



SHADBOLT
ENVIRONMENTAL



Unit 3 Pilsworth Industrial Estate Bury

Gas Protection Measures Design Report

Roach Pilsworth Ltd.

Version 2

June 2026



SHADBOLT
GROUP

Unit 3 Pilsworth Industrial Estate Bury

Gas Protection Measures Design Report

Project Reference: 2931

Client	Roach Pilsworth Ltd.
Our Reference	2931 – Unit 3 Pilsworth Industrial Estate
Produced by	Rob Plews
Checked by	Mike Taylor
Submitted	Version 2 – June 2026



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1.0 INTRODUCTION AND BACKGROUND INFORMATION

Shadbolt Group were commissioned by the Client, Roach Pilsworth Ltd. to produce a Gas Protection Measures report detailing the protective measures required to prevent the ingress of ground gases, including depleted oxygen to the Characterisation Situation 2 standard (CS2) as specified in BS8485:2015.

The development is an extension to the existing commercial development located at the site of Unit 3 Pilsworth Industrial Estate, Bury, Greater Manchester.

1.1 Site Information

The site is located at Unit 3 Pilsworth Industrial Estate, Bury, Greater Manchester.

The approximate National Grid Reference (NGR) for the centre of the site is **SD 81487 09020**.

A general site location plan of the site is shown in Figure 1 and an aerial photograph in Figure 2.

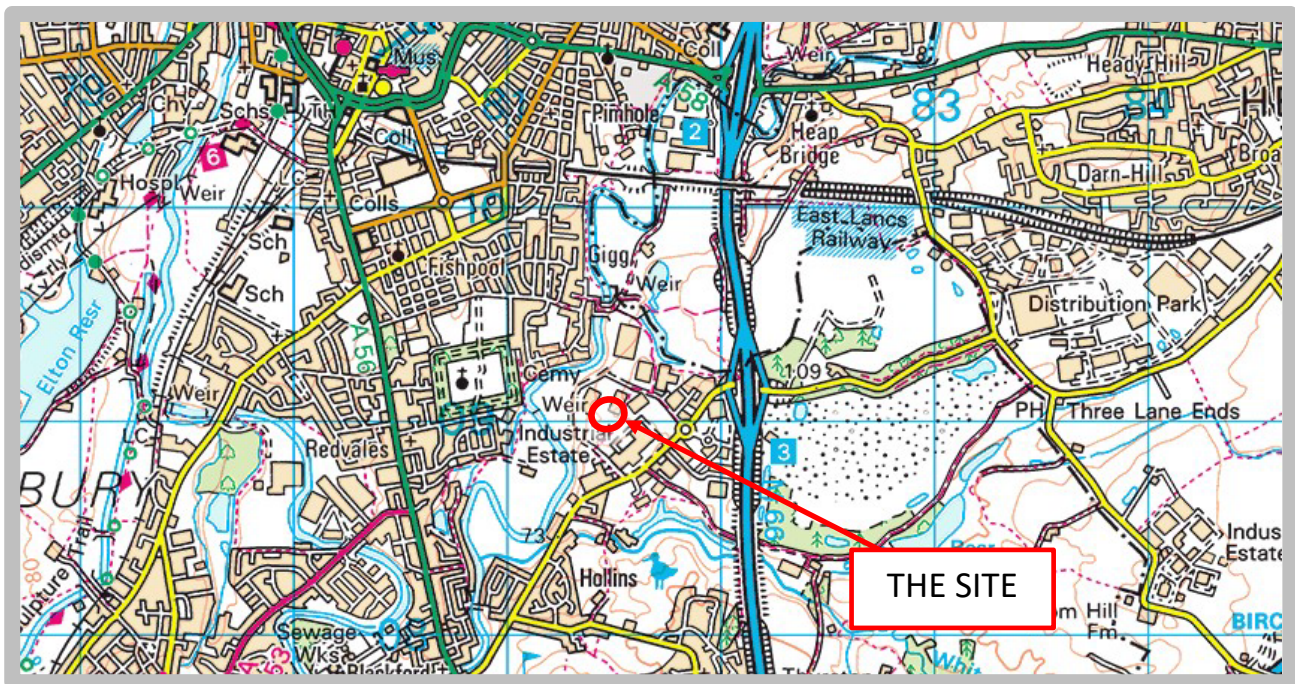


Fig. 1 – General Site Location Plan

1.2 Site Description

A site reconnaissance visit was made in November 2022 with site works undertaken shortly thereafter.

The site is approximately rectangular in shape and comprises rough scrubby grass land with shrubs and small trees. The site was notably wet at the time of site works with pooling water within depressions.

The site is surrounded immediately by similar commercial buildings of the Pilsworth Industrial Estate. The river Roch lies approximately 300m to the west of the site with the Redvales area of Bury beyond this. To the east lies the M66 motorway with the Pilsworth South Landfill beyond this. Beyond the industrial estate land to the north and south is more agricultural in nature.

Access to the site is via Roach Bank Road/Pilsworth way and through the existing hardstanding yard of the wider Unit 3 site with generally good access.



1.3 Proposed Development

It is understood that the proposed development will comprise an extension to the existing commercial development located at the site of Unit 3 Pilsworth Industrial Estate, Bury, Greater Manchester.

Following a Phase 2 ground investigation it was determined that the site will require the provision of ground gas protection measures to the standard equivalent to that for a Characteristic Situation 2 classification.

2.0 HISTORICAL LAND USE AND GROUND CONDITIONS

2.1 Site History

SG have reviewed a Phase 1 Desk Study entitled;

- *Phase 1 Environmental Report. Unit 3 Roach Bank Road Bury BL9 8RY. Nova Ambiente for Star UK PAS PROPCO Ltd. November 2020.*

The site history (covering the entire unit area) is summarised thus;

'From the earliest available map (dated 1851), the site was developed with Roach Bank Farm buildings (arranged around a central farm yard) in the central eastern part of the site with surrounding fields to the north, south and west. An access track extended from the farm off-site to the east. In a detailed map dated 1893 a second access track was marked from the farm extending off-site to to the north. A spring was also marked in the western part of the site (no longer marked after 1910).

The farm building had largely been demolished by the map of 1980. A map dated 1999 shows almost all the former features within the site boundary were no longer present. An aerial photograph dated 1999 shows apparent earthworks across the whole site, with a large mound of material occupying the eastern half of the site. A 2003 aerial photograph shows ongoing earthworks and the mound on the eastern side is no longer present. The site was shown to be developed in its current configuration between the aerial images of 2003 and 2005.'

SG have also reviewed a more recent Phase 1 Desk Study for the site entitled;

- *Phase 1 Desk Study for L'Oreal, Unit 3 Pilsworth Industrial Estate, Bury, SL07660-HBPW-DOC-C-GE-DSR Rev A03. HBPW for Star UK PAS I PROPCO Ltd. Issue 03 August 2022.*

'Historic land use is summarised thus: The site was occupied by a farm and open land from the earliest map until the 2001 map, the existing warehouse on site was first shown on the 2006 map. The site was surrounded by open land from the earliest map until 1970 where industrial development started to occur east of the site. Based on the observed history there are potential ground obstructions from previous land uses on site, most notably the demolition of the farm buildings. There may be some contamination of near surface soils associated with agricultural and industrial uses.'

Reference should be made to these reports for full details.

2.2 Site Geology

SG undertook a Phase 2 ground investigation entitled '2931 - Unit 3 Pilsworth Industrial Estate Bury – Ground Investigation Interpretive Report. V2 - February 23. Shadbolt Group for Star UK PAS I Propco Ltd' the findings of ground conditions are summarised thus;

The SG ground investigation undertaken comprised the boring of 3 No. cable boreholes to a maximum depth of 13.54m bgl along with the installation of 3 No. ground gas/groundwater monitoring installations to a maximum depth of 13.00m bgl. 10 No. mechanically excavated trial pits were undertaken across the site reaching a maximum depth of 2.40m bgl.

Made Ground was encountered to a maximum depth of 6.00m bgl and was widespread across the site

being encountered at all exploratory locations. Encountered Made Ground generally comprised dark grey sandy very gravelly clay/very clayey gravel including frequent demolition type rubble including brick, sandstone, tarmac, concrete fragments, concrete blocks, metallic fragments, wood fragments and plastic including sheeting. Made Ground became progressively deeper from east to west across the site ranging from 0.90m thickness to 6.00m bgl

Topsoil was identified across the site to a maximum thickness of 0.20m bgl and includes generally grey slightly sandy very clayey Topsoil including angular to subangular sandstone and mudstone.

Natural superficial deposits were encountered across the site to a maximum depth of 13.54m bgl (the maximum drilled depth). The base of superficial deposits is considered to have been encountered during these works with refusal possibly within bedrock. Encountered deposits included soft/firm grey silty clay/clayey silt noted with rarer lamination noted as well as limited fine subangular to subrounded mudstone gravel. Sand was generally fine within silty/cohesive strata. More locally shallower deposits of brown and grey fine to medium gravelly sand encountered at BH01 including fine gravel including mudstone in thin bands. Deeper deposits included stiff grey and brown slightly sandy gravelly boulder clay including gravel of fine to medium subangular to subrounded sandstone mudstone and coal.

Solid deposits were considered to have been encountered within 3 No. cable percussive boreholes at the site at depths ranging from 11.20m to 13.54m bgl. Although recovery was limited due to the nature of the drilling technique medium grained red/brown sandstone was noted within SPT refusals.

Should the site be developed in the future the risk to site users would, overall, be considered LOW from the soils located at the site including Made Ground encountered. Low contaminant concentrations have generally been reported.

3.0 GAS PROTECTION MEASURES

BS8485:2015, "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings" sets out a methodology for determining an appropriate level of protection against ground gases in respect of the Characteristic Situation classification and the proposed building type.

Gas protection measures suitable for a Characteristic Situation 2 (CS2) gas regime are required at the site designed in accordance with BS8485:2015 and validated as detailed in CIRIA 735.

For a Type C building (Commercial) (Moderate Risk) on a CS2 site the Minimum Gas Protection Score is 2.5. Appropriate gas protection measures should be incorporated into the proposed development to meet these requirements as described in BS8485:2015.

Based on Tables 5, 6 and 7 in BS8485:2015 a suitable combination of gas protection measures to meet the Gas Protection Score may comprise:

Protection Element / System	Score
Block and Beam Floor	0.0
or	(Table 5)
Cast In-situ ground bearing floor slab.	0.5
or	(Table 5)
Cast in-situ monolithic reinforced ground bearing raft or reinforced cast in-situ suspended floor slab with minimal penetrations.	1 or 1.5
	(Table 5)
Passive subfloor dispersal layer	
Dispersal layer may be formed by:	1.5
• Clear void • Polystyrene void former blanket • Geo-composite void former blanket • No-fines gravel layer with gas drains • No fines gravel layer	(Table 6) Good performance)

Gas resistant membrane meeting ALL of the following criteria:

- Sufficiently impervious to the gases with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method);
- Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
- Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools etc.);
- Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and
- Verified in accordance with Ciria C735.

2
(Table 7)

Table summarising potential ground gas protection measures required in the proposed development to meet/exceed the required gas protection score of 2.5.

Appendix E includes proposed details for the construction. Installation in accordance with the details provided would provide the required **2.5 points**;

Floor slab (reinforced) – 1.0-1.5 points

Gas Resistant Membrane - 2.0 points

Total: 3.0-3.5 points

Level of Verification Requirement (YALPAG Gas Guidance KP4)

Based on Table A1 within CIRIA report C735 the site is classified as **Intermediate Risk** assuming a reinforced slab *without* venting.

For Low Risk developments the installer may be either a General Builder / Groundworker / Landfill Operative with no relevant qualification or a Qualified and experienced installer with a minimum of 1 operative to hold appropriate qualifications.

The level of verification required is subject to the experience of the installer and is as follows:

Installer Experience	Suggested Levels of Verification and Integrity Testing
General Builder / Groundworker / Landfill Operative (No relevant qualification)	Verifier (consultant of qualified and experienced installer) to conduct and thorough verification (visual) inspection prior to all concrete pours including vented void, subgrade etc. All joints, pipe penetrations etc independently air lanced to ASTM D4437. Consideration given to the need for and scope of integrity testing (e.g. initial on say a 50-25 per cent of

	pours then falling to 25 to 10 percent if acceptable results obtained and no concerns raised by visual inspections).
Qualified and experienced installer (Minimum 1 operative to hold qualification – NVQ Level 2 in gas protection installation)	Verifier (consultant or third party qualified and experienced installer) to conduct a thorough verification (visual) inspection prior to 50 per cent of concrete pours (min. one to 1 visit) including vented void, subgrade etc 25 per cent of joints, pipe penetrations, corner etc testing to recognised standard by installer (as detailed in method statement and CQA plan). Installer to supply sign off sheets (verification evidence) including, sub grade acceptance forms, photographs etc to independent verifier for all other pours. Consideration given to the need for and scope of integrity testing (e.g. initial on say a 10 to 25 per cent of pours then falling to 0 to 10 per cent if acceptable results obtained and no concerns raised by visual inspections).

Table of verification requirements recreated from CIRIA Report C735, Table A1

Any non-conformances in the gas protection measures detected during inspections are to be rectified to the satisfaction of the verifier before works may progress. Any non-conformances are to be recorded with details of works required and undertaken to rectify the situation.

On completion of the installation a signed plot-specific statement or certificate will be produced for the development plot by the supervising SG consultant engineer confirming that the gas protection measures were installed as agreed and that the membrane was free from tears and punctures and was lapped and sealed as agreed at joins and around services and sub-floor voids were clear and free from debris. These certificates are to be included within the Verification Report in a format similar to that given in Appendix A5 of CIRIA 735 and replicated in Appendix 5 of the YALPAG guidance on Verification Requirements for Gas Protection Systems.

Plot specific photographs showing the installed membrane will also be included within the Verification Report which will be forwarded to the Local Authority to discharge the condition.

It should also be noted that verification of the effective seal the annulus on the service duct(s) will be required. The applicant should ensure that as well as the top-hat being secured to the membrane (taped or welded) that the internal annulus of the duct holding each of the service pipes and conduits (water etc.) should be filled with a gas tight sealant. One such suitable sealant (Filoseal) is detailed within Appendix C of this report along with specific instructions pertaining to the use of this product. The installation of this sealant will require verification as above - it should be noted that a second verification will be required by the supervising SG consultant engineer as the installation of services usually takes place after the main gas protection components are installed. The plot specific validation certificate will be withheld until verification of the sealing of service ducts is carried out – including photographic evidence within the certificate.

A typical ground floor gas protection details are presented in **Appendix B** with an appropriate membrane, duct sealant (and specific instructions) that maybe be used at the site as presented in **Appendix C**.

4.0 REFERENCES

- Site walkover survey.
- Historical and Recent Ordnance Survey maps and plans.
- Geological Survey Sheets.
- The Environment Agency.
- Groundsure Report.
- British Geological Survey.
- Coal Authority Mining Report.
- BRE Report BR211; Radon: Protective measures for new buildings.
- NRPB-W26 'Radon Atlas of England and Wales,' NRPB, 2015.
- CIRIA C665: 2006. Assessing risks posed by hazardous ground gases to buildings.
London UK.
- BS8485: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, BSI 2015
- Ciria 735: Good practice on the testing and verification of protection systems for buildings against hazardous ground gases (C735). London: CIRIA, 2014.

APPENDIX A

REPORT CONDITIONS

REPORT CONDITIONS

GAS PROTECTION MEASURES

*This report is produced for the benefit of **Roach Pilsworth Ltd.** in accordance with the terms of the appointment.*

This report has been prepared in accordance with the terms and conditions of the appointment and relates to the condition of the site at the time of ground investigations. No warranty is provided as to the possibility of future changes in the condition of the site.

Shadbolt Environmental takes no responsibility for conditions which occur between the individual exploratory holes. Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative.

Whilst the contamination assessment detailed within this report reflects our view, because there are no exact UK definitions of these matters, being subject to risk analysis, Shadbolt Environmental are unable to give categoric assurances that they will be accepted by authorities or funds without question. This report is prepared and written for the purposed uses stated in the report and should not be used in a different context without reference to Shadbolt Environmental. In time, improved practices or amended legislation may necessitate a re-assessment.

The report is limited to the geotechnical and environmental aspects detailed within the report and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents.

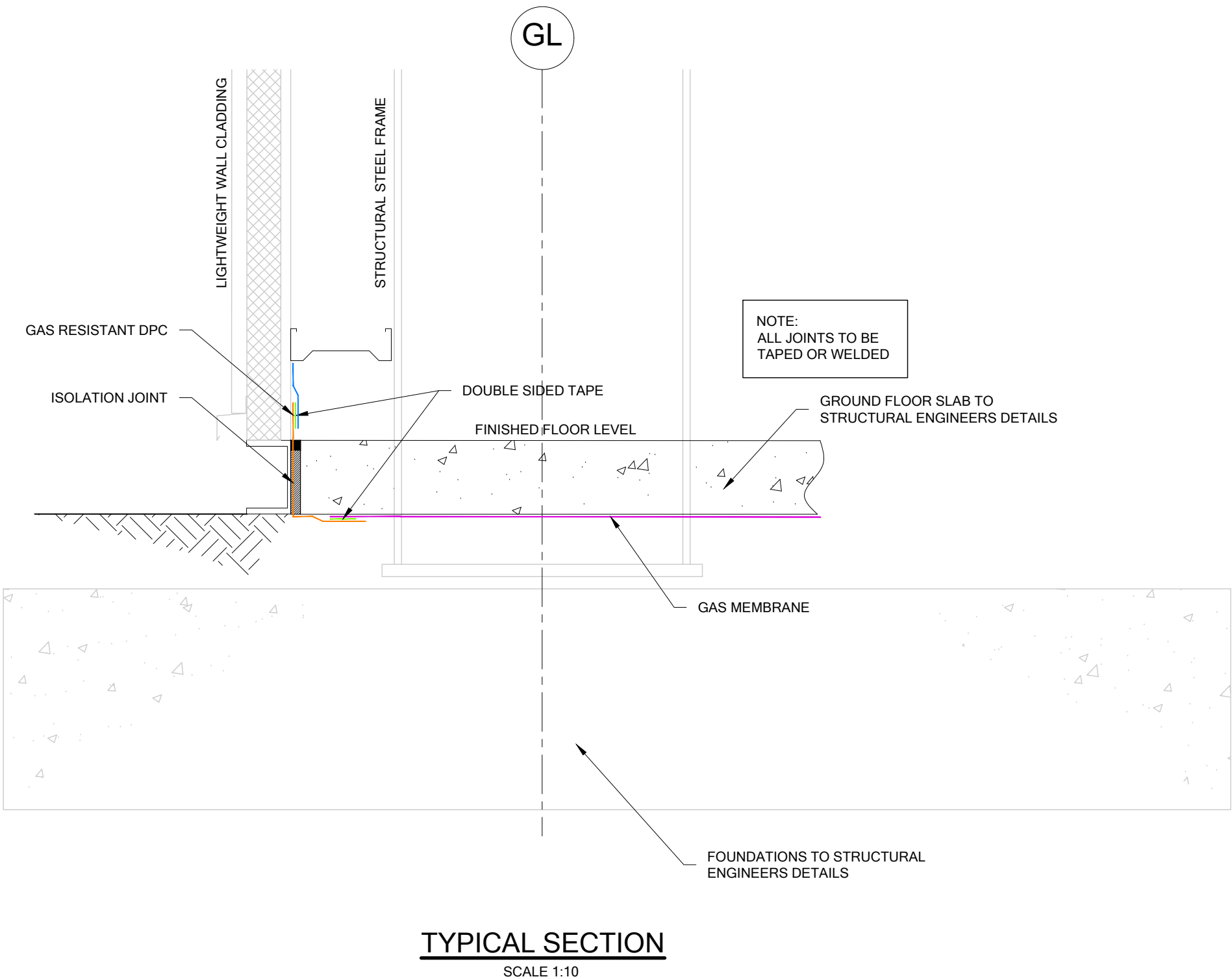
APPENDIX B

DRAWINGS

DO NOT SCALE

GENERAL NOTES

- 1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER INFORMATION BY RELEVANT PARTIES CLASSED AS DESIGNERS UNDER THE CONSTRUCTION (DESIGN & MANAGEMENT) REGULATIONS 2015.
- 2. ONLY FIGURED DIMENSIONS ARE TO BE WORKED FROM. THE CONTRACTOR IS TO CHECK ALL DIMENSIONS ON SITE AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
- 3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- 4. DETAIL IS INDICATIVE ONLY, FINAL DETAILS TO BE AGREED WITH GAS MEMBRANE SPECIALIST



CHARACTERISTIC SITUATION 2

Gas Protection Measures
BS 8485:2015
Type C Building

Gas Membrane + Validation (CIRIA C735)	= 2.0 Points
Well Reinforced Slab (Minimal Penetrations)	= 1.5 Points
TOTAL	= 3.5 Points

Rev	Description	By	Ckd	Date
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Drawing No: X001 - 012 Rev: *

Scale: As indicated @ A3 By: GH Ckd: RP Date: JUN '26



Drawing Status: INFORMATION
Client: Typical Detail

Project: L'Oreal, Bury Industrial Unit
Drawing Title: Gas CS2 - Detail

APPENDIX C

SUITABLE GAS MEMBRANE/DUCT SEALANT/INSTRUCTION

Solshield Ultra Gas Barrier

Description:

Solshield Ultra Gas Barrier is a multi-layer low density polyethylene (LDPE) gas barrier and damp-proof membrane reinforced with a polypropylene grid with an integral aluminium foil. The membrane is designed for use in concrete ground floors, above and below slab not subject to hydrostatic pressure.

Solshield Ultra protects buildings against Moisture, Radon, Carbon Dioxide, and Methane from the ground.

Air & Moisture protection system.

Resistance to puncture - the membrane has a strong resistance to puncture and on smooth surfaces will not be damaged by foot/site traffic.

Durability - the membrane remains effective against the ingress of water and water vapour, will restrict the ingress of radon, methane, and carbon dioxide during the lifetime of the flooring construction in which it is installed.

Compliance:

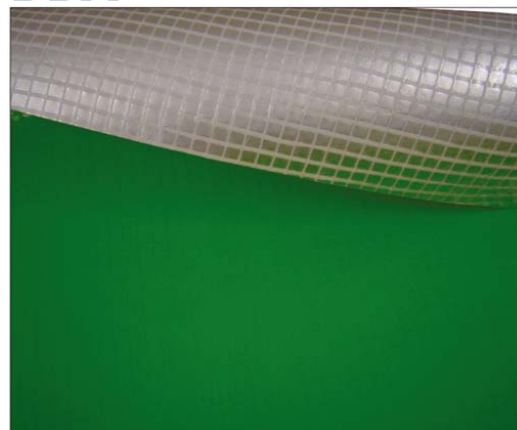
- NHBC Standards 2019, Chapters 4.1/5.1.
- CE Marking Standard EN13967:2012
- BS 8485:2015+A1:2019.
- CP 102:1973, Section 2.
- BS8000-4:1989.
- BBA Certificate No. 20/5737.

General:

- Solshield Ultra Gas Membrane should not be installed at temperatures below 5°C, to prevent the risk of surface condensation.
- The membrane must be installed and fixed in accordance with the relevant clauses in BRE Report BR 211:2015, and guidance given in BS 8485:2015+A1:2019.
- The membrane should be installed on a sand blinding layer, Solshield P30 protection fleece, or a smooth concrete float finish. In order to provide a continuous barrier across the cavity, Solshield Ultra Gas Barrier should be taken through the blockwork and incorporated below the damp proof course cavity tray in the outer leaf.
- Solshield Ultra Gas Membrane is suitable for installation with:
 - Beam and block floor application with 150mm clear void in an Amber 2 category projects.
 - Reinforced raft foundation and in situ suspended slab, providing the membrane is laid above the ground and not in direct contact with any source of hydrocarbon/VOC vapour.
- Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane.

Venting:

- Solshield Ultra can be used on site where passive or active ventilation is required.
- Solshield Geocomposite Drainage & Venting Mat should be used in conjunction with the relative vent connectors where required. These types of systems are designed on a bespoke site specific nature.
- Please contact us for our design advice.



- Complies with latest codes of practice as published by BRE, BSI & CIRIA.
- BBA Certified, NHBC Compliant & CE Marked.
- Suitable to protect against the ingress of Rn, CO₂, and CH₄.
- BS 8485:2015+A1:2019 Accordant.
- Suitable for use as gas protection for NHBC Green, Amber 1, and Amber 2 site situations.
- High resistance to puncture.
- Also acts as a damp proof membrane.

Solco, Unit 51, Portmanmoor Road Industrial Estate, Ocean Park, Cardiff, CF24 5HB

Technical Data:

Property	Test Method	Value
Thickness	EN 1849-2	0.60mm
Thickness - Between Scrim	BS EN ISO 9863-1:2016	0.40mm
Width	EN 1849-2	2.0m
Length	EN 1849-2	50m
Weight	EN 1849-2	370 g/m ²
Hydraulic Properties		
Water Column Test	EN 20811	> 300
Resistance to Water Penetration	EN 13967 / EN 1928	Pass
Watertightness	EN 1296 / EN 1367 / EN 1928	Pass
Mechanical Properties		
Resistance to Static Load	EN 12730-B	20 kg
Tensile Strength (MD)	EN 12311 - 1	600 N/50mm
Tensile Strength (CMD)	EN 12311 - 1	480 N/50mm
Tensile Elongation (MD)	EN 12310 - 1	20%
Tensile Elongation (CMD)	EN 12310 - 1	20%
Puncture Resistance	EN 12236	1.25 kN
Resistance to Tearing (Nail Shank) (MD)	EN 12310 - 1	330 N
Resistance to Tearing (Nail Shank) (CMD)	EN 12310 - 1	400 N
Durability and Chemical Resistance		
Transmission Rate of Volatile Liquids (Diesel)	ISO 6179:2010 (B)	0.246 g/m ² /hr
Transmission Rate of Volatile Liquids (Xylene)	ISO 6179:2010 (B)	0.571 g/m ² /hr
Transmission Rate of Volatile Liquids (Toluene)	ISO 6179:2010 (B)	0.583 g/m ² /hr
Transmission Rate of Volatile Liquids (Petrol)	ISO 6179:2010 (B)	0.135 g/m ² /hr
Gas Permeability		
Methane Permeability	BS EN ISO 15105-1	< 0.09 ml/m ² /day/atm
Carbon Dioxide Permeability	BS EN ISO 15105-1	< 0.09 ml/m ² /day/atm
Radon Permeability	K124/02/95	8.0x10 ⁻¹⁵ m ² /s

Solco, Unit 51, Portmanmoor Road Industrial Estate, Ocean Park, Cardiff, CF24 5HB

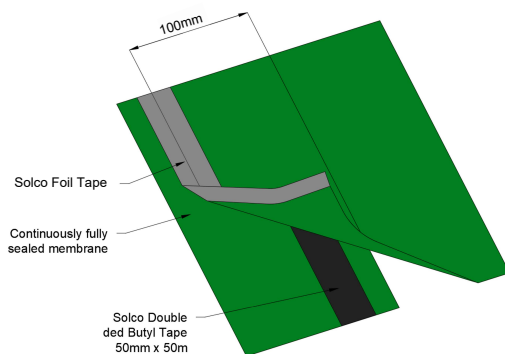
Installation:

1. The membrane must only be applied to surfaces that have a smooth finish - free from voids, projections, and mortar deposits. Surfaces should be dry and free from dust and frost. In order to provide a continuous barrier across the cavity, Solshield Ultra should be taken through the blockwork and incorporated below the damp proof course cavity in the outer leaf.
2. Concrete surfaces should be dense. Vertical surfaces of brickwork and blockwork must be dry and rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level.
3. Solshield Ultra is rolled out with the coloured side up, ensuring that it is properly aligned. All end and side overlaps should be a minimum of 100mm and prepared.
4. When the membrane is laid below the concrete slab, it should be loose-laid to accommodate any small movements.
5. All surfaces must be dried thoroughly prior to joining. Roll edges can be welded or taped.
6. The continuity of the damp proofing must extend over the footprint of the building, and the membrane must be sealed to a damp-proof course where required.
7. The membrane should be covered by a screed or other protective layer, such as Solco Protection Fleece, as soon as possible after installation. If blockwork protection is used, care must be taken to avoid damage to the membrane during construction. Care should be taken when handling building materials over the exposed surface.

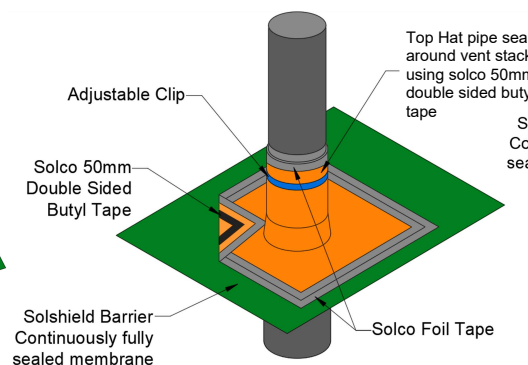
Jointing Detail:

1. Apply Solco Double Sided Butyl Tape around 50mm from the membrane edge, leaving the backing paper on.
2. Lay the next membrane, overlapping the first by a minimum of 100mm.
3. Remove the backing paper from the double sided butyl tape and join the top sheet to the bottom sheet, by applying pressure with a hand roller to remove trapped air.
4. Where the membranes overlap, apply Solco Single Sided Foil Tape, equidistant on both membranes (see detail). All service entry points must have airtight seals. Top hats and corner pre-forms must be sealed using double sided butyl tape.

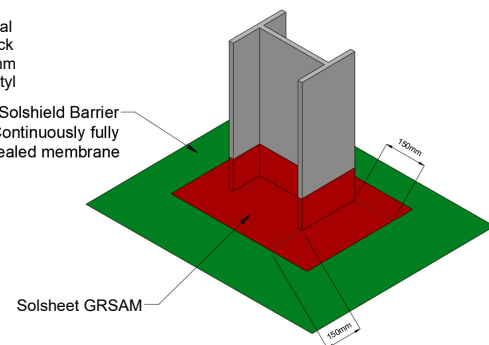
Typical Jointing Details for Solshield Ultra



Typical Lap Detail



Typical Penetration Detail

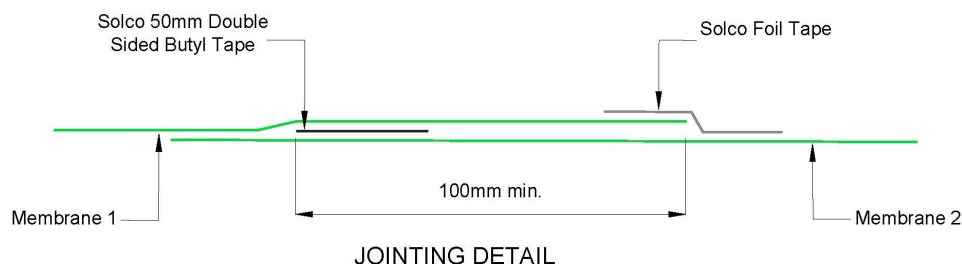


Typical Column Detail

Solco, Unit 51, Portmanmoor Road Industrial Estate, Ocean Park, Cardiff, CF24 5HB

Note:

All service entry points must have airtight seals. Top hats and corner pre-forms must be sealed using double sided butyl tape.



Solshield Ultra System Accessories

Solco Top Hats	Form an effective seal where a pipe, duct, or service penetrates Solsheet membranes.	Units
Solco Double Sided Butyl Tape	A double-sided synthetic butyl mastic tape, used for securing joints and laps in DPC's, Cavity trays & pre-formed Cloaks.	Rolls
Solco Foil Tape	A single-sided tape for securing laps & joints.	Rolls
Solco Venting Accessories	Allows the effective venting of gas from beneath a building.	Units
Solco Int / Ext Corners	Preformed units that ensure protection at corners.	Units
Solco GR DPC	A gas resistant tri-polymer damp proof course.	Rolls
Solco P30 Protection Fleece	Forms a protective layer to prevent damage to the membrane.	Rolls
Solsheet GR Self-Adhesive Membrane	A gas resistant self-adhesive membrane.	Rolls
Solseal HP Primer	Used to provide adhesion to bitumen enhanced geomembranes.	Tins
Solshield Venting Mat	Cuspated (HDPE) drainage mat for providing a drainage / venting channel.	Rolls
Solseal Liquid Gas Barrier	A gas resistant liquid applied membrane	Tins

Storage and Handling on Site:

- Solshield Ultra is classified as non-hazardous (code of practice CP102 1973).
- Rolls should be stored on a flat surface, kept under cover, and protected from sunlight and mechanical damage. The product is chemically inert and any acids or alkalis present in the subsoil will not affect the membrane.
- Do not use when exposed to sunlight and general outdoor weather conditions for long periods of time.
- Quality control during the laying of the membrane is extremely important.
- The membrane should be protected either through the use of temporary protection over its whole area or the immediate laying of the concrete slab. Care should be taken when handling building materials over the exposed surface.

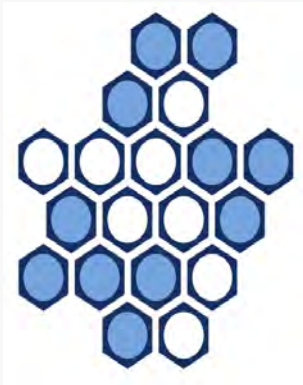
Solco, Unit 51, Portmanmoor Road Industrial Estate, Ocean Park, Cardiff, CF24 5HB

FiloSeal+HD Duct Seal



Duct sealing system FiloSeal+HD is an engineered universal solution for sealing larger heavy cables and pipes in ducts, boreholes or transit frames.

Up to 2 bar Pressure Resistance
100Kg pulling Force on the cables when sealed
10xd at 45°, with 1 bar pressure bending test



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, applicable to all common building materials
- Shows Fire resistance properties
- Resistant against Water, Alkaline, Chemical agents
- Resistant to termites (*Mastotermes darwiniensis*) Northern Australian termites
- Resistant to Rats
- 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)
- Suitable for any shaped duct/borehole/opening
- WIMES Compliant (3.02 2013 6.4.3.2 b)
- Quick and easy installation
- A complete kit
- Seals all known materials, PVC & PE sheathed cables, PILC, (HD) PE pipes
- Engineering duct sealing solution
- Suitable for renovations, can be installed retrospectively
- Over 25 years of operational experience

More info

[Download: FiloSeal+ disclaimer](#)

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name:

MD+ Sealant

Chemical name : Silicones

CAS-number : Mixture of silicone and fillers

Reach reg.nrs. : -

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use:

Sealing of ducts

Unsuitable use:

-

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:

Filoform B.V.

Postbus 2

NL-4190 CA Geldermalsen

T: +31 (0)345 588220

E: info@filoform.com

W: www.filoform.com

1.4 Emergency telephone number

The UK National Poisons Emergency number is 0870 600 6266

2. Hazards identification

2.1 Classification of the substance or mixture

Classification according to directive (EG) nr. 1272/2008 [CLP]

No dangerous good according to Globally Harmonized System (GHS).

2.2 Label elements

Labeling according (EG) nr. 1272/2008

2.3 Other hazards

Not known

3. Composition/information on ingredients

3.1 Substances

3.2 Mixtures

Contains:

2-butanone O,O',O'' - (ethenylsilyldi)ne trioxime

CAS-nummer: 2224-33-1

< 1 %

Eye Dam. 1, H318; Skin Sens. 1, H317; STOT RE 2, H373

2-Butanone, O,O',O'' - (methylsilyldi)ne trioxime

CAS-nummer: 22984-54-9

< 1 %

Eye Irrit. 2, H319; Skin Sens. 1, H317; STOT RE 2, H373

4. First aid measures

4.1 Description of first aid measures

Remove contaminated clothing immediately.

After inhalation:

If symptoms occur supply fresh air and if symptoms persist consult a doctor.

After skin contact:

Immediately wash with water and rinse thoroughly. If symptoms persist consult a doctor.

After eye contact:

Rinse opened eye for 15 minutes under running water. If symptoms persist consult a doctor.

After swallowing:

Immediately rinse mouth and then drink plenty of water, induce vomiting, seek medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Dangers:

No further relevant information available.

Symptoms:

No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

5. Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media:

Water spray, dry powder or foam.

Unsuitable extinguishing media: Not known.

5.2 Special hazards arising from the substance or mixture

Wear self-contained respiratory protective device. Wear fully protective suit.

5.3 Advice for firefighters:

Protective equipment:

Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

General:

Provide adequate ventilation.

When gases/vapours arise:

Wear a respirator.

6.2 Environmental precautions

No special measures required.

6.3 Methods and material for containment and cleaning up

Cleaning / absorption method:

Treating liquids and solids as household waste.

Disposal:

Remove liquids and solids as household waste.

6.4 Reference to other sections food stuff

Information regarding safe handling is located in section 7.

Personal protection and disposal considerations can be found in section 8 and 13.

7. Handling and storage

7.1 Precautions for safe handling

Provide a well ventilated workplace and wear protective equipment.

7.2 Conditions for safe storage, including any incompatibilities

No special requirements.

7.3 Specific end use(s)

Sealing and fixing

8. Exposure controls/personal protection

8.1 Control parameters

The product does not contain any relevant quantities of materials with considering the workplace in terms limits should be monitored.

8.2 Exposure controls

General protection and hygiene measures:

- Avoid contact with skin, eyes and clothing.
- Do not eat, drink or smoke at work.
- Remove contaminated clothing immediately.
- Before breaks and at the end of the working day wash hands thoroughly.
- Keep away from food and drinks.

8.2.1 Appropriate engineering controls

Only use in a well ventilated area.

8.2.2 Individual protection measures, such as personal protective equipment

Respiratory protection:

No personal respiratory protective equipment required if the area is well ventilated.

Hand protection:

Impermeable gloves.

Eye/face protection:

Safety glasses.

Skin protection:

Wear suitable protective clothing.

8.2.3 Environmental exposure controls

Not applicable.

Additional Information

Occupational exposure:

Avoid skin contact.

9. Physical and chemical properties

9.1.1 General properties

Colour:

Red

Form:

Viscous, Pasty

Odour:

Specific mild odor

9.1.2 Information on basic physical and chemical properties

Melting point/freezing point:

Not determined.

Initial boiling point and boiling range:

Not determined

Flash point:

Not determined

Evaporation rate:

Not determined.

Flammability (solid, gas):

Not flammable.

Upper/lower flammability or explosive limits:

Not determined.

Ignition temperature:

Not applicable

Vapour pressure at 25°C:

Not determined.

Relative density at 20 °C:

1,2 g/cm³

Partition coefficient: n-octanol/water:

Not determined.

Relative vapour density:

No data available.

Solubility in water:

No insoluble in water.

Viscosity at 25°C:

High viscosity, pasty

Explosive properties:

No data available.

Oxidising properties:

No data available.

9.2 Other information

Miscibility with water:

Not miscible.

Other information:

If necessary, the information on other physical and chemical parameters listed in this section.

10. Stability and reactivity

10.1 Reactivity

No hazardous reactions if the regulations / notes for storage and handling are followed.

10.2 Chemical stability

The product is stable, if the regulations / notes for storage and handling are followed.

10.3 Possibility of hazardous reactions

No hazardous reactions if the regulations / notes for storage and handling are followed.

10.4 Conditions to avoid

Non, if the regulations / notes for storage and handling are observed.

10.5 Incompatible materials

No further relevant information available.

10.6 Hazardous decomposition products

No hazardous decomposition products, if the regulations / notes for storage and handling are followed

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity:

Not classified.

Skin corrosion/irritation:

Not classified.

Sensibility of the respiratory system and skin:

Not classified.

Germ cell mutagenicity:

Not classified.

Carcinogenicity:

Not classified.

Reproductive toxicity:

Not classified.

STOT-single exposure:

Not classified.

STOT-repeated exposure:

Not classified.

Aspiration hazard:

Not classified.

12. Ecological information

12.1 Toxicity

The product is not considered harmful to aquatic organisms nor to cause long-term adverse effects in the environment.

12.2 Persistence and degradability

No further relevant information available.

12.3 Bio accumulative potential

No further relevant information available.

12.4 Mobility in soil

No further relevant information available.

12.5 Results of PBT and vPvB assessment

No further relevant information available.

12.6 Other adverse effects

No further relevant information available.

13. Disposal considerations

13.1 Waste treatment methods

Liquid product: Let it cure in the open air. *Cured product:* treat as household waste.

14. Transport information

Not classified as a dangerous goods under transport regulations: ADR, RID, ADN, IMDG/GGVSee, ICAO/IATA.

14.1 UN number

N/A

14.2 UN proper shipping name

N/A

14.3 Transport hazard class(es)

N/A

14.4 Packing group

N/A

14.5 Environmental hazards

N/A

14.6 Special precautions for use

N/A

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

N/A

Special precautions for transport

Hazard map:

No hazard map required.

Hazard symbol:

None

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

If other legal rules that are not mentioned elsewhere in this safety data sheet, then it is described in this subsection.

15.2 Chemical safety assessment

N/A

16. Other information

Legal Disclaimer:

This product is intended for filling, sealing and fixing. Always use the manufacturer's instructions. Local laws and regulations should be the recipient of the product on its own responsibility are met. The above information is believed to be correct but does not purport to be complete. Filoform is not responsible for any damage resulting from handling or contact with the above product.

This safety data is made on 10-01-2017 and prepared in accordance with Regulation (EC) No. 453/2010

Status: final



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IMPORTANT POINTS BEFORE YOU BEGIN

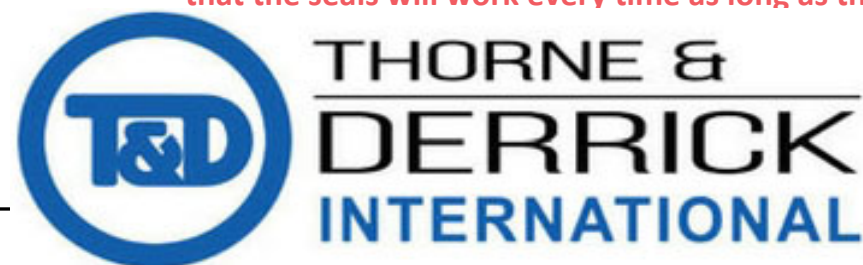
Filoseal+ HD installation

1. The duct and cables/pipes must be both clean and dry.
2. Separation of the cables/pipes must be a minimum of 5mm both from each other and from the duct edges.
3. Gloves are provided in the kit for your use.
4. Filoseal+ HD kits may be installed in temperatures as low as -5 degrees C.

Installation Instructions

1. Using the provided cleaning cloth, clean the first 20-25mm of the duct inner and the cables.
2. Using the provided abrasive, sand the duct inner and cables for the first 20-25mm to provide a key for the sealant to adhere to.
3. Taking the strips of adjoining hex tubes, insert them around and between the cables ensuring the spacing required is maintained. The strips can be inserted as a flat line or rolled to form a tight group of 5. If not enough room, the strips of hex tubes may be torn down to individual hex tubes. Start at the bottom of the duct with the large dark blue tubes and build up to completion. Should there be very heavy cables in the duct that require support, the hex tubes can be nested one small one inside the other larger one. The small light blue hex tubes are used to fill the remaining small gaps. All the hex tubes should be inserted so that there is a clear space in front of them of about 20-25mm where the MD+ sealant is to be placed. Ensure the tubes are packed as tightly as possible to prevent any cable movement..
4. In a vertical duct, group together strips or rolled groups of tubes and squeeze them into a duct as one unit. Then proceed to maintain the required spacing by adding either large or small tubes (groups of or singly).
5. Prepare the MD+ tube by cutting the cartridge and the nozzle. Insert the cartridge into your gun of choice.
6. Apply the MD+ onto the hex tubes ensuring you get into every gap and around every cable or pipe. Fill up the end of the duct until slightly proud of the duct end.
7. In order to finish the seal, use the provided finishing cloth by first immersing it in water. The cloth is made of a special material that will not stick to the MD+ sealant so long as the cloth remains damp. Pat the MD+ sealant into the duct ensuring you cover every part of the seal. This patting of the sealant encourages it to adhere to the hex tubes.
8. It is imperative that once you have installed the Filoseal+ HD the cables or pipes are not disturbed in any way until the seal is cured.
9. Curing takes 8-10 days. Backfilling a site should be avoided until at least 10 days after installation. When backfilling, ensure adequate packing is below the cables before adding material on top of the cables.

Filoform UK Ltd have supplied thousands of seals to many different industries. We are confident that the seals will work every time as long as the instructions and tips are followed precisely.



Thorne & Derrick
+44 (0) 191 410 4292
www.powerandcables.com

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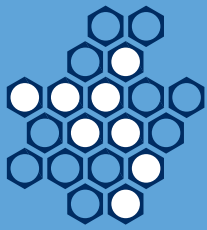


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INTERNATIONAL

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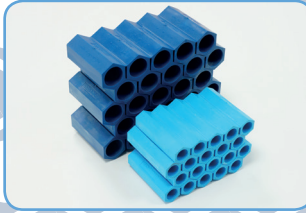
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FILOseal+HD

Re-enterable Duct Sealing System



- Up to 2 bar Pressure Resistance
- 100Kg pulling Force on the cables when sealed
- 10xd at 45°, with 1 bar pressure bending test

FiloSeal+HD provides a strong support system using the hexagonal tubes which builds up like a honeycomb structure.

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

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

The unique design of the hexagonal tubes makes positioning and separation of the cables very simple while also providing a strong backing for the MD+ to be applied on.

- High levels of Gas and Water tightness
- Excellent adhesion, applicable to all common building materials
- Shows Fire resistance properties
- Resistant against Water, Alkaline, Chemical agents
- Resistant to Hydrogen Sulphide / Methane and many other Gases (NedLab)
- Non corrosive
- Solvent free
- Shock absorbing
- Non toxic, neutral and almost odourless
- Complies with ATEX regulations
- Suitable for any shaped duct / bore hole / opening
- Quick and easy installation
- Seals all known materials, PVC & PE sheathed cables, PILC, (HD) PE pipes
- Suitable for renovations, can be installed retrospectively
- Resistant to Rats
- Resistant to termites (Mastotermes Darwiniensis) Northern Australian termites

Item number	Description	Maximum duct diameter (mm)
280010	FiloSeal+HD - 75mm > 110mm	Ø 110 max.
280020	FiloSeal+HD - 125mm > 160mm	Ø 160 max.
280030	FiloSeal+HD - 180mm	Ø 180 max.
280040	FiloSeal+HD - 200mm	Ø 200 max.
280050	FiloSeal+HD - 225mm	Ø 225 max.
280060	FiloSeal+HD - 250mm	Ø 250 max.

Other sizes available upon request



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FILOseal+HD

Re-enterable Duct Sealing System

Test Reports for MD+ (FiloSeal+ & FiloSeal+ HD)

Contents:

Page 1, 2 & 3:

Pressure tests, bending tests, pull strength

Page 4, 5 & 6:

Resistance tests against Chlorine & Methane Gases & Chemicals

Page 7:

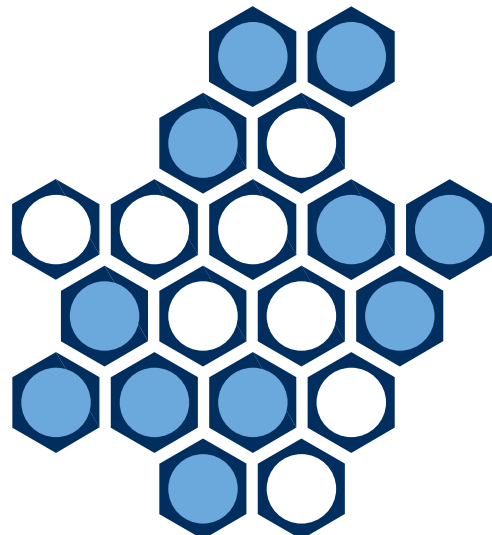
Hydrogen Sulphide resistance

Page 8, 9 & 10:

Resistance to Hydrocarbons

Page 11:

Final Conclusion & Summary



From: Wim Ipenburg

Date: 19 Feb 2016

Ref.: MD+ with Hexagonal tubes

Introduction:

This test report describes the results for testing the pressure, bending strength and pull strength when using Filoform's hexagonal support system, and finishing with a layer of MD+

Requirements:

- Gas & Water tightness – 1 bar long term (10 metres of water)
- Gas & water tightness – 2 bar short term (20 metres of water)
- The seal to withstand the cables being bent or stood on
- The seal to withstand pulling forces on the cables

Test Description:

- The test is performed using the following materials:
- PVC Duct – I/D = 150mm
- 3 x 150mm 4 core PVC/XLPE/SWA cables each having an O/D of around 50mm

Installing & preparing the Seal

The duct seal is installed in accordance with the standard Filoform instruction:

1. The cables and duct are cleaned and given a key with some sandpaper
2. The hexagonal tubes are placed around the cables filling up all the gaps, using the large and small hexagonal backers to make the support system nice and tight. They should end up looking like a honeycomb
3. The hexagonal tubes must be installed leaving a 20mm gap at the front which is where the MD+ sealant is applied.
4. Once fully covered using the Filoform sponge to compress the sealant, so some of the sealant gets compressed into the centres of the hexagonal tubes and ensures the sealant is round each cable.
5. The sealant can take from 4 to 20 days to fully cure as it cures with air humidity. The more humidity the quicker its cures. This test was done 4 weeks after installation at:
(20°C and 50% Relative Humidity)

TEST REPORT

Subject: MD+ Pressure test, bending strength, pull strength

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Picture 1



Picture 2



Picture 3



Picture 4



Test Procedures:

Pressure Test

The transit is pressurized from the inside to 1.0 bar for a period of 48 hours, then a final pressure test of 2 bar.

Bending test

The transit is brought to a pressure of 1,0 bar. One cable is bent at a distance of 10xd at an angle of 45°. After 1 minute, the cable is pushed back again into the starting position. This test is repeated in the opposite direction on the same cable. During and after this test, no leak should occur.



TEST REPORT

Subject: MD+ Pressure test, bending strength, pull strength

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Pull out test.

The transit is brought to a pressure of 1.0 bar. The cable is pulled with a force of 1000N (20 Newton x diameter in mm). After 1 minute, the weight is removed. During and after this test, no leakage should occur.

Since the transit seal is sealed both sides the applied force has been doubled to (2000N).



Final pressure test

After completion of the bending and pull strength, the seals are tested at a pressure of 2.0 bars.



Pressure test 1.0 bar: = PASSED

Bending test 45° = PASSED

Pull out test 1000N: = PASSED

Final pressure test 2 bar after the seal has been weekend by bending and pulling: = PASSED

From: Wim Ipenburg

Date: 4th April 2014

Filoform duct sealing material MD+

Ref.: MD+

Introduction:

This report describes tests carried out at the Nedlab laboratory and at the Filoform laboratory in the Netherlands, to examine the Chlorine and Methane gas resistance of the sealing compound MD+ as used in Filoform duct sealing systems FiloSeal+ & FiloSeal+HD.

Background of this requirement is that in and around waste water treatment installations the presence of Chlorine and Methane gas cannot be excluded. It is therefore of vital importance that the duct seals used in such environments should have sufficient resistance against Chlorine and Methane gas.

Description of test:

The vital material used in Filoform's duct sealing system Filoseal+ is the special sealing compound MD+.

Firstly a 600 gram block was fully cured and prepared for the exposure test of Chlorine and Methane gas. 500 grams of the original block was sent to Nedlab (a certified laboratory in the Netherlands with the capability to arrange exposure to Chlorine and Methane gas) NedLab has cut the block in small pieces for the exposure tests.

Nedlab have exposed these blocks to Chlorine and Methane gas as follows:

- Concentration of Chlorine and Methane gas: 100%
- Relative humidity: Wet (100%)
- Temperature during exposure: 23°C and 90°C
- Duration of exposure: 168 hours (7 days)

After the test, the samples are visually inspected by NedLab and also by Filoform for comparing physical values with the original: Hardness, density, tensile strength and elongation at break.

Test results:

Chlorine

After exposure 7d 23°C & 7d 90°C of cured MD+, in a maximum concentration of Chlorine, in a wet environment, some changes on the surface were noticeable of the MD+,

- Colour change - Slight Discolouration
- Surface texture – Slight roughness

Volume – Slightly increased but density remains unaffected and stays within the pass value.

Hardness, density and elongation at break values are within the standard after exposure at room temperature.

After exposure 7d at 90°, hardness, density, elongation and break values are still respectable, see: Report MD+ Methane & Chlorine resistance.

Methane

After exposure 7d 23°C & 7d 90°C of cured MD+, in a maximum concentration of Methane, in a wet environment, some changes on the surface were noticeable,

- Colour change - Slight Discolouration
- Surface texture – Slightly smoother

Volume – Slightly increased but density remains unaffected and stays within the pass value.

Hardness, density and elongation at break values are within the standard after exposure at room temperature.

After exposure 7d at 90°, hardness, density, elongation and break values are still respectable, see: Report MD+ Methane & Chlorine resistance.

Conclusions:

MD + withstands long term exposure to Methane and Chlorine without loss of functionality.

Test results table for resistance against Chlorine & Methane Gas:

		Norm	Measure - Original	Methane 7 days @ 23°C	Methane 7 days @ 90°C	Chlorine 7 days @ 23°C	Chlorine 7 days @ 90°C
Hardness	Shore A	30	29	27	21	26	23
Density	g/cm3	1.2	1.27	1.27	1.27	1.27	1.27
Elongation	%	100	220	217	248	229	176
Tensile Strength	N/mm2	0.8	0.82	0.71	0.55	0.81	0.53

TEST REPORT

Subject: Chlorine and Methane resistance

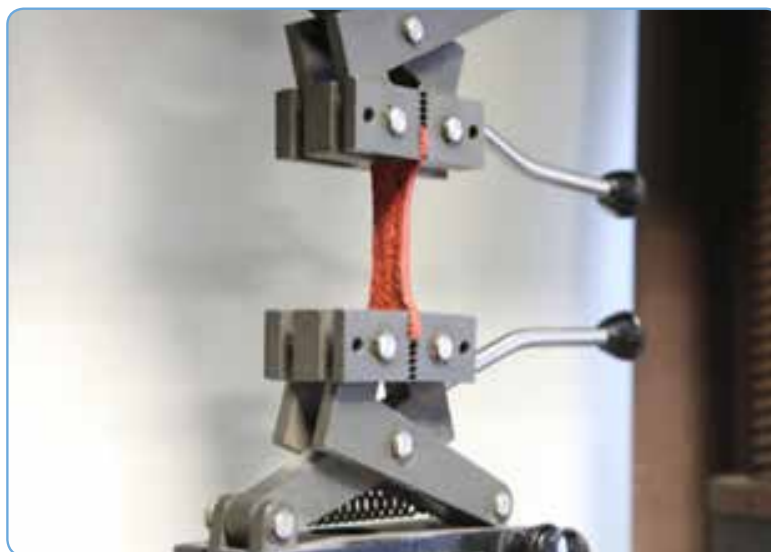
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Hardness Test



Tensile Strength & Elongation



Full test analysis can be seen of the MD+ from the NEDlab reports however they are in Dutch hence the outline and test results mentioned above. If you require to see the originals please contact your local office.

Additional Chemical resistances for MD+

Chemical	Rating	Chemical	Rating
Citric	1	Ammonium Hydroxide 10%	1
Hydrochloric 3%	1	Potassium Hydroxide	1
Phosphoric dilute	1	ASTM 10.1 Aliphatic 70hrs @ 300°F	1
Sulphuric 10%	1	Castor Oil 0.1	1
Nitric 7%	1	Diesel	2
Acetic	1	Linseed Oil	1
Anhydrous Ammonia	1	Mineral Oil	1
Sodium Chloride 10%	1	Silicon oil after 70Hrs @ 300°F	3
Hydrogen Peroxide 3%	1	Acetone	3
Sodium Carbonate 20%	1	Butyl Alcohol	1
Water	1	Jet fuel, JP4	2

Key: 1 = Excellent, 2 = Good (10-25% change), 3 = Fair (25-75% change), 4 = Poor (greater than 75% change), 5 = Complete fail

TEST REPORT

Subject: H₂S (Hydrogen Sulphide) resistance

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From: Wim Ipenburg

Date: 28th July 2010

Ref.: MD+ used within FiloSeal+ HD

This report describes tests carried out at the Nedlab laboratory and at the Filoform laboratory in the Netherlands, to examine the H₂S resistance of the sealing compound as used in Filoform duct sealing systems FiloSeal+ & FiloSeal+HD.

Background of this requirement is that in and around waste water treatment installations the presence of H₂S gas cannot be excluded. It is therefore of vital importance that the duct seals used in such environments should have sufficient resistance against H₂S.

Description of test:

Firstly, 6 blocks of each of cured material were prepared to enable exposure to H₂S.

After full curing, the weight and dimensions of each block were carefully determined.

Three blocks of the material were sent to Nedlab (a certified laboratory in the Netherlands with the capability to arrange exposure to H₂S).

Nedlab have exposed these blocks to H₂S as follows:

- Concentration of H₂S: 200 ppm
- Relative humidity: 95%
- Temperature during exposure: 40°C
- Duration of exposure: 120 hours (5 days)

The exposed blocks were then returned to Filoform's laboratory for further examination, which included:

- Visual inspection
- Determination of possible change of dimensions
- Determination of possible change of weight
- Determination of possible change of compression resistance
- Determination of tightness by comparing the water absorption between exposed and non exposed blocks

Summary of test results*

Description (before/after exposure)	MD+ Sealant	
	No change	PASSED
Visual Inspection	No change	PASSED
Change of dimensions	No change	PASSED
Change of weight	No change	PASSED
Change of shore hardness	No change	PASSED
Overall result		PASSED

Before exposure
to H₂S



After exposure
to H₂S



TEST REPORT

Subject: Hydro Carbon resistance on MD+



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From: Wim Ipenburg

Date: 19 Feb 2016

Ref.: MD+ used within FiloSeal+ HD

This report describes tests carried out at the Filoform laboratory in the Netherlands, to examine the Hydro Carbon (Fuel) resistance of the sealing compound MD+ (as used in Filoform duct sealing systems FiloSeal+ & FiloSeal+HD).

Background of this requirement is that in and around petrol installations, the presence of Gasoline, Benzin, LPG, Ethanol, and Oils and AdBlue cannot be excluded. It is therefore of vital importance that seals used in such environments should have sufficient resistance against all these Hydro Carbons

Description of test:

The vital material, Filoform's special sealing compound MD+ has fully cured and left for 4 weeks before starting the tests as described below.

Firstly a 200 gram block was prepared for the tests.

The block was cut in 10 small pieces of ca 20 grams for the different exposure tests.

Filoform have exposed / fully immersed 2 blocks for 2 years in:

- Gasoline / Diesel: 100%
- Benzin: 100%
- ASTM Oil: 100%

Filoform have exposed / fully immersed 2 blocks for 6 weeks in:

- Ethanol: 100%
- AdBlue: 100% - 32.5% Urea (Air1)
- LPG is not tested yet, but silicon products are commonly used in LPG environments.

After the immersion period, the samples are visually inspected at first.

For comparing physical values with the original: hardness, density, tensile strength and elongation at break where measured.

All measured values are presented in the table on the following page.

Test results:

Gasoline

After exposure of 2 years at 23°C of cured MD+, in 100% concentration of Gasoline, changes of the MD+ are as follows,

- Colour change - No
- Surface texture – No remarkable change.
- Volume – No swelling

Hardness, density, elongation and strength - Values have very little change compared to the original values.

AdBlue

After exposure of 3 weeks at 23°C of cured MD+, in 100% concentration of AdBlue, no changes of the MD+ are noticed.

Benzene

After exposure of 2 years at 23°C of cured MD+, in 100% concentration of Benzin, changes of the MD+ are as follows,

- Colour change - No
- Surface texture – Slightly rougher on the surface
- Volume – No Swelling
- Hardness and Tensile strength - values are slightly decreased.

Density and Elongation - At break have very little change compared to the original values.

Ethanol

After exposure of 42d at 23°C of cured MD+, in 100% concentration of Ethanol, changes of the MD+ are as follows,

- Colour change - No
- Surface texture – No change
- Volume – No Swelling
- Hardness, density, elongation and tensile strength values have not changed

ASTM Oil

After exposure of 2 years at 23°C of cured MD+, in 100% concentration of Oil, changes of the MD+ are as follows,

- Colour change - No
- Surface texture – Slightly rougher on the surface
- Volume – No swelling
- Hardness and Tensile strength - Values are slightly decreased.

Density and Elongation - At break have very little change compared to the original values.

TEST REPORT

Subject: Hydro Carbon resistance on MD+

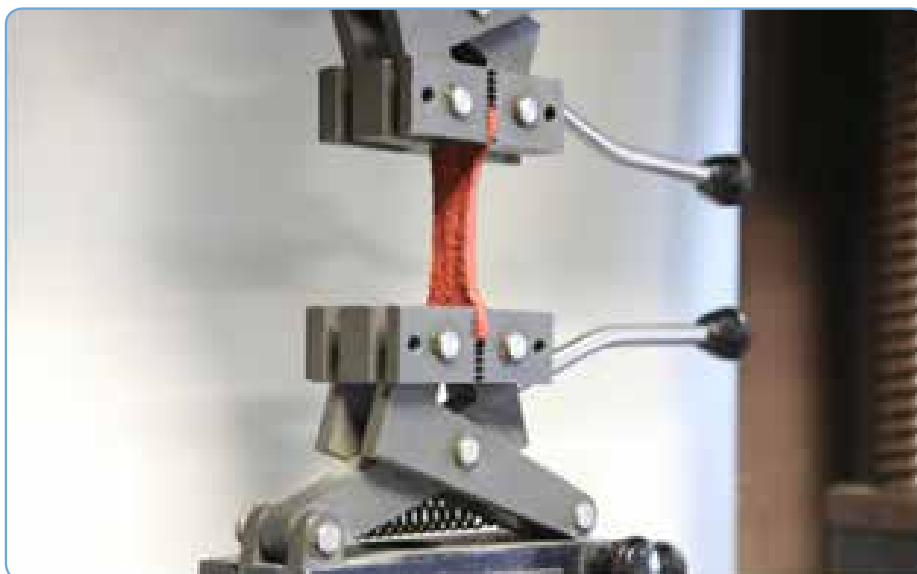
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		Norm	Measure - Original	Gasoline 2 years @ 23°C	AdBlue 21 days @ 23°C	Benzin 2 years @ 23°C	Ethanol 42 days @ 23°C	ASTM Oil 2 years @ 23°C
Hardness	Shore A	30	29	30	30	22	30	26
Density	g/cm3	1.2	1.27	1.27	1.27	1.26	1.27	1.27
Elongation	%	100	150	140	150	140	150	160
Tensile Strength	N/mm2	0.8	0.77	0.69	0.77	0.53	0.77	0.59

Conclusions:

MD + withstands long term exposure to Hydro Carbons, such as used in petrol stations, without disintegration or loss of functionality.



From: Wim Ipenburg
Date: 03rd March 2016
Ref.: FiloSeal+HD

FINAL CONCLUSION

MD+ has been heavily tested against pressure, pulling forces, chemicals, gases, hydrocarbons, in conjunction with using FiloSeal+HD which uses the hexagonal backing system to support and separate the cables.

From all the tests Filoform have performed, we suggest this product can be used in every business sector where sealing cable ducts is a requirement.

Below I have summarised all the results from all the tests in this report.

Test Description	Measurement	Result	Pass or Fail
Pressure	2.0 Bar	1.0 bar long term, 2 Bar short term	PASSED
Pulling Force	100kg	100kg – 1000 newtons	PASSED
Bend Test	10xd at 45°	10xd at 45°, with 1 bar pressure	PASSED
Chlorine Gas	100% for 7 days	Slight change on colour and texture	PASSED
Methane Gas	100% for 7 days	Slight change on colour and texture	PASSED
Diesel	100% for 2 years	Hardly any change	PASSED
Petrol / Benzene	100% for 2 years	Hardly any change	PASSED
Ethanol	100% for 42 days	Hardly any change	PASSED
AD Blue	100% for 21 days	No Change	PASSED
ASTM Oil	100% for 2 years	Hardly any change	PASSED
Hydrogen Sulphide (H ₂ S)	200ppm for 5 days	Hardly any change	PASSED

The test results given in this report have been done in accordance with our installation instructions, however values achieved in field installations may vary if the instructions are not followed, and results may vary depending on cable and duct tolerances such as size, material, and volume.

Name: Wim Ipenburg

Position: R&D manager

Date: 03rd March 2016

Signature: *Wim Ipenburg*



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