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Electricity Specification 400D5

Issue 3 October 2021

Duct Seal

Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 3	New template applied throughout.
October 2021	Prepared by: D M Talbot
	Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director

Contents

1 Introduction

Electricity North West Limited are aware of the potential for equipment failure resulting from high humidity caused by water ingress, in addition to pollution from dust, smoke, and gases, within high voltage substations, resulting in partial discharge of switchgear.

In addition, where a substation is in a location of extreme weather or flooding extra measures to prevent water ingress may be required.

External cable entry points are one of the main sources of water ingress to substations and they should be effectively sealed.

This specification covers the technical requirements for a duct seal system to seal cable ducts for use on the Electricity North West Limited (hereinafter referred to as Electricity North West) Distribution system.

In addition, this specification names the preferred suppliers of products to be used when sealing cable ducts within Electricity North West assets.

2 Scope

This specification covers duct seals for all the situations on the Electricity North West Distribution system described in the Introduction above.

3 Definitions

Approval	Sanction by the Electricity North West Civil 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.
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 Civil 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.

4 General Requirements for Approvals and Testing

4.1 Product not to be Changed

No change in the product, packaging or labelling shall be made after Approval has been granted without prior notice to the Electricity North West Civil Policy Manager, and receipt of a written agreement to the proposed change from the Electricity North West Civil Policy Manager.

4.2 Electricity North West Technical Approval

The Tenderer shall submit, with this Tender, proposals for testing which will demonstrate, to the satisfaction of the Electricity North West Civil Policy Manager, compliance with this Specification. Such tests shall be carried out without expense to Electricity North West.

Alternatively, technical reports and other data may be submitted that the Tenderer considers will demonstrate, to the satisfaction of the Electricity North West Civil Policy Manager, compliance with this Specification. Acceptance of this evidence shall be at the discretion of the Electricity North West Civil Policy Manager but will not be unreasonably withheld.

Approval shall be 'factory specific' and is not transferable to another factory without the written Approval of the Electricity North West Civil Policy Manager.

The Supplier and product shall comply with all the relevant requirements of Electricity North West documents EPD311 and CP311.

4.3 Quality Assurance

The Tenderer shall confirm whether or not Approval is held in accordance with a quality assurance scheme accredited under ISO 9000. If not, the Tenderer shall submit a statement of the quality assurance procedures employed to control the quality of the product, including the performance of Suppliers and Sub-Contractors.

The right is reserved for the repeat of such tests, from time to time, that the Electricity North West Civil Policy Manager may deem to be reasonably necessary to demonstrate continued compliance with the Specification.

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 Civil Policy Manager, fitness for installation and service.

The Tenderer shall provide free of charge to Electricity North West such samples as may, in the opinion of the Electricity North West Civil Policy Manager, be reasonably required for inspection and/or retention as quality control samples. The Electricity North West Civil Policy Manager will confirm the requirement for samples at the time of Tendering.

The right is reserved for inspections to be made of Tenderer's facilities, from time to time, as deemed reasonably necessary by the Electricity North West Civil Policy Manager to ensure compliance with this Specification and any Contract of which it forms a part.

The Tenderer shall submit, with the Tender, such details of product packaging disposal, as will enable Electricity North West to comply with the requirements of BS EN ISO 14001 - Environmental Management Systems.

4.4 Formulation

The Tenderer shall submit, with the Tender, such details of the formulation and use of the product and associated substances as will enable Electricity North West to comply with the obligations of the Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health Regulations 2002, in the use, storage and disposal of the product. The Tenderer may stipulate, prior to submission of such information, that it is to remain confidential, and the Electricity North West Civil Policy Manager will, if requested, confirm agreement to this prior to receipt of the information.

4.5 Identification Markings

The Tenderer shall submit, with the Tender, details of markings which it is proposed to apply to the product or packaging to identify manufacturing batches or items. The forms and content of such markings shall be subject to the Approval of the Electricity North West Civil Policy Manager and shall in all cases include the Electricity North West approved description and commodity code number.

The Tenderer shall submit, with the Tender, such details of marking gross weight on components, assemblies and packages, as will enable Electricity North West to comply with the Health and Safety Manual Handling Operation Regulations 1992, for components, assemblies and packages supplied with a gross weight over 1kg. The forms and content of such markings shall be subject to the Approval of the Electricity North West Civil Policy Manager.

4.6 Minimum Life Expectancy

The minimum life expectancy of all products covered by this Specification is 20 years.

4.7 Product Conformity

Preference will be given to those Suppliers who can provide suitable product conformity certification to a recognised or specified standard, or an equivalent certification.

4.8 Confirmation of Conformance

The Tenderer shall complete the conformance declaration sheets in Appendix A. Failure to complete these declaration sheets may result in an unacceptable bid.

5 Requirements for Type and Routine Testing

The Electricity North West Civil Policy Manager shall set out the requirement of the following tests to be carried out by the Supplier at the Supplier's cost.

5.1 Requirement for Type Tests at Suppliers Premises

These are a series of one-off type tests, which are carried out to ensure the satisfactory performance of the product design, under extremes of operating stresses, and of endurance, as may be appropriate, to be determined by the Electricity North West Civil Policy Manager.

These may or may not be destructive tests.

5.2 Requirement for Routine Tests at the Supplier's Premises

These tests may be required to be carried out on every individual unit or component, as specified, or at some regular frequency to be determined by the Electricity North West Civil Policy Manager.

The results of these tests may be required to be supplied to Electricity North West with each unit purchased or retained for inspection, at a period to be determined by the Electricity North West Civil Policy Manager.

6 Research and Development

Research has been undertaken to assess the various products for duct sealant to ascertain, in the opinion of Electricity North West, the most suitable products to be used within substations.

Following evidence presented on existing sites, research and trials on new products three products have been identified suitable for long term effective sealant of cable ducts from water ingress.

7 Preferred Suppliers

The following have been identified to be used on Electricity North West substations in regard to the permanent sealing of cable ducts.

7.1 CDS Sealing Systems

CSD Sealing Systems
Unit 6
Easter Park
Nelson Park West
Cramlington
NE23 1WQ

T: +44 (0)1670 739970
F: +44 (0)1670 716548

7.2 Roxtec

Roxtec Ltd.
Unit C 1, Waterfold Business Park,
Bury, Lancashire BL9 7BQ

Phone: +44 161 7615280
Fax: +44 161 7636065

Email: info@uk.roxtec.com

7.3 FiloForm

Unit B1. Lambs Farm Business Park
Bassingstoke Rd
Reading, RG7 1PQ

Phone: +44 (0)118 988 6873

8 Product Description and Use

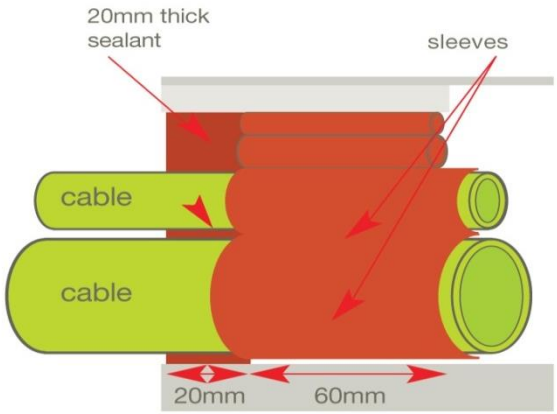
8.1 CDS Sealing Systems

The NOFIRNO Duct Seal system is a multi-cable and pipe transit sealing system for sealing cable ducts and building entries and is suitable for both new build and retrofit. It consists of two components: **NOFIRNO sealant**, a fire retardant silicone based sealant and **NOFIRNO rubber multi sleeves.**

The system provides flood protection and prevents gas ingress.

- Water tight pressure resistant tested up to 4 bar.
- Can be installed in both horizontal & vertical ducts.
- Age tested to 50 years.
- Suitable for trefoil and large power cables (provides long term cable support).
- Can be re-entered for the adding, removing or replacing of cables.
- Prevents rodent ingress.
- Can seal ducts in some running water conditions when used with the Slipsil Waterstop.
- ATEX & DSEAR Gastight Compliant.

The **NOFIRNO** multi sleeves are supplied bonded for quick installation. The sleeves provide cable separation & cable support, are used to pack the free space in the duct and are a backing for the application of the NOFIRNO sealant.



Once the installation of the Nofirno Duct Seal system is complete a 6 point check should be made on each installation.

- Were 60mm long Nofirno filler sleeves used to separate cables and tightly pack the free space?
- Was a 20mm layer of Nofirno sealant applied?
- Are all cables separated from each other and from the inside of the duct or entry point?
- Are there any gaps in the sealant layer?
- Does the sealant have a smoothed finish and is it in good contact with the duct or conduit wall?
- Is the sealant in good contact with the cables?

8.2 Roxtec

The Roxtec system provides a means of secure cable retention under normal loads and fault conditions and/or where the exterior of the building is subject to ground settlement post back-filling of the cable trench. They also provide ingress protection in both normal and flood conditions and can be installed in running water.

Typical products being:

Roxtec Knock Out Sleeve UG (KOS)

- Used for formation of 100mm, 150mm and 200mm ducts – see casting guidelines for additional information.
- Complete solution comprising of a sleeve with an external puddle flange and integrated sealing plate – keeps building dry during and after construction.

- Cast installation for either new build or retrofit applications.
- IP68 tested and certified to 0.3bar constant water pressure & 1bar catastrophic water pressure. Gas tight to 0.3bar.

Roxtec UG Rubber Seals

- Tested and certified to IP68 for constant water pressure to 0.3bar (3m head of water normal conditions) and catastrophic pressure to 1bar (10m head of water flood conditions). Gas tight to 0.3bar.
- Certified rodent / vermin ingress protection.
- Can be installed in running water conditions & retrofit around existing cable installations.
- Fittings manufactured from 316L stainless steel. Minimum clearance of 3mm between rubber and metal fittings to prevent direct contact between the cable and any metal components.
- Minimum seal depth 60mm to aid with cable retention. Preventing loss of seal when; movement occurs on the cable due to ground settlement post backfill, the weight of the cables and the flex during operation.
- Cable retention with a pull force of up to 10,000N and a weight load of up to 1,000kg, depending on size / seal selection.

Roxtec RS UG Seal

Manufactured from Roxylon EPDM rubber with Multidiameter peelable layers at 1mm increments, designed to seal a single cable between 9-204mm Ø. The unique indicator window allows for a simple check that the seal has been sufficiently tightened. Fully split system allowing for easier installation / cable positioning.

Roxtec H3 UG Seal

Manufactured from Roxylon EPDM rubber with Multidiameter peelable layers at 1mm increments, designed for use with HV single core cables between 23-68mm Ø in a trefoil formation. The unique indicator window allows for a simple check that the seal has been sufficiently tightened. Fully split system allowing for easier installation / cable positioning.

Roxtec R UG Seal

Designed for entries with multiple cables and earthing arrangements. Used in conjunction with Roxtec RM UG™ modules and RM earth tape modules.

Earthing Arrangements

Flat earth tapes can be sealed using a water jet cut module in Roxylon EPDM rubber. Note that the Roxtec UG™ sealing system is not suitable for use with braided / twisted earth rope. Solid circular earth bar can be sealed using the standard Roxtec RM UG™ modules.




Roxtec UG™ Sealing Solution; A visual inspection of the Roxtec sealing system after installation is sufficient.

8.3 Filoform

FiloSeal+ Re-enterable duct sealing system.

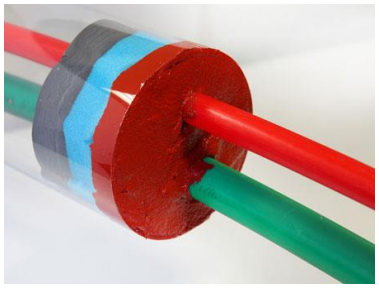
Filoform FiloSeal+ Duct sealing system is a universal solution for sealing cables and pipes in ducts or bore holes. The FiloSeal+ sealing system seals against gas and water and can also be adapted to seal against fire. The FiloSeal+ system protects valuables from damage caused by gas and waterleaks.

The Filoform FiloSeal+ duct sealing system uses Filoform MD+ sealant which is easily applied using a skeleton gun. Filoform MD+ flexible sealant is high quality, one component and based on a silicon compound that cures with air (humidity).

Filoform FiloSeal+ is very easy to apply regardless of the type of cable scenario in the cable ducts as the FiloSeal+ uses a uniquely shaped foam piece which positions neatly around the cables or pipes in the duct.

The unique design of the Filoform tri-flexible foam makes the positioning and separation of the cables very easy while also providing a backing for the Filoform MD+ to be applied. This Filoform FiloSeal+ seal is easily installed in vertical cable sealing applications whilst insuring no loss of components down the cable duct.

Filoform FiloSeal+ cable duct seals are suitable for sealing several cables or pipes contained in one duct and the FiloSeal+ system also allows re-entry of the seal to add or remove cables or pipes as required. The Filoform MD + cable and pipe sealant seals on all common materials cable duct and bore hole types : PVC & PE sheathed cables, GPLK, HDPE pipes and PE water pipes.



- Flexible, one component, adhesive and sealing compound in a cartridge
- High levels of gas and water tightness
- Excellent adhesion to cable and duct
- Fire resistance properties
- Resistant against water, alkaline and chemical agents
- Resistant to hydrogen sulphide / methane and other gases
- Non corrosive
- Solvent free
- Non toxic, neutral and almost odourless
- Complies with ATEX regulations
- WIMES compliant cable duct seal
- Suitable for any shaped cable duct, bore hole or opening
- A complete kit for one duct
- Suitable for renovations, can be installed retrospectively

9 Design and Product Choice

The engineer or designer needs to assess which of the products, within Section 7, is preferred depending on an assessment of the variables associated with the cable sealing requirements. This could be, but not limited to, location, new build or reuse of ducts, access, cable size, configuration and numbers, etc.

A similar judgement needs to be made on projects where the decision is made on site by the responsible engineer.

10 Installation

Installation of the cable sealant product must be in strict accordance with the manufacturer's installation instructions and recommendations and agreed, where applicable, with the designer and responsible Electricity North West engineer.

Careful consideration is to be taken in regard to the location and working environment which is inevitably within a live substation environment, in deep excavations, cable trenches or cable basements. Prior to any cable sealing a full risk assessment is to be undertaken in regard to the working environment presented.

11 Testing

All inspections and testing must be in accordance with the manufacturer's recommendations and agreed and witnessed with the Electricity North West engineer.

12 Health and Safety

Electricity North West safety rules should be adhered to, at all times, together with the appropriate PPE.

In addition, all PPE recommended by the product manufacturer.

On sites where the installation is within a project Construction Design Management, (CDM), site then the specific restrictions and rules of the site shall be adhered to.

If installation is within a confined space then the confined space entry procedures for that building must be followed and appropriate actions undertaken.

RAMS and COSHH should be made available to the Project Engineer prior to commencing of the project.

13 Training

Prior to installation the person(s), using the product, must seek advice and training from the manufacturer to ensure sufficient knowledge is obtained to apply the product.

14 Documents Referenced

DOCUMENTS REFERENCED	
Health and Safety at Work Act 1974	
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
CP311	Equipment Approval Policy and Process

15 Keywords

Cable; duct; water ingress; sealant; PPE

Appendix A – 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**		
8.1	**CDS Sealing Systems**		
8.2	**Roxtec**		
8.3	**FiloForm**		

* 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: