NPS/001/018 - Technical Specification for Steel Poles

1. Purpose

The purpose of this document is to detail the technical specification for steel poles for use on the low voltage overhead line distribution networks of Northern Powergrid.

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

Reference	Version	Date	Title
NSP/001/018	5.0	Oct 2018	Technical specification for LV steel poles

2. Scope

This document applies to steel poles for use on the low voltage overhead line networks of Northern Powergrid.

This specification contains the following appendixes:

- Appendix 1 - Schedule of requirements
- Appendix 2 – Self Certification Conformance Declaration
- Appendix 3 – Fabrication Drawing
- Appendix 4 – Technical Information Check List

2.1. Table of Contents

3. Technical Requirements

3.1. General

Steel poles shall be manufactured from Grade S355JO steel in accordance with BS EN 10025 – 1: and be of tubular construction in accordance with BS EN 10210 – 2.

Steel poles shall be available in two standard lengths, 9.75m and 10.75m and either constructed in two sections or a single length as shown on drawing 1091193501 sht2 in Appendix 3. The bottom section of the two-piece pole shall be a maximum length of 5.0m. to allow for the base section to be installed adjacent to live network conductors without infringing safety clearances and then the top section added a few days later after the foundation concrete has cured.

Steel pole, two-piece top section and bottom section diameters are not fixed by this specification, they shall be selected by the manufacturer to comply with all design loads whist still offering the lowest overall price.

An earth continuity connection system shall be applied across the slip joint of the two-piece poles to maintain conductivity across the joint.

All poles shall be provided with welded pole caps and all pre-drilled holes shall be provided with removable blanking plugs to reduce the ingress of water into the pole. All pole hole details can be found on drawing 1091193501 sht2 in Appendix 3.

(Note the requirement for the provision of an M12 tapped hole in the bottom section of the pole can also be satisfied via a welded earthing tag installed in the same location with a M14 hole.

To allow the remaining thickness of the steel pole to be measured using ultrasonic thickness testers without the need to excavate, a form of removable inspection hatch is required. This will enable access to the inside of the pole at a depth of 75mm below ground level.

Manufacturers shall provide the following information with all designs offered:-

- The weight and length of each pole section together with the overall pole weight
- Details of where a poles centre of gravity occurs to allow poles to be moved about safely
- The estimated minimum thickness of Galvanisation achieved on the pole.

3.2. Mechanical Strength

Poles shall be designed in accordance with BSEN50341-1 with a factor of safety of 1.6 based on the yield strength of the steel under the following loading cases:-

a) A maximum distributed conductor load of 1497kgf applied at an assumed resultant loading point of 825mm from the pole top with the pole sunk 1.6m

b) A maximum single point load conductor load of 1156kgf applied at a loading point of 525mm from the pole top with the pole sunk 1.6m.

3.2.1. Deflection Limits

Steel poles shall be designed such that they do not deflect more than a single pole top diameters length when the loads in clause 3.2 are applied.

3.3. Steelwork Protection

Poles shall be galvanised in accordance with BS EN 1461 after fabrication. The coating shall be smooth, clean and of uniform thickness. The minimum thickness of the coating shall be 200 microns. Upon completion the pole shall be painted with a coating of black bitumastic paint (at least 150 microns) applied to the outside of the pole from the base to a height of 2.3m

3.4. Pole Markings

Poles shall be marked with a 100mm horizontal line embossed at a distance 3m from the base of the pole. This will give an indication of how deep the pole has been sunk once it has been erected. Directly above this line, the pole shall be embossed with the year of manufacture. All fabrications and markings shall take place prior to galvanisation.

3.5. Welding

The sections shall be welded in accordance with BS EN 1011 – 1.

3.6. Pole Testing

Where new pole designs are offered they shall be tested in accordance with the following procedure:-

- Select the most highly loaded pole to test from the designs offered
- Restrain the base of the pole up to the 1600mm sinking depth point and then apply a test load of 1.6 x 1497kgf load to the top of the pole using an M20 eyebolt installed into the top M22 diameter hole with a curved washer and nut applied to the back of the pole
- Steadily increase the load up to the maximum test value, noting the pole top deflection for each 100kgf of applied load. Once this value has been achieved hold at this tension for 1min before releasing the tension. If safe to do so, the pole shall then have the tension increased until the pole failure occurs to allow an understanding of the failure mode to be recorded.

Criteria for success

The criteria for success will be that the pole can withstand the test load of 1.6 x 1497kgf for 1 min with a maximum pole top deflection of less than the measured pole top diameter and can be demonstrated to be still within its elastic limit by virtue that it goes back to the same point from which it started when the load is released. Additionally since in service this pole will be embedded in concrete we need to ensure that no buckling of the steel section occurs at the ground level point.

4. References

4.1. External Documentation

The products described within this specification shall comply with all current versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of supply

Reference	Title
BS EN 10025 – 1	Hot rolled products of non-alloy structural steels
BS EN 1011 – 1	Welding. Recommendations for welding of metallic materials. Guidance for arc welding
BS EN 10210 – 2	Hot finished structural hollow sections of non-alloy and fine grain structural steels. Tolerances, dimensions and sectional properties
BS EN 1461	Hot dipped galvanised coatings on fabricated iron steel articles. Specifications and test methods

4.2. Internal Documentation

Reference	Title
n/a	

4.3. Amendments from Previous Version

Reference	Description
3.0 Technical Requirements	Updated to include the requirement for single piece steel poles
4.1 External Documentation	Reviewed and updated with document published dates removed
6.0 Authority for Issue	Updated to reflect current section structure
Appendix 1 Schedule of Requirements	Updated to include commodity codes for single piece steel poles

5. Definitions

Reference	Definition
None	

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	06/03/2024

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: Update will be dictated by contact renewal date or any Significant changes in the specification or documents referenced.
Should this document be displayed on the Northern Powergrid external website?		Yes
		Date
S Salkeld	Policy and Standards Engineer	06/03/2024

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
G Hammel	Senior Policy and Standards Engineer	07/03/2024

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
P Black	Head of System Engineering	20/03/2024

Appendix 1 – Schedule of Requirements

Cat Number	Description
235035	Steel Pole Two Piece Galvanised, 9.75m, Class M
235036	Steel Pole Two Piece, Galvanised, 10.75m, Class
235040	Steel Pole Single Piece Galvanised, 9.75m, Class M
235041	Steel Pole Single Piece, Galvanised, 10.75m, Class

Appendix 2 – Self Certification Conformance Declaration

Steel poles shall comply with the latest issues of the relevant international and British Standards.

This check sheet identifies the clauses in the aforementioned Standards relevant to steel poles for use on current United Kingdom designs of low voltage overhead lines.

The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes

N/A = Clause is not applicable/ appropriate to the product
Cs1 = The product conforms fully with the requirements of this clause
Cs2 = The product conforms partially with the requirements of this clause
Cs3 = The product does not conform to the requirements of this clause
Cs4 = The product does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

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 / Product Reference:

Northern Powergrid Commodity Code:

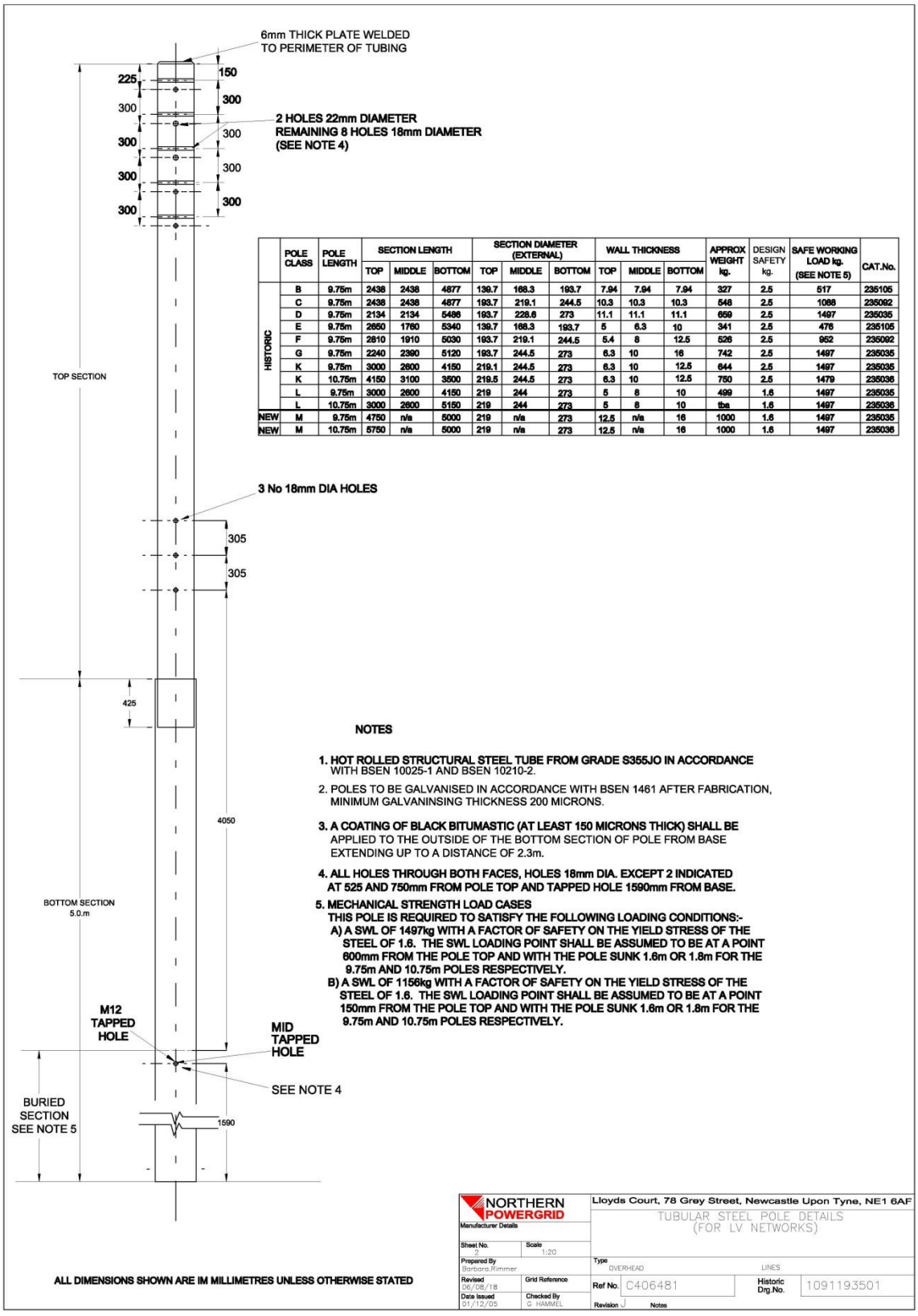
Name: **Signature:** **Date:**

BS EN 10210 – 2 – Tubular steel				
Clause / Sub-clause	Requirement	Conformance Code	Evidence / Reference	Remarks
6.0	Tolerances			
8.0	Dimensions and sectional properties			

BS EN 1011 – 1 – Welding				
Clause / Sub-clause	Requirement	Conformance Code	Evidence / Reference	Remarks
10.0	Fabrications			
11.0	Preparation of joints			
21.0	Traceability			
23.0	Inspection and testing			

BS EN 1461 – Galvanising				
Clause / Sub-clause	Requirement	Conformance Code	Evidence / Reference	Remarks
4.0	General requirements			
5.0	Sampling			
6.0	Coating properties			
7.0	Certificate of compliance			

Appendix 3 – Fabrication Drawing



	POLE CLASS	POLE LENGTH	SECTION LENGTH			SECTION DIAMETER (EXTERNAL)			WALL THICKNESS			APPROX WEIGHT kg.	DESIGN SAFETY kg.	SAFE WORKING LOAD kg. (SEE NOTE 5)	CAT.No.
			TOP	MIDDLE	BOTTOM	TOP	MIDDLE	BOTTOM	TOP	MIDDLE	BOTTOM				
HISTORIC	B	9.75m	2438	2438	4877	139.7	168.3	193.7	7.94	7.94	7.94	327	2.5	517	235105
	C	9.75m	2438	2438	4877	193.7	219.1	244.5	10.3	10.3	10.3	548	2.5	1088	235092
	D	9.75m	2134	2134	5486	193.7	228.6	273	11.1	11.1	11.1	659	2.5	1497	235035
	E	9.75m	2650	1760	5340	139.7	168.3	193.7	5	6.3	10	341	2.5	476	235105
	F	9.75m	2610	1910	5030	193.7	219.1	244.5	5.4	8	12.5	526	2.5	952	235092
	G	9.75m	2240	2390	5120	193.7	244.5	273	6.3	10	16	742	2.5	1497	235035
	K	9.75m	3000	2600	4150	219.1	244.5	273	6.3	10	12.5	644	2.5	1497	235035
	K	10.75m	4150	3100	3500	219.5	244.5	273	6.3	10	12.5	750	2.5	1479	235036
	L	9.75m	3000	2600	4150	219	244	273	5	8	10	499	1.6	1497	235035
	L	10.75m	3000	2600	5150	219	244	273	5	8	10	tba	1.6	1497	235036
NEW	M	9.75m	4750	n/a	5000	219	n/a	273	12.5	n/a	16	1000	1.6	1497	235035
NEW	M	10.75m	5750	n/a	5000	219	n/a	273	12.5	n/a	16	1000	1.6	1497	235036

NOTES

1. HOT ROLLED STRUCTURAL STEEL TUBE FROM GRADE S355JO IN ACCORDANCE WITH BSEN 10025-1 AND BSEN 10210-2.
2. POLES TO BE GALVANISED IN ACCORDANCE WITH BSEN 1461 AFTER FABRICATION, MINIMUM GALVANINSING THICKNESS 200 MICRONS.
3. A COATING OF BLACK BITUMASTIC (AT LEAST 150 MICRONS THICK) SHALL BE APPLIED TO THE OUTSIDE OF THE BOTTOM SECTION OF POLE FROM BASE EXTENDING UP TO A DISTANCE OF 2.3m.
4. ALL HOLES THROUGH BOTH FACES, HOLES 18mm DIA. EXCEPT 2 INDICATED AT 525 AND 750mm FROM POLE TOP AND TAPPED HOLE 1590mm FROM BASE.
5. MECHANICAL STRENGTH LOAD CASES
   THIS POLE IS REQUIRED TO SATISFY THE FOLLOWING LOADING CONDITIONS:-
   A) A SWL OF 1497kg WITH A FACTOR OF SAFETY ON THE YIELD STRESS OF THE STEEL OF 1.6. THE SWL LOADING POINT SHALL BE ASSUMED TO BE AT A POINT 600mm FROM THE POLE TOP AND WITH THE POLE SUNK 1.6m OR 1.8m FOR THE 9.75m AND 10.75m POLES RESPECTIVELY.
   B) A SWL OF 1156kg WITH A FACTOR OF SAFETY ON THE YIELD STRESS OF THE STEEL OF 1.6. THE SWL LOADING POINT SHALL BE ASSUMED TO BE AT A POINT 150mm FROM THE POLE TOP AND WITH THE POLE SUNK 1.6m OR 1.8m FOR THE 9.75m AND 10.75m POLES RESPECTIVELY.

ALL DIMENSIONS SHOWN ARE IM MILLIMETRES UNLESS OTHERWISE STATED

NORTHERN POWERGRID
Manufacturer Details
Lloyds Court, 78 Grey Street, Newcastle Upon Tyne, NE1 6AF
TUBULAR STEEL POLE DETAILS (FOR LV NETWORKS)
Sheet No. 2 | Scale 1:20
Prepared By Barbara.Rimmer
Type OVERHEAD LINES
Revised 06/08/18 | Grid Reference
Date Issued 01/12/05 | Checked By C HAMMEL
Ref No. C406481 | Historic Drg.No. 1091193501
Revision J | Notes

Appendix 4 – Technical Information Check Sheet

The following information shall be provided by the supplier for review by Northern Powergrid. Additional information shall be provided if requested.

Requirement	Provided (Y/N)
Appendix 2 – completed self-certification conformance declaration	
Complete set of drawings for each item, complete with pole weights etc.	
Type test evidence	
Manufacturing routine test/quality plan	
Delivery information	