

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-		April 2024	Page	1	of	13

NPS/001/021 – Technical Specification for Overhead Line Tower, Steel Pole and Substation Plant Paint Systems

1. Purpose

The purpose of this document is to detail the specification for the protective coatings to be used on Northern Powergrid overhead line towers, steel poles and substation plant.

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

Document Reference	Document Title	Version	Published Date
NPS/001/021	Technical Specification for Overhead Line Tower, Steel Pole and Substation Plant Paint Systems	3.0	February 2019

2. Scope

This specification provides details for acceptable paint systems to be used on overhead line towers, steel poles and substation plant. In all other respects it must be suitable for application by hand brush as detailed in MNT/001/004.

Technical Specification for Tower, Steel Pole and Substation Plant Painting. However, for substation plant the paint can be applied by spraying.

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.

This specification includes the following appendices: -

- Appendix 1 – Batch Certificate
- Appendix 2 – Addendum to Suppliers Requirements
- Appendix 3 – Self Certification Conformance Declaration
- Appendix 4 – Technical Information Check List

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-	April 2024	Page	2	of	13	

2.1. Contents

1. Purpose.....	1
2. Scope	1
2.1. Contents.....	2
3. Technical Requirements.....	3
3.1. General Requirements	3
3.2. Containers and Labelling.....	3
3.3. Systems	4
4. References	8
4.1 External Documentation	8
4.2 Internal Documentation	8
4.3 Amendments from Previous Version	8
5. Definitions	8
6. Authority for issue	9
6.1. CDS Assurance	9
6.2. Author	9
6.3. Technical Assurance.....	9
6.4. Authorisation	9
Appendix 1 – Batch Certificate.....	10
Appendix 2 - Addendum to Supplier Requirements	11
Appendix 3 – Self Certification Conformance Declaration.....	12
Appendix 4 - Technical Information Check List.....	13

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-		April 2024	Page	3	of	13

3. Technical Requirements

3.1. General Requirements

All paints systems must meet the following general requirements:

- Within the normal constraints of good practice all paints should be formulated with the lowest toxicity materials and with high flash point solvents
- All paints must be suitable for application over a wide variety of substrates including weathered galvanising, rusty steel, aged paint or any combination of these
- Each coat of a multi-coat paint system must be compatible with all preceding coats and to avoid any dispute, should be supplied by the same manufacturer
- All materials must have a shelf life in excess of 12 months. No hard settlement will be acceptable
- All materials used on overhead line towers and substation plant must provide a slip resistant surface suitable for climbing on. The TRRL pendulum test, with RAPRA Four S rubber as a slider, has been identified as a suitable practical objective test for the assessment of slip resistance of painted surfaces. All coats must have a minimum category of ‘Low Potential for Slip’ according to the limits set by the UK Slip Resistance Group, i.e., a measurement of 35 or above under both dry and wet (distilled water) conditions. Measurements shall be carried out in accordance with:
 - The Measurement of Floor Slip Resistance. Guidelines Recommended by the UK Slip Resistance Group, Issue 6, 2024.
 - BS EN 16165: 2021 - Determination of slip resistance of pedestrian surfaces. Methods of evaluation
- Rheological data in the form of a band of acceptable values of viscosity, measured using a Rion VT04 Viscometer (No. 1 Rotor, No. 1 cup) from 5°C to 30°C, must be available from the paint manufacturer and shall be provided with systems supplied to Northern Powergrid.

3.2. Containers and Labelling

3.2.1. Containers

For normal brush application the paint shall be supplied in 5 litre metal cans with securely attached flat metal carrying handles. Larger containers may be used when painting substation plant which are situated on the ground.

3.2.2. Labels

Containers shall bear the following information:-

- Manufacturer
- Formulation reference
- Batch number (marked in two positions)
- Date of manufacture
- Quantity
- “Electricity Company Tower Paint” or “Electricity Company Plant Paint”
- Paint type and colour
- Wording - “Thinning agents must not be used”

Document Reference:- NPS/001/021		Document Type:- Code of Practice	
Version:- 4.0	Date of Issue:- April 2024	Page 4	of 13

- Relevant Health and Safety wording and pictograms.

3.3. Systems

Northern Powergrid has a preference for a two-coat alkyd paint system for standard applications. Additional systems are available for projects with specific issues as detailed below: -

- Single coat alkyd system;
 - for projects where operational circumstances reduce the outage period providing the condition of the existing steelwork is classified as CR1 or CR2 (light rust)
 - for application in built up areas where there is a risk of damage to the customer's property.
- Aquatic friendly two coat systems – for use near waterways or sites with special scientific interest (SSSI's).
- Concrete Muff Paint

3.3.1. Two Coat Alkyd System - Primer

Composition Requirements

Specific Gravity	1.30-1.40
Pigment content	45-50% w/w
% Zinc phosphate in total pigmentation	40-45% w/w
% lamellar micaceous iron oxide* in total pigmentation	5% w/w
Volatile content	White spirit
Volume solids	48% minimum
Medium	Urethane alkyd 20-25% w/w

*Note: Micaceous Iron Oxide referred to in this specification must comply with ISO 10601 (BS 91/57463), Type 2, Grade 1 but with a minimum thin flake content of 70%.

Additional Requirements

(a)	Colour	08 C 35 - 08 E 51 (buff yellow) Matt finish
(b)	Drying time	Surface dry at 20°C Hard dry at 20°C
		4 hours maximum 16 hours maximum
(c)	Wet edge time	20°C 10-15 minutes

Application Properties

- (a) To be capable of application by brush direct from the can over the temperature range 5-30°C.
- (b) The paint must be capable of application to give a dry film thickness of 50-75 microns.
- (c) ViscosityICI Cone and Plate (20°C) 3.0-4.0 poise
 RION VT04 (No 1 Rotor 20°C) 25-35 poise
 RION VT04 (No 1 Rotor 10°C) 50 poise maximum
- (d) Hiding power Complete obscuration of a Morest Chart at 50-micron dft.
- (e) Sag resistance
 When applied on vertical surfaces the paint must be sag resistant at 175 microns wet film thickness.

Document Reference:- NPS/001/021		Document Type:- Code of Practice	
Version:- 4.0	Date of Issue:- April 2024	Page 5	of 13

- (f) Moisture displacement

Under a normal brushing action, the paint should be capable of displacing moisture present in the form of uniformly dispersed droplets which have not coalesced from the substrate without detrimental effect on the dried film.

3.3.2. Two Coat Alkyd System – Top Coat

Composition Requirements

Specific Gravity	1.55-1.70
Pigment content	55-60%w/w
% lamellar micaceous iron oxide* in total pigmentation	75% minimum w/w
Volatile content	White spirit
Volume solids	48-52%
Medium	Urethane alkyd 17-20% w/w

*Note: Micaceous Iron Oxide referred to in this specification must comply with ISO 10601 (BS 91/57463), Type 2, Grade 1 but with a minimum thin flake content of 70%.

Additional Requirements

(a)	Colour	Tower grey (BS 4800 00 A 09)
(b)	Drying time	Surface dry at 20°C
		4 hours maximum
(b)	Hard dry at 20°C	16 hours maximum
(c)	Wet edge time	20°C
		10-15 minutes

Application Properties

- (a) To be capable of application by brush direct from the can over the temperature range 5-30°C.
- (b) The paint must be capable of application to give a dry film thickness of 75-100 microns.
- (c) ViscosityICI Cone and Plate (20°C) 3.5-4.5 poise
RION VT04 (No 1 Rotor 20°C) 35-45 poise
RION VT04 (No 1 Rotor 10°C) 60 poise maximum
- (d) Sag resistance
When applied on vertical surfaces the paint must be sag resistant at 225 microns wet film thickness.
- (e) Moisture displacement
Under a normal brushing action, the paint should be capable of displacing moisture present in the form of uniformly dispersed droplets which have not coalesced from the substrate without detrimental effect on the dried film.

3.3.3. Single Coat Alkyd System

Composition Requirements

Specific Gravity	1.55-1.70
Pigment content	55-60%w/w
% lamellar micaceous iron oxide* in total pigmentation	75% minimum w/w
Volatile content	White spirit
Volume solids	48-52%

Document Reference:- NPS/001/021		Document Type:- Code of Practice	
Version:- 4.0	Date of Issue:- April 2024	Page 6	of 13

Medium

Urethane alkyd 17-20% w/w

*Note: Micaceous Iron Oxide referred to in this specification must comply with ISO 10601 (BS 91/57463), Type 2, Grade 1 but with a minimum thin flake content of 70%.

Additional Requirements

(a)	Colour		Tower grey (BS 4800 00 A 09)
(b)	Drying time	Surface dry at 20°C	4 hours maximum
		Hard dry at 20°C	16 hours maximum
(c)	Wet edge time	20°C	10-15 minutes

Application Properties

- (a) To be capable of application by brush direct from the can over the temperature range 5-30°C.
- (b) The paint must be capable of application to give a dry film thickness of 75-100 microns.
- (c) ViscosityICI Cone and Plate (20°C) 3.5-4.5 poise
RION VT04 (No 1 Rotor 20°C) 35-45 poise
RION VT04 (No 1 Rotor 10°C) 60 poise maximum
- (d) Sag resistance
When applied on vertical surfaces the paint must be sag resistant at 225 microns wet film thickness.
- (e) Moisture displacement
Under a normal brushing action, the paint should be capable of displacing moisture present in the form of uniformly dispersed droplets which have not coalesced from the substrate without detrimental effect on the dried film.

3.3.4. Aquatic Friendly Two Coat System - Primer

Composition Requirements

Specific Gravity	1.65-1.75
Non-volatile content	55%

Additional Requirements

(a)	Colour		Buff
(b)	Drying time	Surface dry at 20°C	4 hours maximum
		Hard dry at 20°C	16 hours maximum

Application Properties

- (a) To be capable of application by brush direct from the can over the temperature range 3-30°C.
- (b) The paint must be capable of application to give a dry film thickness of 50 microns.
- (c) ViscosityICI Cone and Plate (20°C) 2.0-3.0 poise
- (d) Hiding power
Complete obscuration of a Morest Chart at 50-micron dft.

Document Reference:- NPS/001/021		Document Type:- Code of Practice	
Version:- 4.0	Date of Issue:- April 2024	Page 7	of 13

3.3.5. Aquatic Friendly Two Coat System – Top Coat

Composition Requirements

Specific Gravity	1.65-1.75
Non-volatile content	49%

Additional Requirements

(a)	Colour	Grey
(b)	Drying time	Surface dry at 20°C Hard dry at 20°C
		4 hours maximum 16 hours maximum

Application Properties

- (a) To be capable of application by brush direct from the can over the temperature range 3-30°C.
- (b) The paint must be capable of application to give a dry film thickness of 110 microns.
- (c) ViscosityICI Cone and Plate (20°C) 2.0-3.0 poise

3.3.6. Concrete Muff Paint

Tower Concrete Muffs

This system is applied in two coats on concrete that is clean, dry and free from grease, dirt, peeling or any loose material with the moisture content of the concrete less than 14% to ensure good adhesion.

Composition Requirements

Non-volatile content	50% Nominal by weight
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Additional Requirements

(a)	Colour/Texture	Black MIO Finish
(b)	Heat resistance	Up to 60°C
(c)	Drying time	Surface dry at 20°C Hard dry at 20°C
		4 hours maximum 16 hours maximum

Application Properties

- (a) To be capable of application by brush direct from the can over the temperature range 3-30°C.
- (b) The paint must be capable of application to give a dry film thickness of 100 microns.

Document Reference:- NPS/001/021		Document Type:- Code of Practice	
Version:- 4.0	Date of Issue:- April 2024	Page 8	of 13

4. References

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

4.1. External Documentation

Reference	Title
BS EN 16165:2021	Determination of slip resistance of pedestrian surfaces. Methods of evaluation
BS4800: 2011	Schedule of paint colours for building purposes
ISO 10601: 2008	Micaceous iron oxide pigments for paints. Specifications and test methods

4.2. Internal Documentation

Reference	Title
MNT/001/004	Technical Specification for Tower, Steel Pole and Substation Plant Painting

4.3. Amendments from Previous Version

Reference	Description
3.0 Technical Requirements	Reference standards updated
3.3 Systems	Corrosion rating defined
3.3.6 Concrete Muff Paint	Requirement to add additional paint at steel pole base removed
4.1 and 4.2 External and Internal Documentation	Reference standards updated

5. Definitions

Term	Definition
None	

Document Reference:- NPS/001/021		Document Type:- Code of Practice	
Version:- 4.0	Date of Issue:- April 2024	Page 9	of 13

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
Deb Dovinson	Governance Administrator	27/03/2024

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 years	Reason: Based on the standard contract period
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Steve Salkeld	Policy and Standards Engineer	27/03/2024

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
Aaron Chung	Policy and Standards Engineer	02/04/2024

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	Head of System Engineering	05/04/2024

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-		April 2024	Page	10	of	13

Appendix 1 – Batch Certificate

MANUFACTURER	.....
PRODUCT NAME AND REFERENCE	.....
BATCH NUMBER	.....
DATE OF MANUFACTURE	.....
SPECIFIC GRAVITY	.....
VISCOSITY:	
CONE & PLATE 20°C	.....
RION VT 04 (20°C, No 1 ROTOR)	.....
RION VT 04 (10°C, No 1 ROTOR)	.....
DRYING TIME (ICI DRYING TIME RECORDER)	
SURFACE DRY (20°C)	.....
HARD DRY (20°C)	.....
SAG RESISTANCE	.....

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-		April 2024	Page	11	of	13

Appendix 2 - Addendum to Supplier Requirements

Packaging/delivery information

For normal brush applications the paint shall be supplied in 5 litre metal cans for tower paint with securely attached flat metal carrying handle. Paint for plant can be supplied in larger containers and have a durable label attached detailing the following information: -

- Manufacturer
- Formulation reference
- Batch number (marked in two positions)
- Date of manufacture
- Quantity
- "Electricity Company Tower or Plant Paint"
- Paint type and colour
- Wording - "Thinning agents must not be used"
- Relevant Health and Safety wording and pictograms.

Each batch shall be supplied with a completed batch certificate as detailed in appendix 1 of this specification. Paint shall be supplied with a minimum of 12 months shelf life remaining.

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-		April 2024	Page	12	of	13

Appendix 3 – Self Certification Conformance Declaration

Supplier shall complete the table below for each system being offered and provide supporting evidence where applicable.

Requirement	Section	Compliant / Non-compliant	Evidence Reference	Comment
Meets the specification general requirements	3.1			
Meets - Low potential for slip resistance	3.1			
Requirement for Containers	3.2.1			
Requirement for Labels	3.2.2			
Requirements for Two coat alkyd system - Primer	3.3.1			
Requirements for Two coat alkyd system – Top Coat	3.3.2			
Requirements for Single coat alkyd system	3.3.3			
Requirements for Aquatic friendly two coat system - primer	3.3.4			
Requirements for Aquatic friendly two coat system – top coat	3.3.5			
Requirements for concrete muff paint	3.3.6			

Document Reference:-		NPS/001/021	Document Type:-		Code of Practice			
Version:-	4.0	Date of Issue:-		March 2024	Page	13	of	13

Appendix 4 - Technical Information Check List

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)
Product descriptions, pantone colour code and system reference number	
Appendix 3 – completed self-certification conformance declaration	
Manufacturing routine test plan	
Packaging information	
Material Safety Data Sheets	
ISO:9001, ISO:14001 and ISO:18001 certificates	