

ERGO

GAS VERIFICATION STRATEGY REPORT

Land to the rear of Suncroft,
Warkworth,
Northumberland

Prepared for:

Mr and Mrs Walton

Report Ref: 22-1214-r01
Date Issued: May 2022



ERGO LIMITED

Hoults Yard,
Walker Road,
Newcastle upon Tyne,
NE6 2HL

Tel : + 00 (0) 191 389 6200
<http://www.ergoenvironmental.com>

Registered in England
No: 11162116

QUALITY ASSURANCE




REMARKS	RevA - Draft	
DATE	May 2022	
PREPARED BY	J Campbell	
QUALIFICATIONS	MESci, FGS	
SIGNATURE		
CHECKED BY	J Malley	
QUALIFICATIONS	BSc, MSc, MCIWEM C.WEM	
SIGNATURE		
AUTHORISED BY	J Nairn	
QUALIFICATIONS	BSc, MSc, FGS, MIEEnvSc, CEnv	
SIGNATURE		
PROJECT NUMBER	22-1214	
IMS Template Reference: QR011		

Table of Contents

1. INTRODUCTION.....	2
1.1 Background	2
1.2 Proposed Development	2
1.3 Objectives.....	2
1.4 Limitations	2
1.5 Sources of Information.....	3
1.6 Confidentiality.....	3
2. GROUND GAS ASSESSMENT.....	4
2.1 Ground Conditions.....	4
2.2 Site History	4
2.3 Gas Risk.....	4
3. GAS PROTECTION MEASURES	5
3.1 BS 8485 Property Considerations.....	5
3.2 Required BS 8485 Point Score	5
3.3 Proposed Protection Measures.....	5
4. VERIFICATION REQUIREMENTS.....	7
4.1 Visual Inspection Verification	7
4.2 Verification Reporting	8

APPENDICES

Appendix I Limitations

Appendix II Glossary

Appendix III Drawings

Drawing No 22-1214-001 – Site Location Plan

Drawing No 22-1214-002 – Proposed Development Layout

Heddon Structures Limited Drawing No 0458-DR-S-004 – Foundation Detail

Appendix IV Summary of Gas Protection Measures

Appendix V Examples of Verification

Appendix VI Filoseal Data Sheet

Appendix VII Verification Proforma

1. INTRODUCTION

1.1 Background

ERGO has been instructed by Mr A Laurie to develop a Ground Gas Verification Strategy for the proposed residential development, located on land off Station Road, Warkworth.

1.2 Proposed Development

ERGO understands that the client intends to construct a residential development comprising 2No. dwellings with associated garages, landscaped areas, access and infrastructure.

Drawing 22-1214-002 (Appendix III) identifies the proposed development layout. A snapshot of the proposed development layout is indicated in Figure 1.1 below.

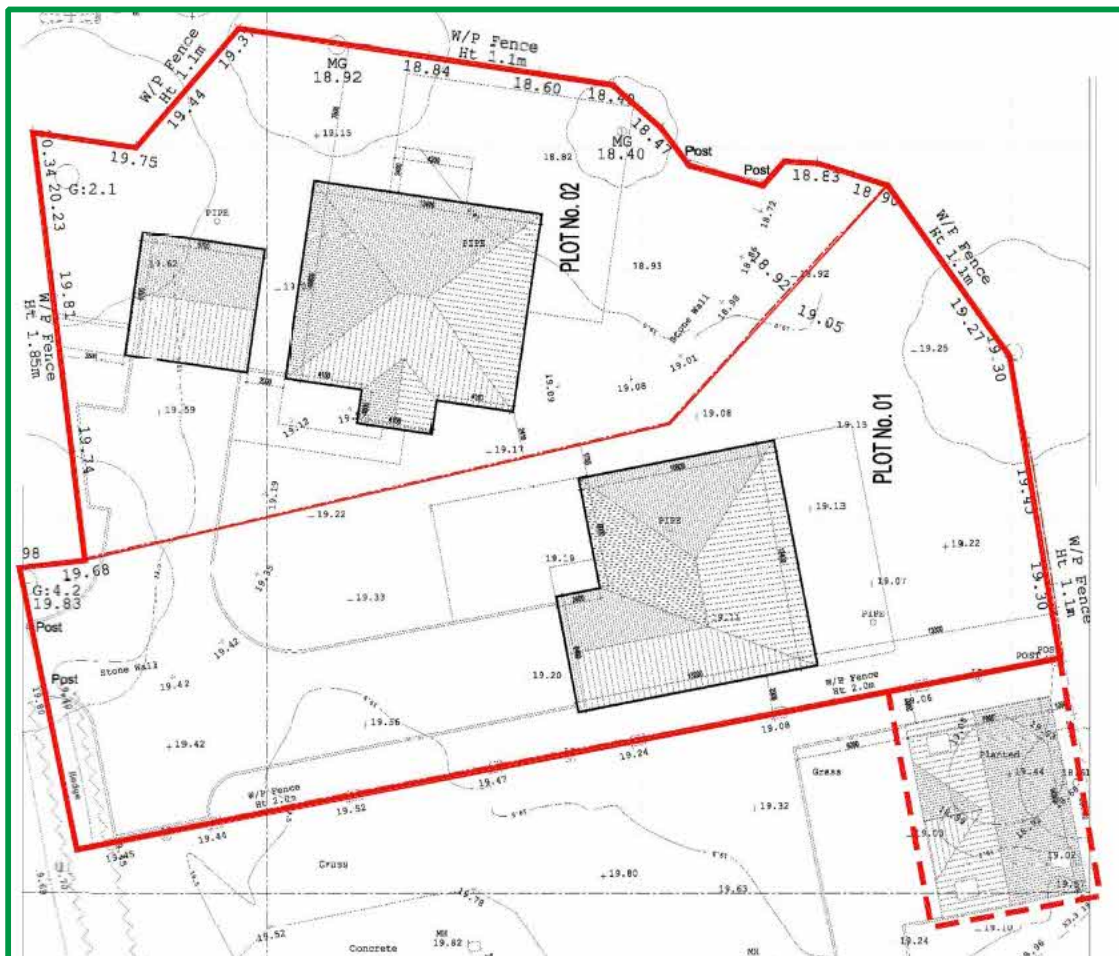


Figure 1.1 Snapshot of Proposed Development

1.3 Objectives

The objectives of the Geo-Environmental Investigation are to:

- Review previously completed reports outlining potential ground gas risks and liabilities;
- Summarise the proposed ground gas mitigation measures to be included within proposed plots; and,
- Outline the requirements to verify the suitable and appropriate installation of ground gas mitigation measures.

1.4 Limitations

The limitations of this report are presented in Appendix I.

1.5 Sources of Information





The following reports have been reviewed to complete this Verification Strategy:

Intersoil – *Environmental Study* Ref: 12023/amd2, dated June 2013.

Intersoil – *Environmental Soils Investigation Report*. Ref: 20003, dated January 2020

ARC Environmental – *Preliminary Data Sheet* Ref: Report No.20-610, dated May 2021.

The following guidance documents have been reviewed to complete this Verification Strategy:

-  BS 8485:2015 (+A1 2019), 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings';
-  CIRIA C735 (2014), 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases';
-  YALPAG Technical Guidance for Developers, Landowners and Consultants, 'Verification Requirements for Gas Protection Systems';
-  ASTM D4437/D4437M (2018), 'Standard Practice for Non-destructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheer Geomembranes'.

1.6 Confidentiality

ERGO has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from ERGO; a charge may be levied against such approval.

2. GROUND GAS ASSESSMENT

ERGO have reviewed the previously completed reports to establish the following. These reports should be read in line with this report to ensure maximum understanding.

2.1 Ground Conditions

Table 2.1 *Encountered Ground conditions*

SUMMARY OF GROUND CONDITIONS	
Made Ground	Made Ground was encountered within all exploratory hole locations to maximum depths of 10.40mbgl and was recorded to be significantly deeper in the south/south east. Made Ground generally comprised a brown clayey topsoil overlying a dark grey ashy sandy gravel to a maximum depth of 4.70-5.00mbgl. with brick, glass, metal, plastic, ceramics, coal and sandstone noted overlying a firm reworked clay to a maximum recorded depth of 10.40mbgl. in the south east of the site, becoming shallower to the west.
Drift	No drift deposits were noted, clay deposits were noted to be reworked.
Bedrock	Suspected solid bedrock was encountered at depths between 2.00-10.70mbgl. comprising a weak weathered orange SANDSTONE, recovered as sand and gravel. Bedrock was noted to be significantly shallower to the west of the site (2.00mbgl). as per ARC's investigation (ref: 20-610) the significant difference in rockhead is likely associated with the high wall feature of the former quarry.

2.2 Site History

Historic mapping suggests the site comprised open ground and was partially occupied by a 'Quarry' in c.1855 to the north/east. By c.1923, the quarry is shown to have expanded and occupied the majority of the site (approx. 90%). By c.1981, the site was in use as a builders yard with several structures noted in the south-western site area though noted to have been cleared by c.2013.

2.3 Gas Risk

ARC suggested the site was to be classified as Gas Characteristic Situation 2/Amber 1 following a review of the completed ground gas monitoring data identifying elevated carbon dioxide levels (>5%), depleted oxygen concentrations (<19%) and the location of the site within the Northumberland Coalfield in accordance with the guidance followed by Northumberland County Council.



This assessment is understood to have been accepted by Northumberland County Council.

A verification report is also required to confirm gas protective measures have been installed in general accordance with CIRIA C735, for submission and approval to the LPA.

3. GAS PROTECTION MEASURES

3.1 BS 8485 Property Considerations

British Standard BS8485:2015+A1:2019 provides two types of commercial property that require assessment. These building types are:

-  **Type A building:** private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.
-  **Type B building:** private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

It is understood that the proposed building will be 'Type A'.

3.2 Required BS 8485 Point Score

Based on the previously completed gas risk assessment and in accordance with the requirements of Northumberland County Council; the proposed structures at the site require installation and validation of specialist Ground Gas Mitigation Measures in line with a CS2/Amber 1 classification to be constructed in accordance with BS8485:2015+A1:2019 as is displayed below in Table 3.1.

Table 3.1 BS8485:2015+A1:2019 Points Required for Type A and B Building

CHARACTERISTIC SITUATION	NHBC TRAFFIC LIGHT SYSTEM	MINIMUM GAS PROTECTION SCORE (POINTS)	
		High Sensitivity	
		Type A building	Type B building
1	Green	0	0
2	Amber 1	3.5	3.5
3	Amber 2	4.5	4
4	Red	6.5	5.5
5	N/A	—	6
6	N/A	—	—

3.3 Proposed Protection Measures

It is understood that the proposed plots within the development will include the following protection measures displayed in Table 3.2 below. A summary of all gas protection measures is shown within Appendix V.

Table 3.2 Summary of Proposed Measures

PROTECTION MEASURE	SCORE ^A
Precast suspended segmental subfloor (i.e. beam and block).	0.0
Ventilation Protection Measures - Passive sub-floor void	1.5
Gas Membrane in accordance with BS 8485	2.0
Total Score	3.5

Subject to the suitable installation, the above proposed protection measures will achieve a point score in excess of the required 3.5-point score for a CS2/Amber 1 property.

Architectural drawings showing the floor construction and membrane detailing have not been provided by the Client to date. These will need to be confirmed subsequently within planning.

It has not been confirmed which Ground Gas Barrier product will be used within the development. However, it will need to be compliant with BS8485. A data sheet for the chosen product will be included in the overall verification report.

Northumberland County Council require all service penetrations to be sealed with a closed-cell expanding foam. Northumberland County Council and Northumbrian Water have previously confirmed the suitability of FiloSeal and FiloSeal+HD products, a data sheet for the selected product is enclosed in Appendix II. Where a product other than FiloSeal is used then the applicant will need to seek approval from Northumbrian Water prior to submitting the details to the LPA.

4. VERIFICATION REQUIREMENTS

To achieve the required gas mitigation scores detailed in Section 3, it is necessary to ensure the adequate workmanship and installation of all proposed protection measures. This will involve the following:

- Independent validation of the works undertaken;
- Attendance to the site a sufficient number of times in accordance with the requirements set out within the YALPAG guidance document to ensure the adequate installation of the proposed gas protection measures;
- Verification of the completed installation works immediately prior to concrete pours to ensure no damage to the membrane by follow on trades; and,
- Full photographic records of the plots validated during each visits; and,
- Production of verification proformas for the inspected plots.

The verification requirements are assessed using guidance within the aforementioned YAHPAG guidance document and CIRIA C735. This assessment determines the risk associated to the works. This assessment is outline is Table 4.1 below.

Table 4.1 Verification Assessment

ITEM	RISK
Hazardous Ground Gas Regime	CS1 requiring CS2 - Low/Moderate
Design Complexity	Simple with limited penetrations - Low/Moderate
Number of plots	4no. small structures– Low/Moderate
Installers	Groundworkers of unknown experience - High

Based on YALPAG guidance and the experience of the installers this will comprise a full assessment of the entire gas membrane by primary means of pick-testing and inspection of all joints and service penetrations.

Verification should be undertaken immediately prior to all concrete pours to ensure that no damage is possible by follow on trades.

Any alteration to the verification assessment will require suitable revisions to the required verification process.

4.1 Visual Inspection Verification

To ensure the adequate installation of the proposed protection measures the following items, shown in table 4.2, are required to be verified within each plot by an independent verifier.

Table 4.2 Visual Inspection Verification

INSPECTION	METHOD
Product Verification	Confirmation that suitable products have been installed to consist of photographs of product types, labels on packaging and delivery tickets.
Wall Cavity Inspection	Confirmation that gas membrane spans the external wall cavity above the periscopic vents.
General Condition	The membrane is to be inspected to ensure there are no tears, punctures or rips.
Jointing	The engineer is to check the overlaps between membranes are correctly sealed with sufficient overlaps.
Service Entry Points	Verification of the presence of closed cell expanding foam, preformed top hats sealed to the pipe and membrane as per the construction detail.

To ensure the future site users will be at no significant risk from possible ground gas related issues, the Gas Membrane Verifier should attend the site a sufficient number of times in line with YAHPAG guidance to adequately inspect the installed membrane and subfloor voids immediately prior to the concrete pours within the plot requiring Gas Mitigation Measures. Given the size of the plot, all seams should be adequately inspected during the validation programme.

Examples of gas membrane verification (photographs include different membrane types for demonstrative purposes only – gas membranes are site specific) are shown in Appendix VII. Should the gas mitigation measures be deemed to be non-compliant with the remediation strategy, minor amendments will be made under observation until deemed sufficient. Major non-compliance with the remediation strategy will result in the re-installation and subsequent revalidation of mitigation measures where necessary.

Upon completion of the verification a proforma will be produced detailing the inspection and adequate installation of gas protection measures within inspected plots.

4.2 Verification Reporting

Upon completion of the installation works ERGO will produce a document detailing the adequate workmanship involved in the installation of the proposed mitigation. This report will be submitted to and approved by the Local Authority prior to the occupation of the building.

Also included within the report will be a summary and experience of the independent verifier.

END OF REPORT

**APPENDIX I
LIMITATIONS**



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between ERGO and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. ERGO cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by ERGO is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by ERGO in this connection without their explicit written agreement there to by ERGO.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



**APPENDIX II
GLOSSARY**



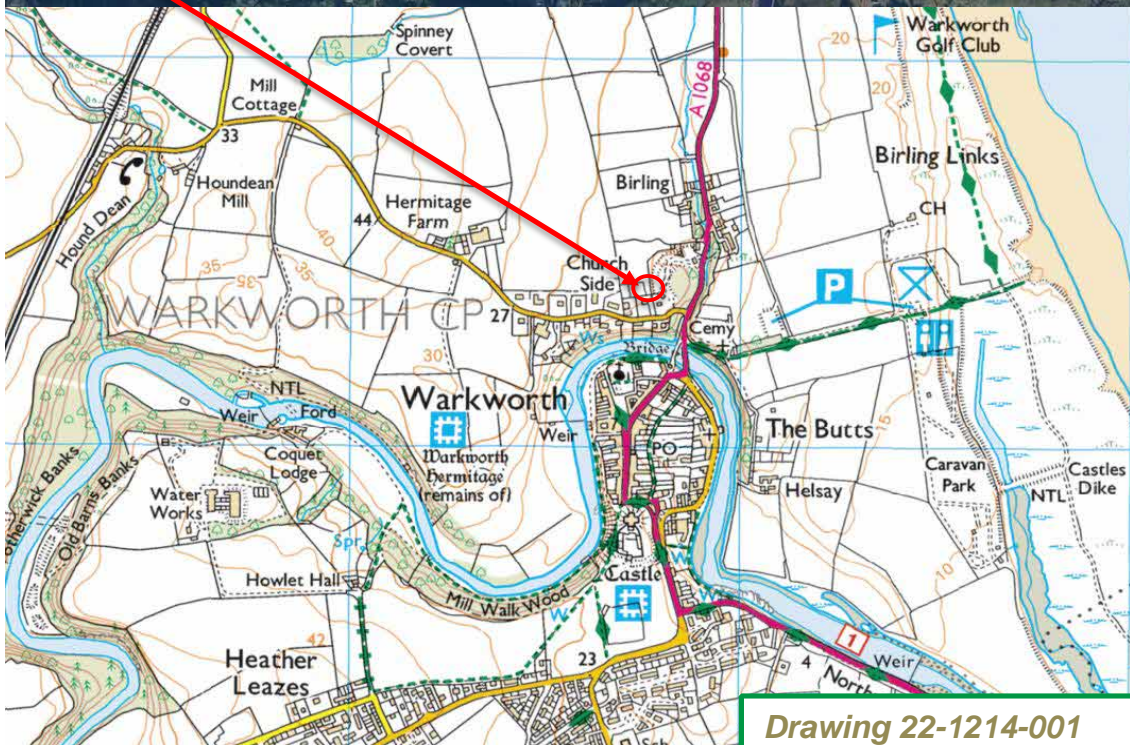
TERMS

AST	Above Ground Storage Tank	SGV	Soil Guideline Value
BGS	British Geological Survey	SPH	Separate Phase Hydrocarbon
BSI	British Standards Institute	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	SPT	Standard Penetration Test
CIEH	Chartered Institute of Environmental Health	SVOC	Semi Volatile Organic Compound
CIRIA	Construction Industry Research Association	UST	Underground Storage Tank
CLEA	Contaminated Land Exposure Assessment	VCCs	Vibro Concrete Columns
CSM	Conceptual Site Model	VOC	Volatile Organic Compound
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	WTE	Water Table Elevation
DWS	Drinking Water Standard	m	Metres
EA	Environment Agency	km	Kilometres
EQS	Environmental Quality Standard	%	Percent
GAC	General Assessment Criteria	%v/v	Percent volume in air
GL	Ground Level	mb	Milli Bars (atmospheric pressure)
GSV	Gas Screening Value	l/hr	Litres per hour
HCV	Health Criteria Value	µg/l	Micrograms per Litre (parts per billion)
ICSM	Initial Conceptual Site Model	ppb	Parts Per Billion
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)	mg/kg	Milligrams per kilogram (parts per million)
ND	Not Detected	ppm	Parts Per Million
LMRL	Lower Method Reporting Limit	mg/m³	Milligram per metre cubed
NR	Not Recorded	m bgl	Metres Below Ground Level
PAH	Polycyclic Aromatic Hydrocarbon	m bcl	Metre Below Cover Level
PCB	Poly-Chlorinated Biphenyl	mAOD	Metres Above Ordnance Datum (sea level)
PID	Photo Ionisation Detector	kN/m²	Kilo Newtons per metre squared
QA	Quality Assurance	µm	Micro metre
SGV	Soil Guideline Value		



**APPENDIX III
DRAWINGS**

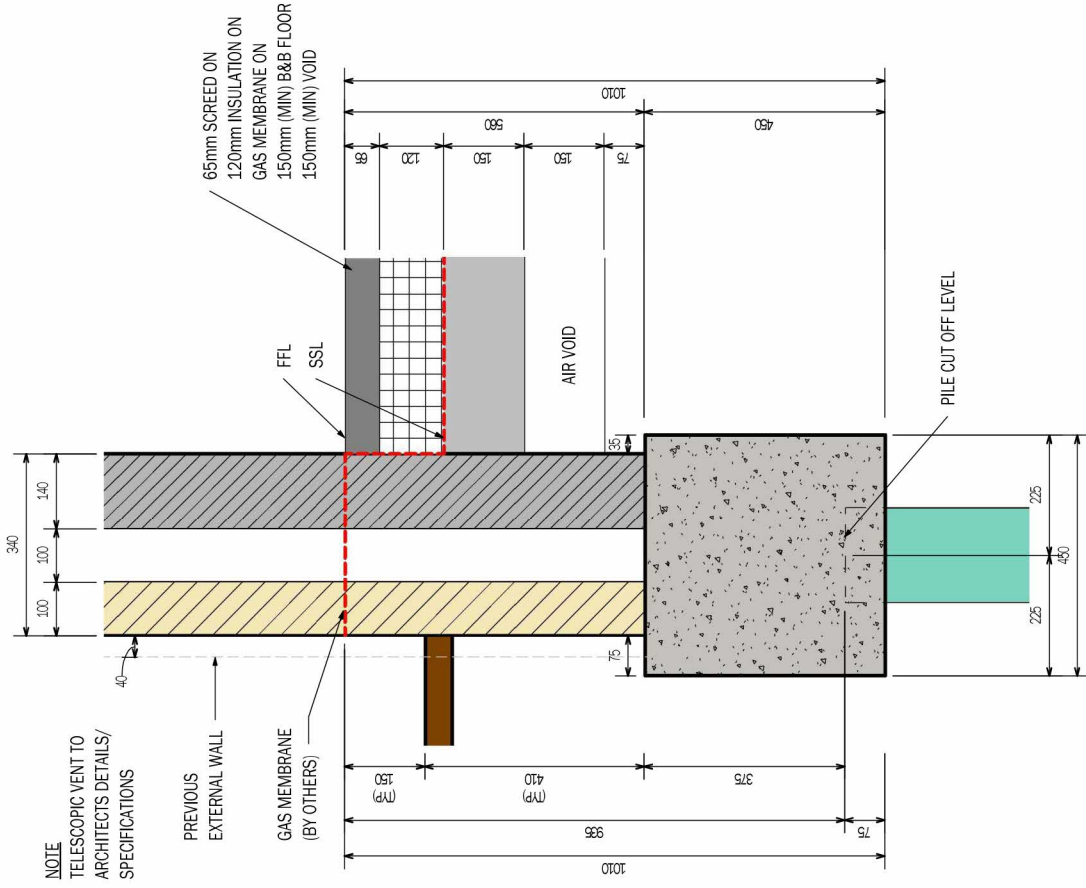




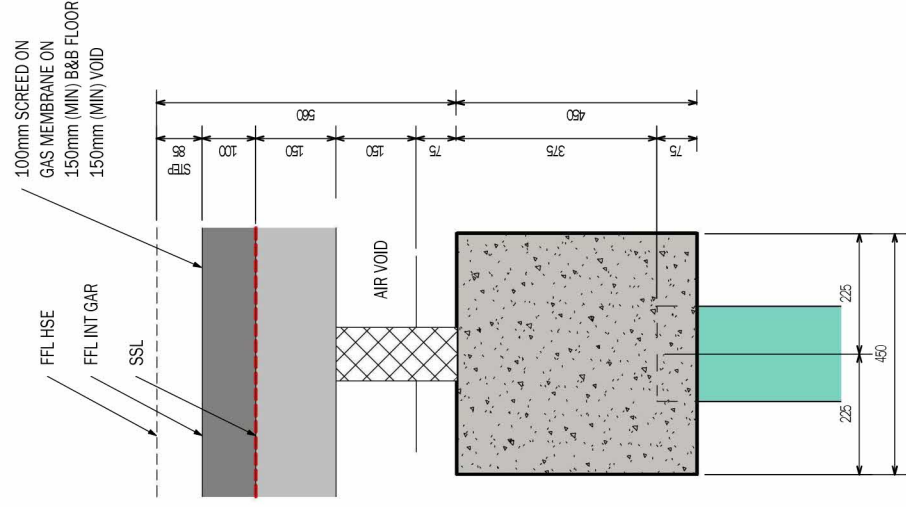
Drawing 22-1214-001
Site Location Plan



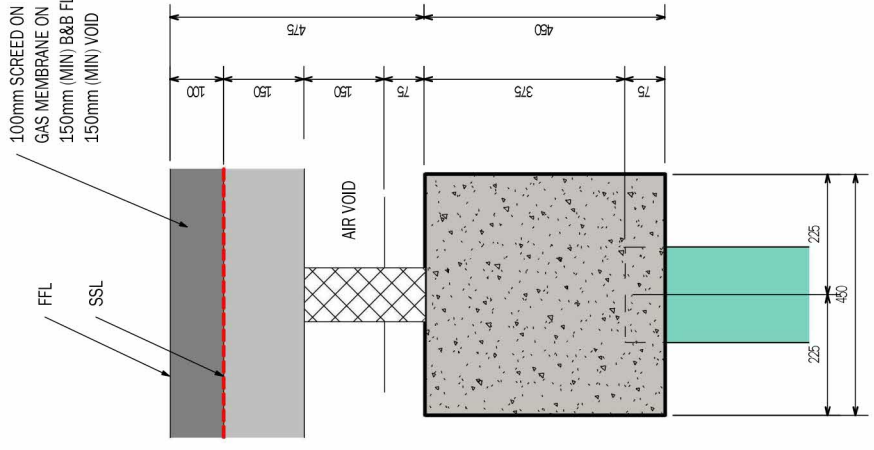
REV 4 - CONSTRUCTION ISSUE 04-04-22. GROUND BEAM LEVEL RAISED 40mm. GARAGE SCREED DEPTH INCREASED TO 100mm.



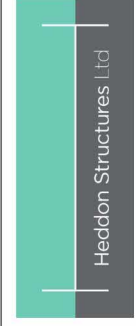
1 PERIMETER DETAIL HSE 1 1:10



2 INTERNAL SECTION INTEGRAL GARAGE 1:10















3 INTERNAL SECTION DETACHED GARAGE 1:10



**APPENDIX IV
SUMMARY OF GAS
PROTECTION MEASURES**



GAS PROTECTION SCORES FOR THE STRUCTURAL BARRIER		SCORE ^A
a) Floor and substructure design		
Precast suspended segmental subfloor (i.e. beam and block).		0
Cast in situ ground bearing floor slab (with only nominal mesh reinforcement).		0.5
Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations.		1 or 1.5 ^B
Basement floor and walls conforming to BS 8102:2009, Grade 2 waterproofing. ^C		2
Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing. ^C		2.5
<p>^{A)} The scores are conditional on breaches of floor slabs, etc., being effectively sealed.</p> <p>^{B)} To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see A.2.2.2).</p> <p>^{C)} The score is conditional on the waterproofing not being based on the use of a geosynthetic clay liner waterproofing product (see C.3, Note 4).</p>		
PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
Gas protection scores for ventilation protection measures		
(a) Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building)	0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems. If the layer has a low permeability and / or is not terminated in a venting trench (or similar), then the score is zero.
(b) Passive sub floor dispersal layer. Media used to provide the dispersal layer are:	Very good performance	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS8485:2015. Passive ventilation should be designed to meet at least "good performance".
<ul style="list-style-type: none">  Clear void  Polystyrene void former blanket  Geocomposite void former blanket  No-fines gravel layer with gas drains  No-fines gravel layer 	Good performance	
(c) Active dispersal layer, usually comprising fans with active abstraction (suction) from a sub floor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers.	1.5 to 2.5	
(d) Active positive pressurization by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.	1.5 to 2.5	

(e) Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park)	4	Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F [9].
Gas Protection score for the gas resistant membrane		
<p>Gas resistant membrane meeting all of the following criteria:</p> <ul style="list-style-type: none">  Sufficiently impervious to the gases with a methane gas transmission rate <math><40.0\text{ ml/day/m}^2/\text{atm}</math> (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 (eg settlement if placed below a floor slab);  Sufficiently strong to withstand the installation process and following trades until covered (eg 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;  Complying with guidance within BH8485; and,  Verified in accordance with CIRIA C735. 	2	<p>The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints.</p> <p>For example, a minimum 0.40mm thickness (equivalent to 370g/m² for polyethylene) reinforced membrane (virgin polymer) meets the performance criteria opposite.</p> <p>If a membrane is installed that does not meet all the criteria; opposite, then the score is zero.</p>
This table should be read in conjunction with the notes presented in BS8485 (2015)		



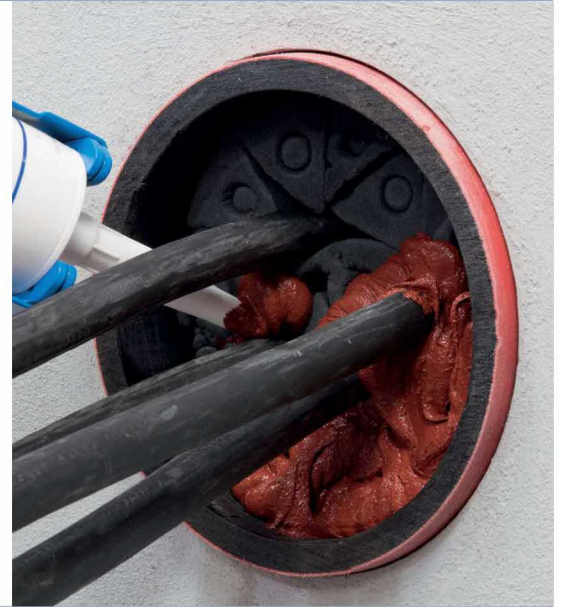
**APPENDIX V
FILOSEAL PRODUCT
DATA SHEET**



FILoseal+

FEATURES

- Gas & Water Tight - Up to 1 Bar
- Resistant to: Hydrocarbons (Petrol, Diesel, Ethenol, LPG, Adblue)
- Resistant to: Methane, H2S, Chlorine, and many other gases (Nedlab)
- Resistant to Rats & Termites (Mastotermes Darwiniensis) Northern Australian termites.
- Excellent Adhesion
- Flexible one component adhesive & sealing compound (MD+)
- Non-Corrosive
- Non-Hazardous
- Complies with ATEX regulations
- Seals all common materials
- Suitable for retrofit
- Re-enterable
- Wimes Compliant, (3.02 Clause, 7.4.3.2 d)

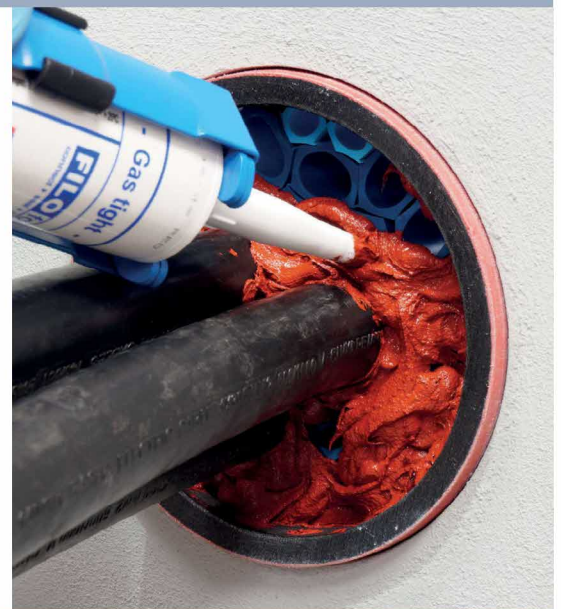


FILoseal+HD

All the benefits of the FILoseal+ with the addition of the following features:

FEATURES

- Gas & Water Tight - Up to 2 Bar
- Seals Large LV, MV, & HV cables
- 100kg Pulling force on the cables
- 10xd at 45°, with 1 bar pressure



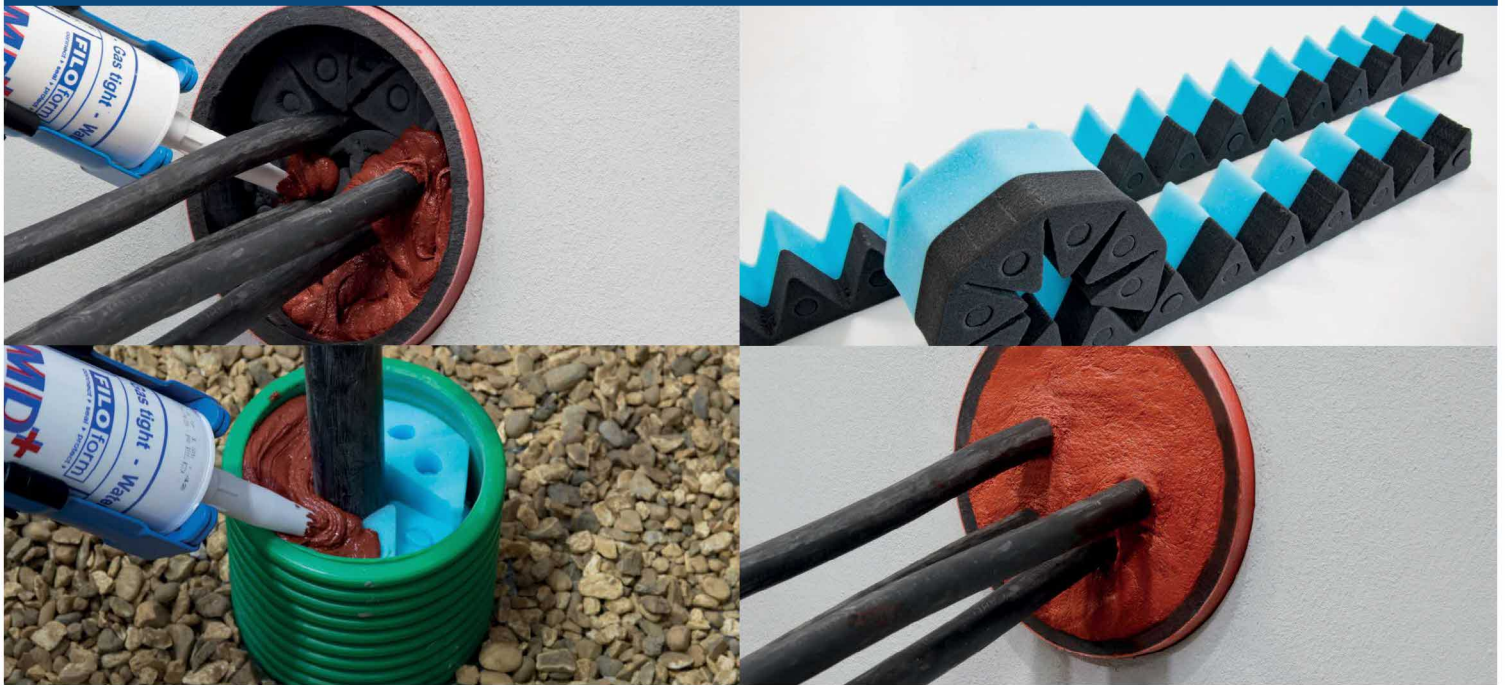
FILoseal+HD FIRE

All the benefits of the FILoseal+HD with the addition of the following features:

FEATURES

- Fire Resistant up to 4 hours BS EN1366-3 2009 & AS1530.4-2014
- Wimes Compliant (3.02 Clause, 7.4.3.2 b)
- Tested to London Underground - LUL S1085
- Tested to European rail applications - BS EN 45545-2:2013
- Tested to French rail standard Clt NF F16-10
- Tested to Smoke index - ISO 5659-2:2012
- Tested to Oxygen index - BS EN ISO 4589-2:1999





FILoSeal+

universal re-enterable duct sealing system

duct opening up to Ø 200 mm

Larger sizes available upon request

Duct sealing system FiloSeal+ is a universal solution for sealing cables and pipes in ducts, drilled holes or transit frames.

The tri-flexible foam makes positioning and separation of the cables very simple while also providing a backing for the MD+ to be applied on to. FiloSeal+ 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+ uses our MD+ sealant which is easily applied from a skeleton gun. The high quality, one component, flexible sealant "MD+" is based on a silicone compound that cures with air (Humidity).

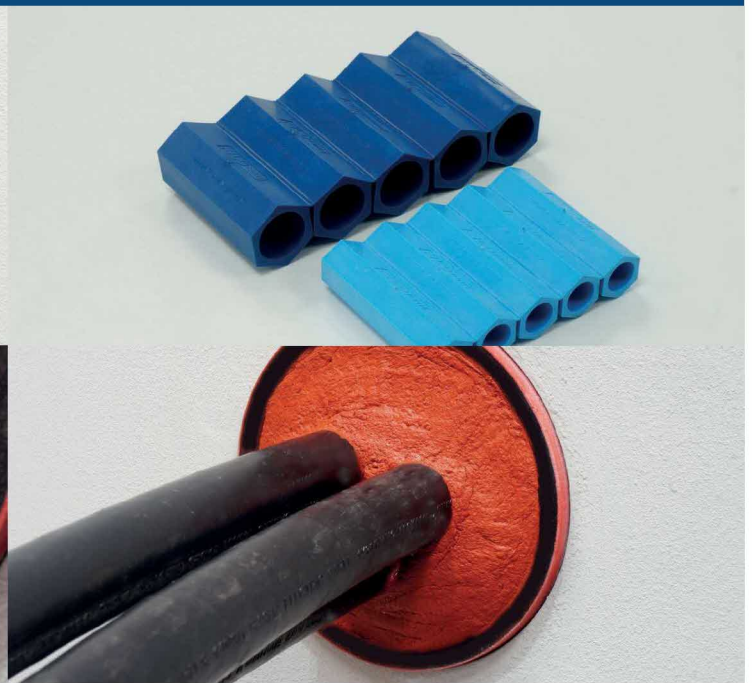
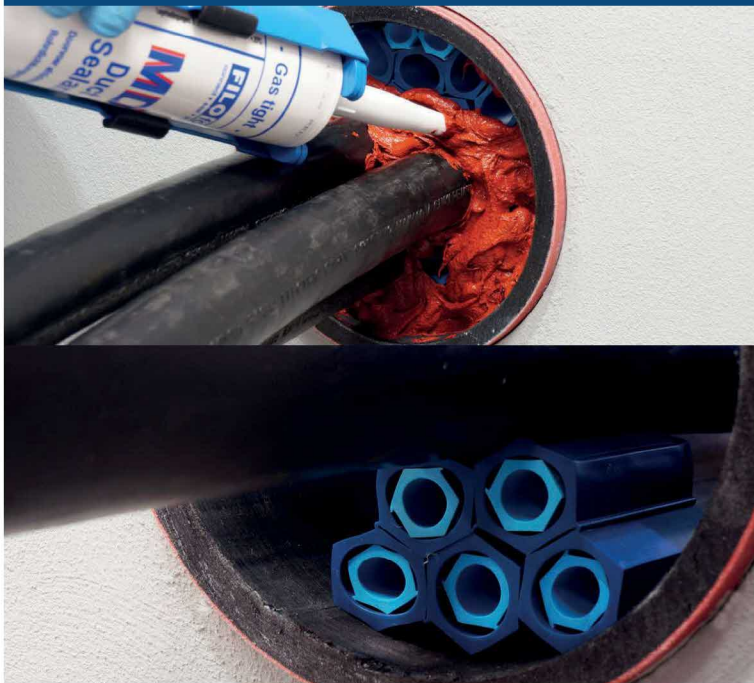
After application and full curing the thixotropic MD+ forms a plastic elastomer mass with special qualities effectively sealing and bonding, while providing a high level of durability.

FEATURES

- Flexible, one component, adhesive and sealing compound in a cartridge (310ml)
- High levels of Gas and Water tightness
- Excellent adhesion
- Resistant against Water, Alkaline, Chemical agents
- Resistant to Hydrocarbons
- Suitable for sealing underground cable ducts set out within the APEA 'Blue Book'
- Resistant to Hydrogen Sulphide / Methane and many other Gases (NedLab)
- Resistant to rats
- Resistant to termites (Mastotermes Darwiniensis) Northern Australian termites
- Non corrosive
- Solvent free
- Shock absorbing
- Non toxic, neutral and almost odourless
- Complies with ATEX regulations
- WIMES Compliant, (3.02 clause 7.4.3.2, d & e)
- Suitable for any shaped duct / bore hole / opening
- Seals all known materials, PVC & PE sheathed cables, PILC, (HD) PE pipes
- Suitable for renovations, can be installed retrospectively
- Up to 1 bar pressure resistance
- Quick & easy to install, especially in vertical ducts
- Non Hazardous
- Over 25 years of operational experience

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

For enquiries contact our sales department.



FILoSeal+HD

universal re-enterable duct sealing system

duct opening up to Ø 250 mm

Larger sizes available upon request

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

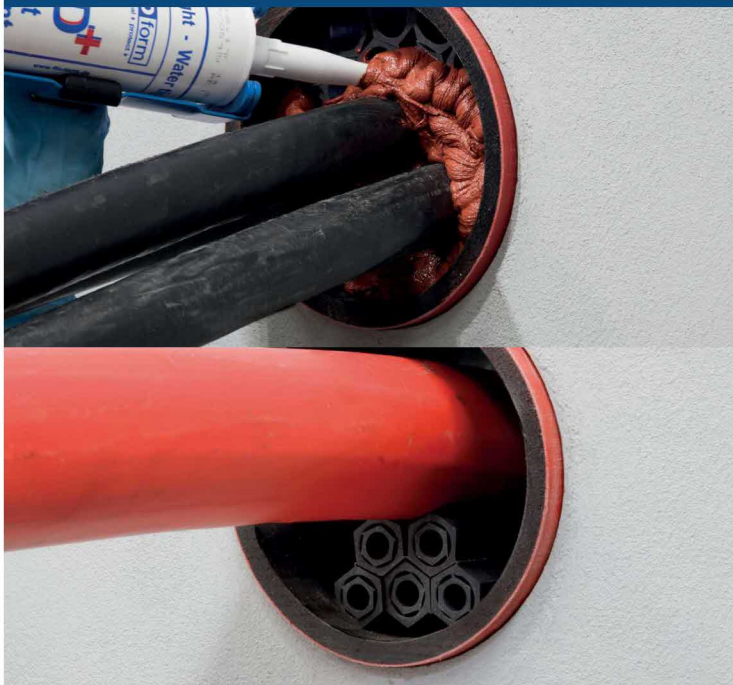
FiloSeal+HD provides a strong support system using the hexagonal tubes which builds up like a honeycomb structure. FiloSeal+HD is suitable for sealing any cable configuration or pipes contained in one duct and also allows easy re-entry of the seal to add or remove cables or pipes as required. The Filoform 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.

FEATURES

- 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
- Resistant to hydrocarbons

Product Name	Duct diameter min.-max. (mm)	Order unit
FiloSeal+HD - 75 mm > 110 mm	Ø 110 max.	per piece
FiloSeal+HD - 125 mm > 160 mm	Ø 160 max.	per piece
FiloSeal+HD - 180 mm	Ø 180 max.	per piece
FiloSeal+HD - 200 mm	Ø 200 max.	per piece
FiloSeal+HD - 225 mm	Ø 225 max.	per piece
FiloSeal+HD - 250 mm	Ø 250 max.	per piece

Watch the FiloSeal+HD productvideo online on our website.



FILoSeal+HD FIRE

FiloSeal+HD FIRE provides a strong support system using our specially formulated material called Formite which builds up like a honeycomb structure.

FiloSeal+HD FIRE 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 FIRE 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.

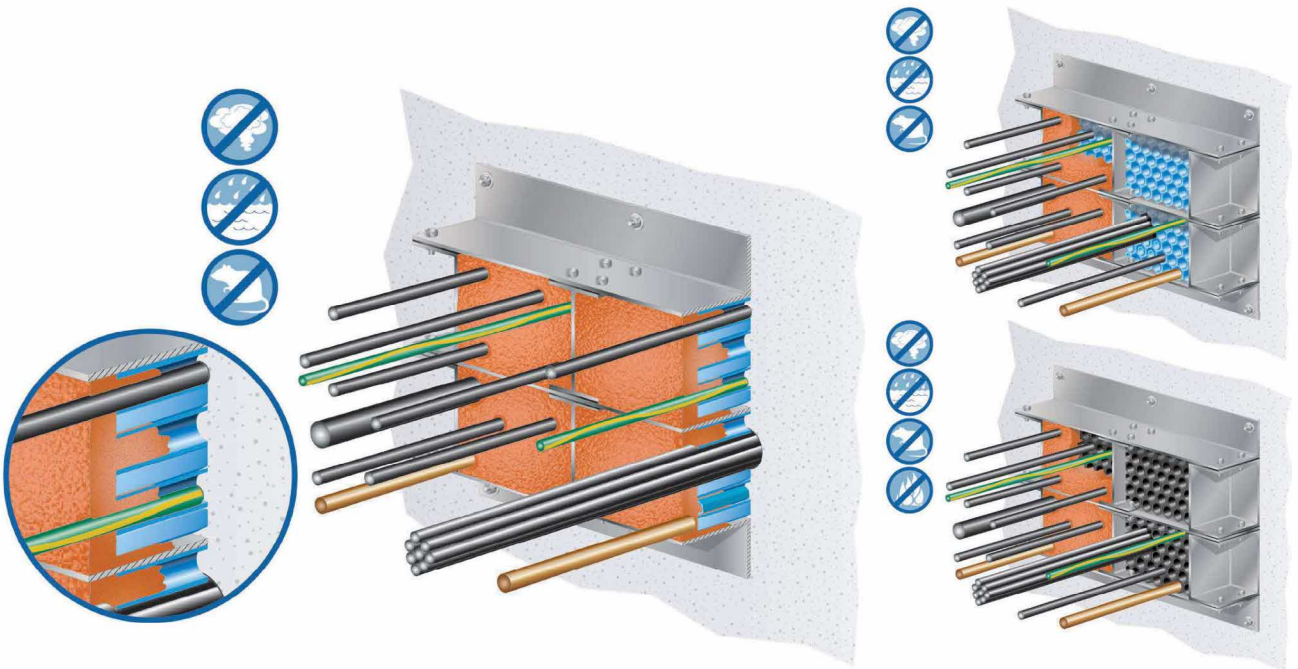
- Up to 4 hours fire resistance in ducts
- Tested to BS EN1366-3 2009 & AS1530.4-2014
- Tested to London Underground - LUL S1085
- Tested to European rail - BS EN 45545-2:2013
- Tested to French rail standard Clt NF F16-101
- Tested to Smoke index - ISO 5659-2:2012
- Tested to Oxygen index - BS EN ISO 4589-2:1999
- Up to 2 bar Pressure Resistance
- 100Kg pulling Force on the cables when sealed
- 10xd at 45°, with 1 bar pressure bending test

FEATURES

- Gas & Water tight up to 2 bar
- Excellent adhesion, applicable to all common building materials
- Fire resistant to BS EN1366-3:2009 & AS1530.4-2014
- High Oxygen index
- 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
- A complete kit
- 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

Product Name	Duct diameter min.-max. (mm)	Order unit
FiloSeal+HD FIRE - 75 mm > 110 mm	Ø 110 max.	per piece
FiloSeal+HD FIRE - 125 mm > 160 mm	Ø 160 max.	per piece
FiloSeal+HD FIRE - 180 mm	Ø 180 max.	per piece
FiloSeal+HD FIRE - 200 mm	Ø 200 max.	per piece
FiloSeal+HD FIRE - 225 mm	Ø 225 max.	per piece
FiloSeal+HD FIRE - 250 mm	Ø 250 max.	per piece

Watch the FiloSeal+HD productvideo online on our website.



A frame

120 x 120 mm

The frames are modular in construction based around a working opening size of 120 x 120 and can be assembled in almost any size required. The frames are made of 6mm steel which is zinc plated to give a longer life.

Use of Filoseal+HD FIRE in these frames has been tested to BS EN1366-3:2009 & AS1530.4-2014 for a period of up to 4 hours on a standard installation. Frames are a worthy addition to the Filoseal+HD and HD FIRE ranges as they are a problem solver in the following situations:

1. Irregular openings in a wall – frame neatens the install
2. Walls of a poorer quality – frame stops reliance of seal bonding to structure
3. Ducts with too many cables – frame allows splaying of cables to obtain a proper seal.
4. Large cable runs such as a riser can be neatly sealed.

With this design of seal system, accompanied by these frames, the need for upfront design is minimized. With the offer of this style frame, we have performed all the tests we can on it to give you confidence in the system as a whole.

There is no need to get into complicated modular insert sizes as this system is filled with our widely approved Filoseal+HD and Filoseal+HD FIRE systems which need little to no upfront design in order to be incorporated into your project.

In order for us to quote you, please advise the wall opening size and layout of cables. We can work out your needs based upon this and provide a CAD based drawing of our solution.

The frames can be assembled around existing cable runs which minimizes (or should that be eliminates) down time of whatever your cables are connected to.

FEATURES

- Minimal frame dimensions outside the wall aperture means fitting is easy.
- Modular frame to fit around existing cables or around over large connectors.
- Zinc plated for a longer life.
- Spare apertures can be used in the future.
- Fixing holes to be drilled by the user to suit their individual application.
- Design advice given by Filoform.

Designed to partner with the Filoseal+HD and Filoseal+HD FIRE, Filoform have created frames to

hold a seal where the space or structure will not allow fitting of a seal into the structure itself. All the features of Filoseal+HD and Filoseal+HD Fire can be applied, but the highlights are:

- Up to 4 hours fire resistance in transit frames (single side)
- Tested to BS EN1366-3:2009 & AS1530.4-2014
- Up to 2 bar Pressure Resistance
- 100Kg pulling Force on the cables when sealed
- 10xd at 45°, with 1 bar pressure bending test

A frame

120 x 120 mm

Cable Transit Frame Key

The modularity of the frame is based around two opening sizes; they are 120 x 120mm (type A) or 120 x 240mm (type B) which somewhat follows the frame sizing of regular transit systems. Obviously, for a larger hole, we build a multi-opening frame to suit the application.

Built frames - (A Frame & B Frame)

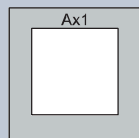
Built frame size notation.

Frames of **Type A** (120 x 120 opening). For clarity, all frames are 120 wide, it is the height that changes.

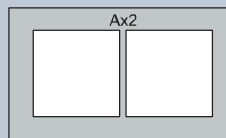
Frames types followed by an 'xn' notation means there are n number of openings set out horizontally in a row.

Frames types followed by a '+type **A** or **B**' notation mean the frames are stacked vertically on top of each other.

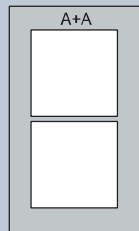
So a frame denoted A+A+A x8 means there are 24 openings in total of size A, in columns of 3 high 8 times over.



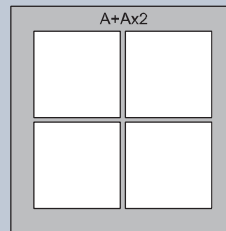
A x 1 (1 opening, 120x120mm)



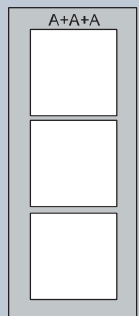
A x 2 (2 openings, side by side 120x120mm)



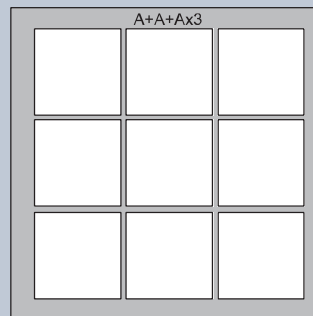
A+A (2 openings on top of each other 120x120)



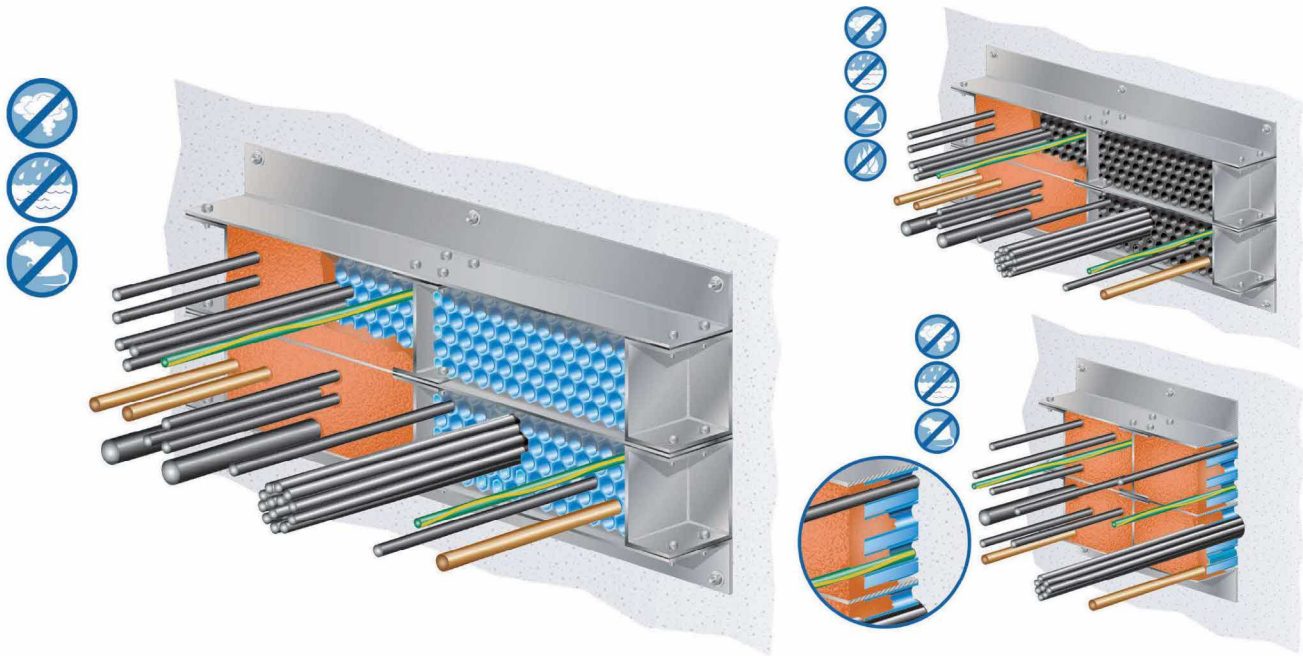
A+A x 2 (4 openings, 2 in a row x 2 high 120x120mm)



A+A+A (3 openings on top of each other 120x120)



A+A+A x 3 (9 openings, 3 in a row x 3 high 120x120mm)



B frame

120 x 240 mm

The frames are modular in construction based around a working opening size of 240 x 120 and can be assembled in almost any size required. The frames are made of 6mm steel which is zinc plated to give a longer life.

Use of Filoseal+HD FIRE in these frames has been tested to BS EN1366-3:2009 & AS1530.4-2014 for a period of up to 4 hours on a standard installation.

Frames are a worthy addition to the Filoseal+HD and HD FIRE ranges as they are a problem solver in the following situations:

1. Irregular openings in a wall – frame neatens the install
2. Walls of a poorer quality – frame stops reliance of seal bonding to structure
3. Ducts with too many cables – frame allows splaying of cables to obtain a proper seal.
4. Large cable runs such as a riser can be neatly sealed.

With this design of seal system, accompanied by these frames, the need for upfront design is minimized. With the offer of this style frame, we have performed all the tests we can on it to give you confidence in the system as a whole.

There is no need to get into complicated modular insert sizes as this system is filled with our widely approved Filoseal+HD and Filoseal+HD FIRE systems which need little to no upfront design in order to be incorporated into your project.

In order for us to quote you, please advise the wall opening size and layout of cables. We can work out your needs based upon this and provide a CAD based drawing of our solution.

The frames can be assembled around existing cable runs which minimizes (or should that be eliminates) down time of whatever your cables are connected to.

FEATURES

- Minimal frame dimensions outside the wall aperture means fitting is easy.
- Modular frame to fit around existing cables or around over large connectors.
- Zinc plated for a longer life.
- Spare apertures can be used in the future.
- Fixing holes to be drilled by the user to suit their individual application.
- Design advice given by Filoform.

Designed to partner with the Filoseal+HD and Filoseal+HD FIRE, Filoform have created frames to

hold a seal where the space or structure will not allow fitting of a seal into the structure itself. All the features of Filoseal+HD and Filoseal+HD Fire can be applied, but the highlights are:

- Up to 4 hours fire resistance in transit frames (single side)
- Tested to BS EN1366-3:2009 & AS1530.4-2014
- Up to 2 bar Pressure Resistance
- 100Kg pulling Force on the cables when sealed
- 10xd at 45°, with 1 bar pressure bending test

B frame

120 x 240 mm

Cable Transit Frame Key

The modularity of the frame is based around two opening sizes; they are 120 x 120mm (type A) or 120 x 240mm (type B) which somewhat follows the frame sizing of regular transit systems. Obviously, for a larger hole, we build a multi-opening frame to suit the application.

Built frames - (A Frame & B Frame)

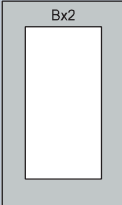
Built frame size notation.

Frames of **Type B** (120 x 240 opening. For clarity, all frames are 120 wide, it is the height that changes.

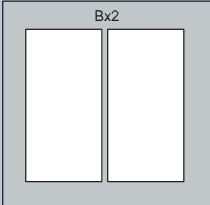
Frames types followed by an 'xn' notation means there are n number of openings set out horizontally in a row.

Frames types followed by a '+type A or B' notation mean the frames are stacked vertically on top of each other.

So a frame denoted B+B+B x8 means there are 24 openings in total of size B, in columns of 3 high 8 times over.



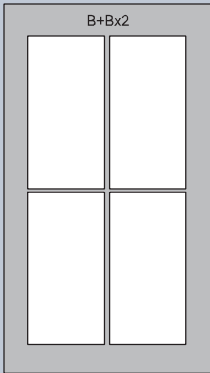
B x 1 (1 opening, 120x240mm)



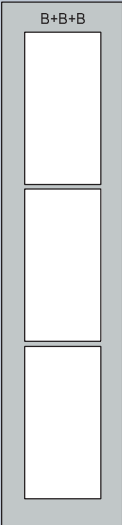
B x 2 (2 openings, side by side 120x240mm)



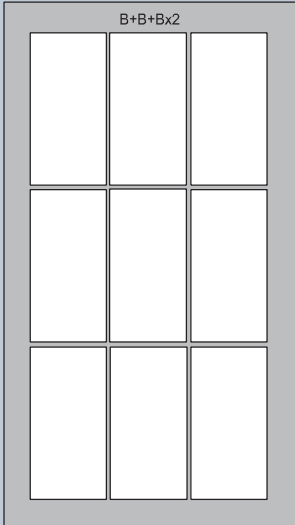
B+B (2 openings on top of each other 120x240)



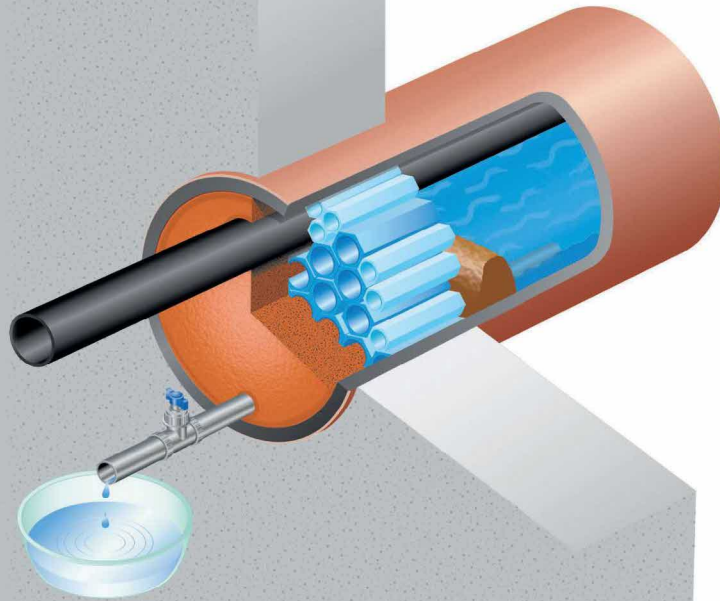
B+B x 2 (4 openings, 2 in a row x 2 high 120x240mm)



B+B+B (3 openings on top of each other 120x240)



B+B+B x 3 (9 openings, 3 in a row x 3 high 120x240mm)



Running Water Blocking Kit

Can be used with FiloSeal+, FiloSeal+HD

One of the reasons why ducts are sealed is to prevent running water getting into a building or enclosure.

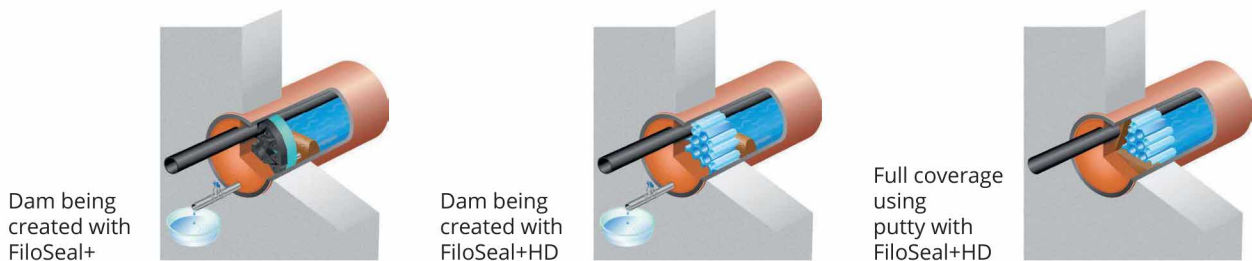
Often when faced with sealing a duct, this running water is still evident.

Our Filoseal Running Water Block system provides the user with a method of preventing the water from ruining any permanent sealing system whilst that system is installed.

The kit provides a method of damming or blocking the water flow, **controlling it and stopping it.**

FEATURES

- Mouldable putty
- Sticks to a wet surface
- Non hazardous
- Stops Water
- No shelf life
- Major problem solver
- Allows pressure release before adding a new cable or pipe in the future.



Dam being created with FiloSeal+

Dam being created with FiloSeal+HD

Full coverage using putty with FiloSeal+HD

Product Name	Description	Used with	Duct Size	Order Unit
FiloSeal - Water blocking kit - small	Water blocking kit with pipe & tap	FiloSeal+ 125mm	Up to 125mm	Per kit
FiloSeal+ Water blocking kit - large	Water blocking kit with pipe & tap	FiloSeal+ 200mm	125mm to 200mm	Per kit
FiloSeal+HD - Water Blocking kit - small	Water blocking kit with pipe & tap - Dam and full coverage can be achieved	FiloSeal+HD - 110mm	Up to 110mm	Per kit
FiloSeal+HD - Water Blocking kit - Large	Water blocking kit with pipe & tap - Dam and full coverage can be achieved	FiloSeal+HD - 160mm	125mm to 160mm	Per kit



FILOform
group

Head office Filoform BV

De Panoven 17
4191 GW Geldermalsen-NL
Netherlands

T +31 (0) 345 58 82 20
F +31 (0) 345 52 82 21
E info@filoform.com
W www.filoform.nl

Filoform UK Ltd

Unit K, Lambs Farm Business Park
Basingstoke Road, Swallowfield
Reading RG7 1PQ

T +44 (0) 1189 886873
F +44 (0) 1189 886576
E info@filoform.co.uk
W www.filoform.co.uk

Filoform DE

GT Elektrotechnische Produkte GmbH
Kupferschmidstraße 86
79761 Waldshut-Tiengen

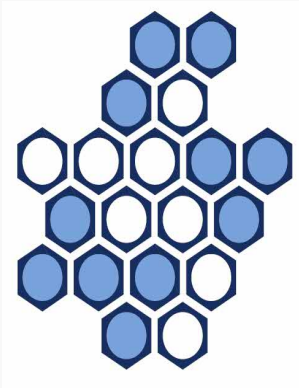
T +49 (0) 77 41 / 92 25-0
F +49 (0) 77 41 / 92 25-29
E verkauf@filoform.com
W www.filoform.de

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](#)

View this product at: <https://www.filoform.co.uk/filoseal-hd-re-enterable-duct-sealing>

FiloSeal+HD Duct Seal

Products

Art.nr.	Product Name	Duct diameter min.-max. (mm)	Order unit
280010	FiloSeal+HD - 75mm > 110mm	Ø 110 max.	per piece
280020	FiloSeal+HD - 125mm > 160mm	Ø 160 max.	per piece
280030	FiloSeal+HD - 180mm	Ø 180 max.	per piece
280040	FiloSeal+HD - 200mm	Ø 200 max.	per piece
280050	FiloSeal+HD - 225mm	Ø 225 max.	per piece
280060	FiloSeal+HD - 250mm	Ø 250 max.	per piece

View this product at: <https://www.filoform.co.uk/filoseal-hd-re-enterable-duct-sealing>

**APPENDIX VI
EXAMPLES OF
VERIFICATION**





Photographs 1 and 2: Check general condition of membrane for punctures / tears etc



Photograph 3: Confirm membrane product type and check joints between rolls of membrane to ensure 150mm overlap and presence of double-sided butyl tape (by touch – may not be visible) and girth jointing tape.



Photograph 4: Check top hat is sealed to membrane and pipework. If the formed top hat is not tight to the pipework, then also confirm presence of jubilee clip beneath butyl tape.



Photograph 5: Showing the process of Air Lance testing in progress to verify the quality of the welded seams along gas membrane joints. Check top hat is sealed to membrane and pipework.

**APPENDIX VII
VERIFICATION
PROFORMA**





Gas Protection Validation Site Record

Plot No:.....

Inspection date/time:		Inspected by:		Photographed:	Y/O
-----------------------	--	---------------	--	---------------	-----

	Y/O	Notes/recommendations
Membrane Type Correct		
Extent of Coverage Correct		
Underside of Membrane		
Slab / membrane condition		
Laps and joints		
Damp-proof course		
Service entries		
Folded Membrane Joint Taped & inspected		

This Plot has **PASSED/FAILED*** inspection. (Any proposed remedial works will be noted in the "Remarks" column on this form).
 An additional inspection visit IS/IS NOT* required for this Plot.

Inspection by:.....Signed:.....

One record sheet to be completed for each plot – To be completed by ERGO Professional Inspecting.

