 Table 5			
- Conductor Resistance	• BS 7870 3.21 Clause 15.2			
- Voltage Test	• BS 7870 3.21 Clause 15.3			
- Insulation Resistance	• BS 7870 3.21 Clause 17.2			
- Spark Tests	• BS 7870 3.21 Clause 15.4			
- Cable Markings	• BS 7870 3.21 Clause 15.6			
- General	• BS 7870 3.21 Clause 16.1 Table 5			
- Compatibility	• BS 7870 3.21 Clause 17.5 Table 6			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables with LSOH Oversheath – BS 7870 Part 3 – 3.22				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables with LSOH Oversheath – BS 7870 Part 3 – 3.22				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Voltage Designation	• BS 7870 3.22 Clause 3			
- Phase Conductor	• BS 7870 3.22 Clause 4			
	• BS 7870 3.22 Clause 15.2			
	• BS 7870 3.22 Clause 16.2			
Insulation				
- Insulation Type	• BS 7870 3.22 Clause 5 (XLPE Type DIX3)			
- Insulation Conformity	• BS 7870 3.22 Clause 16.4			
- Insulation Shrinkage	• Requirement in Clause 3.53 of NPS Document States 2%			
- Insulation Spark Test	• BS7870 3.22 Clause 15.4			
- Assembly of Cores	• BS 7870 3.22 Clause 6			
- Bedding for 3-Phase Cables	• BS 7870 3.22 Clause 7			
- Concentric Neutral Conductors	• BS 7870 3.22 Clause 8.1			
- Concentric Neutral Conformity	• BS 7870 3.22 Clause 15.2			
- Blue polymeric compound on Neutral Conductors	• BS 7870 3.22 Clause 17.4			
- Concentric Neutral Conductor Lay Length Conformity	• BS 7870 3.22 Clause 16.3			
- Earth Continuity Conductor	• BS 7870 3.22 Clause 8.2			
- Earth Continuity Conductor Conformity	• BS 7870 3.22 Clause 16.3			
- Application of Concentric Layer	• BS 7870 3.22 Clause 8.4			
Oversheath				
- Oversheath Material	• BS 7870 – 3.22 Clause 10 Type DMZ 4			
- Oversheath Spark Test	• BS 7870 3.22 Clause 15.4			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Single and Three Phase SNE Service Cables with LSOH Oversheath – BS 7870 Part 3 – 3.22				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Oversheath Application	• BS 7870 3.22 Clause 16.5			
- Oversheath Test	• BS 7870 3.22 Clause 17.5			
- Oversheath Flame Propagation	• BS 7870 3.22 Clause 16.6			
- Marking	• BS 7870 3.22 Clause 11			
	• BS 7870 3.22 Clause 15.5			
- Cable End Sealing	• BS 7870 3.22 Clause 12			
- Dimensions	• BS 7870 3.22 Clause 13 Table 1 (1Ø Cu)			
	• BS 7870 3.22 Clause 13 Table 2 (1Ø Al)			
	• BS 7870 3.22 Clause 13 Table 3 (3Ø Cu)			
	• BS 7870 3.22 Clause 13 Table 4 (3Ø Al)			
Tests				
- Schedule of Tests	• BS 7870 3.22 Clause 14 Table 5			
- Conductor Resistance	• BS 7870 3.22 Clause 15.2			
- Voltage Test	• BS 7870 3.22 Clause 15.3			
- Corrosive and Acid Gas	• BS 7870 3.22 Clause 17.2			
- Insulation Resistance	• BS 7870 3.22 Clause 17.3			
- Spark Tests	• BS 7870 3.22 Clause 15.4			
- Neutral Conductor wire Covering Material	• BS7870 3.22 Clause 17.4			
- Cable Markings	• BS 7870 3.22 Clause 15.5			
- General	• BS 7870 3.22 Clause 16.1 Table 5			
- Compatibility	• BS 7870 3.22 Clause 17.7 Table 6			
- Flame Propagation	• BS 7870 3.22 Clause 17.8			
- Smoke Emission	• BS 7870 3.22 Clause 17.9			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Substation 1c Cables (Stranded Cu) – BS 5467				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 5467 Clause 4 (600/1000v)			
- Phase Conductor	• BS 5467 Clause 5			
Insulation				
- Material	• Cross-linked Polyethylene DIX3 to BS 7870 1			
- Thickness	• BS 5467 Clause 6.2			
- Testing	• BS 5467 Clause 6.3			
- Identification of Cores	• BS 5467 Clause 7			
- Bedding – General	• BS 5467 Clause 9.1			
- Bedding Thickness	• BS 5467 Clause 9.2			
- Wire Armours	• BS 5467 Clause 10.3			
- Armour Resistance	• BS 5467 Clause 10.5			
Oversheath				
- Oversheath Type	• PVC Type DMV23 as per BS7870-1			
- Thickness	• BS 5467 Clause 11.2			
- Testing	• BS 5467 Clause 11.3			
- Marking	• BS 5467 Clause 12			
- End Sealing	• BS 5467 Clause 13			
- Flame Propagation	• BS 5467 Clause 17.2			
- Dimensions	• BS 5467 Table 4 (Stranded Cu)			
Tests				
- Schedule of Tests	• BS 5467 Table 2 (Schedule of Tests)			
- Conductor Resistance	• BS 5467 Clause 16.2			
- Voltage Test	• BS 5467 Clause 16.3			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Substation 1c Cables (Stranded Cu) – BS 5467				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
- Insulation Shrinkage	• 2% as Stated in 3.4.1 of NPS Document			
- Compatibility Requirements	• BS 5467 Table 3			
- Compatibility	• BS 5467 Clause 18.2			
NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Substation 1c Cables (Solid Sectoral Al) – BS 6346				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	• Provide technical data sheets and associated drawings			
- Voltage Designation	• BS 6346 Clause 4 (600/1000v)			
- Phase Conductor	• BS 6346 Clause 5			
Insulation				
- Material	• Cross-linked Polyethylene DIX3 to BS 7870 1			
- Thickness	• BS 6346 Clause 6.2			
- Testing	• BS 6346 Clause 6.3			
- Identification	• BS 6346 Clause 7			
- Bedding General	• BS 6346 – 9.1			
- Bedding Thickness	• BS 6346 – 9.2			
Oversheath				
- General	• PVC Type DMV23 as per BS7870-1			
- Thickness	• BS 6346 Clause 11.2			
- Testing	• BS 6346 Clause 11.3			
- Marking	• BS 6346 Clause 12			
- End Sealing	• BS 6346 Clause 13			
- Flame Propagation	• BS 6346 Clause 17.2			
- Dimensions	• BS 6346 – Table 6 (Solid Al)			

NPS/002/019 – Technical Specification for LV Distribution and Service Cables – Substation 1c Cables (Stranded Cu) – BS 5467				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Tests				
- Schedule of Tests	• BS 6346 – Table 2 (Schedule of Tests)			
- Conductor Resistance	• BS 6346 Clause 16.2			
- Voltage Test	• BS 6346 Clause 16.3			
- Insulation Resistance	• BS 6346 Clause 16.4			
- Compatibility	• BS 6346 – Table 4			
- Compatibility Tests	• BS 6346 Clause 18.2			

Appendix 3 – Addendum to Supplier Requirements

For each power cable offered the Tenderer shall provide the following cable rating data using the operating conditions presented below: -

- Cover to top of cable being 450mm
- Ground Thermal Resistivity 1.2 Cm/W
- Ambient Temperature of ground 15^{o}C
- Ambient Temperature of air 25^{o}C
- Maximum conductor operating temperature 90^{o}C

The supplier shall provide with the tender full technical details of the equipment offered and shall indicate any divergence from the relevant British Standards or Energy Network Association Technical Specifications.

Supplier Requirements				
Clause	**Requirement**	**Conformance Code (Y/N)**	**Evidence Reference**	**Remarks**
Cable Rating Data	Cable rating laid direct (Amps)			
Cable Rating Data	Cable rating laid in a 100mm internal diameter duct (Amps)			
Cable Rating Data	Cable rating in air (Amps)			
Cable Rating Data	Maximum dc resistance per phase conductor at 20^{0}C (Ohms/km)			
Cable Rating Data	Maximum ac resistance per phase conductor at maximum conductor temperature (Ohms/km)			
Cable Rating Data	Star reactance at 50Hz (Ohms/km)			
Cable Rating Data	Star capacitance at 50Hz (Ohms/km)			
Cable Rating Data	Charging current per phase at normal voltage and frequency (mA/m)			
Cable Rating Data	Zero sequence impedance $R_0 + jX_0$ (Ohms/km)			
Cable Rating Data	Minimum dynamic bending radius (mm)			
Cable Rating Data	Minimum static bending radius (mm)			

Supplier Requirements				
Clause	**Requirement**	**Conformance Code (Y/N)**	**Evidence Reference**	**Remarks**
Cable Rating Data	Recommended pulling method and maximum pulling tension (kgF)			
Oversheath marking	The oversheath of all cables shall be marked in accordance with the requirements of the relevant Standard specified in this document.			
Cable metre marking	All cables shall be metre marked throughout the length of the cable and the start and end values shall be marked on the drum label.			
Cable reference number marking	Cables shall be marked with some form of reference or batch number that can be used to ensure batch trace ability of materials and manufacturing facilities used in the construction of the cable.			
Internal profile of the PVC sheath	Tenderers shall submit a drawing showing the internal profile of the PVC sheath.			

Appendix 4 – Pre-commission Testing, Routine Inspection and Maintenance Requirements

Suppliers shall provide details of the recommended pre-commission testing and inspection required.

They shall also provide information regarding periodic inspection and maintenance requirements to be undertaken during the lifetime of their product.

Detailed inspection and maintenance instructions shall be also be provided.

Testing ,inspection or maintenance		
Clause	**Requirement**	**Comment**
Pre commissioning Testing	Please state any pre commissioning tests	
Routine Inspection	Please state any inspections required during life time of the cable	
Routine Maintenance	Please state any routine maintenance required during the normal expected life of the cable	

Appendix 5 – Logistical Requirements

Drums used for LV distribution and service cables shall have the following dimensions and weights as shown in the table below. Where dimensions and weights are not provided, then confirmation shall be agreed with the Logistics department on an individual basis.

Cable Type	Commodity Code	Suggested Max Drum Size (Height) (Dia mm)	Suggested Max Drum Size (Width) (mm)	Maximum Drum Weight (kg)	Maximum Quantity On A Drum (m)
3-Core Waveform					
95mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110960	2200	1200	2000	250/500
185mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110963	2200	1200	2000	250
300mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110978	2200	1200	2000	250
185mm^2 - 3 x Stranded Copper XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110920	2200	1200	2000	250
300mm^2 - 3 x Stranded Copper XLPE Insulated Phase Conductors, Copper Neutral/Earth Conductor & PVC Oversheath.	110921	2200	1200	2000	250
3-Core Waveform - LSOH					
95mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Concentric Copper Neutral/Earth Conductor, Orange LSOH Oversheath.	114271	2200	1200	2000	250/500
185mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Concentric Copper Neutral/Earth Conductor, Orange LSOH Oversheath.	114269	2200	1200	2000	250
300mm^2 - 3 x Solid Aluminium XLPE Insulated Phase Conductors, Concentric Copper Neutral/Earth Conductor, Orange LSOH Oversheath.	114270	2200	1200	2000	250
4-Core Waveform					
95mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110965	2200	1200	2000	250/500
185mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110964	2200	1200	2000	250
300mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110966	2200	1200	2000	250

Cable Type	Commodity Code	Suggested Max Drum Size (Height) (Dia mm)	Suggested Max Drum Size (Width) (mm)	Maximum Drum Weight (kg)	Maximum Quantity On A Drum (m)
185mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110922	2200	1200	2000	250
300mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Copper Earth Conductor & PVC Oversheath.	110923	2200	1200	2000	250
4-Core Waveform - LSOH					
95mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110969	2200	1200	2000	250/500
95mm2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110930	2200	1200	2000	250/500
185mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110967	2200	1200	2000	250
185mm2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110931	2200	1200	2000	250
300mm^2 - 4 x Solid Aluminium XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Orange LSOH Oversheath.	110968	2200	1200	2000	250
4-Core Waveform – LS0H - SWA					
95mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Steel Wire Armour (SWA), Orange LSOH Oversheath.	110932	2200	1200	2000	250
185mm^2 - 4 x Stranded Copper XLPE Insulated Neutral/Phase Conductors, Concentric Copper Earth Conductor, Steel Wire Armour (SWA), Orange LSOH Oversheath.	110933	2200	1200	2000	250
Low Voltage Single Core Cables for Substations					
800mm^2 - Single Core 600/1000 Volt, Armoured: Stranded Copper Core: XLPE Insulated: PVC Oversheath.	102134	2200	1200	2000	250
480mm^2 – Single Core (Sectoral 4 x 120mm^2) 600/1000 Volt, Solid Aluminium Conductor PVC Insulated & Sheathed.	014100	2200	1200	2000	250
Single Phase CNE Service Cables					
16mm2 – XLPE Insulated Circular Stranded Copper Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	012260	750	500	120	250/500
25mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	114837	750	500	120	250/500

Cable Type	Commodity Code	Suggested Max Drum Size (Height) (Dia mm)	Suggested Max Drum Size (Width) (mm)	Maximum Drum Weight (kg)	Maximum Quantity On A Drum (m)
35mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	114856	750	500	120	250/500
35mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and Orange LSOH Oversheath.	114273	750	500	120	250/500
25mm2 – XLPE Insulated Stranded Copper Conductor, Helical Concentric Copper Neutral Conductors, Steel Wire Armour (SWA) and Orange LSOH Oversheath.	110934	750	500	120	250/500
Three-Phase CNE Service Cables					
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and PVC Oversheath.	114911	1000	1000	350	250
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Concentric Copper Neutral Conductors and Orange LSOH Oversheath.	114910	1000	1000	350	250
Single Phase SNE Service Cables					
16mm^2 – XLPE Insulated Circular Stranded Copper Conductor, Helical Split Concentric Copper Neutral Earth Conductors and PVC Oversheath.	012088	750	500	150	250/500
25mm^2 – XLPE Insulated Circular Stranded Copper Conductor, Helical Split Concentric Copper Neutral Earth Conductors and PVC Oversheath.	012104	750	500	150	250/500
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors and Orange LSOH Oversheath.	114914	750	500	150	250/500
25mm2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors, Steel Wire Armour (SWA) and Orange LSOH Oversheath.	110935	750	500	150	250/500
Three- Phase SNE Service Cables					
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors and PVC Oversheath.	114912	1000	1000	350	250
35mm^2 – XLPE Insulated Circular Solid Aluminium Conductor, Helical Split Concentric Copper Neutral Earth Conductors and Orange LOSH Oversheath.	114913	1000	1000	350	250

All cable drums shall be marked in accordance with the relevant cable Specification or Standard. The drum label shall also contain:

a) Northern Powergrid commodity code

b) Name of manufacturer

c) Supplied length

d) Rated voltage

e) Number of cores

f) Size of conductor

g) Type of conductor material ("Cu" / "Al", “stranded” / “solid”))

h) Abbreviated description of cable construction

i) Gross and net weights

j) Direction of rolling drum

k) The metre marking start and end values

l) The unique reference number

In order to avoid snagging, cables shall be neatly wound in layers on the drum with the inner “start” end either, protruding through, protected and securely fixed to the outer flange of the drum or securely fixed to the inner surface of the drum. The end of the wound cable shall be securely fixed into position on the drum.

Cable drums may be stored for long periods outdoors. All drum labels shall remain legible and durable under these conditions.

All service cable drums shall be non-returnable the tenderers shall state at the time of tender their proposed cable drum sizes and weights for each cable type offered.

The ends of all cables shall be effectively sealed against the ingress of moisture by a method appropriate to the cable type. Tenderers shall detail at the time of tender their proposed sealing arrangement for each cable type offered.

Where applicable the cable end projecting from the drum shall be protected from damage during transit, storage and handling on site.

The cable on the drum shall not be susceptible to damage during transit, storage and handling on site.

Tenderers shall state at the time of tender their proposed method of protection for each cable.

Each delivery length of cable shall be allocated a unique reference number. This number shall appear on the factory test sheet covering the cable length, shall be clearly marked on the drum on which the length is delivered and shall be referred to on all invoices and advice notes.

Additional costs should be included if applicable for the option of providing a unique identifier / batch number or Northern Powergrid printed onto the aluminium conductor to enable positive identification of ownership in event of theft.

Appendix 6 – 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 (Y/N)
Appendix 2 – Self Certification Conformance Declaration	
• Full product descriptions and part number/reference	
• Complete set of technical data sheets and associated drawings	
• Completed self-certification conformance declaration including **all** associated type test data	
Appendix 3 – Addendum to Supplier Requirements	
• Provide additional information as specifically requested	
Appendix 4 – Pre-commission Testing, Routine Inspection and Maintenance Requirements	
• Provide details of:	
○ Pre-commission testing	
○ Routine inspection requirements	
○ Routine maintenance requirements	
○ Product Quality Plan	
Appendix 5 – Logistical Requirements	
• Provide logistical details with regard to packaging / delivery information and requirements	