NPS/002/008 – Technical specification for cold pour resins, hot and cold pour compounds

1. Purpose

The purpose of this document is to specify the Northern Powergrid (the Company) technical requirements for cold pour resins used in cable joints up to 66kV.

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

Reference	Version	Title
NPS/002/008	3.1	Specification for Cold Pour Resins and Hot Pour Compounds

2. Scope

This document specifies the requirements for cold pour resins and hot poured compounds for use in Northern Powergrid.

The resin will be utilised in joints on a range of power cable systems including XLPE, PVC sheathed, Waveform, PILC, Concentric, Split concentric and PILC service cables.

The resin will be also be used in transition joints connecting different cable types.

Hot and cold pour compound will be utilised on certain cable joints and terminations up to 66kV.

Northern Powergrid has classified the resin/compound requirements into the following categories:

- Type One – Hot and cold pour compounds,
- Type Two – Polyurethane resin,
- Type Three - Re-enterable resin for cable joints, and
- Type Four - Re-enterable resin for cable boxes.

The following appendices form part of this technical specification:

- Appendix 1 – Requirements,
- Appendix 2 - Logistical Requirements,
- Appendix 3 – Self Certification Conformance Declaration,
- Appendix 4 – Addendum to Supplier Requirements, and
- Appendix 5 – Technical Information Check List.

2.1 Contents

3. Requirements

3.1 Overview

The resins and compounds shall comply in all respects with the specification detailed below unless otherwise agreed in writing by Northern Powergrid.

The method of supplying resin and hardener shall utilise a system which eliminates the problems of hardener container disposal and on completion of mixing, any containers shall be considered non-hazardous and suitable for disposal as general waste.

The filling medium shall be two-part cold pouring hard set resin compound identical to that which Type Approval has been obtained in accordance with the latest version of Engineering Recommendation C81/4 “Type Approval Tests for Joints for 600/1000 volt Cable Systems” and/or BS EN 50393**.**

The resin compound shall have no detrimental effect when used in conjunction with ABS, HIPS, PE or similar cable joint shell materials.

3.2 Two part cold pouring resin

The preferred type of resin is one which uses MDI as the hardener, the resin and hardener shall be adequately protected and sealed against the ingress of moisture.

The current pouch size used by Northern Powergrid for this type of resin is 2.7 and 4.0 litres as described in Appendix 1 – Product Requirements. However other pouch sizes shall be considered assuming they are operationally practical and economically viable. The pouch shall be supplied as a single unit in a suitable rectangular shaped container with carrying handle.

The time required for curing to reach a stage where normal back-filling may commence without damage to the joint, or “setting time”, shall not exceed 60 minutes at 0°C and shall not be less than 20 minutes at 30°C.

3.3 Cold pour re-enterable resin

Re-enterable resin is required for use in ‘temporary’ LV jointing situations and shall comply with the general requirements of two part cold applied resin as stated above. It will however set in such a way that removal of the resin will be achievable without undue difficulty with an insulated knife or similar tool, to allow access to the joint or termination, thus enabling it to be broken down and remade. The resin shall be compatible with heat shrink and cold applied materials as well as other components commonly used in LV jointing activities.

Re-enterable resin shall maintain its characteristics irrespective of typical seasonal temperature variation found in the UK and should be suitable for use at a minimum of -5°C outside air temperature without affecting its removal performance.

Preference will be given to low or non-hazardous products and any environmental impact this may have. Re-enterable resin shall not be subject to safety classification that requires special measures for the transportation, handling, use or disposal.

Each kit shall be supplied with a method statement providing details of the correct method of mixing and pouring of the compound.

3.4 Re-enterable compound for cable boxes

A cold pour compound is required for existing designs of 11, 20 and 33kV switchgear and transformer cable boxes where clearances or electrical insulation by the use of heat shrink or cold shrink materials cannot be satisfactorily achieved.

The compound shall be compatible with commonly used heat shrink and cold applied terminations and have no adverse effect on polymeric type cables.

To allow a termination to be broken down and remade, the compound shall set in such a way that its removal from any cable box will be achievable with an insulated knife or similar tool. No heat shall be required for this process.

The compound shall be unaffected by the presence of any residue of traditional oil based hot or cold pour resins or compounds which may be present within the cable boxes.

Preference will be given to low or non-hazardous product and any environmental impact this may have. Re-enterable compound for cable boxes shall not be subject to safety classifications which require special measures for the transportation, handling, use or disposal.

Each kit shall be supplied with a method statement providing details of the correct method of mixing and pouring of the compound.

3.5 Compounds

Compound for use up to 20kV shall be identical to that which Type Approval has been obtained in accordance with BS 1858 2002 or equivalent. The classification of compounds is defined in Table 1 of BS 1858: 2002.

Compounds for use at 11kV, shall be Class II and compounds at 20kV, shall be Class V.

The compounds shall have the general requirements of clause 4 of BS 1858: 2002 and have characteristics as defined in clauses 5 through to 16 or equivalent.

The compound used for 33 to 66kV shall be identical to that which Type Approval has been obtained in accordance with BS 2000: Institute of Petroleum Standards or equivalent.

The classification of compounds rated between 33 and 66kV shall be defined and tested in accordance with BS 2000: Institute of Petroleum Standards.

3.6 Northern Powergrid classification of use

Classification Type	Use
One	Hot and Cold pour compounds
Two	Polyurethane resin
Three	Re-enterable resin for cable joints
Four	Re-enterable resin for cable boxes

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 in this respect the following documents are particularly relevant.

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

Reference	Version/Date	Title
BS 1858	2002	Electric cables. Accessories. Bitumen-based filling compounds
Energy Networks Association: Engineering Recommendation C81/4	1999	Type Approval Tests for Joints for 600/1000 volt Cable Systems
BS 2000		Institute of Petroleum Standards
BS EN 50393	2015	Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV

4.2 Internal Documentation

Reference	Version/Date	Title
N/A		

4.3 Amendments from previous version

Clause	Amendments
3.1 Overview	Reference added to requirement for 'hard' set resin and resin having no detrimental effect on the joint shell material
3.6 Northern Powergrid Classification of use	Table revised to more effectively capture resin/ compound usage
4.1 External documentation	Section updated to reference latest document versions
5.0 Definitions	Section updated
Appendix 1 – Product Requirements	Section updated to provide additional product information Product '164569 - Resin, 2-Part, Cold Pour, Polyurethane. For use at voltages up to and including 33kV. Supplied in 2 x 4.0 litre packs' added to the list of requirements.
Appendix 3 – Self certification	Section updated in line with section 4.1
Appendix 5 – Technical information	Table updated

5. Definitions

Term	Definition
The Company	Northern Powergrid
MDI	Diphenylmethane diisocyanate
XLPE	Cross linked polyethylene
PVC	Polyvinyl chloride
PILC	Paper insulated lead covered
ABS	Acrylonitrile butadiene styrene
HIPS	High impact polystyrene
PE	Polyethylene

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.

		Sign	Date
Andrew Leggett	CDS Administrator	Andrew Leggett	09/05/2018

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:** Update will be dictated by contract renewal date or any significant changes in the specification or documents referenced.
Should this document be displayed on the Northern Powergrid external website?		Yes

		Sign	Date
Paul Hollowood	Policy & Standards Engineer	Paul Hollowood	10/05/2018

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.

		Sign	Date
Steven Salkeld	Policy & Standards Engineer	Steven Salkeld	10/05/2018

6.4 Authorisation

Authorisation is granted for publication of this document.

		Sign	Date
David Gazda	Policy & Standards Manager	David Gazda	11/05/2018

Appendix 1 – Product Requirements

Type	Commodity Code	Description
1	160996	Compound, Hot Pour Bituminous (G101-123). For use at voltages up to and including 11kV. Supplied in 10kg containers.
1	160939	Compound, Hot Pour Oil/Rosin (G38A). For use at voltages up to and including 33kV. Supplied in 25kg containers.
2	164568	Resin, 2-Part, Cold Pour, Polyurethane. For use at voltages up to and including 33kV. Supplied in 2.7 litre packs.
2	164569	Resin, 2-Part, Cold Pour, Polyurethane. For use at voltages up to and including 33kV. Supplied in 2 x 4.0 litre packs.
3	164559	Resin, Re-enterable, 2-Part, Cold Pour, Resin. For use at voltages up to and including 415V. Supplied in 3 x 2.0 litre packs.
3	164560	Resin, Re-enterable, 2-Part, Cold Pour, Resin. For use at voltages up to and including 415V. Supplied in 2.0 litre packs.
4	085317	Resin, Insulating, 2-Part, Cold Pour. For use at voltages up to and including 33kV. Supplied in 5.3 litre containers. (Ref: JOR-59003)
4	085318	Resin, Insulating, 2-Part, Cold Pour. For use at voltages up to and including 33kV. Supplied in 10.0 litre containers. (Ref: JOR-59005)

Appendix 2 – Logistical requirements

To enable Northern Powergrid to store the product(s) in accordance with the manufacturer's recommendations the Tenderer shall provide details of the recommended storage environment with respect to each tendered product including statements of critical importance such as storage temperature requirements.

Details should be provided where relevant in respect to the minimum and maximum exposure levels, frequency of exposure and duration of exposure of the packaged item with respect to;

* Ambient temperature
* Humidity
* Water
* Dust
* Atmospheric corrosion
* Impact
* Vibration
* Solar radiation

Components shall be supplied complete in a package designed to withstand general handling, transport and outdoor storage without damage to the components and adequately sealed against moisture.

The package should be clearly labelled with the Northern Powergrid reference numbers, the shelf life expiry date and the manufacturer's batch number. The shelf life, expiry date shall be that of the item within the package which has the minimum life, i.e. resin or hardener etc.

This package must contain sufficient resin, hardener and protective gloves or mittens as required.

The method for the supply and mixing of the resin is by the use of a system, which eliminates problems of hardener container disposal, and on completion of mixing shall be considered non-hazardous and suitable for disposal as general waste.

Each component shall be suitably labelled to show: -

(a) The type and reference number of the resin/compound
(b) Volume and/or weight
(c) Shelf life expiry date where applicable
(d) Batch number
(e) Any safety warning or advice required by Statute or considered necessary by the manufacturer or Northern Powergrid

Palletised goods shall be supplied on standard 1200mm x 1000mm pallets.

Tenderer shall submit at the time of tendering a sample of the proposed labelling for each product package type.

Appendix 3 - SELF CERTIFICATION CONFORMANCE DECLARATION

Cold Pour Resins and Hot Pour Compounds 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 Product Type (e.g. Voltage, Type, Size):

Name:

Signature:

Date:

NOTE: One sheet shall be completed for each item or variant submitted.

NPS/002/008 – Technical specification for cold pour resins, hot and cold pour compounds				
	Clause / Requirements	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
Resin:				
Range of Approval: - Mains Straight Joints - Mains Branch Joints - Mains Service Joints - Transition Mains St Jt - Transition Mains Br Jt - Service Straight Joint - Service Branch Joints - Transition Service St Jt - Transition Service Br Jt - Stop Ends - Terminations	C81/4 9.2			
	C81/4 9.3			
	C81/4 9.4			
	C81/4 9.5			
	C81/4 9.6			
	C81/4 9.7			
	C81/4 9.8			
	C81/4 9.9			
	C81/4 9.10			
	C81/4 9.11			
	C81/4 9.12			
General	BS EN 50393 8.1			
Impulse Withstand	BS EN 50393 8.2			
AC Voltage Withstand	BS EN 50393 8.3			
Insulation Resistance	BS EN 50393 8.4			
Impact	BS EN 50393 8.5			
Heat Cycle	BS EN 50393 8.6			

NPS/002/008 – Technical specification for cold pour resins, hot and cold pour compounds				
	Clause / Requirements	Conformance Code	Evidence Reference	Clause / Requirements
Resin:				
Immersion	BS EN 50393 8.7			
Examination	BS EN 50393 8.8			
Re-Enterable Resin	NPS/002/008 3.2 / as above			
Re-Enterable Compound	Tenderer to submit type test evidence			

NPS/002/008 – Technical specification for cold pour resins, hot and cold pour compounds				
	Clause / Requirements	Conformance Code	Evidence Reference	Remarks / Comments
Compound:				
- Classification - General Requirements - Solubility - Softening Point - Penetration - Viscosity (Class I) - Pouring (Classes II – V) - Electric Strength - Flash Point - Mineral Matter - Acidity - Sulphur - Adhesive Properties - Contraction	BS 1858 3			
	BS 1858 4			
	BS 1858 5			
	BS 1858 6			
	BS 1858 7			
	BS 1858 8			
	BS 1858 9			
	BS 1858 10			
	BS 1858 11			
	BS 1858 12			
	BS 1858 13			
	BS 1858 14			
	BS 1858 15			
	BS 1858 16			

Appendix 4 – Addendum to supplier requirements

Copies of all witnessed test reports on which Type Approval was given shall be included with the tender document.

Suitable protective gloves or mittens shall be supplied with each resin pack.

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

All packages shall include written details on how to mix and handle the Resin/Compound and list any special precautions required for use with this product.

Graphical values of resin mixing and setting times and of resin temperature variation with time at temperatures between -5°C and 30°C shall be supplied with the tender.

Appendix 5 - Technical information check list

The following information shall be provided by the supplier for technical review by the company.
Additional information shall be provided if required.

Requirements	Provided (Yes / No)
Full product descriptions and part number/reference	
Appendix 3 – completed self-certification conformance declaration	
Complete set of drawings for each variant	
Type test evidence	
Routine test plan (example)	
Pre-commissioning testing/inspection requirements	
Recommended periodical inspection and maintenance requirements	
Packaging/delivery information	