NPS/002/018 – Technical Specification for Pilot, Control and Telephone Cables

1. Purpose

The purpose of this document is to detail the requirements of Northern Powergrid (the Company) in relation to multicore and multipair cables for use on the Northern Powergrid distribution networks.

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

Document Reference	Document Title	Version	Published Date
NPS/002/018	Technical Specification for Pilot, Control and Telephone Cables	5.0	July 2018

2. Scope

This Specification details the requirements for PVC insulated and sheathed multicore, armoured cables suitable for operation on cable systems having a working voltage up to and including 600/1000 volts, polyethylene insulated, polyethylene inner-sheathed "filled" and "unfilled" multipair armoured cables with PVC oversheath, PVC insulated multipair armoured light current control cables and PVC insulated armoured cables for use as LVAC supplies to primary substations.

Technical documents referenced within this specification refer to the latest versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of supply.

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. Polyethylene Insulated (Armoured) Multipair Cables

3.1.1. General

Polyethylene insulated, Polyethylene inner-sheathed 'filled' or 'unfilled' armoured cables with PVC oversheath, which are the intended to provide circuits for feeder protection, speech and data transmission.

3.1.2. Requirements

a) Multipair cables for situations where the induced voltages will not exceed 5kV shall comply with the requirements of section 5 and table E2(a) of ENA TS 09-6.

b) Multipair cables for situations where the induced voltages may exceed 5kV but not exceeding 15kV shall comply with the requirements of section 5 and table E2(b) of ENA TS 09-6.

3.1.3. Conductors

Plain annealed copper wire complying with BS EN 60228.

3.1.4. Conductor Insulation

Polyethylene Insulation shall be in accordance with BS 7870-8.2.

3.1.5. Conductor Size and Cable Configuration

The size and numbers of cores required are as detailed in Appendix 1.

3.1.6. Cable Filling

Filled cables shall be filled with a suitable medium which shall have no detrimental effect with the core insulation and insulation colours.

3.1.7. Inner Bedding

The inner bedding shall consist of an extruded layer of a polyethylene polymer, as detailed in BS 7870-8.2.

3.1.8. Wire Armouring

The armour of the cable shall consist of one layer of galvanised steel wire as detailed in BS 7870- 8.2.

3.1.9. Identification of Cores

The cores shall be clearly identified by colours in accordance with the sequence detailed in ENA TS 09-6.

3.1.10. Oversheath/Embossing-Markings

The cable oversheath shall consist of an extruded covering of Black PVC type TM1 in accordance with BS EN 50363-4.1. Along with the manufacturers identification mark, the sheath of the cables shall be embossed **ELECTRIC CABLE – TELE** for unfilled cables and **ELECTRIC CABLES – TELE- F** for filled cables, as per BS 7870-8.2. Additional markings as detailed in Appendix 3 shall also be present.

3.2. PVC Insulated Multipair (Armoured) Light Current Control Cables

3.2.1. General

PVC insulated Multipair light current control cables (armoured) for use with control, indication and alarm equipment for switchgear and similar power apparatus. These cables are required to meet the voltage test associated with a 5kV induced voltage level between the bunched conductors and the armour only.

3.2.2. Requirements

Single wire steel armoured PVC multipair cables having (2 pairs to 40 pairs) as detailed in ENA TS 09-6 – "*Auxiliary multicore and multipair cables*" table E.3(b) with copper conductors, a collective screen and having reduced fire propagation performance complying with the requirements of BS 7870:8.4 – *"LV and MV polymeric insulated cables for use by distribution and generation utilities"*

3.2.3. Conductors

Conductors shall be of plain copper wire consisting of a single strand of 0.8mm nominal diameter complying with BS EN 60228.

3.2.4. Conductor Insulation

The insulation compound shall be PVC Compound type T1 X, conforming to the requirements of BS 7870-8.4 Table 2. The insulation shall be applied so that it fits closely on the conductor and it shall be possible to remove it without damage to the insulation itself or to the conductor.

The insulation shall be applied by a suitable extrusion process, cross-linked where required, and shall form a compact and homogenous body.

3.2.5. Conductor Size and Cable Configuration

The size and numbers of cores required shall be as detailed in Appendix 1 with the identification and arrangement as detailed in clause 3.3.8 of this document.

3.2.6. Assembly of Cores, Fillers , Binders and Rip Cord

Cables shall be twinned and where required formed into separate identifiable units, which shall then be laid up to form a compact and symmetrical cable using non-hygroscopic fillers and binders as required.

A terylene rip cord shall be included to facilitate stripping.

3.2.7. Collective Screen

2-pair cables with binding tape shall have a plain aluminium tape of minimum thickness 0.075 mm, applied helically with a minimum 25 % overlap, in contact with which shall be a 1/0.8 mm tinned copper drain wire or stranded conductor of equivalent cross-sectional area.

5-pair and above cables shall have a collective aluminium screen with a backing which will ensure adhesion to the bedding. The laminated screen tape shall be applied longitudinally over the rip cord and drain wire and shall be in electrical contact with the latter, which shall be a 1/0.8 mm diameter tinned copper wire. The laminated screen shall be a minimum thickness of 0.15 mm aluminium bonded to a suitable backing material.

3.2.8. Wire Armouring

The armour of the cable shall consist of one layer of galvanised steel wire as detailed in BS 7870- 8.4 clause 11.

3.2.9. Bedding Layer

The bedding layer shall be PVC compound type TI 1, conforming to the requirements of BS EN 50363-3:2005+A1 :2001.

3.2.10. Identification of Cores

The cores shall be laid up in accordance with BS 7870:8.4 clause 6.2 and clearly identified by colours in accordance with the colour code sequence detailed in BS 7870:8.4 Table 1.

3.2.11. Oversheath/Embossing-Markings

The cable oversheath shall consist of an extruded covering of Black PVC type TM1 in accordance with BS EN 50363-4.1. Along with the manufacturers identification mark, the sheath of the cables shall be embossed **ELECTRIC CABLE – TELE** for unfilled cables as per BS 7870-8.4. Additional markings as detailed in Appendix 3 shall also be present.

3.3. PVC Insulated Multicore Cables

3.3.1. General

PVC insulated and sheathed multicore, armoured cables suitable for operation on cable systems having a working voltage up to and including 600/1000volts. The primary use is for remote operation of electrical equipment and switchgear protection circuits within substations.

The cable shall comply with the requirements of section 5 and Annex E, table E1 of ENA TS 09-6 - Auxiliary Multicore and Multipair Cables.

3.3.2. Conductor Size and Cable Configuration

The size and numbers of cores required are as detailed in Appendix 1.

3.3.3. Conductor

Conductors shall comply with BS EN 60228 having plain annealed copper wires.

3.3.4. Core Insulation

The white PVC core insulation shall be type TI 1 compound in accordance with BS EN 50363-3.

3.3.5. Core Identification

Core identification shall be effected by black printed numbering on white cores as the scheme of identification as detailed in ENA TS 09-06.

3.3.6. Inner Bedding

The inner bedding shall consist of an extruded layer of a polymer compound having a tensile strength and elongation break of not less than 50%, thickness as detailed in BS 7870-8.1.

3.3.7. Armour Wires

The armour of the cable shall consist of one layer of galvanised steel wire as detailed in BS 7870- 8.1.

3.3.8. Oversheath/Embossing-Markings

The cable oversheath shall consist of an extruded covering of Black PVC type TM1 in accordance with BS EN 50363-4.1.

Along with the manufacturer identification, the cable shall be embossed with the following legend: **ELECTRIC CABLE 600 / 1000 V AUX** as detailed in BS 7870-8.1. Additional markings as detailed in Appendix 3 shall also be present.

3.4. PVC Insulated, Armoured Cables for LV AC Supplies

3.4.1. General

PVC insulated, 5 core, armoured cables suitable for operation on cable systems having a working voltage up to and including 600/1000 volts manufactured in accordance with BS 6346 - *Electric cables — PVC insulated, armoured cables for voltages of 600/1 000 V and 1 900/3 300 V.*

The primary use for this cable is to facilitate LV AC supplies into primary Substations from the local network.

3.4.2. Conductor Size and Cable Configuration

This cable shall be provided as detailed in BS 6346, Table 14 but with a 95mm^2 5 core variant instead of the currently largest size of 70mm^2.

3.4.3. Conductor

Conductors shall be circular stranded copper as given BS 6346, Table 14 and shall conform to the requirements of BS 6346, Table 2 and BS EN 60228.

3.4.4. Core Insulation

The core insulation shall be PVC compound TI 1 conforming to BS EN 50363-3. The insulation shall be applied by the extrusion process to form a compact and homogeneous layer. The core insulation shall be spark tested as detailed in BS 6346 clause 6.3 with the thickness of the insulation complying with BS 6346 clause 6.2.

3.4.5. Core Identification

The cores shall be identified as follows:- Green/Yellow (Earth), Blue (Neutral) Brown, Black and Grey (Line Conductors). The Bi-colour core combination used for the earth conductor shall comply with the requirements of BS 6346 clause 7.2

3.4.6. Laying-up

The 5 cores cables shall be laid-up with a right-hand or right-and-left-hand alternating direction of lay.

3.4.7. Inner Bedding

The inner bedding shall consist of an extruded layer of a polymer compound as detailed in BS 6346 clause 9.

3.4.8. Armour Wires

The armour of the cable shall consist of a single layer of galvanised steel wire as detailed in BS 6349 clause 10.

3.4.9. Oversheath/Embossing-Markings

The cable oversheath shall consist of an extruded covering of Black PVC type TM1 in accordance with BS EN 50363-4.1. The thickness and testing of the oversheath shall be as detailed in BS 6346 clause 11

Along with the manufacturer identification, the cable shall be embossed with the following legend: **ELECTRIC CABLE 600 / 1000 V** as detailed in BS 6346 clause 12. Additional markings as detailed in Appendix 3 shall also be present.

4. References

4.1. External Documentation

The cables shall comply with the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of tendering, except where varied by this standard. In respect the following documents are particularly relevant.

Reference	Title
BS 5467	Electric cables — Thermosetting insulated, armoured cables for voltages of 600/1 000 V and 1 900/3 300 V
BS 6346	Electric cables — PVC insulated, armoured cables for voltages of 600/1 000 V and 1 900/3 300 V
BS 7655-1.3	Insulating and sheathing materials for cables - Part 1: Cross-linked elastomeric insulating compounds - Section 1.3: XLPE
BS 7870-8.4	LV and MV polymeric insulated cables for use by distribution and generation utilities
BS 7870-8-1	LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 8: Specification for multicore and multipair cables for installation above and below ground – Section 8.1: Single wire armoured and PVC sheathed multipair cable with copper conductors
BS 7870-8-2	LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 8: Specification for multicore and multipair cables for installation above and below ground. - Section 8.2 Single wire armoured and PVC sheathed multipair cable with copper conductors
BS EN 50363-3 +A1	Insulating, Sheathing and Covering Materials for Low Voltage Energy Cables – Part 3: PVC insulating compounds
BS EN 50363-4-1	Insulating, Sheathing and Covering Materials for Low Voltage Energy Cables – Part 4-1: PVC Sheathing compounds
BS EN 60228	Conductors of Insulated Cables
ENA TS 09-6	Auxiliary Multicore and Multipair Cables

4.2. Internal Documentation

Reference	Title
IMP/001/913	Code of Practice for the Economic Development of the EHV System
NPS/002/013	Technical Specification For Telephone and pilot cable joints

4.3. Amendments from Previous Version

Reference	Description
Appendix 5 – Logistical Requirements	Table updated
Section 6 – Authority for Issue	Updated to represent current structure

5. Definitions

Term	Definition
PVC	Polyvinyl Chloride
The Company	Northern Powergrid

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	20/01/2022

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	Reason:
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Steven Salkeld	Policy and Standards Engineer	20/01/2022

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	20/01/2022

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	System Engineering Manager	28/01/2022

Appendix 1 – Cable Types Utilised

Reference IMP/001/913 – Code of Practice for the Economic Development of the EHV System

Cable Type	Commodity Code
Polyethylene Insulated Multipair (Armoured)Auxiliary Cables (in accordance with clause 3.1)	
7-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120861
7-Pair: **UNFILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	011585
19-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120876
37-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120880
37-Pair: **UNFILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	121597
61-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120895
PVC Insulated Multipair (Armoured) Light Current Control Cables - (in accordance with clause 3.2)	
2-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125535
5-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125537
10-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125640
20-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125643
40-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125646
PVC Insulated Multicore Auxiliary Cables (in accordance with clause 3.3)	
2 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125441
4 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125460
7 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	011015
12 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125494
19 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125507
27 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125530
2 Core: 7x0.85mm (4.0mm2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125649
5 Core: 7x0.85mm (4.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125463
7 Core 7x0.85mm (4.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125466
2 Core: 7x1.04mm (6.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125672
5 Core: 7x1.04mm (6.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125469

Cable Type	Commodity Code
7 Core: 7x1.04mm (6.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125471
PVC Insulated, armoured cables for LV AC Supplies - (in accordance with Clause 3.4)	
5 Core: 95mm^2 PVC insulated , Solid Aluminium conductor, steel wire armoured and PVC Oversheath	125480

Notes:-

The outside diameters of XLPE Insulated, Steel wire Armoured, PVC over sheathed cables specified to BS 5467 shall be as detailed below:-

Cable Type	Cable O/D (mm)
5 Core: 4.0mm^2	16.5
7 Core: 4.0mm^2	18.4
5 Core: 6.0mm^2	18.2
7 Core: 6.0mm^2	19.5

Appendix 2 – Self Certification Conformance Declaration

Pilot and telephone cables are 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 evidence to confirm 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.

Specification for Polyethylene Insulated Multipair (Armoured)Auxiliary Cables (in accordance with clause 3.1)				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	Provide technical data sheets and associated drawings			
Conductors	BS EN 60228			
Insulation				
- Requirement	BS 7870-8.2: 5			
- Voltage Test	BS 7870-8.2: 14.4			
- Non Electrical	BS 7870-8.2: 16.2			
- Application &Thickness	BS 7870-8.2: 15.3			
- Core Identification	ENATS 09-6 Annex F / Fig F.2			
- Cable Construction	ENATS 09-6 Annex E / Table E2(a) / E2(b)			
Bedding				
- Layer & Thickness	BS 7870-8.2: 15.7			
- Testing	BS 7870-8.2: 16.3			
Compatibility of Filling	BS 7870-8.2: 16.10			
Water Penetration	BS 7870-8.2: 15.11			
Wire Armouring				
- Diameter	BS 7870-8.2: 15.8			
- Mass of Zinc Coating	BS 7870-8.2: 16.4			
Oversheath				
- Thickness	BS 7870-8.2: 15.8			
- Marking	BS 7870-8.2: 14.7			
- Voltage Tests	BS 7870-8.2: 14.6			
- Compatibility	BS 7870-8.1: 16.8			
- Tests	BS 7870-8.2: 16.7			

Specification for PVC Insulated Multipair (Armoured) Light Current Control Cables - (in accordance with clause 3.2)					
	Category of Test	**Clause / Requirements**	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data		Provide technical data sheets and associated drawings			
Electrical					
Conductor Resistance	R	BS 7870-8.4, clause 16.2			
Insulation Resistance	R	BS 7870-8.4, clause 16.3			
Voltage Test	R	BS 7870-8.4, clause 16.4			
Mutual Capacitance	T	BS 7870-8.4, clause 16.3			
Capacitance Unbalance	T & S	BS 7870-8.4, clause 18.4 & 17.4			
Mutual Inductance	T	BS 7870-8.4, clause 18.5			
Voltage Test After Bending	T	BS 7870-8.4, clause 18.6			
Spark test on oversheath	R	BS 7870-8.4, clause 16.5			
Provisions covering Constructional and dimensional Characteristics					
Conductor Material and construction Insulation:-	S				
Application	S	BS 7870-8.4, clause 17.2			
Thickness	S	BS 7870-8.4, clause 17.3			
Core Identification	S	BS 7870-8.4, clause 17.5.1			
Pair Identification	S	BS 7870-8.4, clause 17.5.2			
Unit Identification	S	BS 7870-8.4, clause 17.5.2			
Laid up Cores	S	BS 7870-8.4, clause 17.6			
Rip Cord	S	BS 7870-8.4, clause 17.7			
Collective Screen	S	BS 7870-8.4, clause 17.8			
Bedding Sheath	S	BS 7870-8.4, clause 17.9			
Armour Wire					
- Wire Diameter	S	BS 7870-8.4, clause 17.10			
- Mass of Zinc Coating	T	BS 7870-8.4, clause 18.7.1			
- Wrapping Test	T	BS 7870-8.4, clause 18.7.2			
Oversheath Thickness	S	BS 7870-8.4, clause 17.12			

Specification for PVC Insulated Multipair (Armoured) Light Current Control Cables - (in accordance with clause 3.2)					
	Category of Test	Clause / Requirements	Conformance Code	Evidence Reference	Remarks / Comments
Cable Marking	R	BS 7870-8.4, clause 16.6			
Overall Dimensions	R	BS 7870-8.4, clause 16.6			
Mechanical Properties					
Insulation	T	BS 7870-8.4, clause 18.8			
Extruded Bedding	T	BS 7870-8.4, clause 18.9			
Oversheath	T	BS 7870-8.4, clause 18.10			
Electrical Type Approval	T	BS 7870-8.4, clause 18.2			
Tests under Fire Conditions					
Oxygen Index	T & S	BS 7870-8.4, clause 17.13.2 & 18.11.2			
Propagation:-					
- Single Cable	S	BS 7870-8.4, clause 17.13.3			
- Bunched Cables	T	BS 7870-8.4, clause 18.11.3			

Test Types S= Sample, R = Routine & T = Type Approval

Specification for PVC Insulated Multicore Auxiliary Cables (in accordance with clause 3.3)				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Technical Data	Provide technical data sheets and associated drawings			
Conductors	BS EN 60228			
Insulation				
- Requirement	BS 7870-8.1: 5 / BS 5467: 6			
- Voltage Test	BS 7870-8.1: 14.4 / BS 5467: 16.3			
- Non Electrical	BS 7870-8.1: 16.2 / BS 5467: 18.2			
- Application &Thickness	BS 7870-8.1: 15.3 / BS 5467: 6.2			
- Core Identification	ENATS 09-6 Annex F / Fig F.1			
- Cable Construction	ENATS 09-6 Annex E / Table E1			
Bedding				
- Layer & Thickness	BS 7870-8.1: 15.6 / BS 5467: 9.2			
- Testing	BS 7870-8.1: 16.4 / BS 5467: 9.1			
Wire Armouring				
- Diameter	BS 7870-8.1: 15.7 / BS 5467: 10.3a			
- Mass of Zinc Coating	BS 7870-8.1: 16.5 / BS 5467: 10.3b			
Oversheath				
- Thickness	BS 7870-8.1: 15.8 / BS 5467: 11.2			
- Marking	BS 7870-8.1: 14.7 / BS 5467: 12			
- Voltage Tests	BS 7870-8.1: 14.6			
- Compatibility	BS 7870-8.1: 16.8 / BS 5467: 18.2			
- Tests	BS 7870-8.1: 16.7 / BS 5467: 11.1			

PVC Insulated, armoured cables for LV AC Supplies - (in accordance with Clause 3.4)					
	Category of Test	Clause / Requirements	Conformance Code	Evidence Reference	Remarks / Comments
Technical Data		Provide technical data sheets and associated drawings			
Conductor Construction	S	BS EN 60228			
Insulation					
Material	T	BS 6346 clause 6.1			
Thickness	S	BS 6346 clause 6.2			
Spark Test	R	BS 6346 clause 6.3			
Core Identification	S	Visual examination and measurement			
Direction & Sequence of lay	S	BS 6346 clause 8.1			
Fillers & Binders	S	BS 6346 clause 8.1			
Extruded Bedding					
- Physical Properties	T	BS 6346 clause 9.1			
- Thickness	S	BS 6346 clause 9.2			
Wire Armour					
- Diameter	S	BS 6346 clause 10.3a			
- Mass of zinc coating	T	BS 6346 clause 10.3b			
- Wrapping Test	T	BS 6346 clause 10.3c			
Oversheath					
- Physical Properties	T	BS 6346 clause 11.1			
- Thickness	S	BS 6346 clause 11.2			
- Spark Test	R	BS 6346 clause 11.3			
Tests on Completed Cables					
Cable markings	R	BS 6346 clause 12			
Conductor Resistance	R	BS 6346 clause 16.2			
Voltage Test	R	BS 6346 clause 16.3			
Insulation Resistance Test	R	BS 6346 clause 16.4			
Armour Resistance Test	S	BS 6346 clause 16.5			
Tests under fire conditions					

PVC Insulated, armoured cables for LV AC Supplies - (in accordance with Clause 3.4)					
	Category of Test	Clause / Requirements	Conformance Code	Evidence Reference	Remarks / Comments
Flame propagation test on single cable	S	BS 6346 clause 17.2			
Compatibility test	T	BS 6346 clause 18.2			

Test Types S= Sample, R = Routine & T = Type Approval

Appendix 3 – Addendum to Supplier Requirements

The oversheath of all cables shall be marked in accordance with the requirements of the relevant Standard specified in this document.

Additional markings shall comply with BS7870-8.1 clause 11.4, BS 7870-8.4 clause 13.1, BS7870-8.2 Clause 11.4 and BS 6346 clause 12.2 respectively for each cable type.

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

Supplier Requirements				
Clause	**Requirement**	**Conformance Code (Y/N)**	**Evidence Reference**	**Remarks**
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 traceability of materials and manufacturing facilities used in the construction of the cable with the added advantage of providing proof of ownership when required by law enforcement agencies in the investigations and prosecutions of metal-theft.			

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 and/or Maintenance Requirements				
Clause	**Requirement**	**Conformance Code (Y/N)**	**Evidence Reference**	**Remarks**
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 Pilot, Control and Telephone 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)
Polyethylene Insulated Multipair (Armoured) Auxiliary Cables (in accordance with clause 3.1)					
7-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120861	1000	1000	2000	500
7-Pair: **UNFILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	011585	1000	1000	2000	500
19-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120876	1500	1200	2000	500
37-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120880	2000	1200	2000	500
37-Pair: **UNFILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	121597	2000	1200	2000	500
61-Pair: **FILLED**: 1 x 0.8mm Copper Conductor, Polythene Insulated, Steel Wire Armoured and PVC Oversheath (up to 15kV withstand induced voltage)	120895	2000	1200	2000	250
PVC Insulated Multipair (Armoured) Light Current Control Cables - (in accordance with clause 3.2)					
2-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125535	1500	1200	2000	500
5-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125537	1500	1200	2000	500
10-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125640	1500	1200	2000	500
20-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125643	1500	1200	2000	500
40-Pair: **Unfilled**: 1 x 0.8mm Copper Screened Conductor, PVC Insulated, Steel Wire Armoured and PVC Oversheath (up to 5kV withstand induced voltage)	125646	2000	1200	2000	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)
PVC Insulated Multicore Auxiliary Cables (in accordance with clause 3.3)					
2 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125441	1000	1000	2000	250
4 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125460	1000	1000	2000	250
7 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	011015	1000	1000	2000	250
12 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125494	1000	1000	2000	250
19 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125507	1000	1000	2000	250
27 Core: 7x0.67mm (2.5mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125530	1000	1000	2000	250
2 Core: 7x0.85mm (4.0mm2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125649	1000	1000	2000	250
5 Core: 7x0.85mm (4.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125463	1000	1000	2000	250
7 Core 7x0.85mm (4.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125466	1000	1000	2000	250
2 Core: 7x1.04mm (6.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125672	1000	1000	2000	250
5 Core: 7x1.04mm (6.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125469	1000	1000	2000	250
7 Core: 7x1.04mm (6.0mm^2) Copper Conductor, PVC Insulated, Steel Wire Armour and PVC Oversheath	125471	1000	1000	2000	250
PVC Insulated, armoured cables for LV AC Supplies - (in accordance with Clause 3.4)					
5 Core: 95mm^2 PVC insulated , Solid Aluminium conductor, steel wire armoured and PVC Oversheath	125480	1000	1000	2000	250

All cable drums shall be returnable and the tenderer shall arrange to collect empty drums from the company's normal delivery locations.

Tenderers shall state at the time of tender their proposed cable drum sizes and weights for each cable type offered.

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) Cable type

(e) Number of pairs

(f) Size of conductor

(g) Gross and net weights

(h) Direction of rolling drum

(i) The metre-marking start and end values

(j) The unique reference or batch number

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

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.

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 or batch 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.

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	
• Table to be completed	
Appendix 4 – Pre-commission Testing, Routine Inspection and Maintenance Requirements	
• Provide details of:	
○ Pre-commission testing	
○ Routine inspection requirements	
○ Routine maintenance requirements	
○ Provide product manufacturing quality plan	
Appendix 5 – Logistical Requirements	
• Provide logistical details with regard to packaging / delivery information and requirements	