Electricity Distribution

nationalgrid

Company Directive

ENGINEERING SPECIFICATION
EE SPEC: 85/4

Relating to Specification for Bare and PVC Covered Overhead Line Conductor

Author: **Chris Sterling**

Implementation Date: **February 2025**

Approved by

Andrew Reynolds
Engineering Policy Manager

Date: **20th February 2025**

Target Staff Group	**Purchasing, Logistics, Specifier, Senior Nominated Persons and Network Services staff involved in either the tender process and / or purchasing of insulators.**
Impact of Change	**Green**
Planned Assurance checks	**N/A**

IMPLEMENTATION PLAN

Introduction

Relating to Specification for Bare and PVC Covered Overhead Line Conductor.

Main Changes

This document has been reviewed and rebranded in preparation for the release of the ITT for the National Grid Group Procurement Event. The approved supplier list within Appendix A has subsequently been removed, and nominal references within the document have been updated.

Impact of Changes

Until such time that the group tender is complete, conductor should continue to be purchased via the approved suppliers listed on the contract. Upon completion of the grid group tender, an update will be issued on the has been awarded the contract.

Implementation Actions

Purchasing, Logistics, the Nominated Person and Material Specifier shall use this specification for ‘Goods In’ tendering to ensure potential suppliers meet its requirements.

When project work is being undertaken by a contractor on behalf of NGED and the materials are not free issue Network Services in conjunction with the Material Specifier shall use this specification to approve the supply of materials supplied by the contractor.

Implementation Timetable

This Equipment Specification can be implemented with immediate effect.

REVISION HISTORY

Document Revision & Review Table		
Date	**Comments**	**Author**
February 2025	• Document reviewed and updated to latest format • Appendix A Approved supplier list removed as ABC conductors now falls under the group tender procurement event • National Standard References Updated • All references to WPD removed and changed to NGED	Chris Sterling
July 2018	• Section 1 Scope amended to clarify who this specification is applicable to. • Section 8 introduced outlining the requirements conductors containing optical fibre • Clause 11.5 included which outlines WPD's right to prior to formal approval to be present during Type Testing and / or to undertake a factory visit. • Section 12 introduced outlining the provision of information that must be supplied when a supplier tenders or wishes to be approved to supply WPD with overhead conductor. • Appendix A – Approved Suppliers List added • Appendices C & D Removed as now covered by the implementation plan. • Subsequent Sections and clauses and appendices re-referenced	Mike Chapman
11 April 2017	• Section 3 - General Requirements has been added to bring together common requirements for all conductors. • It also introduces a requirement to ensure o Segregation of different metals to avoid cross contamination e.g. Aluminium and Copper. o That all stranded wires shall lie naturally in their position in the stranded conductor, and where the conductor is cut; the wire ends shall remain in position or be readily replaced by hand and then remain in position. • Where there is duplication subsequent clauses have been removed from Section 4, 5, 6 & 7. • Numbering of sections and clauses has been amended to facilitate the introduction of section 3. • Clause 9.4 - Amended to clarify that the label attached to the drum should be written in English. • Clause 9.5 - Added to clarify that nails and / or other fasteners that are likely to cause damage to the drum shall not be used to secure the drum during transit. • Clause 10.4 - Added which requires that a final quality check of the finished conductor is performed to ensure the strands lie naturally in position when the conductor is cut.	Mike Chapman
19 February 2015	Table 3.1 – Amendment made to correct values in line with BS 7884.	Mike Chapman

Contents

1.0 SCOPE

This specification details technical, manufacturing and delivery requirements and shall be used as the basis for approving suppliers to supply NGED with bare, optical fibre and PVC covered overhead line conductors used within NGED.

It does not list all legacy conductors used within NGED and should be read in conjunction with the NGED's Schedule of Requirement during times of tender. Where a conductor is not listed it shall still be supplied in accordance with this specification.

It shall be used by Network Services, Logistics, Purchasing and the Specifier to ensure that only Overhead Line Conductor meeting this specification is supplied into 'Goods In' or for project work where a contractor supplies the materials.

This specification does not apply to conductors used for insulated systems, such as LV ABC.

2.0 REFERENCES

The following standards are applicable to in this specification:-

BS 6485	PVC Covered Conductors for Overhead Lines.
BS 7884	Specification for Copper and copper-cadmium stranded conductors for overhead electric traction and power transmission systems.
BS EN 50182	Conductors for overhead lines - Round wire concentric lay conductors.
ENA ER L38	Protective greasing of PVC covered copper and bare and PVC covered Aluminium based overhead line conductors.
ENA TS 43-126 Pt 1	Fittings for Overhead Line Optical Cables –OPGW
ENA TS 43-126 Pt 2	Fittings for Overhead Line Optical Cables – Optical phase Wire Cables

3.0 GENERAL REQUIREMENTS

3.1 Cross contamination of copper and aluminium based conductors shall be avoided at all times.

3.2 Where PVC covering is required, it shall conform to BS 6485; HV conductors shall be coloured green and LV conductors shall be coloured black.

3.3 The outer layer strands of all conductors shall be right hand lay unless otherwise stipulated at the time of ordering.

3.4 All wires shall lie naturally in their position in the stranded conductor, and where the conductor is cut, the wire ends shall remain in position or be readily replaced by hand and then remain in position.

4.0 HARD DRAWN COPPER CONDUCTORS

4.1 Unless stated in this document Hard Drawn Copper conductor shall comply with BS 7884.

4.2 Hard Drawn Copper (HDC) conductors shall be supplied in the following sizes and stranding:-

Nominal Size, mm^2	Stranding, No./diameter in mm	Approximate Overall Diameter, mm	Minimum Breaking Load, Kn
16	3/2.65	5.7	6.194
25	7/2.14	6.3	9.073
32	3/3.75	8.06	12.4
38	7.2.64	7.92	15.7
50	7/3.00	9.0	18.52
70	7/3.55	10.65	25.93
100	7/4.30	12.90	36.54
125	19/2.90	14.50	45.94
150	19/3.20	16.0	55.94

5.0 HARD DRAWN ALUMINIUM CONDUCTORS (AAC)

5.1 Unless stated in this document AAC conductors shall comply with BS EN 50182, and be manufactured of AL1 grade aluminium.

5.2 AAC conductors shall be supplied in the following sizes:

Nominal Size mm^2	BS 50182 Code	Old Code	Stranding, No./diameter, mm
25	27-AL1	GNAT	7/2.21
50	53-AL1	ANT	7/3.10
100	106-AL1	WASP	7/4.39
300	323-AL1	BUTTERFLY	19/4.65
400	415-AL	CENTIPEDE	37/3.78

6.0 ALUMINIUM CONDUCTOR, STEEL REINFORCED (ACSR)

6.1 Unless stated in this document ACSR conductors shall comply with BS EN 50182, and be manufactured of AL1 aluminium and ST1A type steel.

6.2 ACSR conductors shall be supplied in the following sizes:-

Nominal Size mm^2	BS 50182 Code	Code Name	Stranding, No. Al/diameter, no. Fe/ diameter, mm
25	26-AL1/4-ST1A	GOPHER	6/2.36, 1/2.36
50	53-AL1/9-ST1A	RABBIT	6/3.35, 1/3.35
100	105AL1/14-ST1A	DOG	6/4.72, 7/1.57
150	159-AL1/9-ST1A	DINGO	18/3.35, 1/3.35
175	184-AL1/10-ST1A	CARACAL	18/3.61, 1/3.61
175	183-AL/43-ST1A	LYNX	30/2.79, 7/2.79
400	429-AL1/56-ST1A	ZEBRA	54/3.18, 7/3.18

7.0 ALL ALUMINIUM ALLOY CONDUCTORS (AAAC)

7.1 Unless stated in this document AAAC conductors shall comply with BS EN 50182.

7.2 The following AAAC conductors shall be manufactured of AL3 grade alloy:-

Nominal Size mm^2	BS 50182 Code	Code Name	Stranding, No of strands / diameter, mm.
25	30-AL3	ALMOND	7/2.34
40	48-AL3	FIR	7/2.95
50	60-AL3	HAZEL	7/3.30
60	72-AL3	PINE	7/3.61

7.3 The following AAAC conductors shall be manufactured of AL5 grade alloy:-

Nominal Size mm^2	BS 50182 Code	Code Name	Stranding, No of strands / diameter, mm.
100	119-AL5	OAK	7/4.65
150	181-AL5	ASH	19/3.48
175	211-AL5	ELM	19/3.76
200	239-AL5	POPLAR	37/2.87
300	362-AL5	UPAS	37/3.53
500	587-AL5	RUBUS	61/3.50
700	821-AL5	ARAUCARIA	61/4.14

8.0 CONDUCTORS CONTAINING OPTICAL FIBRE

8.1 Conductors containing optical fibre shall meet the meet the electrical, mechanical, dimensional and weight characteristics of the conductor it is replacing.

8.2 Unless otherwise stated optical fibre conductors shall meet the requirements of and be type tested in accordance with ENATS 43-126

8.3 The outer strands shall have a minimum diameter of 2.5mm.

8.4 Unless otherwise requested the conductor shall provide the facility to house 96 fibres contained in 2 or 3 tubes.

8.5 Typical Optical Fibre Conductors are used by NGED to replace the following conductors.

Nominal Size of Conductor to be replaced mm^2	Code Name
70	Horse
175	Lynx
175	Keziah

8.5 Further information and typical datasheets for conductors containing fibre can be seen by following this link.

9.0 GREASING

9.1 All bare aluminium based conductors shall be greased to Category 4 of EA ER L38, or Case 4 of BS EN 50182. The grease shall comply with EA ER L38 and be continuous.

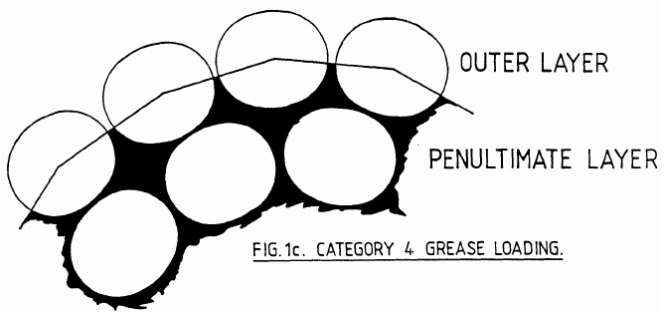

FIG.1c. CATEGORY 4 GREASE LOADING.

9.2 Where PVC covering is required the conductor shall be greased to Category 1 of EA ER L38, or Case 1 of BS EN 50182. The grease shall comply with EA ER L38 and be continuous.

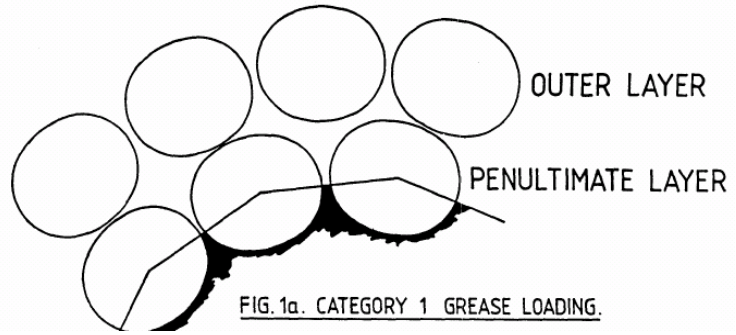

FIG. 1a. CATEGORY 1 GREASE LOADING.

9.3 The following greases are approved for use in NGED conductors:-

- Castrol Rustillo 431
- Castrol Rustillo 450
- Shell Ensis CD
- Vaportek Cableguard
- Metallube OCG 1000
- Metallube OCG 3000
- Metallube OCG 5000

or any having NGC Type Approval. Other greases or grades may be offered for consideration.

9.4 NGED's preferred method of greasing is fully encapsulated.

Suppliers at time of tender should indicate what type of grease is used and how it is applied to ensure the correct amount and consistency of coverage of grease is applied and how the process is protected against contamination from foreign particles.

10.0 DRUMS, PACKAGING & TRANSPORTATION

10.1 Conductor shall be supplied on returnable drums. These drums shall be suitable for handling with fork-lift trucks, installing on drum trailers and rolling for short distances on hard surfaces.

10.2 Conductor shall be protected from damage in transit and handling. This protection should be in the form of rebated battens with a circumferential banding system or similar rebated method.

Drums with battens nailed to the flanges are not acceptable.

The drum barrel should be covered with a waterproofed lagging to provide a smooth external surface to the barrel.

The inner surface of each flange should have a smooth surface and should be painted with aluminium flake (bare aluminium type conductors only) or bitumen based paint.

The distance between the outer layer of the covered conductor on the filled drum and the ground or lagging shall be sufficient to avoid damage to the covered conductor.

Battens or other protective packaging shall be non-returnable, and easily disposed.

10.3 Conductor shall be evenly wound onto the drum without large gaps between coils, in successive layers, to ensure free running from the drum during winching procedures.

Both inner and outer conductor ends shall be secured to the drum by either staples or sisal tails; the inner end of the conductor shall be brought out to the outer drum face and secured.

The ends of covered conductors shall be sealed to prevent ingress of moisture during transport and storage

10.4 The Drum label shall be marked in English displaying the following

- Manufacturers name,
- Size, stranding & material type,
- Length,
- Insulation (type and colour) where applicable,
- NGED's Code,
- Net and gross drum weight.
- A permanent distinguishing number on the outside of one flange
- The direction of rolling should also be indicated

The labelling should be applied to at least one of the outer faces of the drum flange and must remain permanent throughout the life of the drum.

Note: The use of card or paper, whether or not enclose is not acceptable.

10.5 During transit the drums shall be secured in such a way that the drums will not move and at no point shall nails be driven into the drums or any other fastener used that will cause damage to the drums or conductor.

11.0 TESTING AND COMPATIBILITY

11.1 Type Approval Testing must be carried out in line with the relevant standards applicable to the conductor type and certification of this approval should be supplied at the time of tender together with individual data sheets.

11.2 Any variation to this specification must be identified at the time of tender.

11.3 Routine and sample tests must be carried out in line with the relevant standards applicable to the conductor type and the test information retained. When requested to do so, the supplier shall provide this information to NGED.

11.4 During routine sampling and in line with the requirements of clause 3.4 the memory form of the complete conductor shall also be checked to ensure that it has been neutralised; this will not involve taping etc. of the stranded conductor within 200mm of the position of cut.

11.5 Prior to formal approval NGED reserves the right to have a representative present during Type Testing and / or to undertake a factory visit.

12.0 PROVISION OF INFORMATION[i]

Suppliers shall at the time of tender or one off supply during project work review the requirements of this specification and

1. Clearly identify whether their products meet this specification.
2. Provide all relevant drawings, data sheets and all in date type test reports specific to the products they wish to supply.
3. Provide full details of how the risks of cross contamination will be mitigated.
4. As per section 9 provide full details of the grease and greasing process that will be used.
5. Provide details of the process by which there is assurance that the conductor has been killed effectively.
6. Provide, as requested, samples for evaluation.
7. Provide details on how products will be marked.
8. Provide details of how traceability is assured.
9. Provide details of where the conductor is manufactured and where the raw materials are obtained this information should include the country of origin.
10. Provide a list of UK companies together with contact details where conductors has been supplied in the last three years
11. Provide details of any warranty for the items supplied and what this covers.

APPENDIX A

SUPERSEDED DOCUMENTATION

This document supersedes EE SPEC 85/3 dated July 2018 which has now been withdrawn

APPENDIX B

RECORD OF COMMENT DURING CONSULTATION

No comments received

APPENDIX C

ASSOCIATED DOCUMENTATION

See “2.0 References”

APPENDIX D

KEY WORDS

Conductor