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Electricity Specification 400C4

Issue 7 April 2025

Steel Tower Overhead Line Conductors (33kV and 132kV)

Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 6 **Sept 2021**	New template applied throughout. Prepared by: D M Talbot Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director
Issue 7 **April 2025**	New conductor type ACCC added in Appendix A4. Prepared by: P Howell Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chairperson.

Contents

1 Introduction

This specification comprises general requirements for the approval and testing of steel tower overhead line conductors used on the distribution network (Network) owned and operated by Electricity North West Limited (Electricity North West), as Distribution Licensee.

2 Scope

This specification covers conductors used on Electricity North West's steel tower overhead line system operating at 33kV and 132kV.

3 Definitions

AAAC	All Aluminium Alloy Conductor.
AACSR	Aluminium Alloy Conductor Steel Reinforced.
ACCC	Aluminium Conductor Composite Core
ACSR	Aluminium Conductor Steel Reinforced.
Approval	Sanction by the Electricity North West Circuits Policy Manager that specified criteria have been satisfied
Contract	The agreement between Electricity North West and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.
Contractor	The person or person's firm or company, including personal representatives, successors and permitted assigns, who's Tender has been accepted by Electricity North West.
ENA ER	Energy Networks Association Engineering Recommendation.
Infocore	Proprietary brand name registered by CTC Global for composite cores including fibre optic strands to allow for continuity testing before installation of conductor
HDAl	Hard-Drawn Aluminium.
HDCu	Hard-Drawn Copper.
Specification	The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.
Sub-Contractor	Any person (other than the Contractor) named in the Contract for any part of the Works or any person to whom any part of the Contract has been sub-let with the consent in writing of the Electricity North West Circuits Policy Manager, and the legal representatives, successors and assigns of such person.
Supplier	Any person or person's firm or company who supplies goods to Electricity North West or to its Contractor.
Tender	An offer in writing to execute work or supply goods at a fixed price.
Tenderer	The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by Electricity North West to submit a Tender.

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4 General Requirements for Approvals and Testing

4.1 Product not to be Changed

Compliance with this clause shall be in accordance with ES001.

4.2 Electricity North West Limited Technical Approval

Compliance with this clause shall be in accordance with ES001.

4.3 Quality Assurance

Compliance with this clause shall be in accordance with ES001.

4.4 Formulation

Compliance with this clause shall be in accordance with ES001.

4.5 Identification Markings

Compliance with this clause shall be in accordance with ES001.

4.6 Minimum Life Expectancy

The minimum life expectancy of all products covered by this specification is:

- 40 years for aluminium based conductors.
- 75 years for copper-based conductors.

4.7 Product Conformity

Compliance with this clause shall be in accordance with ES001.

4.8 Confirmation of Conformance

The Tenderer shall complete the conformance declaration sheets in Appendix D.

Failure to complete these declaration sheets may result in an unacceptable bid.

5 Requirements for Type and Routine Testing

5.1 Requirement for Type Tests at Suppliers Premises

Compliance with this clause shall be in accordance with ES001.

5.2 Requirement for Routine Tests at the Supplier's Premises

Compliance with this clause shall be in accordance with ES001.

The Tenderer shall submit, with the Tender, a list of tests and inspections which are carried out on the product prior to despatch which shall demonstrate, to the satisfaction of the Electricity North West Circuits Policy Manager, fitness for installation and service.

6 Technical Particulars

6.1 General

Only the conductors listed in the Appendices to this specification shall be used on the steel tower overhead line system. Additionally:

- New or refurbished lines shall use only the conductors (as identified in the appropriate overhead line specification) listed in Appendix A of this specification.
- Conductors identified as "for repair only" (Appendix B) shall be used only for this purpose, i.e. to match existing requirements. They shall not be used in the construction of new or refurbished lines, nor shall they be used to repair new lines built in accordance with this specification. (Refer to the Note in Appendix B.)

6.2 Specifications for Individual Wires used to Manufacture Conductors to BS EN 50182

Wires used to manufacture conductors to BS EN 50182 shall comply with:

- BS EN 50183 for aluminium-magnesium-silicon alloy wires.
- BS EN 50189 for zinc coated steel wires.
- BS EN 50540 for Aluminium conductor steel supported. Apr 25
- BS EN 60889 for hard-drawn aluminium wires.
- BS EN 61232 for aluminium-clad steel wires.

6.3 Conductor Greasing

Specific greasing requirements for each conductor type are given in the appendices. Where conductor greasing is applicable, it shall also comply fully with ENA ER L38.

6.4 Drums

All conductors shall be supplied on drums manufactured from timber and complete with battens sufficient in quantity to protect conductors during transport, storage and handling.

The drums shall be of such a design that they will withstand transport to site and usage appropriate to the erection of conductors by standard methods.

6.5 Requirements for Approvals, Testing and Quality Control

Type Approval, Quality Assurance, Formulation and Labelling shall be in accordance with the requirements of the appropriate conductor specification (refer to Appendix A or B for the conductor/specification reference).

The quality control scheme applicable to Aluminium Alloy Conductors shall include the following test which shall be applied to each drum of completed conductor:

- A 50m length shall be pulled off the drum.
- During this operation the conductor shall not have any undue tendency to form into a helix.
- When released the conductor shall not have a tendency to recoil back towards the drum.

6.6 Product Confirmation of Compliance Schedule

Tenderers shall complete the Product Confirmation of Compliance Schedules (refer to Appendix C).

Failure to complete these Schedules sheets may result in an unacceptable bid.

7 Documents Referenced

DOCUMENTS REFERENCED	
Health and Safety at Work Act 974	
Control of Substances Hazardous to Health Regulations 2002	
Manual Handling Operations Regulations 1992	
BS EN ISO 9000:	Quality management systems.
BS EN ISO 14001:	Environmental management systems. Requirements with guidance for use.
BS EN 50182:	Conductors for overhead lines. Round wire concentric lay stranded conductors.
BS EN 50183:	Conductors for overhead lines. Aluminium-magnesium-silicon alloy wires.
BS EN 50189:	Conductors for overhead lines. Zinc coated steel wires.

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BS EN 50540	Conductors for overhead lines. Aluminium conductors steel supported (ACSS)
BS EN 60889:	Hard drawn aluminium wire for overhead line conductors.
BS EN 61232:	Aluminium-clad steel wires for electrical purposes.
BS 7884:	Specification for copper and copper-cadmium stranded conductors for overhead electric traction and power transmission systems.
ENA ER L38:	Overhead Line Conductors – Protection Against Corrosion by the Application of Anti-Corrosion Grease During Manufacture.
ES001	ENWL Main Specifications
CP311:	Equipment Approval Process.

8 Keywords

Overhead; Conductor; Steel Tower

Appendix A – Conductors for New or Refurbished Line Construction: Specific Requirements

A1 Plain Stranded Aluminium Alloy Conductors

APPROVED DESCRIPTION (FOR PURCHASING AND PRODUCT LABELLING)	CONDUCTOR SPECIFICATION*	CONDUCTOR GREASING ENA ER L38	COMMODITY CODE
Conductor, AAAC, 200mm^2 (Poplar) (37/2.87)	BS EN 50182	Cat 3	013690
Conductor, AAAC, 300mm^2 (Upas) (37/3.53)	BS EN 50182	Cat 3	013920
Conductor, AAAC, 500mm^2 (Rubus) (61/3.50)	BS EN 50182	Cat 3	013230

* Individual wires shall comply with the appropriate specification as listed under Technical Particulars.

A2 Stranded Aluminium (Steel Reinforced)

APPROVED DESCRIPTION (FOR PURCHASING AND PRODUCT LABELLING)	CONDUCTOR SPECIFICATION*	CONDUCTOR GREASING ENA ER L38	COMMODITY CODE
Conductor, ACSR, 70mm^2 (Horse) (12/2.79+7/2.79) **	BS EN 50182	Cat 3	013854
Conductor, ACSR, 175mm^2 (Lynx) (30/2.79+7/2.79)	BS EN 50182	Cat 3	013927

* Individual wires shall comply with the appropriate specification as listed under Technical Particulars.

** 70mm^2 (Horse) shall be used for earth wire only (ie it shall not be used for phase conductor).

A3 Stranded Aluminium Alloy (Steel Reinforced)

APPROVED DESCRIPTION (FOR PURCHASING AND PRODUCT LABELLING)	CONDUCTOR SPECIFICATION*	CONDUCTOR GREASING ENA ER L38	COMMODITY CODE
Conductor, AACSR, 175mm^2 (Keziah) (30/2.79+7/2.79)	BS EN 50182	Cat 3	013936

* Individual wires shall comply with the appropriate specification as listed under Technical Particulars.

A4 Stranded with trapezoidal shaped Aluminium Alloy (Composite Core)

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APPROVED DESCRIPTION (FOR PURCHASING AND PRODUCT LABELLING)	CONDUCTOR SPECIFICATION*	CONDUCTOR GREASING ENA ER L38	COMMODITY CODE
Conductor, ACCC, 325mm^2 (Oslo) (20/4.5+1/8.76) (Infocore [1])	BS EN 50540	N/A	TBA
Conductor, ACCC, 150mm^2 (Helsinki) (16/3.5+1/5.97) (Infocore [1])	BS EN 50540	N/A	TBA

* Individual wires shall comply with the appropriate specification as listed under Technical Particulars.

* Manufacturer's recommendations for fittings, storage and installation shall be complied in all cases.

[1] Composite core to include fibre optic strands to allow continuity testing to check integrity of core.

Appendix B – Conductors for Repair Only: Specific Requirements

B1 Plain Stranded Hard Drawn Copper Conductors

APPROVED DESCRIPTION (FOR PURCHASING AND PRODUCT LABELLING)	CONDUCTOR SPECIFICATION	CONDUCTOR GREASING	COMMODITY CODE
Conductor, HDCu, 70mm^2 (7/3.55)	BS 7884	N/A	013196
Conductor, HDCu, 100mm^2 (7/4.30)	BS 7884	N/A	013199
Conductor, HDCu, 125mm^2 (19/2.90)	BS 7884	N/A	013210
Conductor, HDCu, 150mm^2 (19/3.20)	BS 7884	N/A	013220

B2 Stranded Aluminium (Steel Reinforced)

APPROVED DESCRIPTION (FOR PURCHASING AND PRODUCT LABELLING)	CONDUCTOR SPECIFICATION*	CONDUCTOR GREASING ENA ER L38	COMMODITY CODE
Conductor, ACSR, 75mm^2 (Racoon) (6/4.10+1/4.10)	BS EN 50182	Cat 3	013678
Conductor, ACSR, 100mm^2 (Dog) (6/4.72+7/1.57)	BS EN 50182	Cat 3	013862
Conductor, ACSR, 400mm^2 (Zebra) (54/3.18+7/3.18)	BS EN 50182	Cat 3	013870

* Individual wires shall comply with the appropriate specification as listed under Technical Particulars.

Appendix C – Product Confirmation of Compliance Schedules

TENDERER……. **TABLE 1**

CONDUCTOR:

ELECTRICAL AND MECHANICAL TESTS (SPECIFY BS):

SAMPLE NO AND LOCATION:

	Aluminium / Copper						Steel Wire				
	Stranded as Rec.	Dia Cleaned	Measured Resistance at 20 °C	Breaking Load	Wrapping Test	Torsion Test (Twists)	Strand Dia.	Tensile Strength	Stress at 1% Elongation	Elongation 200 mm Gauge Length %	Wrapping Test
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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26											
27											
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29											
30											

BS CRITERIA:
Minimum specified diameter :
Maximum specified resistance:
Outer strands (1-18)
Inner strands (19-30)
Minimum specified breaking loads :

BS CRITERIA
Minimum specified diameter:
Minimum tensile strength:
Minimum stress at 1% elongation:
Minimum elongation:

TENDERER…… **TABLE 2**

CONDUCTOR DETAILS (To be completed by Tenderer for each conductor/size tendered for)

Item Number								
Conductor Size								
Conductor Stranding								
Conductor Material								
U.T.S.	(N)							
Diameter	(mm)							
Bare Weight	(Kg/m)							
Greased Weight	(Kg/m)							
Cross Sectional Area	(Sq.mm)							
Modulus of Elasticity	(N/Sq.mm)							
Coefficient of Linear Exp.	(deg C)							

Appendix D – Conformance Declaration

SECTION-BY-SECTION CONFORMANCE WITH SPECIFICATION

The Tenderer shall declare conformance or otherwise for each product/service or range of products/services, section-by-section, using the following Conformance Declaration Codes.

Conformance Declaration Codes:

N/A =	Clause is not applicable/appropriate to the product/service.
C1 =	The product/service conforms fully with the requirements of this clause.
C2 =	The product/service conforms partially with the requirements of this clause.
C3 =	The product/service does not conform to the requirements of this clause.
C4 =	The product/service does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Manufacturer:

Product/Service Description:

Product/Service Reference:

Name:

Company:

Signature:

SECTION-BY-SECTION CONFORMANCE			
Section	**Section Topic**	**Conformance Declaration Code**	**Remarks * (must be completed if code is not C1)**
4.1	**Product not to be Changed**		
4.2	**Electricity North West Technical Approval**		
4.3	**Quality Assurance**		
4.4	**Formulation**		
4.5	**Identification Markings**		
4.6	**Minimum Life Expectancy**		
4.7	**Product Conformity**		
4.8	**Confirmation of Conformance**		
5.1	**Requirements for Type Tests at the Supplier's Premises**		
5.2	**Requirement for Routine Tests at the Supplier's Premises**		
5.3	**Requirement for On Site Tests**		
6.1	**General**		
6.2	**Specifications for Individual Wires used to Manufacture Conductors to BS EN 50182**		
6.3	**Conductor Greasing**		

6.4	**Drums**		
6.5	**Requirements for Approvals, Testing and Quality Control**		
6.6	**Product Confirmation of Compliance Schedule**		

* Applicable specifications shall be stated in the Remarks column where alternatives are quoted within a section. The Remarks column shall also be used to indicate cases where the products or services exceed the quoted specifications.

Additional Notes: