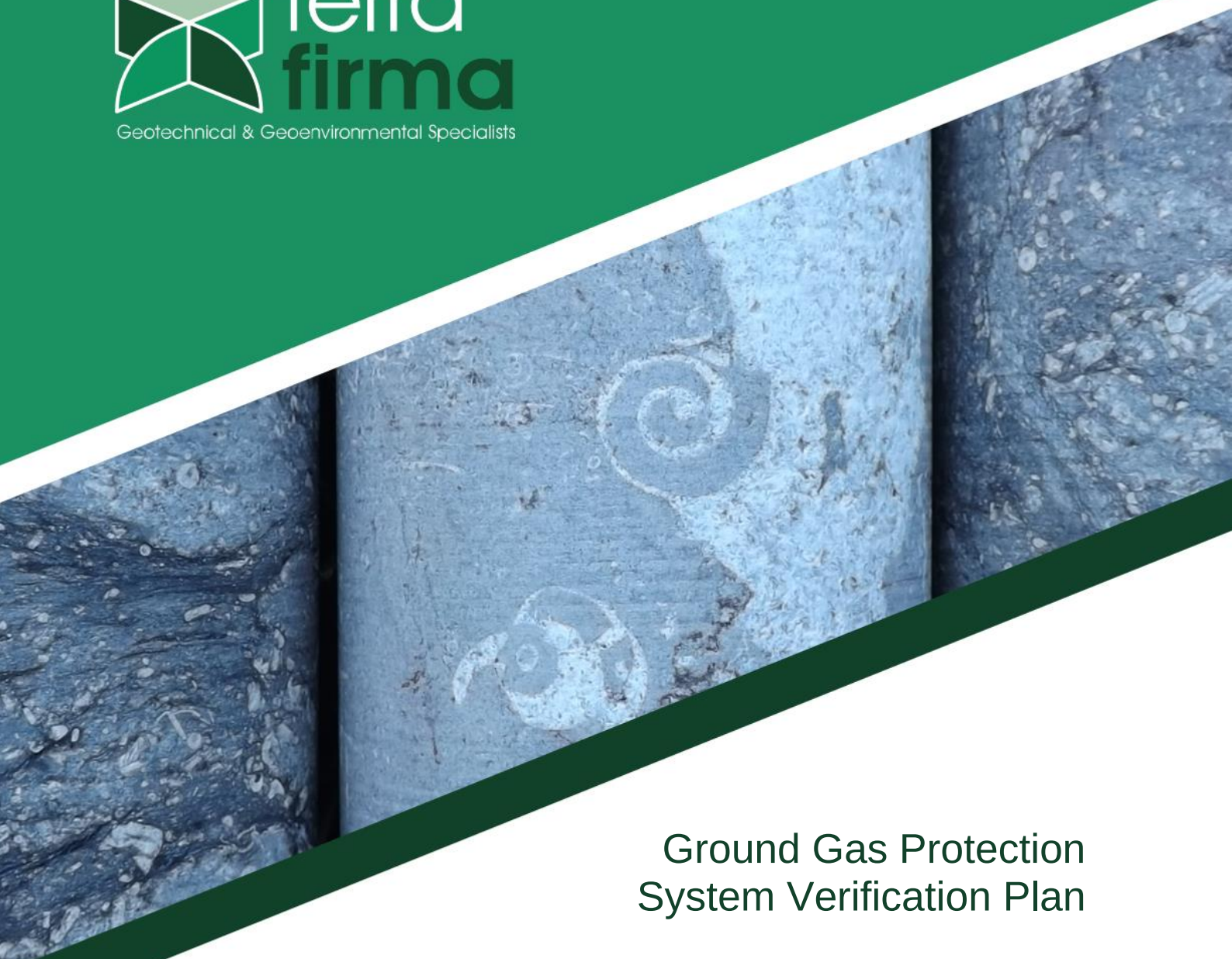




Ground Gas Protection System Verification Plan

Site: 5 Park Row, Cwmafan

Prepared For: Marie Rees

Issue Date: January 2023

Job No: 16881

REPORT TITLE : **Ground Gas Protection System Verification Plan, 5 Park Row, Cwmafan**

JOB NUMBER : **16881**

ISSUE DATE : **January 2023**

REPORT REFERENCE : **GGVP-040123-16881-1**

Document Revision Record

Issue Number	Date	Revision Details
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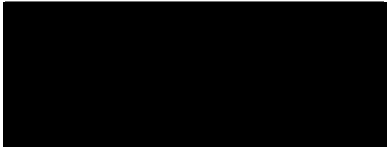
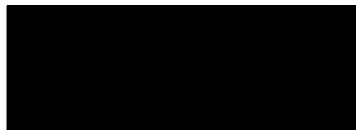
	Name	Signature
Prepared	James Rhys-Williams BSc. (Geol) FGS	
Checked	Mathew Lake MEng FGS Tech IOSH	
Approved	Gwyn Lake BSc (Hons). PhD, CGeol, FGS	



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SECTION 1 Introduction and Proposed Development

1.1 Introduction

Marie Rees (the Client) is proposing the development of a single residential property at the 5 Park Row, Cwmafan, Port Talbot, SA12 9PW.

TFW Group Ltd (Terra Firma) have been commissioned by the Client to prepare a ground gas protection system verification plan (Verification Plan) for the development.

Previous investigations and assessments undertaken at the site have identified that ground gas presents a significant risk to the health of future site users. The incorporation of a ground gas protection system will be required for the identified plots.

This report presents a detailed Verification Plan for the proposed development based on available previous investigations and assessments.

1.2 Objectives

The objective of the Verification Plan is to detail the remedial steps that are required to render the proposed development fit for its intended use and to provide a detailed methodology to facilitate the validation of the ground gas protection system installation.

1.3 Previous Investigations and Assessments

The Verification Plan is based on the findings of previous investigations and assessments. This report shall be read in conjunction with the following documents.

- Terra Firma Wales Ltd. Phase 1 Desk Study Report. 02092021-15568-1, September 2021
- Terra Firma Wales Ltd. Geotechnical and Geoenvironmental Report. 241121-16681-01. November 2021
- TFW Group Ltd. Remediation Strategy Report. 270922-16881/RS-ISSUE03. September 2022

1.4 Roles and Responsibilities

Table 1.1 Roles and Responsibilities

Roles	Organisations
Client	Marie Rees
Principal Designer	Go Concept Designs Ltd
Membrane Installer	TBC – Must be suitably qualified
Local Authority	Neath Port Talbot Council
Validator	TFW Group Ltd

1.5 Limitations and Exceptions

This report has been prepared for the sole internal reliance of the Client and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of TFW Group Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geoenvironmental and geotechnical consultants. TFW Group Ltd does not provide legal advice and the advice of lawyers may be required.

It is not within the scope of Terra Firma to:

- Provide Method Statements and Risk Assessments for the installation of ground gas protection systems.

1.6 Verifier Competency

The principal Verification Officer at Terra Firma is Mr James Rhys-Williams.

Mr Rhys-Williams is suitably qualified holding a Level 4 NVQ Diploma in Verification of Ground Gas Protection Systems. Furthermore, he is an accredited Specialist in Gas Protection Verification (SGPV) by CL:AIRE (SGPV0009) and is a full member of the British Verification Council (BVC) with instant access to industry peers.

Mr Rhys-Williams has extensive experience in brownfield land investigation, risk assessment and site remediation gained while working for various geotechnical and geoenvironmental contractors and consultants since 2014.

Mr Rhys-Williams holds a bachelor honours degree in Geology obtained from the University of Bristol in 2010 and is a fellow of the Geological Society of London, maintaining regular industry related continuous professional development.

1.7 Quality Assurance

The quality and environmental aspects of the assessment comply with Terra Firma business management system which is UKAS Accredited to ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Site Characteristics

The following subsection information has been summarised from previous investigation and assessments listed in **Section 1.3**.

2.1 Site Location & Description

The development site is irregular in shape and locates off Park Row, Cwmafan. The site centres on an approximate National Grid Reference of 278110 192670, occupying a plan area of approximately 0.2 Hectares.

The site elevation is approximately 71m AOD and remains mostly flat across the majority of the main site plateaux. The site falls off to the south with an approximate fall of 2m to the access road of Park Row.

The proposed layout can be seen on **Figure 2.1**, the plot covered under this Verification Plan is illustrated.

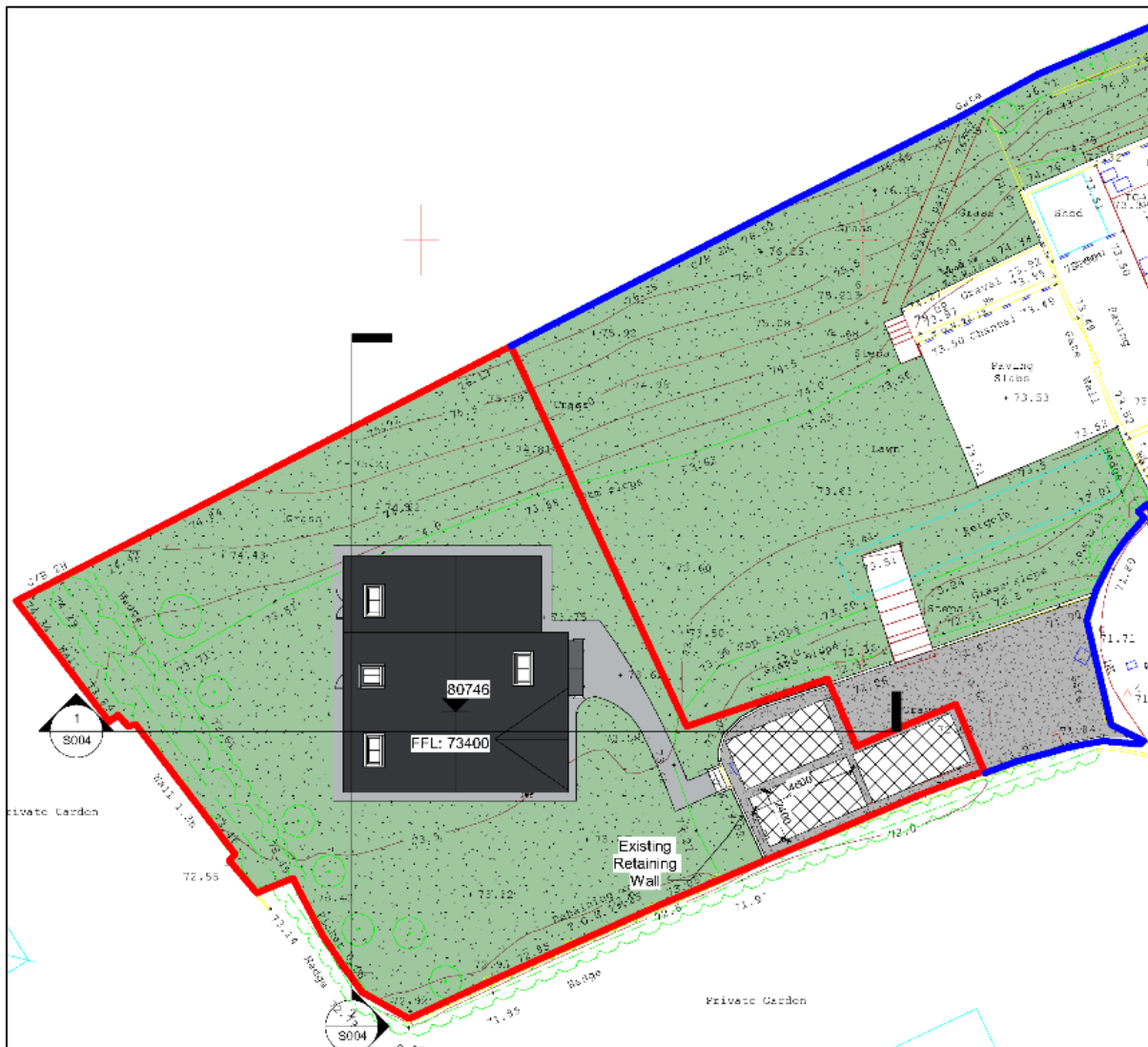


Figure 2.1 Proposed Layout

2.2 Site History Summary

Since the earliest available maps (1878) the site was located within the rear gardens of Park Row residential terrace, with frequent outhouses along the northern boundary. The

surrounding area is heavily industrialised at this time with extensive coal mining related workings and infrastructure and a large chemical works to the south. By 1975 Park Row terrace is removed and the surrounding area brownfield land is redeveloped with dwellings. The site remains undeveloped until 1994 after which time a single dwelling locates towards the east of the wider plot.

2.3 Geology & Ground Conditions

The geological map of the area was consulted for geology underlying the site. The site is shown to be underlain by the South Wales Middle Coal Measures Formation. The rocks generally consist of mudstone, siltstone and sandstone with interbedded coal. Superficial are not recorded to overlie the solid geology.

The ground conditions beneath the site encountered during the site investigations can in general be summarised as shown in **Table 2.1**.

Table 2.1 Summary of Ground Conditions

Depth (m)			Thickness (m)	Stratum
0.00	-	1.25/1.50	0.2/1.50	MADE GROUND brown organic sandy slightly gravelly CLAY (0.1-0.2m) over very soft to soft slightly sandy slightly gravelly CLAY .
1.25/1.50	-	1.9/2.0	0/0.65-	Soft grey and orangish brown sandy slightly gravelly CLAY .
0.20/2.0	-	>4.0	-	Very stiff grey and orangish brown sandy slightly gravelly CLAY or very dense brown slightly clayey gravelly SAND .

2.4 Radon

Radon protection measures are not required for the development.

2.5 Identified Gaseous Contamination

Future development on site should incorporate gas protection measures to mitigate any risks posed from potential ground/mine gas. Gas protection measures suitable to cater for Gas Characteristic Situation 2 should be designed and installed on all future development on site.

Due to elevated concentration of Naphthalene, it is recommended that a vapour barrier also be installed on all future developments at the site.

SECTION 3 Sources of Contamination Requiring Remediation

The summary of the site conceptual model is presented in **Table 3.1** and based on findings of previous investigations and assessments, detailing significant pollutant linkages requiring remediation or mitigation.

Table 3.1 Summary of Pollutant Linkages

Source	Pathway	Receptor
Ground gasses and Vapours	Horizontal migration through near surface soil and indoor accumulation in confined spaces. Asphyxiation from depletion of oxygen. Explosion of flammable gas	Future Site Users – Residents

SECTION 4 Proposed Ground Gas Remedial Measures

4.1 General

Based on the finding of previous investigations and assessments and the identified pollutant linkages the following ground gas remedial measures have been devised for the site.

Specific validation requirements for the proposed remedial measures are discussed in the following section.

4.2 Ground Gasses & Vapours

4.2.1 Protection of Site End Users

Site end users are at risk of inhalation and asphyxiation from the migration through strata and accumulation indoors of carbon dioxide gas, or the explosion of flammable methane gas. Elevated concentrations of Naphthalene in made ground soils may also present a risk to future site users from poisoning through inhalation.

Gas protection measures will be required at the site to effectively sever the link between the sources and receptor.

Previous investigations have classified the site as 'Gas Characteristic Situation 2' (CS2). Volatile organic compound protection, notably Naphthalene, is also required.

In accordance with Table 4 of BS8485:2015+A1:2019 a minimum gas protection score of **3.5** is required for a '**Type A**' structure with a CS2 classification. 'Type A' structures are privately owned without central building management controls limiting internal alterations.

Building structure types are discussed in Section 7.1 of BS8485:2015+A1:2019, any variation to the above may require further assessment and the assignment of a new gas protection score.

To achieve a gas protection score of 3.5 the proposed gas protection measures are summarised in **Table 4.1**.

Table 4.1 Gas Protection Score

Gas Protection Measures	Score (BS8485)
Cast in-situ monolithic reinforced ground bearing raft with minimal penetrations	1.5
Gas resistant membrane (satisfying BS8485:2015 Table 7 requirements)	2

Verification of gas protection measures will be required in accordance with CIRIA publication C735:2014.

SECTION 5 Validation of Remedial Measures

Ground gas protection system installation will require verification and inclusion within a Validation Report.

Verification of the ground gas protection system will be carried out in accordance with CIRIA publication C735:2014.

Verification of the gas protection system should be carried out by a suitably experienced, qualified, trained and independent verifier. Documents demonstrating the above shall be included in the Validation Report.

5.1 Risk Assessment

In general accordance with CIRIA C735:2014 risk based verification approach the proposed development is considered to be an **Intermediate Risk**. This assessment is based on the level of risk as summarised in **Table 5.1**.

Table 5.1 Perceived Risk Assessment

Risk Factors	Risk Level		
	1	2	3
Gas Regime – CS2	1	2	3
Design Complexity – Simple	1		3
Number of Buildings – Small	1	2	3
Installation Workforce – Qualified Installer	1		3
VOC – Yes	1		3
Notes: Classification of Risk – Low risk 5; Intermediate Risk 6-7; High Risk 8-15			

Groundwater is not expected to interact with the gas protection measures.

5.2 Gas Protection Measures Construction Details

The development comprises 1no. 'Type A' residential plot.

Technical drawings showing the proposed gas protection measures are presented in **Annex A**.

5.2.1 Structural Barrier

The substructure will comprise a cast in-situ monolithic well reinforced concrete raft foundation. Structural barriers of this nature provide very effective ground gas protection.

Penetrations through the raft should be kept to a minimum and appropriately sealed.

5.2.2 Membrane

The membrane is to be installed by a suitably trained and qualified installer, with at least one operative holding a **Cskills Award L2 NVQ Diploma in sub-structure work occupations (construction) – installation of gas membranes**. Alternative awarding bodies offering similar certification are considered not acceptable.

The Client has specified that Memtech Titan Bond gas membrane is to be used.

The membrane is to be laid beneath the raft foundation on a 50mm thick bed of sand blinding, over a well compacted substate. Detailed drawings showing the membrane installation are shown in **Annex A**.

Table 5.2 Membrane Specification Compliancy

Memtech Titan Bond
BBA Certificate – 18/5594
Thickness – 1.5mm mean thick. Suitably thick , manufacture confirms material is suitable for heat welding by specialist installer.
Permeation Rates – Methane permeability rate of 0.13ml/m ² /d/atm tested in accordance with BS IS 15105-1. Tested against a range of volatile organic compounds including Naphthalene, of which a permeation of <0.0001ml/m ² /d tested in accordance with BS IS 15105-2, was recorded. (Downstair WC approx. 4.5m ³ , 1.5m ² floor plan area, which equates to <0.0009 (nap)mg/day. Short term exposure allowable is 8000ug/m ³ Wilson et al. 2009, therefore it would take 40000 days to reach a harmful short term concentration within the room, this is not considering the effect of natural ventilation which will dilute this value) Considered sufficiently impervious.
Tensile Strength & Elongation – Mass per unit area of 650g/m ² . Tensile strength MD >550 CD >400 N/50mm tested in accordance with EN 12311-1, elongation >500%. Considered suitable strong , membrane to be loosely laid to accommodate settlement.
Puncture/Impact Resistance – 650N EN 12691-B. Protection recommended.
Tear Strength – Resistance to tearing MD >300N, CD >300N, tested in accordance with EN 12310-1. Measures to be taken to avoid damage from wind and protected from follow on trades.
Durability – Long exposure to UV light will likely reduce its effectiveness. It is considered suitably durable to remain serviceable for the anticipated life of the building. Tensile strength retained when contact tested against a range of organic solvents, acids, bases and other aggressive chemicals .
Satisfies standards to be used as a damp protection. Building Regulation Part C.
CE Mark EN 13967:2012

It is considered that performance specification of the membrane complies with the performance specification in BS8485:2015+A1:2019 Table 7 and key performance properties reported in CIRIA C748:2014. However, additional measure are recommended to be taken to protect the membrane from impact or puncture and tearing.

In addition, the membrane installation will need to be verified in accordance with CIRIA C735:2014 to fully satisfy the requirements of BS8485:2015+A1:2019 Table 7.

During storage membrane rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

The membrane should not be installed in temperatures below 5°C or above 35°C.

Prior to installation the substrate should be free from debris, voids or other protrusions which may compromise the gas protection system. 50mm of blinding sand is to be laid beneath the membrane for protection.

It is essential that all joints are secured using heat welding equipment, operated by a competent and qualified installer, as per the manufacture recommendations. The use of Titan Tape or other jointing tape is not permitted. Weld width must be 50mm. The operating window for welding will likely be between 180-240°C at a rate of 1.5m/min.

If the membrane is damaged a patch of the membrane material should be lapped at least 100mm beyond the limits of the damage, bonded with heat welding equipment by a competent and qualified installer as per the manufacture recommendations. The use of tape products is not permitted. The suitability of the repair will be determined during verification.

All direction changes (internal or external corner for example) should be detailed using a patch of the membrane material and lapped at least 100mm beyond the nearest joint, bonded with heat welding equipment by a competent and qualified installer as per the manufacture recommendations. The installer should be suitably experienced and competent to form these details in accordance with the manufacture guidance. The use of tape products is not permitted.

Membrane and accessory data and technical sheets, certificates and installation guides are presented in **Annex B**.

Upon completion of membrane installation workmanship should be verified by a suitably experienced, qualified, trained and independent verifier.

It is recommended that Installers prepare a daily log sheet during the works which can conveniently be used to record progress made, materials used (batch ID etc), repairs or defects. This log sheet should be submitted to the verifier to aid in the verification process. An example daily log sheet is presented in **Annex C**.

The membrane is to be covered with concrete as soon as practicably possible post installation and post Verification (**Do not pour the concrete before inspection**). The concrete will act to protect the underlying membrane post pour, direct contact with the concrete is recommended by the manufacture. Extreme care is still to be taken during placement of reinforcement, pouring and levelling.

Any rips, punctures or defects identified during the verification process will be recorded by the verifier, repaired by the installer and re-inspected at a later date to check for conformance.

5.2.3 Service Entries

All service penetrations should be detailed in accordance with the manufacturer specifications. The use of prefabricated 'top hats' is recommended, made to order, for the correct diameter utility pipe. Top hats are secured to the utility using a tightened Delta Puddle Flange and heat welded to the membrane as previously described as per the manufacture recommendations. The use of tape products is not permitted to secure top hats.

Service penetrations should be installed at least 100mm away from walls, obstructions and other penetrations to allow for the correct installation.

Ducting style service entries are considered a significant conduit for harmful gasses to enter properties. All service entry ducts should be vented and are to be sealed in accordance with published guidance presented in BRE414:2001 Section 10. It is proposed that FiloSeal+ Duct Seal or Rise Duct Seal is used for this purpose. The installation should follow manufacture guidelines.

Duct seals will need to be verified upon completion of the works.

Membrane and accessory data and technical sheets, certificates and installation guides are presented in **Annex B**.

5.3 Proposed Development Programme

The construction of the dwelling will begin in March 2023. One inspection visit is therefore likely to be adequate.

5.4 Maintaining the Integrity of Gas Protection Measures

To protect the membrane from puncture during reinforcement placement and from footfall during the intervening period between installation and pouring of concrete, the membrane must be protected. To achieve this Site Management will put in place exclusions to limit access to plant and personnel to completed zones and perform inspections prior to pouring of concrete. Site Management is to strictly control this process to avoid damage to the membrane and report to the Verifier any damage that may have occurred.

Follow on contractors should be made aware of the ground gas protection system in place. It is essential that the integrity of all gas protection measures is maintained post-verification and not damaged by any subsequent construction works.

Prior to the commencement of the membrane installation it is recommended a tool box talk on safeguard and upkeep measures should be undertaken. Site management along with membrane installers, ground workers the verifier and other subcontractors (if applicable) should be present.

Accidental damage to the membrane system should be reported to the verifier, rectified and re-inspected at a later date.

A final inspection may be required.

5.5 Required In-situ Integrity Testing & Evidence

With respect to the perceived risk assessment (**Table 5.1**) and in general accordance with CIRIA C735 Table A2 (**Intermediate risk**) the level of verification and integrity testing to be included within the Validation Report for the construction are presented.

Before commencement of the works, the installer contractor should produce a detailed installation plan including a method statement, CQA procedures and any qualifications. On receipt of these documents' verification protocol could be increased or reduced.

Consideration will be given to the need for further integrity testing if concerns are raised by visual and air lance testing. If further integrity is carried out appropriate proforma are to be produced by the Verifier.

It is recommended that the membrane Installer fill out a daily log sheet to be submitted to the Verifier on completion of the works.

5.5.1 Methodology

With reference to CIRIA C735 Table A2.

- **Membrane Installer** to provide daily log sheets, or sign-off sheets to be submitted to the Verifier for each plot.

- **Independent Verifier** to conduct a thorough visual verification of the full membrane installation prior to covering with concrete. Photographic evidence to be collected and inspection proforma to be prepared.
- **Independent Verifier** to air lance all joins, pipe penetrations etc. to ASTM D4437, prior to covering with concrete. Results to be recorded on the inspection proforma.
- **Independent Verifier** to consider further need for/scope of in-situ integrity testing based on inspection findings. Additional in-situ testing might include leak detection (i.e. smoke, tracer gas or dielectric). Testing to be undertaken initially on 25-50% of total area falling to 10-25% of total area if acceptable results obtained. Results to be recorded on inspection proforma.
- **Groundworker (Site Manager)** to provide Verifier detailed photographic evidence of the membrane post placement of the reinforcement.
- **Groundworker (Site Manager)** to provide Verifier photographic evidence of service entry sealing to BRE Report 414 standards upon completion.

5.6 Validation Report

The Validation Report should present a detailed description of the ground gas protection measures applied and lines of evidence gathered during verification processes to confirm that protection measures have been installed as per the Verification Plan and satisfy the remedial objectives, severing the pathway between the source and receptor.

As a minimum the Validation Report should include.

- A CL:AIRE SGPV declaration (maximum of 50 plots per declaration)
- Description of the as-built protection measures installed and any variation in design from the Verification Plan.
- Details of the Installer and relevant qualifications
- Details of the Verifier independency and relevant qualifications
- Verifier proformas and integrity testing results
- Visual inspection photographic evidence
- Installer daily log sheets
- Details of non-conformances and how they were rectified
- Statement based on the presentation of lines of evidences and review of the site conceptual model confirming that the discussed gas protection measures achieve the remedial objectives set out in the Verification Plan

References

BRE (2001) Protective measures for housing on gas-contaminated land, BRE Report 414

BRE (2015) Radon Guidance on protective measures for new buildings, BRE Report 211

BS 5925 (1991) Ventilation principles and designing for natural ventilation

BS 8485:2015+A1 (2019) Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

BS 8576 (2013) Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)

CIRIA C665 (2007) Assessing risks posed by hazardous ground gasses to buildings.

CIRIA C735 (2014) Good practice on the testing and verification of protection systems for building against hazardous ground gases

CIRIA C748 (2014) Guidance on the use of plastic membranes as VOC vapour barriers

CIRIA C795 (2020) Retrofitting hazardous ground gas protection measures in existing or refurbished buildings.

CIRIA R149 (1995) Protecting development from methane

D4437-08 (2013) Standard practice for non-destructive testing (NDT) for determining the integrity of seams used in joining flexible polymeric sheet geomembranes

NHBC (2007) Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, report edition no.4

OVE ARUP & PARTNERS (1997) Passive venting of soil gases beneath building. Research Report. Guide for design.

WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook

**ANNEX A
Technical Drawings**

NOTES:



DRAWING STATUS

Construction

PROJECT

New Build Dwelling, 5 Park Row,
Cwmavon

TITLE

Detailed Section

CLIENT

Delyth Rees

DRAWN BY
Gareth Owen

DATE
01.12.22

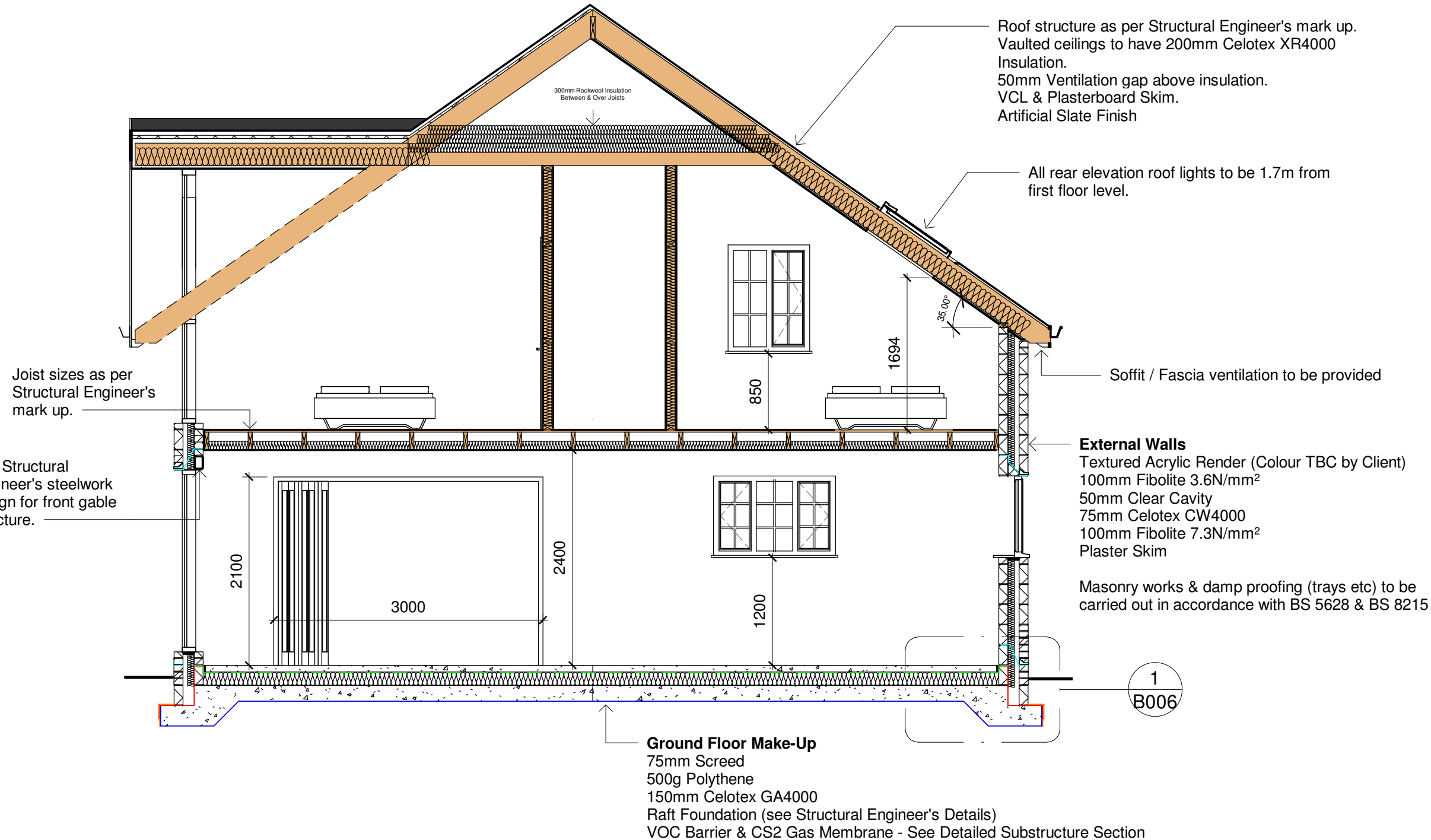
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PROJECT NO.
GOCD DR01

DRAWING NO.
B004

REV
A

GO CONCEPT DESIGNS LTD, 9 DARWIN RD, PORT TALBOT, SA12 6BT
gareth@goconceptdesigns.co.uk adriana@goconceptdesigns.co.uk

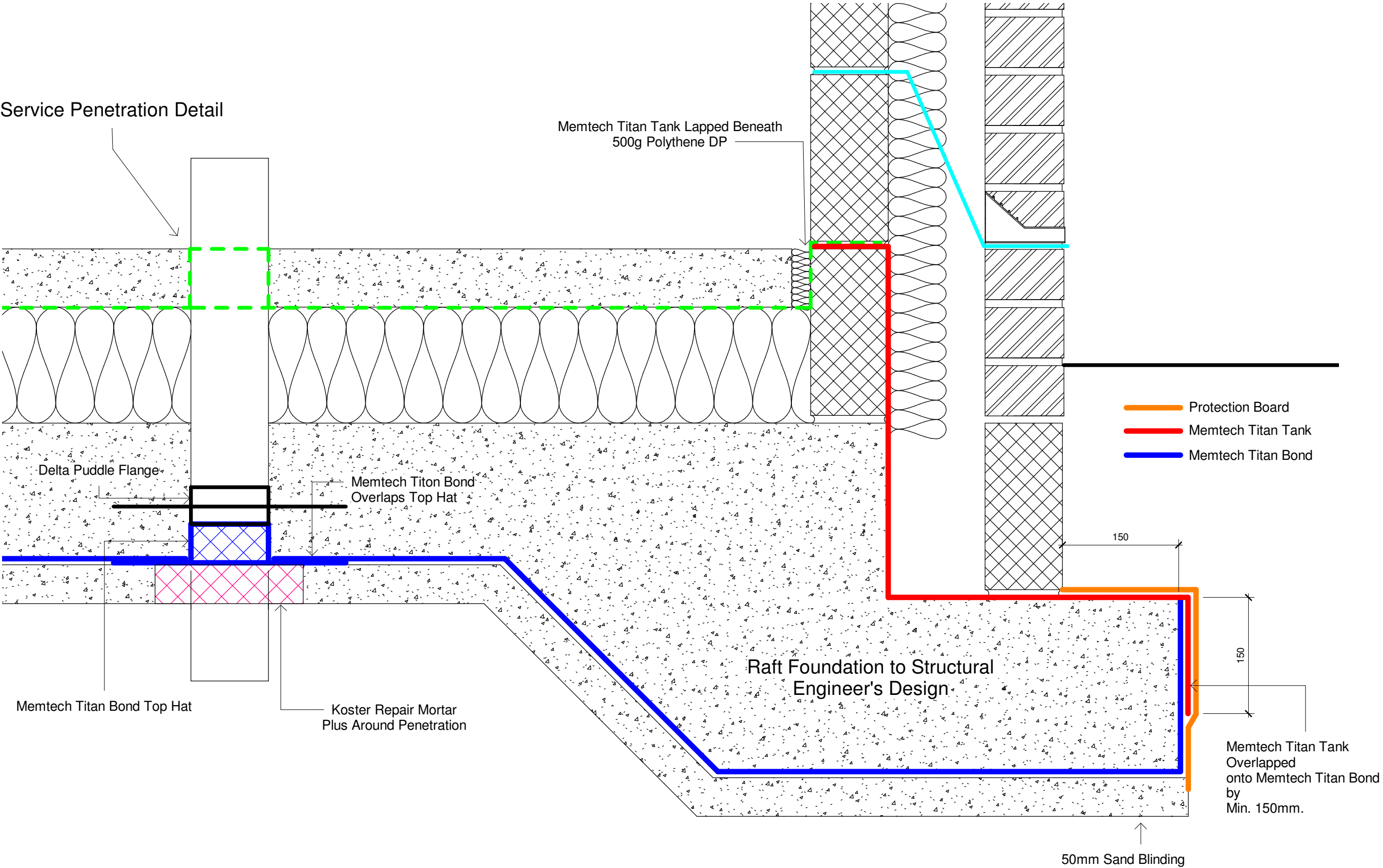


1

Detailed Section

1 : 50

Service Penetration Detail



NOTES:



DRAWING STATUS

Construction

PROJECT

New Build Dwelling, 5 Park Row, Cwmavon

TITLE

Substructure & Gas Mitigation Section

CLIENT

Delyth Rees

DRAWN BY
Gareth Owen

DATE
01.12.22

SCALE (@A3)
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PROJECT NO.
GOCD DR01

DRAWING NO.
B006

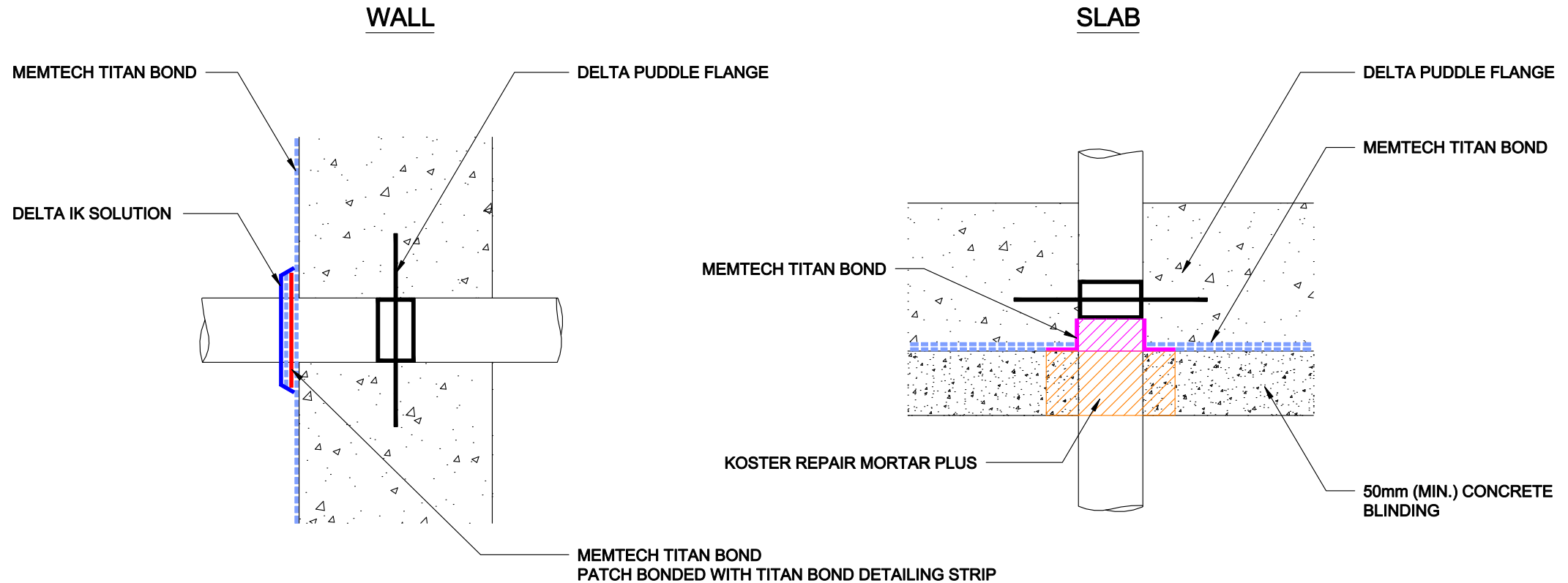
REV
A

GO CONCEPT DESIGNS LTD, 9 DARWIN RD, PORT TALBOT, SA12 6BT
gareth@goconceptdesigns.co.uk adriana@goconceptdesigns.co.uk

1 Substructure Section
1 : 5

**ANNEX B
Manufacturer Data Sheets**

SERVICE PENETRATIONS - MEMTECH TITAN BOND



DELTA HOUSE, MERLIN WAY, NORTH WEALD, EPPING, ESSEX CM16 6HR
TEL: 01992 523523 FAX: 01992 523250

DRAWING NOTES:

Memtech Titan provides both a waterproof membrane and Hydrocarbon and VOC barrier in accordance with BS 8102 (2009) and BS 8485: 2015

OFFICE USE:

REVISION No:

1

REVISION DATE:

November 2017

Drawn By:

Checked By:

Scale:

System Files: PDF / DWG

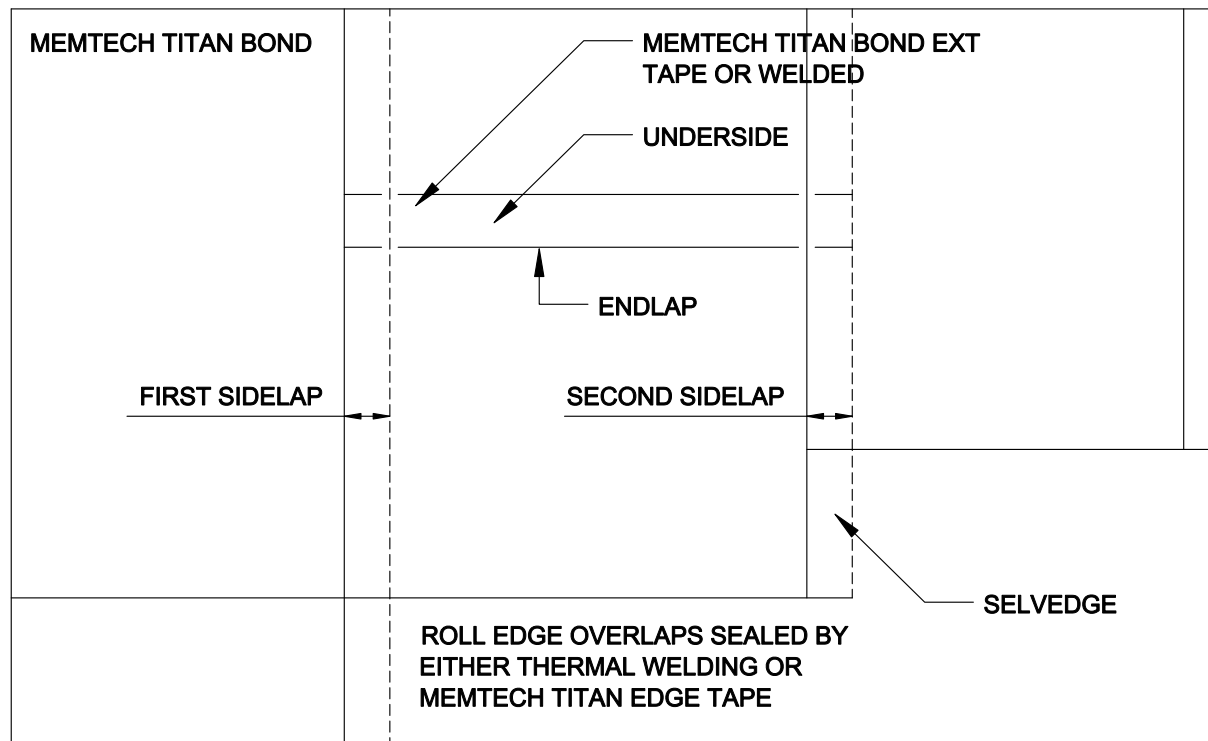
DRAWING NOTE:

This drawing is for illustrative purposes only. Drawing not to scale.

DRAWING No: DGS-316-1

DRAWING TITLE: SERVICE PENETRATIONS - MEMTECH TITAN BOND

PROJECT / COMMENTS:



SELVEDGE
OVERLAP DETAIL



100mm MEMTECH TITAN
TAPE JOINT OR
WELDED OVERLAP

ROLL END
OVERLAP DETAIL

ROLL 1 ROLL 2



300mm MEMTECH TITAN
BOND EXT TAPE
OR WELDED



DELTA HOUSE, MERLIN WAY, NORTH WEALD, EPPING, ESSEX CM16 6HR
TEL: 01992 523523 FAX: 01992 523250

**DRAWING
NOTES:**

Memtech Titan provides both a waterproof membrane and Hydrocarbon and VOC barrier in accordance with BS 8102 (2009) and BS 8485: 2015

OFFICE USE:

REVISION No:

1

REVISION DATE:

November 2017

Drawn By:

Checked By:

Scale:

System Files: PDF / DWG

DRAWING NOTE:

This drawing is for illustrative purposes only. Drawing not to scale.

DRAWING No: DGS-318-1

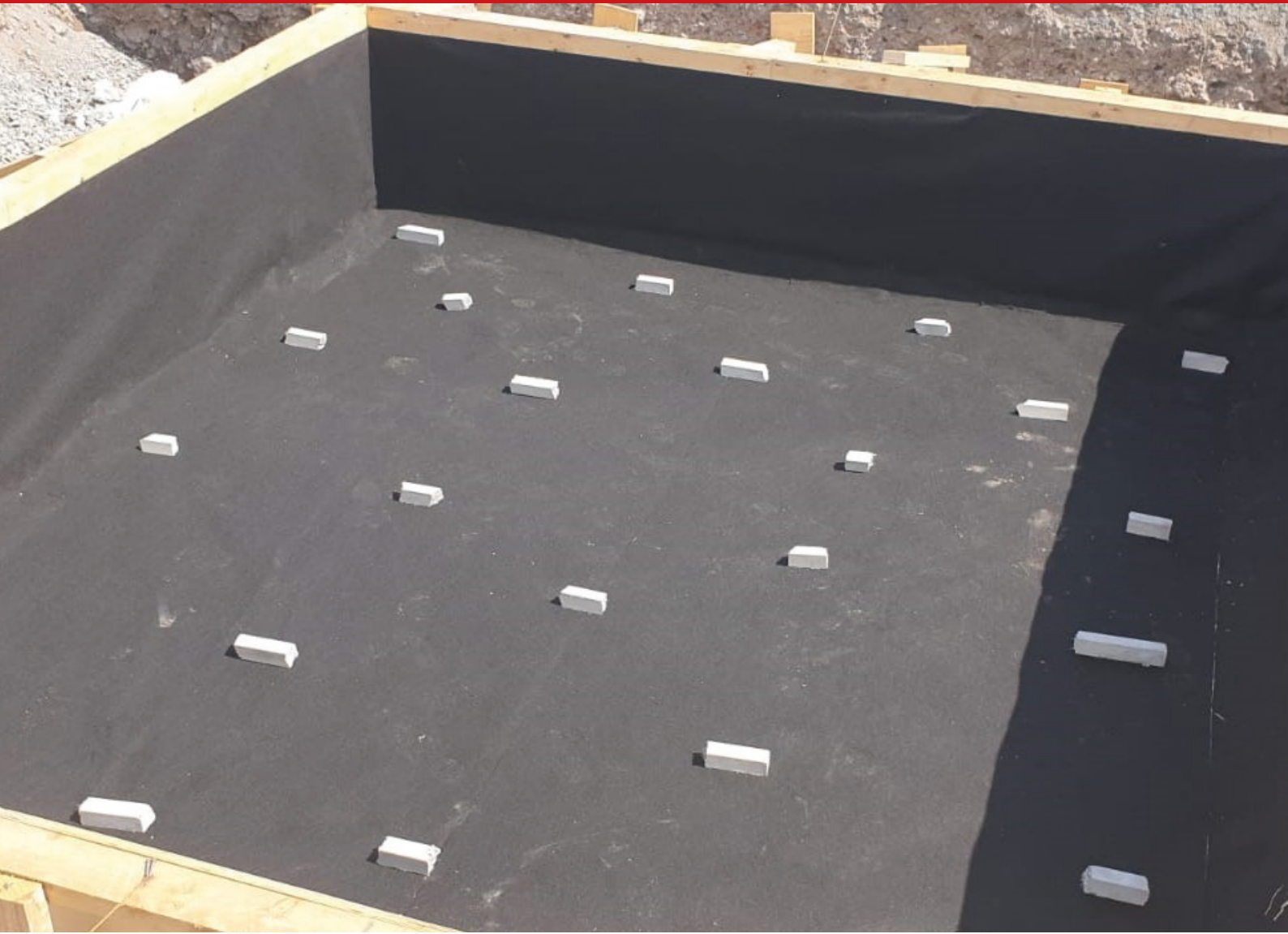
DRAWING TITLE: GAS AND WATERPROOFING PROTECTION MEASURES
TYPICAL DETAIL - OVERLAPPING DETAIL

PROJECT / COMMENTS:

PRODUCT DATA SHEET

PRO TITAN BOND

Product Code: DMS437



GROUND GAS
MEMBRANES

info@deltamembranes.com

www.deltamembranes.com

01992 523 523

PRO TITAN BOND hydrocarbon barrier offers a safe solution for the protection of occupiers against all levels of hydrocarbon, methane, carbon dioxide and radon gas ingress.

PRO TITAN BOND complies with the latest codes of practice as published by BRE, CIRIA(748) and BSI (BS8485:20 15 and BS8102:2009). Suitable for use as ground gas/hydrocarbon protection for NHBC Green, Amber1, Amber2 and Red sites



BENEFITS

- Durable and flexible
- Easy to install
- Bonds fully with concrete
- Bonds Gas protection and waterproofing
- Ground Gas protection and waterproofing in one product



SPECIFICATION

- Complies with BRE CIRIA (748)
- Complies with BS 8485:2015+A1:2019
- Suitable for NHBC Amber1, Amber2 and red sites
- Type A Barrier protection in accordance with BS 8102 (2009)
- NBS J40/130 flexible sheet waterproofing



ASSOCIATED PRODUCTS

- Pro titan tape
- Pro titan tank
- Detailing strip
- GGM Void Vent 25
- GGM LGB

PRODUCT DATA SHEET

PRO TITAN BOND

Product Code: DMS437

HANDLING

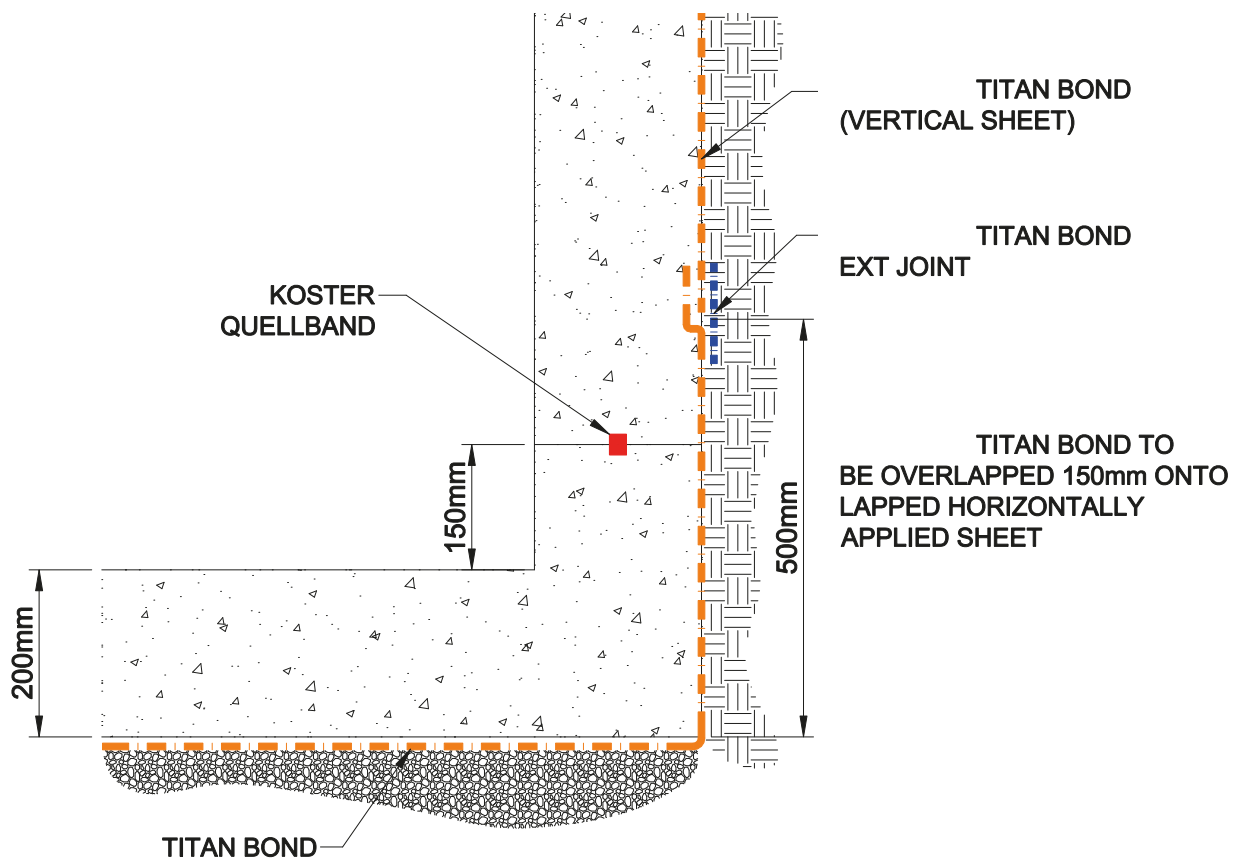
Roll weights can be in excess of 20kg and hence appropriate care and equipment is required for unloading and handling. This product is non-toxic nor flammable.

STORAGE

Rolls of PRO TITAN BOND should be stored horizontally, and pallets should not be stacked on top of one another. PRO TITAN BOND should be stored in a cool, dry place, and be protected from exposure to rain, sun, heat and cold temperatures prior to installation.

INSTALLATION

PRO TITAN BOND should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015.



Head Office:

Delta House, Merlin Way, North Weald, Epping, Essex, CM16 6HR

01992 523 523 | info@deltamembranes.com | www.deltamembranes.com

DMSPDS2020

PRODUCT DATA SHEET

PRO TITAN BOND

Product Code: DMS437

PRO TITAN BOND			
Characteristic	Test Method	Unit	TITAN BOND
PHYSICAL PROPERTIES			
Thickness	EN 1849-2	mm	1.0
Width	EN 1849-2	m	2
Length	EN 1849-2	m	25
Weight	EN 1849-2	g/m ²	700
HYDRAULIC PROPERTIES			
Water Vapour Transmission Rate	EN 1931	g/m ² /day	0.14
Water tightness (60kPa)	EN 1928		PASS
Water Tightness (196kPa-20m head)	EN 1928		PASS
MECHANICAL PROPERTIES			
Resistance To Static Load	EN 12730	Kg	>20
Tensile Strength (MD)	EN 12311-1	N/50mm	>550
Tensile Strength (CMD)	EN 12311-1	N/50mm	>400
Tear Resistance (MD)	EN 12310-1	N	>300
Tear Resistance (CMD)	EN 12310-1	N	>300
Resistance to Impact	EN 12691-B	N	650
Reaction to Fire	EN ISO 11925-2	Class	E
Concrete Peel Adhesion	ASTM D903 (mod)	kN/m	>3.0
Resistance to Artificial Ageing	EN 1296	-	PASS
Resistance to Chemicals	EN 1847	-	PASS
VAPOUR PERMEABILITY - 100% CONCENTRATION			
Transmission Rate of Benzene	EN ISO 15105-2	mg/m ² /day	2250
Transmission Rate of Toluene	EN ISO 15105-2	mg/m ² /day	2370
Transmission Rate of Ethyl Benzene	EN ISO 15105-2	mg/m ² /day	400
Transmission Rate of Xylene (m,p,o)	EN ISO 15105-2	mg/m ² /day	690
Transmission Rate of Hexane	EN ISO 15105-2	mg/m ² /day	95.25
Transmission Rate of Vinyl Chloride	EN ISO 15105-2	mg/m ² /day	36.44
Transmission Rate of Trichloroethane(TCE)	EN ISO 15105-2	mg/m ² /day	1.44
Transmission Rate of Tetrachloroethane(PCE)	EN ISO 15105-2	mg/m ² /day	1.59
GAS PERMEABILITY - 100% CONCENTRATION			
Methane Permeability	EN ISO 15105-1	ml/m ² /day/atm	0.13
Methane Permeability (welded joint)	EN ISO 15105-1	ml/m ² /day/atm	1.00
Carbon Dioxide Permeability	EN ISO 15105-1	ml/m ² /day/atm	3.01
Transmission Rate of Vinyl Chloride Gas	EN ISO 15105-1	ml/m ² /day/atm	0.04
Radon Permeability	SP Method 3873	m ² /s	3.0x10 ⁻¹²

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DMSPDS2020

PRODUCT DATA SHEET

PRO TITAN BOND

Product Code: DMS437

DURABILITY AND CHEMICAL RESITANCE

Heading	Heading	Tensile Strength Retained	Result
Chemical Resistance –SULFURIC ACID (10%solution of Sulfuric Acid(H ₂ SO ₄) 50° for 56 days.	EN 14414 - A	100%	Pass
Chemical Resistance – BASIC (Calcium Hydroxide saturated suspension) 50° for 56 days.	EN 14414 - B	100%	Pass
Chemical Resistance – SOLVENTS (35%Diesel, 35% Paraffin,30% Oil HD30(vol))50° for 56 days	EN 14414 - C	100%	Pass
Chemical Resistance – SYNTHETIC LEACHATE(Mixture of 14 Acids, chlorides, sulphates and phosphate) 50° for 56 days	EN – 14414 - D	100%	Pass
Resistance to Leaching – HOT WATER (Deionised water)50° for 56 days	EN – 14415 - A	100%	Pass
Resistance to Leaching – AQUEOUS ALKALINE (Saturated Calcium Hydroxide)50° for 56 days	EN- 14415 - B	100%	Pass
Resistance to Leaching – ORGANIC (30%methanol,30%isopropanol,40%glycol) 50° for 56 days	EN – 14415 - C	100%	Pass

*Values are typical, with the exception of thickness, which is nominal. Typical indicates the mean value derived from the samples taken for any one test as defined in the BS EN ISO Standard – usually the mean of 5 samples. Nominal is a guide value.

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DMSPDS2020

FiloSeal+ Duct Seal



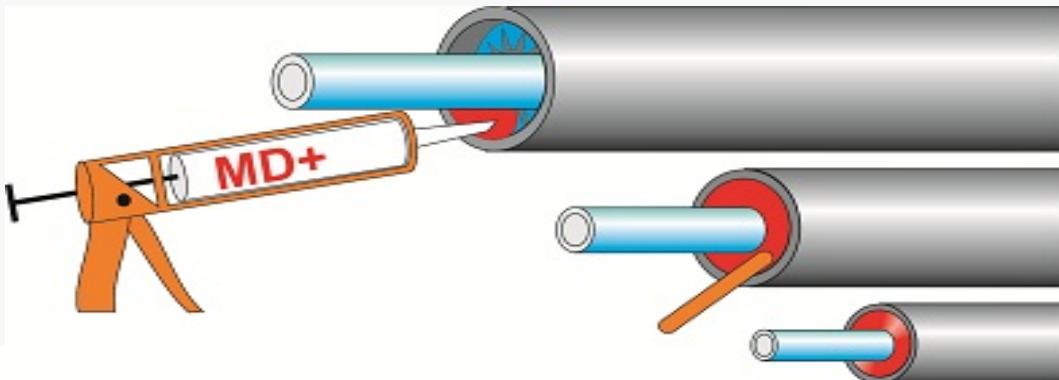
Duct sealing system FiloSeal+ is a universal solution for sealing cables and pipes in ducts or bore holes.

FiloSeal+ is suitable for sealing several cables or pipes contained in one duct and also allows re-entry of the seal to add or remove cables or pipes as required.

Telstra / TPG Approved Duct sealing kit in accordance with Telstra document ID TM00042A01 - Please click [HERE](#)

Features

- Flexible, one component, adhesive and sealing compound in a cartridge - (310ml)
- Kits are complete with backing and mastic to fill an empty duct of the quoted kit size
- High levels of Gas and Water tightness
- Excellent adhesion
- Shows Fire resistance properties
- Resistant against Water, Alkaline, Chemical agents
- Resistant to, Petrol, Diesel, Ethanol, ASTM oil, LPG & Many more.
- Suitable for sealing underground cable ducts set out within the APEA 'Blue Book'
- Resistant to Hydrogen Sulphide / Methane and many other Gases (NedLab)
- Non-corrosive
- Solvent-free
- Shock absorbing
- Non-toxic, neutral and almost odourless
- Also suitable for limiting the EX-zones during transitions (observe chemical resistance)
- Complies with 2011 NEC Articles 225.27, 230.8, 300.5(G), 300.7 (A) on Raceway Seals, and 501.15 (B)(2)
- WIMES Compliant, (3.02 2013 clause 6.4.3.2 d)
- Suitable for any shaped duct /borehole/opening
- Quick and easy installation
- A complete kit for one duct
- Seals all known materials, PVC & PE sheathed cables, PILC, (HD) PE pipes
- Suitable for renovations, can be installed retrospectively
- Over 25 years of operational experience
- Thames Water Approved
- Welsh Water Approved
- Severn Trent Water Approved
- Southern Water Approved
- Anglian Water Approved
- South East Water Approved
- Yorkshire Water Approved
- Bournemouth Water Approved
- Scottish Water Approved



Specifications

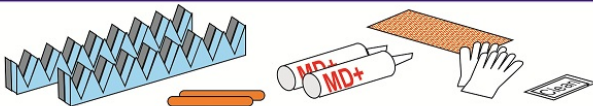
Density	1.2 gr/cm ³	
Flow	< 2mm	ISO 7390
Colour	red-brown	
Skin over time (23C/55%RH)	± 15 minutes	
Curing	3 mm / 24 hours	
Hardness	30 shore A	DIN 53505
Elongation	100%	DIN 53504
Tensile strength	0.8 N/mm ²	DIN 53504
Operating temperature	+5°C tot +40°C	
Temperature resistance	-40°C tot +120°C	

Kits are complete with backing and mastic to fill an empty duct of the quoted kit size

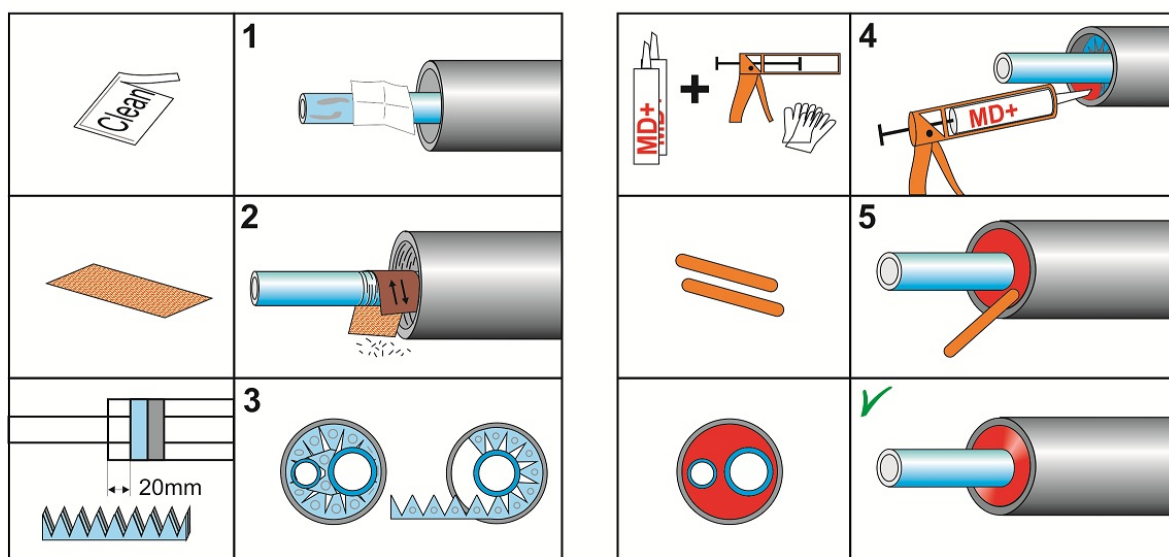
More info

[Download: FiloSeal+ disclaimer](#)

FiloSeal+



FILOform
connect ▶ seal ▶ protect ▶
www.filoform.com +31 (0)345 588 220
UK : www.filoform.co.uk +44 (0)1189886873



Products

Art.nr.	Product Name	Duct diameter min.-max. (mm)	Maximum cable diameter in the duct (mm)	Order unit
282580	FiloSeal+ 125mm	Ø 125 max.	Ø 95 max.	per piece
282590	FiloSeal+ 200mm	Ø 200 max.	Ø 160 max.	per piece



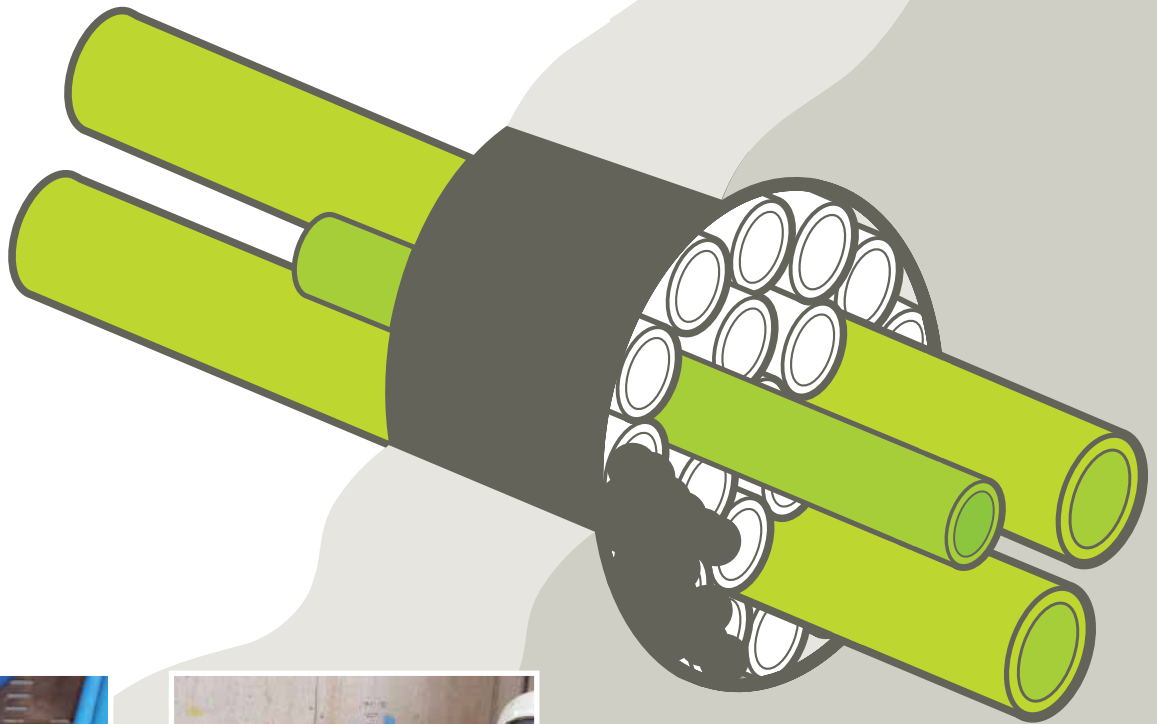
WWW.CABLEJOINTS.CO.UK
THORNE & DERRICK UK
TEL 0044 191 490 1547 FAX 0044 477 5371
TEL 0044 117 977 4647 FAX 0044 977 5582
WWW.THORNEANDDERRICK.CO.UK



RISE[®] Duct Seal

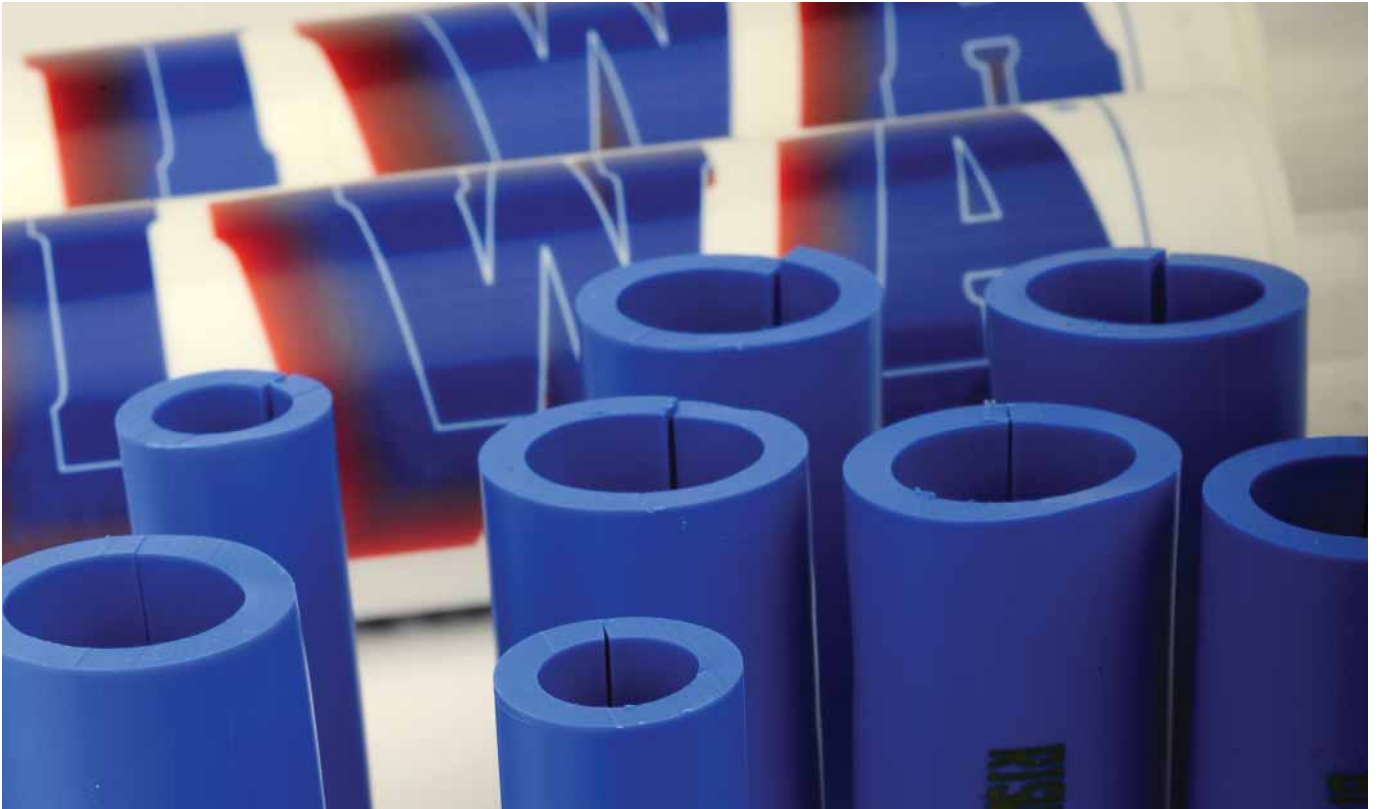
Multi Cable and Pipe Sealing System

"...an effective and simple solution to all fire, gas and watertight sealing requirements."



**SAFETY.
RELIABILITY.
INGENUITY.**

Features.



Simple and Effective

The RISE Duct Seal is a multi-cable and pipe transit sealing system. It provides an effective and simple solution to all fire, gas and watertight duct sealing requirements.

Few Components

It consists of only two components: rubber insert sleeves, used to separate the cables and as a backing for the sealant layer and FIWA sealant; a high quality silicone based, fire resistant, water repellent sealant which consequently makes the system quick and easy to install.

Water and Gas Tight

The elasticity and high bonding strength of FIWA sealant offers a flexible seal, which resists movement, shock and vibration, as well as high pressure. The RISE rubber insert sleeves are applied to provide cable separation and a backing for the application of the FIWA sealant. For water and gas tight applications our standard 60mm RISE sleeve is sufficient.

Fire, Water and Gas Tight

Using the RISE insert sleeves at a length of 160mm and applying FIWA sealant to both faces of the opening, will provide a fire tight seal. When exposed to heat or flame, the advanced rubbers used within the system will resist heat and flame, assuring total conduit sealing protection against fire, heat, toxic and corrosive gases.

Flexible and Versatile

The RISE System can be used in vertical as well as horizontal ducts. The insert sleeves cling to the cables without sliding down and falling out of the penetration. The high adhesion and viscosity of the FIWA sealant means it will not run or drip when applied overhead.

Adding/Removing Cables

Installing additional cables is very straightforward. It is a simple matter of coring into the soft rubber layer of the FIWA sealant to a depth of 20mm and passing the additional cables through the opening created. The FIWA sealant is then applied around the new cable to re-seal. There is no need to disassemble the whole transit.

Benefits.



“The RISE Cable Transit System is quick and flexible, making it easier to achieve an effective gas and watertight seal.”

Cost-effective

Up to four hours
fire protection

WIMES compliant

***Ensures
DSEAR
compliance***

High levels of water
and gas tightness

Ease of re-entry for
adding cables

Few components

No frame required

Suitable for
Trefoil cables

Age tested - 50 years

***Complies
with ATEX
regulations***

Resistant to Methane,
Hydrogen Sulphide
and Chlorine

Resistant to submersion
in Petrol and Diesel

Quick and easy
to install

Extensive test programme.



In-house fire testing and pressure testing at CSD International's Laboratories.

The RISE Duct Seal has been extensively tested, not only in-house at the technical laboratories of CSD International in the Netherlands, but also by independent experts TNO Rubber Technologies and witnessed by independent approval bodies such as Lloyds Register. Our test programme ensures all of our products meet the rigorous quality standards of our customers in a wide range of industries and guarantees our products will be effective against the spread of fire, gases or water, in the most arduous environments and are proven to show no deterioration in that effectiveness in excess of 50 years.

Lloyds Register witnessed
– 2.5 Bar pressure test

TNO Laboratory – Age Testing to 50 years

EN1366-3 European Fire Test
– 4 hour fire protection

NES711 - Low Smoke Index

NES713 - Low Toxicity Index

ISO4589-3 - High Temperature Index

ISO4589-2 - High Oxygen Index

Complies with ATEX regulations

Ensures DSEAR compliance

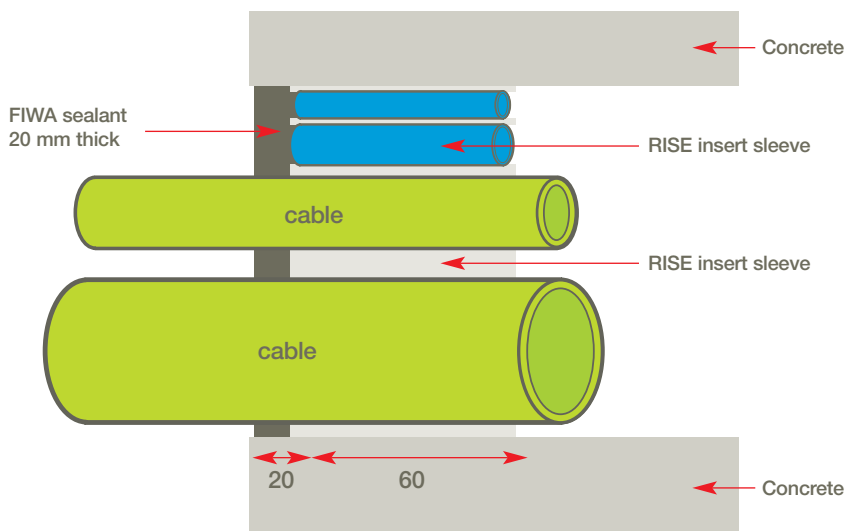
Accelerated Age Testing
- 50 years with no deterioration

Water and Gas Tight

The elasticity and high bonding strength of FIWA sealant offers a flexible seal, which resists movement, shock and vibration, as well as high pressure. The RISE rubber insert sleeves are applied to provide cable separation and a backing for the application of the FIWA sealant. For water and gas tight applications our standard 60mm RISE sleeve is sufficient.

20mm layer FIWA sealant 60mm RISE insert sleeves

- Certified Pressure Resistance - 2.5BAR

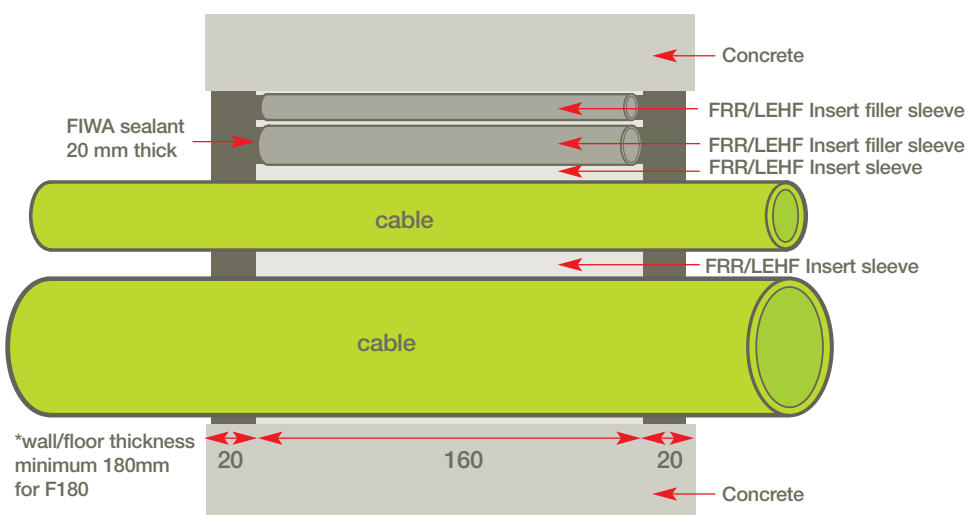


Fire, Water and Gas Tight

Using the RISE insert sleeves at a length of 160mm and applying FIWA sealant to both faces of the opening, will provide a fire tight seal. When exposed to heat or flame, the advanced rubbers used within the system will resist heat and flame, assuring total conduit sealing protection against fire, heat, toxic and corrosive gases.

2 x 20mm FIWA sealant layers 160mm RISE insert sleeves Type FRR/LEHF

- Certified Pressure Resistance - 2.5BAR
- 4 hours fire protection



Installation.



Step 1

Clean the inside of the duct and cables, use an appropriate degreaser to remove the dirt, dust or oil to allow the FIWA sealant to bond. Apply a RISE insert sleeve of the relevant diameter around each cable.



Step 2

Fill the remaining free space with spare RISE insert sleeves, usually of sizes 27/19 and 18/12. Pack sleeves tightly then adjust to allow a 20mm gap from the front of the transit.



Step 3

Apply a 20mm layer of FIWA sealant to the face of the transit. Begin in the most difficult area and work outwards. A slight overfill is recommended.



Step 4

Using a damp cloth, press the FIWA sealant down and between the cables. Ensure a sufficient amount is applied and it makes good contact with all surfaces.



Step 5

Using your hand (gloves are recommended), make sure enough sealant is between the cables and has been applied to the required depth and then smooth to finish. Wet the hands to prevent the FIWA sealant sticking.



Step 6

Take a final check with a torch to ensure sufficient FIWA sealant has been applied between the cables. FIWA sealant layer cures on average at a rate of 2mm per day.

Adding a cable.



Step 1

Adding extra cables is an easy job. Cut away the sealant layer at both sides of the penetration with a knife or a hollow punch in a tapering shape as shown above. This creates a good foundation for the sealant mass to be applied later.



Step 2

Pull the cable through one of the empty filler sleeves with an inner diameter more or less corresponding to the outer diameter of the cable.

Refill the opening in the sealant layer at both sides of the penetration with sufficient sealant.



Step 3

If the empty filler sleeves are not fitting to the size of the cable to be ducted, a number of these insert sleeves must be removed from the penetration.

Install a fitting insert sleeve (with some filler sleeves if necessary) in the open space in the penetration.



Step 4

Pull the cable through the fitting insert sleeve that has now been installed. Refill the openings cut in the sealant layer at both sides of the penetration with sufficient sealant. The sealant is pressed down firmly and smoothed with a damp cloth.

Standard RISE kits - Order table

REQUIREMENT	SIZE	ORDER CODE
WATER/GAS TIGHT	100MM DUCT	RISEDUCT100WG
WATER/GAS TIGHT	150MM DUCT	RISEDUCT150WG
FIRE, WATER AND GAS TIGHT	100MM DUCT	RISEDUCT100F
FIRE, WATER AND GAS TIGHT	150MM DUCT	RISEDUCT150F

NOTE: RISE can be used to suit **ANY** size opening. If the above standard selection does not suit your requirements please contact us.



TOOLS REQUIRED:

- High ratio sealant gun
- Tape measure
- Disposable nitrile gloves
- Cloths
- Long nose pliers
- Water spray
- Wooden depth gauge
- Liquid soap
- Wire brush
- Degreasing agent



CABLE JOINTS, CABLE TERMINATIONS, CABLE GLANDS, CABLE CLEATS
FEEDER PILLARS, FUSE LINKS, ARC FLASH, CABLE ROLLERS, CUT-OUTS

11KV 33KV CABLE JOINTS & CABLE TERMINATIONS
FURSE EARTHING
www.cablejoints.co.uk
Thorne and Derrick UK

Tel 0044 191 490 1547 Fax 0044 191 477 5371
Tel 0044 117 977 4647 Fax 0044 117 9775582



ANNEX C
Installer Daily Log Sheets

Installer Daily Log



(Prepare one installer log sheet per day per plot)

Site Name:	Phase:
Date:	Plot Number:
Weather:	Housing Style:
Installers:	
Progress (End of day) : In-progress, Completed	
Weather Condition:	

(Delete as appropriate)

No.	Item	Comments
1. Tasks		
	<i>Example (product type)</i>	<i>Example (Manufacturer, location, number of, serial number, reasons for repair etc.)</i>
1.1	Membrane	
1.2	Seals	
1.3	Penetrations	
1.4	Internal Corners	
1.5	External Corners	
1.6	Repairs	
1.7	Other	
Additional Notes:		



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