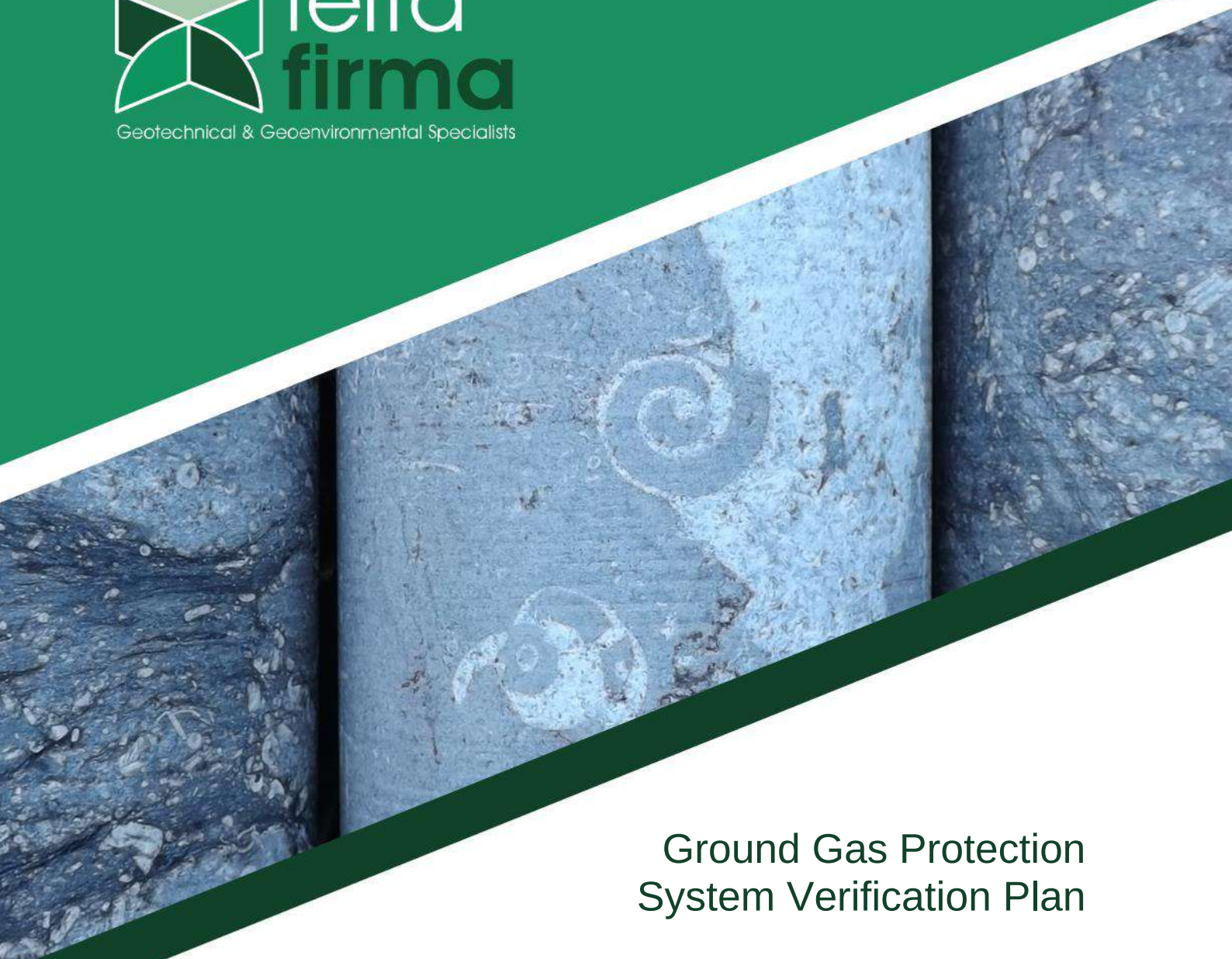




Ground Gas Protection System Verification Plan

Site: Pearson Way, Neath

Prepared For: Wellspring Property and Investment Ltd

Issue Date: October 2022

Job No: 16819

REPORT TITLE : **Ground Gas Protection System Verification Plan, Pearson Way, Neath**

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	Name	Signature
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SECTION 1 Introduction and Proposed Development

1.1 Introduction

Wellspring Property and Investments Ltd (the Client) is proposing the construction of residential properties at Pearson Way, Neath.

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

Previous investigations and assessments undertaken in the location of Plots 129-132 have identified that ground gas presents a significant risk to the health of future site users. The incorporation of a ground gas protection system will be required for the identified plots.

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

1.2 Objectives

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

1.3 Previous Investigations and Assessments

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

- TFW Group Ltd. Geotechnical and Geoenvironmental Report, Reference 28042022-16819-2, Dated April 2022
- TFW Group Ltd. Remediation Strategy. October 2022. 191022-16819/RS

1.4 Roles and Responsibilities

Table 1.1 Roles and Responsibilities

Roles	Organisations
Client/ Project Manager/ Principal Contractor/ Groundworker	Wellspring Property and Investments Ltd
Gas Protection Measures Designer	Atal UK
Architect	Pentan Architects
Structural Engineer	PHG Consulting Engineers
Local Authority	Neath Port Talbot
Membrane Installer	Wellspring Property and Investments Ltd (Groundworker)
Validator	TFW Group Ltd

1.5 Limitations and Exceptions

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

It is not within the scope of Terra Firma to:

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

1.6 Verifier Competency

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

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

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

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

1.7 Quality Assurance

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

SECTION 2 Site Characteristics

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

2.1 Site Location & Description

The development site is rectangular in shape and locates at Pearson Way, Neath, SA11 2EJ. The site centres on an approximate National Grid Reference of 274640 195700, occupying a plan area of approximately 0.25 Hectares.

The site is currently under development.

The proposed site layout can be seen on **Figure 2.1.**



Figure 2.1 Proposed Layout

2.2 Site History Summary

A historical map review revealed that the site has remained undeveloped although it has been reprofiled historically and residential development has occurred around the site in recent times.

It was concluded that the overall risk to the surface stability of the site from possible unrecorded workings is considered low.

No historical landfills are recorded within 250m of the site.

2.3 Geology & Ground Conditions

The site is underlain by the Hughes Member of the Carboniferous South Wales Coal Measures. Superficial deposits were not recorded on the Geology Map and Made Ground is known to be present from reprofiling of the site.

The shallow ground conditions encountered during the recent TFW site investigation can in general be summarised as shown in **Table 2.1**.

Table 2.1 Summary of Ground Conditions

Depth (m)			Thickness (m)	Stratum
0.00	-	0.1-0.8	0.1-0.8	Grass over soft brown very sandy locally gravelly, CLAY with fine rootlets.
0.1-0.8	-	1.7-2.2	1.1-1.4	Stiff to Very stiff occasionally firm brown, orange and blue mottled very Gravelly CLAY to medium dense clayey GRAVEL . (Made Ground Fill)
1.7-2.0	-	3.7-4.0	2.0-2.2	(Boreholes Only) Firm locally stiff brown very gravelly CLAY or Medium Dense very Clayey sandy GRAVEL . Very wet in places. (Made Ground) (Suspected Fill)
3.7	-	4.0	NA	(BH03 and TP02 and TP03 Only). Stiff to very stiff brown gravelly CLAY .

2.4 Radon

Radon protection measures are not required for the development.

2.5 Groundwater

Groundwater seepages were frequently recorded below 1.70m.

2.6 Identified Gaseous Contamination

2.6.1 Carbon Dioxide

Gas monitoring results recorded elevated levels of Carbon Dioxide.

Maximum carbon dioxide levels recorded were 12.6% V/V.

The gas flow rate from the boreholes was also assessed. A maximum flow rate of 0.1l/hr was recorded.

Based on a flow rate of 0.1l/hr and the highest recorded carbon dioxide concentration of 12.6%, a gas screening value of 0.0058l/hr is calculated, as follows:

$$(12.6/100) \times 0.1 = 0.0126\text{l/hr}$$

With reference to Table 8.5 of CIRIA report C665, the site is classified as 'Gas Characteristic Situation 2' (CS2) on account of the peak carbon dioxide concentration being above 5%.

SECTION 3 Sources of Contamination Requiring Remediation

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

Table 3.1 Summary of Pollutant Linkages

Source	Pathway	Receptor
Carbon dioxide – likely derived from made ground soils	Horizontal migration through near surface soil and indoor accumulation in confined spaces. Asphyxiation from depletion of oxygen	Future Site Users – Residents

SECTION 4 Proposed Ground Gas Remedial Measures

4.1 General

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

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

4.2 Carbon Dioxide Gas

4.2.1 Protection of Site End Users

Site end users are at risk of inhalation and asphyxiation from the migration through strata and accumulation indoors of carbon dioxide gas.

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

CIRIA report C665:2007 Table 8.5 classifies the whole site as 'Gas Characteristic Situation 2' (GSC2).

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

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

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

Table 4.1 Gas Protection Score

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

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

SECTION 5 Validation of Remedial Measures

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

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

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

5.1 Risk Assessment

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

Table 5.1 Perceived Risk Assessment

Risk Factors	Risk Level		
	1	2	3
Gas Regime – CS2	1	2	3
Design Complexity – Complex	1		3
Number of Buildings – Medium	1	2	3
Installation Workforce – Non Qualified Installer	1		3
VOC – No	1		3
Notes: Classification of Risk – Low risk 5; Intermediate Risk 6-7; High Risk 8-15			

5.2 Gas Protection Measures Construction Details

The development comprises 6 no. 'Type A' residential structures. All of which are rectangular in shape, with a split level ground floor. All structures orientated northwest-southeast.

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

5.2.1 Structural Barrier

Each structure will incorporate a cast in-situ monolithic reinforced raft, with a 150mm reinforced concrete retaining wall between changes in ground floor levels.

Structural barriers of this nature provide very reliable ground gas protection.

A comprehensive waterproofing system (Type A Barrier Protection) has been designed to incorporate with the gas protection measures, suitable for grades 1 to 3.

5.2.2 Membrane

The membrane is to be installed by the Client/Groundworker.

The Client has specified that Atal GP1 gas barrier membrane and Atal Bentofix 5300 waterproofing membrane is to be used.

Initially Atal GP1 is to be laid on a 50mm layer of blinding sand or smooth cured concrete. On the external raft edge the membrane is to be wrapped up the outside face, and overlapped by 150mm with Atal Premsil GMA Membrane, which in turn will be secured to the primed raft face and lower blockwork of the internal leaf, then horizontally across the blockwork secured to the underside of the cavity tray.

Where the raft terminates significantly below ground level, on an external wall, Atal GP1 membrane will be taped using Atal Bentofix Tape to Atal Bentofix X2 5300 which is to extend 1m from the edge of the raft. On the external raft edge Atal Bentofix X2 5300 is to be wrapped up the outside face, and overlapped by 150mm with Atal Permsil GMA Membrane, which is to continue up the primed external face of the thickened sub-surface wall then wrapped around the blockwork in the external leaf, then horizontally across the blockwork secured to the underside of the cavity tray.

Between the split level ground floors Atal Bentofix X2 5300 is to be secured to the external face of the separating retaining wall, fixed with soft fixings (5/m²). The non-woven side should face the concrete unless otherwise instructed by Atal. Atal Bentofix X2 5300 is to be extended out at the lower and upper levels by 1m beneath the rafts over a 50mm sand blinding or smooth cured concrete layer and taped to the Atal GP1 membrane using Atal Bentofix Tape.

Detailed drawings showing the installation are shown in **Annex A**.

Table 5.2 Membrane Specification Compliancy GP1

Atal GP1 Membrane
Thickness – 0.4mm thick (between scrim) tested in accordance with BS EN 9863-1:2016. Overall thickness 0.6mm. Suitably thick , manufacture confirms material is suitable for heat welding by specialist installer.
Permeation Rates – Methane/Carbon Dioxide permeability rate of <0.09ml/m ² /d/atm tested in accordance with BS IS 15105-1. Considered sufficiently impervious .
Tensile Strength & Elongation – Mass per unit area of 370g/m ² tested in accordance with BS EN 1849-2. Tensile strength MD 600 N/50mm, CMD 480 N/500mm, Tensile elongation MD/CMD 20%, tested in accordance with EN 12311-1, EN 12310-1. Considered suitable strong , membrane to be loosely laid to accommodate settlement.
Puncture/Impact Resistance – 1.25kN, tested in accordance with BS EN ISO 12236. Protection required .
Tear Strength – Resistance to tearing (nail shank) MD 330N, CMD 400N, tested in accordance with EN 12310-1. Measures to be taken to avoid damage from wind and protected from follow on trades .
Durability – Long exposure to UV light will likely reduce its effectiveness. It is considered suitably durable to remain serviceable for the anticipated life of the building.
Satisfies standards to be used as a damp protection. Building Regulation Part C.

It is considered that performance specification of Atal GP1 membrane complies with the performance specification in BS8485:2015+A1:2019 Table 7 and key performance properties reported in CIRIA C748:2014. However, additional measure are to be taken to protect the membrane from impact or puncture and tearing.

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

During storage membrane rolls must be stacked on a flat surface, no more than five rolls high, kept under cover and protected from sunlight and mechanical damage.

The membrane should not be installed in temperatures below 4°C.

Prior to installation the substrate should be free from debris, voids or other protrusions which may compromise the gas protection system.

The membrane should be rolled out with the printed side facing up.

It is recommended that all joints are secured using Atal DS Butyl Tape. The tape must be positioned at least 50mm away from the membrane edge and the overlapping membrane is to be lapped by at least 100mm. Laps are to be further sealed using Atal Single Sided Tape (Lap Tape). **Lap tape is only to be applied post Verification.** All tapes will prove to be ineffective when installed in damp or wet conditions. Alternatively, joints may be secured by heat welding if undertaken by a competent and qualified installer.

If the membrane is damaged a patch of the same material should be lapped at least 150mm beyond the limits of the damage, bonded with Atal DS Butyl Tape and lap sealed with Atal Single Sided Tape. Alternatively a patch may be heat welded by a competent and qualified installer. Where a puncture is minimal, a patch may be formed using Atal Premsil GMA lapped at least 150mm beyond the extents of the puncture. The suitability of either repair method will be determined during verification.

All direction changes (internal or external corner for example) should be detailed using Atal Premsil GMA lapped at least 150mm beyond the nearest membrane joint. The installer should be suitably experienced and competent to form these details in accordance with the manufacture guidance.

Table 5.3 Membrane Specification Compliancy Bentofix

Atal Bentofix X2 5300
BBA Certificate: 05/4256
Thickness – 6mm thick Suitably thick
Permeation Rates – Methane permeability rate of 460ml/m ² /d/atm tested in accordance with BS IS 15105-1. Not sufficiently impervious in accordance with BS8485.
Puncture/Impact Resistance – Very robust with the ability to selfheal one hydrated. Considered suitable
Tear Strength – Very robust with the ability to selfheal one hydrated. Considered suitable

Atal Bentofix X2 5300 membrane does not constitute a gas membrane, as defined in BS8485:2015+A1:2019, but when used as part of the structural barrier in basement floor and wall constructions conforming to BS 8102:2009, Grades 2 and 3 waterproofing, the system will contribute to restricting the ingress of radon, methane and carbon dioxide into a building from landfill and naturally occurring sources, with reference to BS8485:2015+A1:2019 Table 5.

All other performance specifications of Atal Bentofix X2 5300 comply with the performance specification in BS8485:2015+A1:2019 Table 7 and key performance properties reported in CIRIA C748:2014.

Atal Bentofix system components should be stored in dry conditions, under cover and away from the possibility of damage or premature contact with water.

The Bentofix system should only be installed in temperatures between 5-40°C.

The Bentofix system must be installed fully supported on flat, smooth surfaces, without wrinkles or folds in the membrane that could cause the membrane to sag during concrete placing. And all surfaces to which the membrane is applied must be sound and solid to ensure no movement occurs during the pouring of concrete.

The membrane is either installed with the nonwoven geotextile uppermost (horizontal) and to the inside of the structure (vertical) ensuring it will be in contact with the fresh concrete when it is poured, or fixed to existing soil retaining substrates (eg secant or contiguous piling), with the coated geotextile uppermost (horizontal) or to the inside of the structure (vertical), unless otherwise instructed by Atal.

It is recommended that all joints are achieved by overlapping the adjacent membranes by at least 100mm securing all laps using Atal Bentofix Tape .

Floor to wall joints must be overlapped by a minimum of 400mm and laps secured using Atal Bentofix Tape.

When post applied to the retaining concrete wall, the Atal Bentofix X2 5300 membrane is to be secured to the concrete using Atal soft Washer Fixings at 300mm centres around the perimeter and 500mm centres within the area of the membrane.

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

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

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

The membrane is to be covered by a protective fleece as soon as practicably possible post installation and post Verification (**Do not cover the membrane before inspection**). This protection fleece will act to protect the underlying membrane during the raft pour. Extreme care is still to be taken during pouring. The use of mechanical tools is strongly discouraged as the potential to cause damage to the membrane is very high.

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

5.2.3 Service Entries

All service penetrations should be detailed in accordance with the manufacturer specifications.

Service penetrations should be installed at least 50mm away from walls, obstructions and other penetrations to allow for the correct installation.

Ducting style service entries are considered a significant conduit for harmful gasses to enter properties. All service entry ducts are to be sealed in accordance with published guidance presented in BRE414:2001 Section 10. It is recommended that a product such as Filoform MD111 Expanding Resin is used for this purpose. The installation should follow manufacture guidelines.

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

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

5.3 Proposed Development Programme

The construction of all structure substructures is anticipated to commence in the autumn of 2022, to be completed in sequential order. Installation of the membranes is expected to be undertaken over at least **six** visits due to the complexity of the installation and construction programme.

5.4 Maintaining the Integrity of Gas Protection Measures

Membranes installed vertically along reinforced concrete retaining walls are to be protected from damage using Atal Flow Boards 4e Drain Board.

In the intervening period between installation of the membrane, placement of the protection fleece and pouring of concrete raft, membrane must be protected from high footfall traffic. To achieve this Site Management will put in place exclusions to limit access to plant and personnel to completed zones. A method statement to achieve this is provided in **Annex D**.

To protect the membrane from footfall and puncture during raft pouring and levelling, a protection fleece is to be installed above the membrane. Site Management is to strictly control the concrete pour process to avoid damage to the membrane and report to the Verifier any damage that may occur.

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

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

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

A final inspection may be required.

5.5 Required In-situ Integrity Testing & Evidence

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

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

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

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

5.5.1 Methodology

With reference to CIRIA C735 Table A2.

- **Groundworker (Membrane Installer)** to provide daily log sheets, or sign-off sheets to be submitted to the Independent Verifier for each plot/structure.
- **Independent Verifier** to conduct a thorough visual verification of the substrate and membrane prior to 100% of raft pours. Photographic evidence to be collected and inspection proforma to be prepared.
- **Independent Verifier** to air lance 100% of all joints, pipe penetrations etc. to ASTM D4437. Results to be recorded on the inspection proforma.
- **Groundworker (Membrane Installer)** to provide photographic evidence of waterproofing system installation if not observed by the Independent Verifier during inspection visits.
- **Groundworker (Membrane Installer)** to provide photographic evidence of membrane protection elements, post installation, if not observed by the Independent Verifier during inspection visits.
- **Independent Verifier** to consider further need for/scope of in-situ integrity testing based on inspection findings. Additional in-situ testing might include leak detection (i.e. smoke, tracer gas or dielectric). Testing to be undertaken initially on 25-50% of total area falling to 10-25% of total area if acceptable results obtained. Results to be recorded on inspection proforma.
- **Groundworker (Site Manager)** to provide Verifier photographic evidence of service entry sealing to BRE Report 414 standards upon completion. Suitable product datasheets supplied in **Annex B** for reference.

5.6 Validation Report

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

As a minimum the Validation Report should include.

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

References

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

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

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

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

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

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

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

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

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

CIRIA R149 (1995) Protecting development from methane

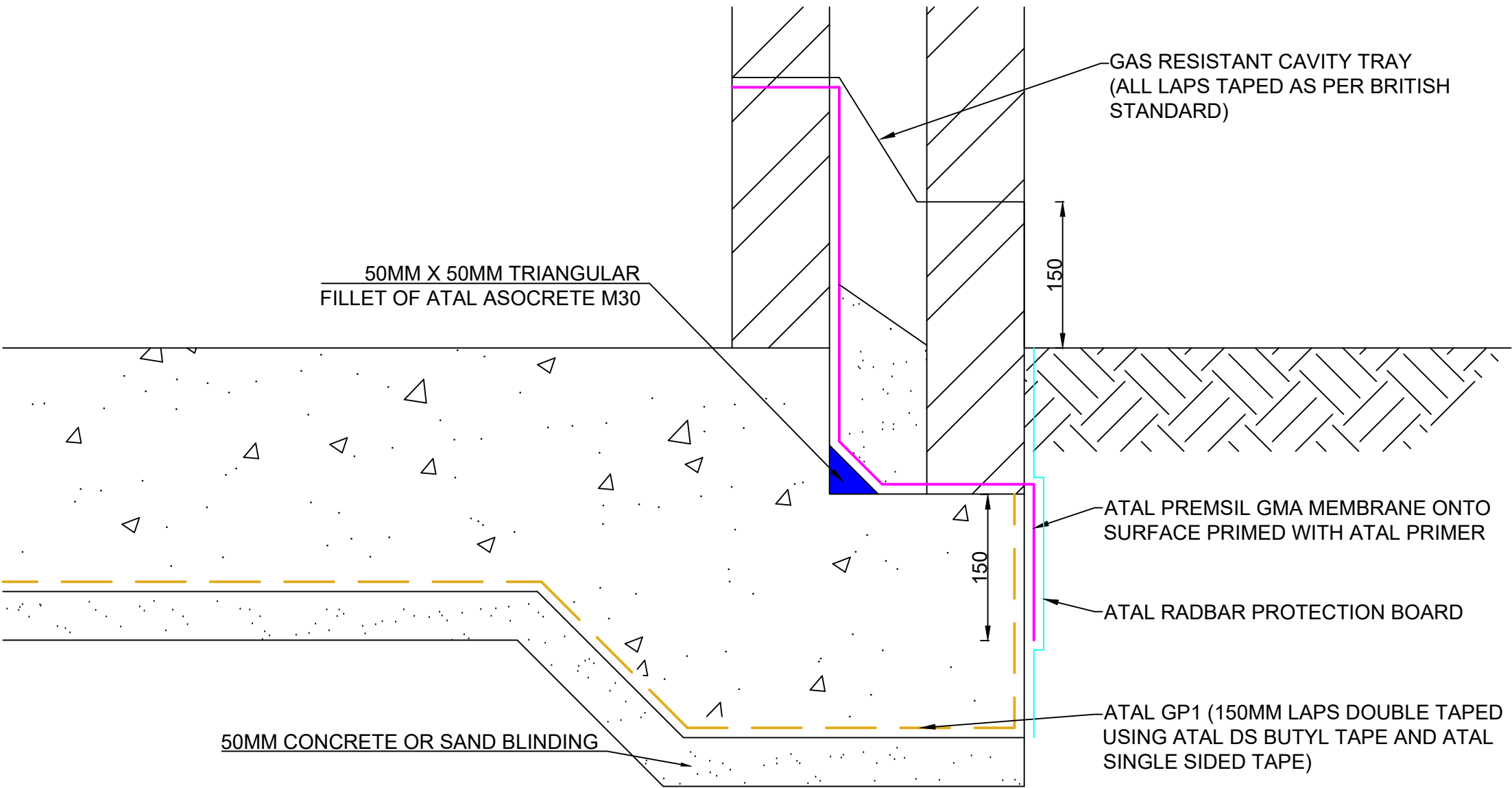
D4437-08 (2013) Standard practice for non-destructive testing (NDT) for determining the integrity of seams used in joining flexible polymeric sheet geomembranes

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

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

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

ANNEX A
Technical Drawings



Installation Notes

DETAILS ISSUED BY atal uk ARE WORKING DRAWINGS FOR WATERPROOFING INSTALLER'S, FOR STRUCTURAL DETAILS AND FINISHES SEE ENGINEERING AND ARCHITECTURAL DRAWINGS RESPECTIVELY.

ATAL BENTOFIX 5000 AND ATAL BENTOFIX 5300 SHOULD BE APPLIED TO THE INSIDE OF SLAB SHUTTERING IN ALL INSTANCES TO CREATE A TENACIOUS BOND AT THE EDGE OF SLAB, UNLESS INSTRUCTED OTHERWISE BY atal uk.

PLASTIC SLEEVE IN TIE BOLT HOLES SHOULD BE REMOVED USING A DRILL TO DEPTH OF 50MM AND FILLED USING ATAL FIX T20 PRIOR TO MEMBRANE INSTALLATION (POST-APPLIED) OR BACKFILL (PRE-APPLIED).

SUBSTRATES NEED TO BE FREE FROM LOOSE MATERIAL AND DEBRIS. BEFORE APPLYING LIQUID MEMBRANE ENSURE DUST, OIL, GREASE, ORGANIC GROWTH , SOIL ARE REMOVED VIA JET WASHING AND SCABBLING IF REQUIRED.

INSTALL ATAL BENTOFIX WITH NON-WOVEN SIDE FACING CONCRETE UNLESS INSTRUCTED OTHERWISE BY atal uk.

INSTALL ATAL FLO BOARD 4E GEOTEXTILE FACING BACKFILL UNLESS INSTRUCTED OTHERWISE BY atal uk.

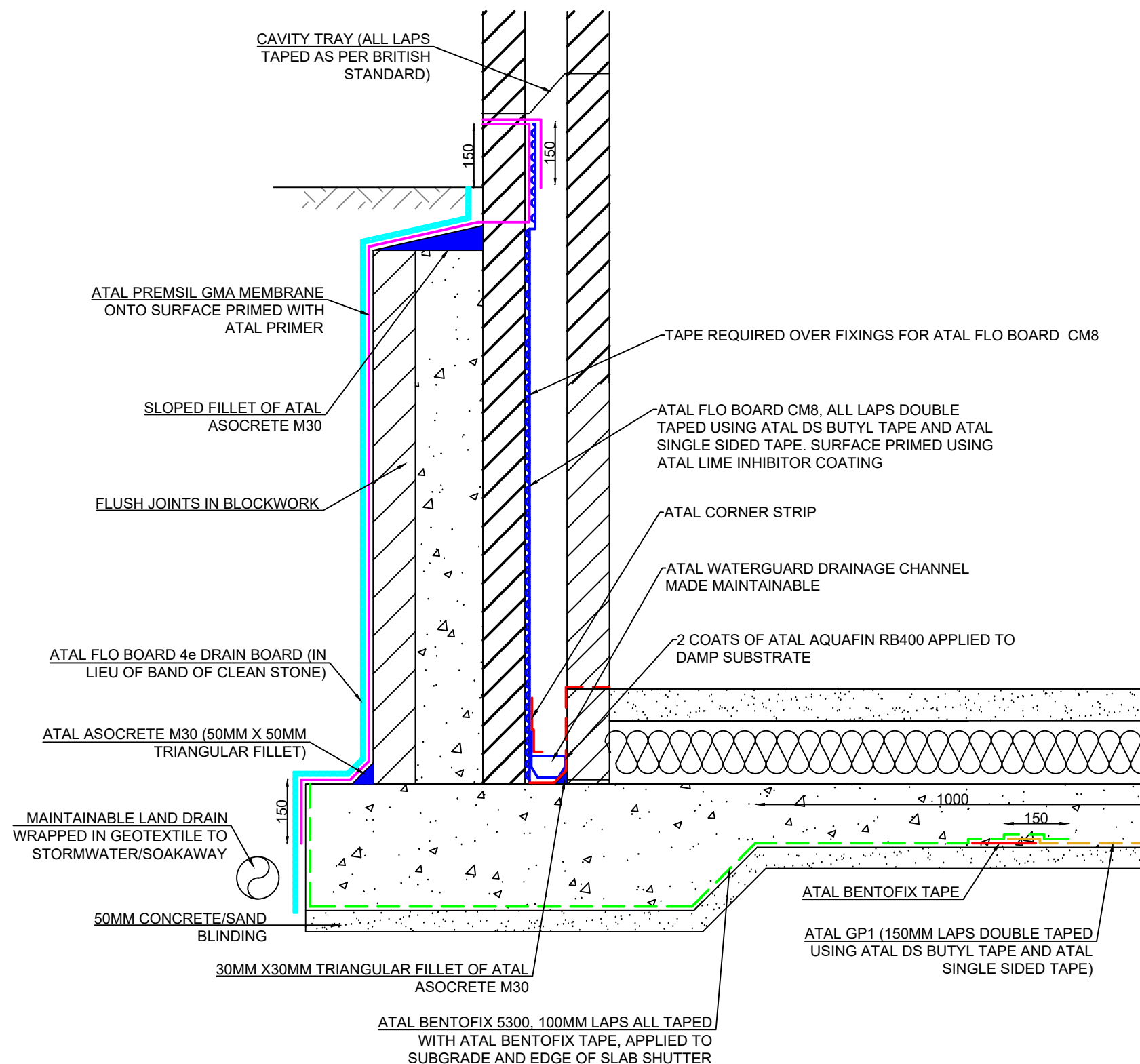
FOR PROJECTS THAT INCLUDE atal's TYPE B SYSTEM, atal BETOCRETE:

- atal SAFECURE SUPER IS REQUIRED TO PREVENT MOISTURE LOSS OF FRESHLY CAST CONCRETE TO ALLOW FULL HYDRATION OF CEMENT ALLOWING THE CONCRETE TO FULLY CURE.
- atal SAFETARD LIQUID AND atal SAFETARD GEL IS REQUIRED FOR THE PRODUCTION OF EXPOSED AGGREGATE FINISHES.

atal uk RESERVES THE RIGHT TO SUPPLY SUBSTITUTE PRODUCTS TO THOSE SHOWN ON atal DETAILS IF REQUIRED.

SOFT WASHER FIXINGS INSERTED USING HILTI DX460 OR DX5 (SINGLE SHOT HEAD) TO BE SOURCED BY THE PURCHASER.

Notes atal uk ARE SUPPLIERS OF BUILDING AND CIVIL ENGINEERING PRODUCTS AND OFFER A DESIGN AID SERVICE ONLY. ALL INFORMATION SHOWN ON THIS DRAWING IS PROVIDED IN GOOD FAITH AND IS BASED ON THIRD PARTY TECHNICAL LITERATURE AND BEST PRACTICE GUIDELINE. THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS IT HAS BEEN SIGNED OFF BY A DESIGN TEAM MEMBER.	Date	Description	Revision	Project Title ATAL4403 PEARSON WAY, NEATH, SA11 2EJ	atal^{uk} Unit 27, Tafarnaubach Industrial Estate, Tafarnaubach, Tredegar NP22 3AA +44 (0) 1495 717202 enquiries@ataluk.com Structural Waterproofing Systems		
				Drawing Title Edge Of Slab Detail	Drawn By SB	Date 29/06/2022	Checked by IP
				Drawing No. 001	Rev A	Checked Date 29/06/2022	



Installation Notes

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Date

Description

Revision

Project Title
ATAL4403
PEARSON WAY, NEATH, SA11 2EJ

Drawing Title

Blockwork Retaining Wall Detail

atal^{uk}

Unit 27, Tafarnaubach Industrial Estate,
Tafarnaubach, Tredegar NP22 3AA

+44 (0) 1495 717202
enquiries@ataluk.com

Structural Waterproofing Systems

Drawn By
SB

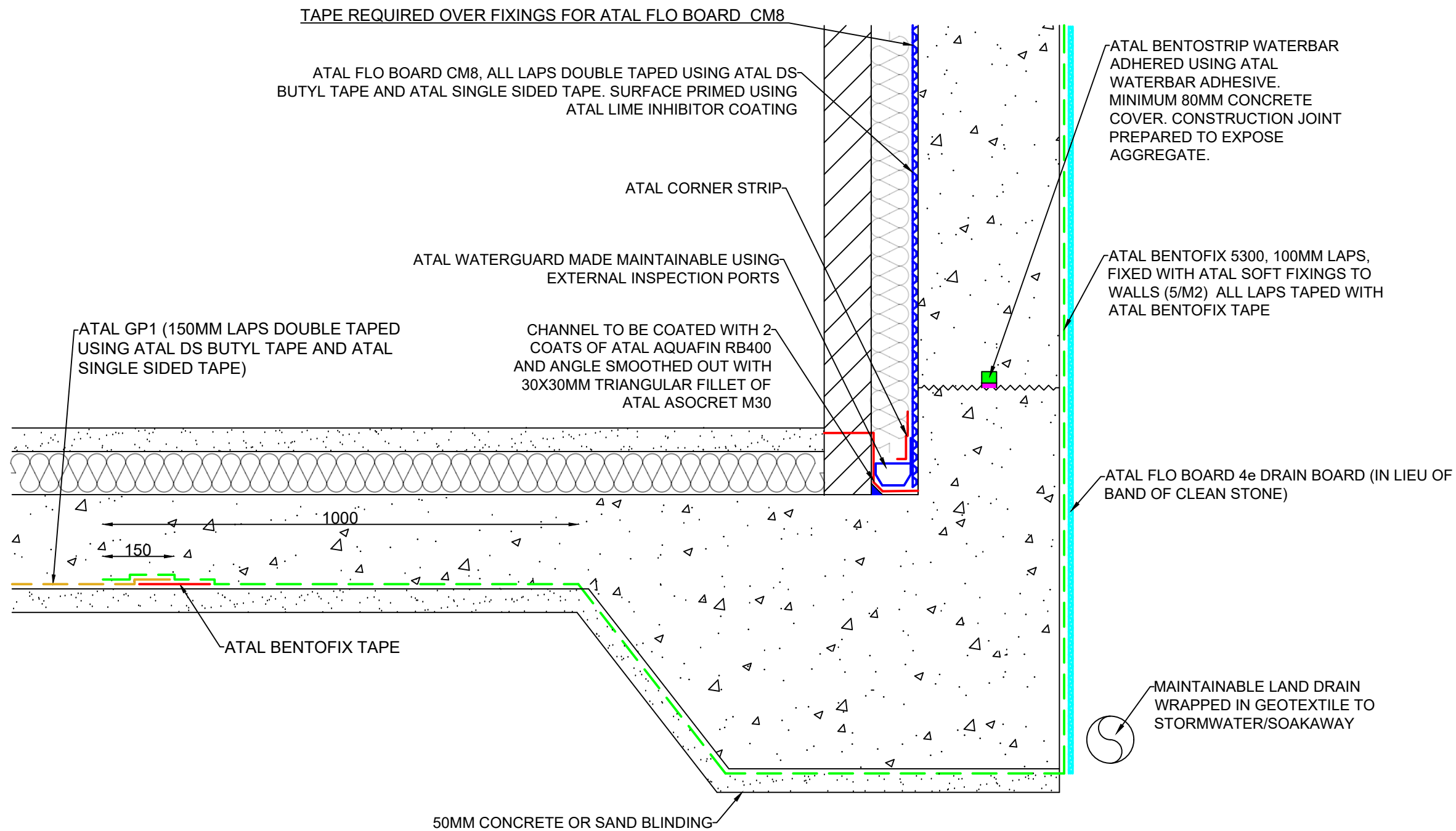
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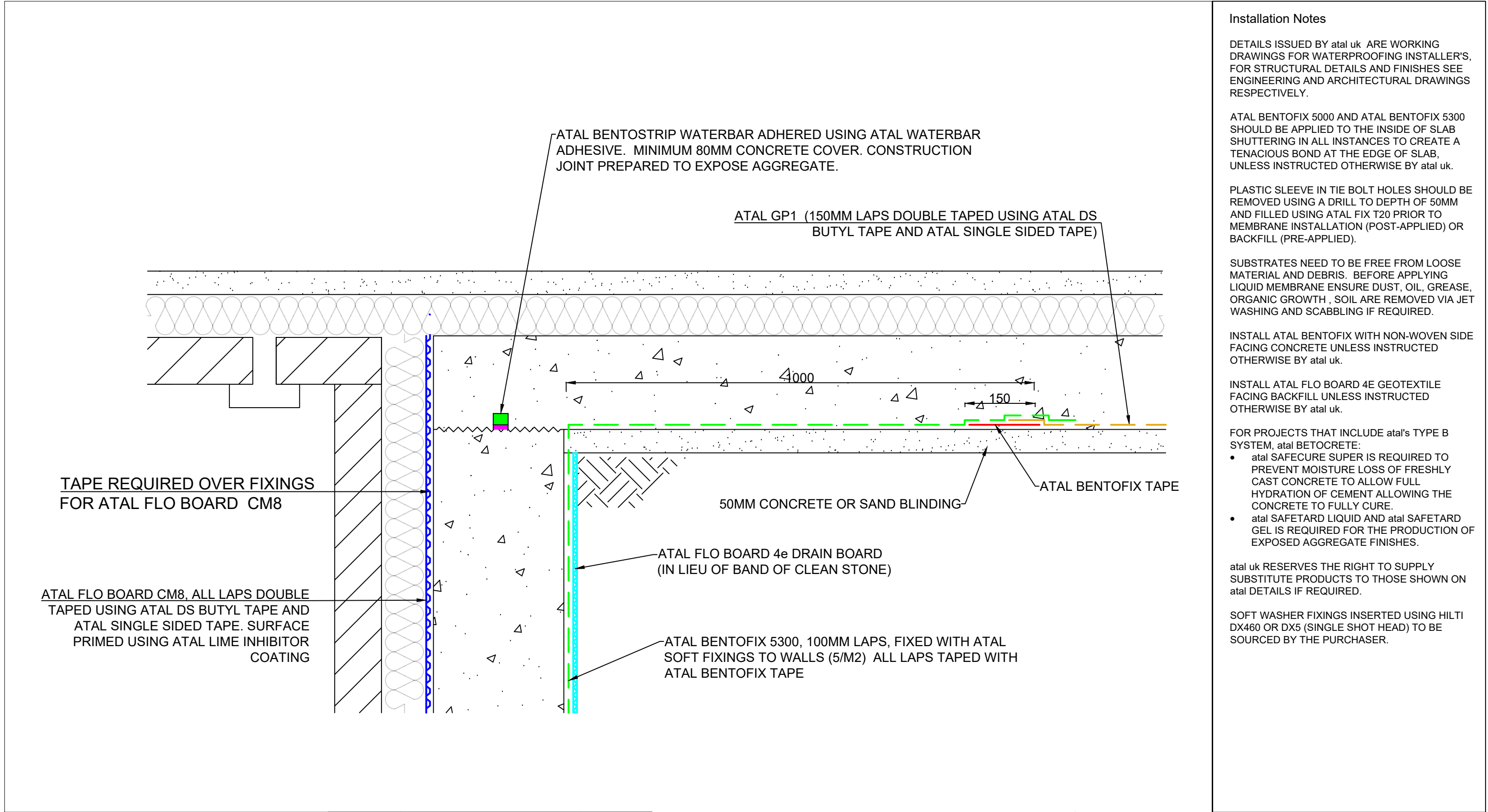
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				Drawing Title Bottom Of RC Retaining Wall Detail	Drawn By SB	Date 29/06/2022	Checked by IP
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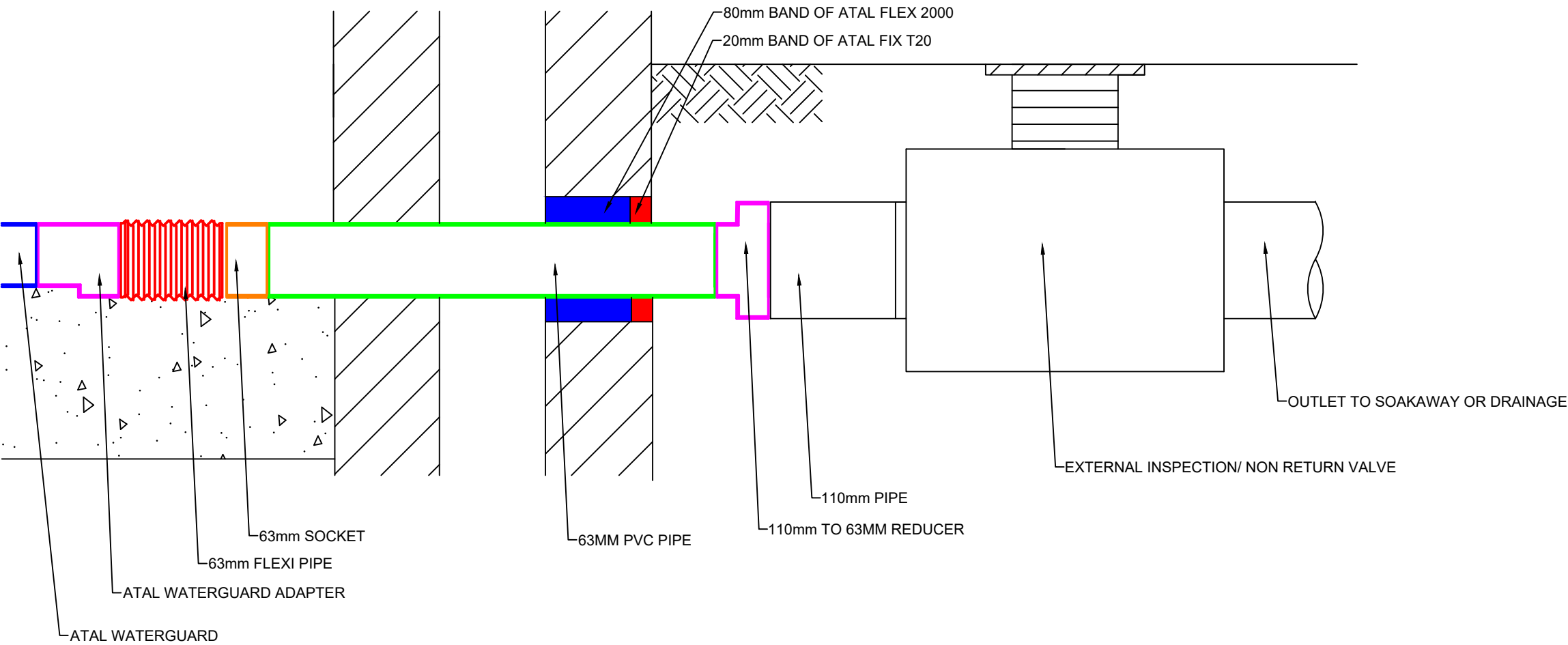
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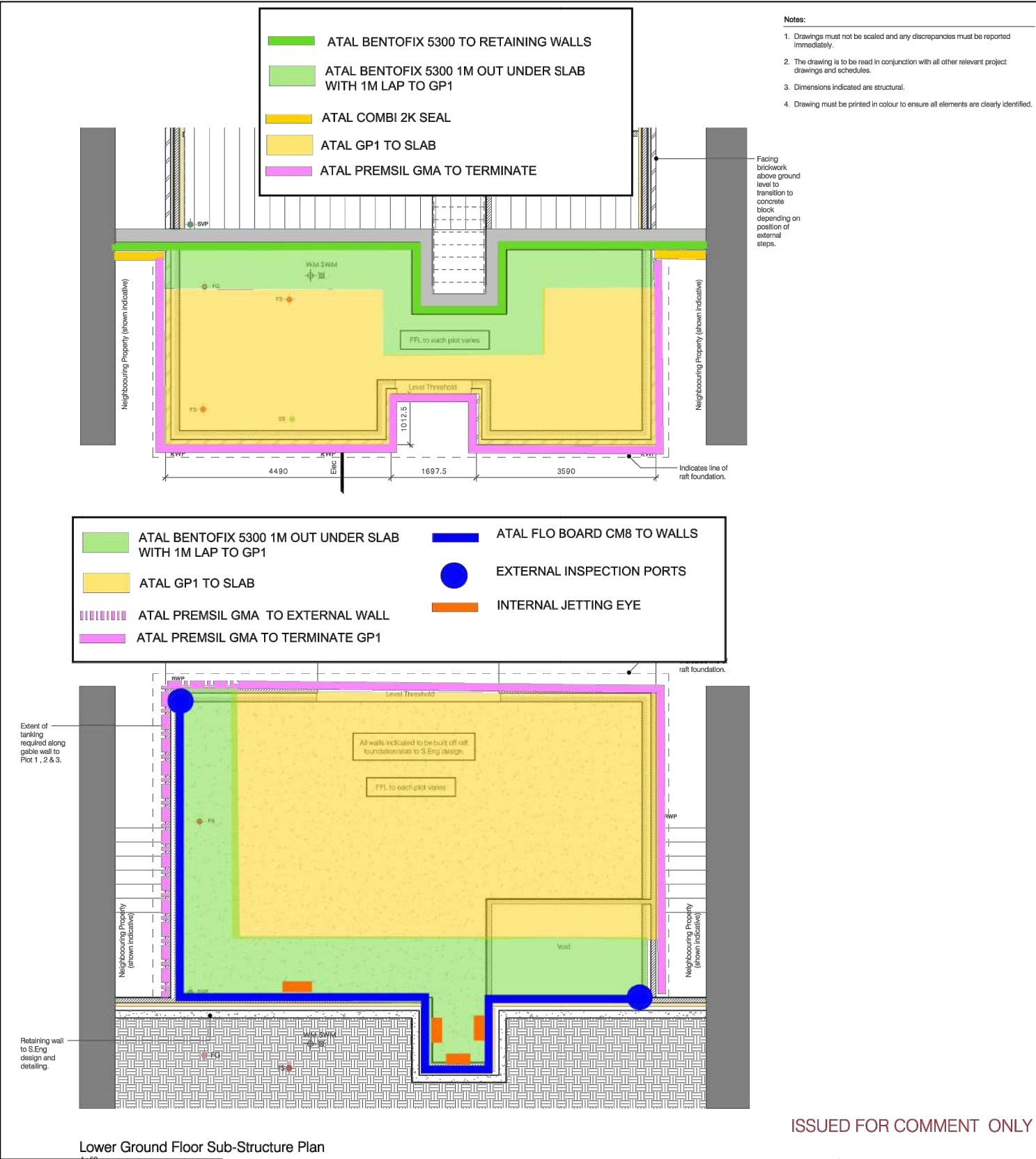
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				Drawing Title Outlet Detail	Drawn By SB	Date 27/06/2022	Checked by IP
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GROUNDFLOOR PLAN

LOWER GROUND FLOOR PLAN



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ANNEX B
Manufacturer Data Sheets

AQUAFIN RB400

Unit 27,
Tafarnaubach Industrial Estate
Tafarnaubach,
Tredegar,
NP22 3AA

WWW.ATALUK.COM



CONTACT US:

Phone Us: 01495 717202

Email: Enquiries@ataluk.com

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Structural Waterproofing Systems

Technical Data Sheet

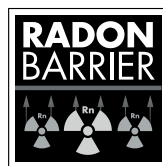
AQUAFIN®-RB400

Rapid cementitious waterproofing

Art. No. 2 04218

	
SCHOMBURG GmbH & Co. KG Aquafinstraße 2 – 8 D-32760 Detmold 19 2 04218	
DIN EN 14891 AQUAFIN-RB400 Liquid-applied water impermeable cement-based product for use beneath ceramic tiling in external areas DIN EN 14891: CM	
Initial tensile adhesion strength	≥ 0,5 N/mm ²
Tensile strength	
after water contact	≥ 0,5 N/mm ²
after heat ageing	≥ 0,5 N/mm ²
after freeze/thaw cycles	≥ 0,5 N/mm ²
after contact with lime water	≥ 0,5 N/mm ²
Water impermeability	no water penetration
Crack bridging	≥ 0,75 mm
Release of dangerous substances	NPD

NPD = „No Performance Determined“



- Horizontal waterproofing against capillary rising moisture in and underneath walls
- Application on old, firmly adhering bitumen coatings
- Bonding protective or perimeter insulation

If applied in containers or in case of water loads with aggressive water or soft water with a hardness < 30 mg CaO per l, a water analysis is always required. The degree of attack is evaluated in accordance with EN 1992-1-1 (Euro Code 2). AQUAFIN-RB400 is resistant up to exposure class XA2.

- Rapid reactive drying
- Multi-functional
- Good crack bridging
- Hydraulic, self-cross-linking setting
- Rainproof, can be walked on and coated already after just 3 hours
- Vapour-permeable, resistant to frost, UV-resistant and ageing-resistant
- radon barrier
- Sulphate resistant
- Resistant to de-icing salt
- Resistant to concrete-damaging water
- Resistant to negative pressure water
- Can be plastered and coated
- Bitumen-free

Areas of use:

- For the waterproofing in direct ground of walls and substrates of new and existing buildings on building components made of concrete or masonry work
- Waterproofing against internal pressure water in container constructions (e.g. service water tanks, waste water tanks)
- Waterproofing of window and door elements

Technical data:

Drum size:	20 kg	
	Liquid component	Powder component
Basis:	Polymer dispersion	Special cement, functional filling materials
Mix ratio:	1 part by weight	1.5 parts by weight
Packaging:	8 kg	12 kg
Colour:	white	grey

Combination product

Density:	approx. 1.1 kg/dm ³
Grain size:	< 0.5 mm
Pot life*:	approx. 45 minutes
Substrate temperature/ processing temperature:	+5°C to +30°C

Adhesive strength,
 in accordance with DIN EN 1542: > 0.5 N/mm²

Crack bridging ability
 referring to DIN 28052-6: > 2.0 mm

Expansion, in accordance
 with ASTM D 412-06: approx. 220 %

Crack bridging ability,
 in accordance with ASTM C836: 3.0 mm

Water-tightness: 2.5 bar

Sealing against
 negative pressing water: 1.5 bar

AQUAFIN®-RB400

Water vapour diffusion coefficient μ : approx. 670
 s_d value at 2 mm dry film thickness: approx. 1.3 m
 CO_2 coefficient of permeability, μ : > 96,000
 s_d value, CO_2 at 3.0 mm dry film thickness: > 280 m
 Full service conditions*):

- Rainproof on inclined surfaces after approx. 3 hours, standing water loading must be avoided
- Sealing against pressing water, (1 bar) after approx. 16 h

*) at +23°C and 50% relative humidity. The stated data may be extended or shortened as a consequence of weather conditions. Higher temperatures and lower humidity shorten the drying time, lower temperatures and higher humidity extend the drying time.

Storage:

Powder component: cool and dry, 9 months
 Liquid component: Frost-free, 9 months in original unopened container, use the opened container promptly

Cleaning: Clean tools in fresh condition with water, loosen dried-on material with ASO-R001 and wash off

Substrate:

The substrate must be load-bearing, fully grouted and level to a large extent, open-pored, and have a closed surface. It must be free of gravel pockets, cavities, gaping cracks and ridges, dust and adhesion inhibiting substances such as oil, paint, laitance layers, and loose components.

Dense concrete, P II and P III plaster, fully grouted masonry, and cement-based screed are suitable as substrates.

Exposure	Dry film thickness, mm	Wet film thickness, mm	Consumption, kg/m ²
Ground moisture, non-pressure water	> 2.0	approx. 2.2	2.4
Pressure water	> 3.0	approx. 3.3	3.6
Joint water proofing in conjunction with joint tape technology	> 2.5	2.75	3.0
Container waterproofing	> 2.0	approx. 2.2	2.4
Profile waterproofing beneath masonry	> 2.0	approx. 2.2	2.4
Non-pressure water on slab surfaces	> 3.0	approx. 3.3	3.6
Levelling layers	1 mm	1.1 mm	1.2
Possible additional consumption in case of uneven substrates and artisanal variations must be considered.			

AQUAFIN-RB400 can be used to renovate old, firmly adhering coatings containing bitumen (**not bitumen sheeting**). The waterproofing must be covered with a scratch coat and double-coated after drying out completely. The base point area and the transition to the splashing water base must be stripped down to the cementitious substrate beforehand, because these connection and termination areas are frequently affected by moisture penetration from the rear during renovation.

Corners and edges such as those on base slabs, etc. must be cut or chamfered. Depressions >5 mm and damaged areas, large-pored substrates, or uneven masonry must be levelled out beforehand using a suitable cement-based mortar, e.g. ASOCRET-M30. Alternatively, levelling or filling coats <5 mm can be applied with a mixture of AQUAFIN-RB400/quartz sand 0.1–0.35 mm (approx. 5 kg on 20 kg of AQUAFIN-RB400).

The substrate must be pre-dampened so that it is matt

AQUAFIN[®]-RB400

damp when AQUAFIN-RB400 is applied. Extremely absorbent and slightly sandy substrates must be primed with ASO-Unigrund-GE or ASO-Unigrund-K, and the primer must be totally dry before the subsequent work steps are carried out.

Moisture penetration from the rear and intermittent moisture loading from the negative side must be avoided. We recommend pre-sealing with AQUAFIN-1K to prevent pushing off of the substrate. This requires min. 1.75 kg/m² AQUAFIN-1K. On uneven substrates, pre-sealing with ASOCRET-M30 can also be completed with consumption of 1.4 kg/m²/mm. Negative moisture loading can also be counteracted with ASODUR-SG2/-thix depending on the object. Consumption of 600–1,000 g/m² is required when using ASODUR-SG2/-thix.

Application:

Put approx. 50–60% of the liquid component into a clean mixing bucket and mix with the powder component to produce a homogeneous, lump-free compound. Finally, add the rest of the liquid component and mix sufficiently. A mixing time of approx. 2–3 min. is required with a powerful agitator (approx. 500–700 min⁻¹). After a settling period of approx. 2 minutes, thoroughly homogenise the compound again.

Due to the project or processing conditions, e.g. processing using the screening or spraying method, adding water up to a maximum of 1.0% (0.2 l/20 kg) AQUAFIN-RB400 is permitted. Water is added after mixing the powder and liquid component.

Pre-screen the base slab-wall transition with AQUAFIN-1K or ASOCRET-M30 featuring consistency able to be screened, and install a sealing groove of ASOCRET-M30 with an edge height of at least 4 cm while it is still wet. After drying, carry out the waterproofing with AQUAFIN-RB400.

AQUAFIN-RB400 is applied pore-free by trowelling, spraying or brushing for at least two application steps. The second and subsequent application steps may be completed once the first application step cannot be damaged (approx. 3 hrs., depending on the ambient conditions). An even layer thickness is achieved, e.g. using a coating thickness trowel or a 6 to 8 mm notched trowel and then smoothing. Apply as much material as needed to achieve the required dry film thickness.

If you apply using the spraying method with suitable spraying systems like HighPump M8 (peristaltic pump), HighPump Small, -Medium or -Pictor (screw pump), we recommend a nozzle size of 4.5 to 6.0 mm. For more information, contact Dittmann Sanierungstechnik GmbH, Hohen Neuendorf, www.saniertechnik.de.

For watertight formation of moving and connecting joints, use the system components of the ASO-joint tape method in accordance with the respective wear class.

Apply ASO-Dichtband-2000-S, or ADF-Dehnfugenband in the transition between the wall and floor and across connecting joints, and adhere ASO-Dichtband-2000-S-Ecken joint tape in the corner areas with AQUAFIN-RB400. Apply AQUAFIN-RB400 at least 2 cm wider than the width of joint tape you use. The joint tape is placed in the fresh layer and then pressed in without voids or wrinkles. Bonding must be carried out in such a way that water cannot migrate around the back. The joint tape to be used should be inserted in a loop over movement joints. The joint tape edges must be adhered overlapping at least 5 to 10 cm with AQUAFIN-RB400, free of wrinkles and covering the whole area. Finally, the bonded joint tapes must be coated over with AQUAFIN-RB400 and seamlessly integrated into the waterproofing. Proceed in the same way when inserting ASO joint tape pre-formed pieces.

Pipe penetrations:

Depending on the nominal diameter, the ASO-Dichtmanschette-Boden (ASO sealing sleeve base)

AQUAFIN®-RB400

or ASO-Dichtmanschette-Wand (ASO sealing sleeve wall) or ADF-Rohrmanschette (ADF pipe sleeve) are used for waterproofing pipe penetrations with non-pressing water and waterproofing is applied at least 5 cm onto the pipe penetration. In case of pressing water, use suitable loose fixed flange constructions. Apply the AQUAFIN-RB400 generously to the thin-bed flange and overlapping area, embed the sealing sleeve used free of voids and wrinkles and subsequently integrate in the waterproofing by means of complete over-coating.

Drainage and protection boards for components in direct ground:

The waterproofing must be protected against weathering influences and mechanical damage using suitable protective measures. Protective layers may only applied after drying is complete. Suitable protection and drainage boards can be fastened using heaps of COMBIDIC-1K, and the perimeter insulation must be bonded covering the whole area and butt jointed with COMBIDIC-2K-CLASSIC or COMBIDIC-2K-PREMIUM.

Alternatively, protective layers can be bonded covering the whole area with a mixture of AQUAFIN-RB400/ quartz sand 0.1–0.35 mm (approx. 5 kg on 20 kg AQUAFIN-RB400) and suitable notched trowel using the Buttering-Floating method.

Drainage is implemented in accordance with national regulations.

Notes:

- Protect surfaces that are not to be treated against the effects of AQUAFIN-RB400!
- The waterproofing must not be affected by water while it is setting. The effect of water from behind can lead to spalling in case of frost.
- In case of strong sunlight, work against the movement of the sun in shaded areas.
- In rooms with high humidity and/or insufficient

ventilation (e.g. water containers), dew point undershooting (condensation formation) may occur on the surface. This must be avoided by taking suitable measures, e.g. by using condensation dryers. Direct heating or uncontrolled blowing warm air is not permitted.

- AQUAFIN-RB400 may not be subjected to punctuated or linear loads as the surface coating.
- AQUAFIN-RB400 may be plastered and coated with vapour permeable, solvent-free dispersion facade paints or dispersion silicate paints (not pure silicate paints). Silicon resin paints and acrylate-based paints may also be used.
- Direct contact with metals like copper, zinc, and aluminium must be avoided by means of pore-sealed priming. Pore-sealed priming is produced via 2 application steps using ASODUR-GBM. The first application step is generously applied to the degreased and cleaned substrate. Once this coat has reacted to the extent that it can no longer be scattered (approx. 3–6 hours), another coat of ASODUR-GBM is brushed on and sprinkled with quartz sand featuring a grain size of 0.2–0.7 mm. Consumption of ASODUR-GBM approx. 800–1,000 g/m².
- To waterproof PVC, gunmetal, and stainless steel flanges, abrade, clean, and degrease the flange, apply AQUAFIN-RB400 and ASO-Dichtmanschette (ASO-Joint-Sleeve) or alternatively embed the ADF-Rohrmanschette (ADF-Pipe-Sleeve) without cavities or wrinkles and connect seamlessly to the surface waterproofing.

The current applicable regulations must be observed!
Please observe valid safety data sheet!

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ATAL BENTOFIX X2 5300

TECHNICAL DATASHEET

Tafarnaubach Industrial Estate,
Unit 27,
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Email: Enquiries@ataluk.com



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Structural Waterproofing Systems

BBA Certified as Bentofix X2 BFG 5300 Waterproofing System Cert No. 05/4256

DESCRIPTION

Atal Bentofix X2 5300 is a needle punched GBR-C comprised of a uniform layer of powder sodium bentonite encapsulated between a slit-film woven and a staple-fibre nonwoven geotextile. The woven fabric is coated with a low-permeability polymer polyolefin coating to achieve an immediate gas and radon gas barrier before hydration. The coated woven geotextile side is, in general, not placed against the concrete structure. Seal all laps using Atal Bentofix Tape.

USES INCLUDE:

- Waterproofing protection to grades 1, 2 and 3 of BS8102:2009
- Protection from ground gases including methane, CO² and radon.
- Can be used in both post-applied or pre-applied situations and either horizontal or vertical application.

ADVANTAGES

- Unique impermeable lap joints derived from surface bentonite impregnation of the nonwoven geotextile layer during manufacture.
- Full surface contact between the bentonite impregnated cover layer and the concrete ensures that small cracks and surface imperfections are sealed.
- Self-healing bentonite properties
- Quick and easy installation in almost all weather conditions
- Forms a tenacious mechanical bond to poured concrete when cast in situ, remaining in place if settlement of the substrate occurs
- No requirement for priming systems or protection systems
- BBA Accredited, certificate no. 05/4256

TYPICAL PROPERTIES @ 20°C

- Tensile Strength - 20 kN/m / 11 kN/m
- Puncture Force - 2500N
- Peel Strength - >360N/m
- Water Permeability - <5 x10m/s-9
- Methane Permeability - 5.46 x 10m/s-9
- Radon Permeability - 1.3x10⁻¹¹ m²/s
- Thickness - 6.0mm



SPECIFICATION OUTLINE

The product must be stored, handled and used strictly per the datasheets.

TESTING

ATAL NAUE BENTOFIX X2 BFG 5300 has been tested in accordance with the appropriate parts of the following standards:

ASTM D5887, CSN 73 0601, ISO 10913.

INSTALLATION INSTRUCTIONS

Installation advise in the BBA certificate must be followed at all times.

HORIZONTAL FLOOR SLAB APPLICATION

For installation of horizontal concrete slabs following the required groundwork preparation, a 50mm blinding layer of lean concrete or sand/gravel is placed, compacted and levelled. This layer should be free from debris and have a smooth surface. Remove all standing water before rolling out Atal Bentofix X2 5300 membrane. Alternatively, well-compacted hardcore or clay base may be suitable; please contact atal for more information.

The membrane edges must be overlapped a minimum of 100mm in the centre and edges. Avoid wrinkles, folds and uneven overlaps. Seal all laps using Atal Bentofix Tape.

Pour concrete following the direction of overlaps to minimise the chances of a break in the waterproofing. In all applications, the vibrating poker used to compact concrete mustn't come into contact with the Bentofix membrane.

VERTICAL CASTING APPLICATION

In most cases, install the Atal Bentofix X2 5300 membrane to the concrete with the bentonite impregnated nonwoven geotextile side facing towards the concrete. Should the Atal Bentofix X2 5300 membrane be used as a gas barrier and installed against a piled wall or sacrificial shutter then the membrane will need to be reversed with the bentonite impregnated nonwoven side facing the shutter or piled wall.

Floor to wall joints must be overlapped a minimum of 400mm. Avoid wrinkles, folds and uneven overlaps. The Bentofix Tape must be used in all laps, 75mm over each roll, on the laminated side. Ensure all overlaps are aligned not to let concrete into the lap during pouring.

PRE APPLIED APPLICATION

Apply the Atal Bentofix X2 5300 to timber formwork, 'tacking' by nail or staple either horizontally or vertically, following general application guidelines for lapping all adjacent edges 100mm, and staggering adjacent roll ends no less than 300mm, ensuring that laps face downwards.

The coated woven geotextile side should be against the formwork, and the nonwoven/spun geotextile side should face the concrete. Extend Bentofix the full depth of the formwork, so that the Bentofix laps 350mm over the Bentofix already cast into the slab edge and wall kicker, and allow no less than 300mm at the top of the formwork, to provide ground slab continuity later, if required. Position formwork and penetrate the Bentofix with tie bolts, as necessary.

The usual concrete practice is applied in terms of striking times for formwork, but due care should be taken to ensure that the Bentofix remains bonded to green concrete.

Where a slab 'toe' exists, and underslab Atal Bentofix has terminated at the top edge of slab, additional Bentofix may be required to ensure continuity and to link underslab/edge of slab Bentofix with the vertical Bentofix. Apply a 50x50mm fillet of Atal Bentonite Paste (powder & water) at the internal wall/slab corner, and place additional Bentofix over the slab 'toe' lapping 300mm over the edge of slab Bentofix, and continue over the 'toe' terminating under the unbonded wall Bentofix 'flap' at the back of the kicker.

Ensure all laps are taped with Atal Bentofix Tape.

POST APPLIED APPLICATION

When post applied to the concrete the Atal Bentofix X2 5300 membrane shall be secured to the concrete using Atal Soft Washer Fixings (30mm length min.) at 300mm centres along the 20mm outside edges, and at 500mm centres within the area of the membrane.

PRECAUTIONS

HEALTH AND SAFETY:

Atal Bentofix X2 5300 rolls are heavy and may need mechanical lifting to be moved. coated woven geotextile is available in 3 roll sizes:

- 1.20 x 4.5m = 28kg
- 2.42 x 15m Roll = 210kg
- 4.85 x 40m Roll = 1000kg

Full health and safety data are given in the Product Safety Data Sheet.

FIRE

Atal Bentofix X2 5300 is non-flammable

STORAGE AND SHELF LIFE

Atal Bentofix X2 5300 will have a shelf life of 12 months when kept in dry conditions at a temperature of 5°C to 45°C. Storage at higher temperatures and high humidity may reduce the shelf life.

Atal Cyf products are guaranteed against defective materials and manufacture. Products are sold subject to the Atal Cyf Terms and Conditions of Sale, copies of which are forwarded on invoice and are available on request. Atal Cyf endeavours to ensure that the above data and any further advice is correct, however, it cannot accept any direct or indirect liability for the use of its products as such usage is beyond its control.

ATAL FLO BOARD 4E TECHNICAL DATASHEET

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Structural Waterproofing Systems

DESCRIPTION

Atal Flo Board 4e consists a high strength flexible polyethylene cusped core with a non-woven geotextile bonded onto one or both sides.

The geotextile filters a wide range of materials allowing water to percolate into the core to be efficiently transported away to a discharge point. The geotextile is bonded to the core to ensure that it does not deform into the drainage passages under the load of the backfill material allowing continuity of the drainage void.

The single cusped HDPE core forms a high-performance drainage layer with clear void to allow flow in all directions. The compressive strength and creep resistance properties of Atal Flo Board 4e ensures that the core maintains its drainage capacity, even when subjected to compressive loads.

Atal Flo Board 4e is durable and sufficiently robust to resist the mechanical stresses imposed during installation and throughout the design life.

Use of Atal Flo Board 4e will eliminate the need for further protection of the waterproofing.

ADVANTAGES

When compared with aggregate drainage layers Atal Flo Board 4e geocomposites are much thinner yet offer superior flow characteristics. This reduces dead loads associated with aggregate drainage layers and may reduce required thickness of the roof slab construction.

The wide roll Atal Flo Board 4e composites are especially suited for rapid installation on large block paving or roof drainage projects.

Atal Flo Board 4e enhances structural waterproofing performance by providing an additional barrier that prevents the majority of the water reaching the liner.

The high CBR puncture resistance of Atal Flo Board 4e provides protection and prolongs the life of the waterproofing.

INSTALLATION

Atal Flo Board 4e is easy to handle and is rapidly installed without the need for specialist plant.

Atal Flo Board 4e has a built in geotextile overlap that ensures integrity of the drainage layer across the entire installation area.

The site in which the Atal Flo board 4e is to be installed must be sufficiently excavated and prepared.

A perforated pipe is normally used at the base of the wall to collect water from the geocomposite and must be placed as closely as possible and surrounded with filter stone.

The geocomposite can either be unrolled across the wall structure with the flapped edge at the bottom, or lengthways down the wall structure and cut to length as required. The flat face of the core must be secured against the structure and the geotextile faced cusped side towards the backfill to ensure efficient water filtration across the geotextile.

Where the geocomposite is laid on vertical structures in the vertical plane, it can be supported at the top of the wall with ballast (such as sand bags) and at the bottom with filter stone, prior to backfilling. In all situations, the geocomposite can also be supported temporarily using stick pins. Alternatively, pin shot fix or plug drill and fix plugs provide a permanent method of securing the geocomposite to the wall.

On wider or higher areas of walls, additional lengths of Flo board will be required. Jointing is carried out by butting the cores together ensuring the 100 mm geotextile overlapping piece is located over the joint. The lapped joint is then sealed and held in place using a continuous run of ABG Jointing Tape. Subsequent rows of geotextile can be installed in the same manner with the final row overlapped using a separate geotextile piece to seal the complete installation.

All cut edges must be sealed using ABG Jointing Tape. It is essential that during the lapping process no gaps are left in the installed Flo board System that could allow the soil to enter the core.

At corners, Flo board must be cut and re-sealed. For all Flo board Systems, the use of an angle profile will ensure a secure installation.

BACKFILLING

Prior to backfilling, the installed geocomposite must be inspected to ensure it has been securely fitted into position and that all joints are completely sealed.

Backfill material must not contain sharp or large stones that could tear or damage the geocomposite during compaction and is normally SHW class 6 or 7 backfill material. Care must be taken to avoid damaging the geocomposite during the backfilling process.

The permeability of the backfill material, when compacted, should be at least equal to that of the native soil.

Where the geocomposite is laid as transverse strips across a wall, backfilling is brought up progressively in layers as subsequent rolls are installed. Compacting equipment can operate close to the geocomposite without causing damage.

Where the geocomposite is laid vertically in upright lengths and adequately secured (see section 12.4), backfilling can proceed in one operation.

HEALTH SAFETY AND ENVIRONMENT

All components of Atal Flo Board 4e are inert and do not present a hazard to health.

SUPPLY

Atal Flo Board 4e is Manufactured in 4mm and 12mm and 1.1m wide rolls.

CHEMICAL RESISTANCE

Atal Flo Board 4e has excellent resistance to petrol, oils, acid, alkalis, leachate and all common chemicals.

ATAL FLO BOARD 4E APPLICATIONS

A strong, robust geocomposite layer

designed to:

- Relieve external water pressure from buried structures.
- Provide drainage behind retaining walls, potable water reservoir roofs and walls, tunnels, roof gardens
- Provide drainage under block paving.
- Relief of uplift pressure beneath tanks, slabs and culverts.
- Capillary break layer below base slabs.
- Atal Flo Board 4e can be applied horizontally on roofs and below base slabs or vertically against walls.

Atal Flo Board 4e geocomposite drainage layer is ideal for structural drainage applications; it provides sub-surface drainage with higher performance and lower cost than conventional granular filters layers. It has been specially designed to be compatible with structural waterproofing and to give the optimum performance over the whole life of the structure.

Atal Flo Board 4e enhances the performance of the waterproofing systems by providing an additional barrier, preventing the majority of the water reaching the waterproofing system.

Atal Flo Board 4e geocomposite drainage system has a proven record in structural drainage and offers a 120 year design life.

BURIED STRUCTURES

When installed on external faces of a buried structure Atal Flo Board 4e collects and drains percolated groundwater from the backfill material. Installed with the flat face of the core against the structure and dimpled face against the backfill, Atal Flo Board 4e also provides a high level of protection to the waterproofing system.

RETAINING STRUCTURES

Atal Flo Board 4e installed behind retaining structures acts as an efficient groundwater drainage system. Atal Flo Board 4e provides a high-level of protection to the structure offering drainage capacity 10 to 50 times better than filter stone.

ATAL GP1

TECHNICAL DATASHEET

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Structural Waterproofing Systems

INTRODUCTION

Atal GP1 is a multi layer, low-density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil. Atal GP1 is specifically designed and manufactured to perform as a Methane, Carbon Dioxide, Radon, air and Moisture protection system.

The membrane is manufactured by using a multi-layer extrusion/coating process and incorporate a tough polypropylene reinforcement grid. Atal GP1 is extremely flexible for ease of installation and is robust enough to cope with the site conditions. atal GP1 will also protect against damp and therefore will act as a DPM and satisfy Approved Document C.

USAGE

The product will restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally-occurring sources and meet the performance criteria for a gas resistant membrane as defined in BS 8485 : 2015.

INSTALLATION

Atal GP1 should be installed in accordance with the product installation guidelines and in accordance with BS8485:2015.

The membrane can be installed in all normal site conditions, provided that the air temperature is not below 4°C to prevent the risk of surface condensation.

The product must only be applied to surfaces that have a smooth finish, ie they should be free from voids, projections and mortar deposits. Surfaces should be dry and free from dust and frost.

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.

The membrane is rolled out with the coloured surface uppermost (white side down), ensuring that it is properly aligned. All end and side overlaps should be a minimum of 150 mm and prepared in accordance with the Certificate holder's instructions.

When the membrane is laid below the concrete slab, it should be loose-laid to accommodate any small movements.

All surfaces must be dried thoroughly prior to joining. Roll edges can be welded, or taped. A strip of the tape is unrolled over the membrane with its nearest edge 50 mm from the membrane edge. The protective paper is removed from the butyl tape prior to rolling an adjacent run of the membrane, which must be carefully unrolled over the jointing tape, ensuring a 100 mm overlap.

All service penetrations and direction changes should be properly detailed in accordance with the Certificate holder's instructions. Service ducts should be vented to prevent the possibility of gas accumulating in confined spaces.

The continuity of the gas protection must extend over the footprint of the building, and the gas membrane must be sealed to a gas-resistant damp-proof course.

The membrane should be covered by a screed or other protective layer, such as Atal 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.

The membrane installation should be subject to third-party independent validation, in accordance with the BS 8485 : 2015.

JOINTING AND SEALING

Atal GP1 is suited to sealing using atal DS Butyl Tape and atal Single Sided Tape or by means of welding. atal GP1 should be overlapped by at least 150mm. When taping the laps a silicon roller should be used to remove trapped air and ensure a good seal is achieved.

Welding should be carried out by competent personnel with suitable qualifications in accordance with best practice, and guidance contained within BS8485:2015. Atal Premsil GMA should be used to for sealing around pipe penetrations and termination into DPC.

INSTALLATION BELOW SLAB

A 50mm sand or concrete blinding should be laid when the membrane is installed below the slab. Atal GP1 should be protected after installation using atal Protection Board, insulation or a protective blinding to prevent puncture during the construction process.

INSTALLATION ABOVE SLAB AND TO SUSPENDED FLOORS

The substrate should be smooth and free from voids, projections, mortar deposits, dust and frost. Atal GP1 should be protected after installation using atal Protection Board, insulation or a protective blinding to prevent puncture during the construction process.

RESISTANCE TO PUNCTURE

The membrane can be punctured by sharp objects. Care should be taken during installation to not damage the membrane. If damage occurs the repair should be in accordance with atal guidance.

The rolls can be stored outdoors when packaged but should be protected from exposure to UV.

ANCILLARY PRODUCTS

- atal Termination Strap
- atal DS Butyl Tape
- atal Single Sided Tape
- atal Premsil GMA
- atal Premsil Primer
- atal Protection Board
- atal Gasflow 25S

ADDITIONAL INFORMATION

For additional information or assistance please contact atal on 01495 717202.

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HANDLING

Roll weights are in excess 20 kg and hence appropriate care and equipment is required for unloading and handling.

STORAGE

Rolls of atal GP1 should be stored on stable/level ground and stacked not more than five rolls high, with no other material stacked on top.



CHARACTERISTIC	TEST METHOD	UNIT	ATAL GP1
PHYSICAL PROPERTIES			
Thickness	EN 1849 - 2	mm	0.6
Width	EN 1849 - 2	m	4
Length	EN 1849 - 2	m	25
Weight	EN 1849 - 2	g/m ²	370
HYDRAULIC PROPERTIES			
Water Column	EN 20811	-	>300
Resistance to Water Penetration	EN 13967, EN 1928	-	Pass
Water Tightness	EN 1296, EN 1367, EN 1928	-	Pass
MECHANICAL PROPERTIES			
Resistance to Static Load	EN 12730 - B	kg	20
Tensile Strength (MD)	EN 12311 - 1	N/50mm	600
Tensile Strength (CMD)	EN 12311 - 1	N/50mm	480
Tensile Elongation (MD)	EN 12311 - 1	%	20
Tensile Elongation (CMD)	EN 12311 - 1	%	20
Puncture Resistance	EN 12310 - 1	kN	1.25
Resistance to Tearing (Nail Shank) MD	EN 12310 - 1	N	330
Resistance to Tearing (Nail Shank) CMD	EN 12310 - 1	N	400
DURABILITY AND CHEMICAL RESISTANCE			
Transmission Rate of Volatile Liquids - Diesel	ISO 6179:2010 (B)	g/m ² /h	0.246
Transmission Rate of Volatile Liquids - Xylene	ISO 6179:2010 (B)	g/m ² /h	0.571
Transmission Rate of Volatile Liquids - Toluene	ISO 6179:2010 (B)	g/m ² /h	0.583
Transmission Rate of Volatile Liquids - Petrol	ISO 6179:2010 (B)	g/m ² /h	0.135
GAS PERMEABILITY			
Methane Permeability	BS EN ISO 15105 - 1	ml/m ² /day/atm	<0.09
Carbon Dioxide Permeability	BS EN ISO 15105 - 1	ml/m ² /day/atm	<0.09
Radon Permeability	K124/02/95	m ² /s	8.0 x 10 ⁻¹⁵
COMPLIANCE AND CERTIFICATION			
NHBC Standards Compliant			
BS8485:2015 Compliant			

ATAL PREMSIL GMA

TECHNICAL DATASHEET

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Structural Waterproofing Systems

EC Certificate of factory production control 0836-CPD-13/F032 accredited by the BBA.

DESCRIPTION

Atal Premsil GMA is an advanced waterproof membrane capable of resisting the passage of methane gas. The membrane is manufactured from an aluminium, and cross-orientated HDPE film laminated to a layer of rubber modified bitumen adhesive.

Independent tests show that this advanced backing film and adhesive layer provides excellent technical performance for the suppression of methane, radon and other common ground gases.

The membrane should be covered as soon as possible after installation with protective blinding or Atal Flo Board 4e.

Use Atal Premsil GMA for the following applications:

- External tanking of underground structures
- Car parks and Retaining Walls
- Subways and Lift Shafts

ADVANTAGES

- Independent certification for the suppression of methane and radon gas
- Excellent overlap integrity due to bitumen joint
- Factory controlled thickness
- Rapid and easy application
- Flexible and accommodating giving an excellent bond to the substrate
- Non-hazardous and resistant to dilute acids and alkalis
- High-performance protection against groundwater and soluble salts such as sulphates and chlorides
- Capable of resisting a 6 metre head of water when fully supported

STORAGE

The membrane rolls must be stacked on end and stored in dry, well-ventilated buildings, out of direct sunlight or other significant sources of heat. Storage conditions should be adjusted before application to bring the temperature of the rolls to within the relevant specified application range.

INSTRUCTIONS FOR USE

First, apply Atal Premsil Primer ensuring complete coverage and allow to dry. Only prime areas where Atal Premsil GMA is to be applied on the same day.

Atal Premsil GMA should be applied, allowing 50mm for edge laps and 100mm for end laps.

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Dimensions	Method	Units	Data
Backing Thickness	-	mm	0.1
Backing Type	-		Aluminium Polythene Laminate
Adhesive Thickness	-	mm	0.9
Total Thickness	-	mm	1
Width	-	mm	1050
Length	-	m	28.6
Area	-	m ²	30
Weight	-	kg/m ²	1.1
Carton Weight	-	kg	33

Mechanical Data	Method	Units	Data
Membrane Strength	ASTM D1000	N/mm	3
Elongation	ASTM D1000	%	40
Puncture Resistance	ASTM E154	N	250
Adhesion (180° Peel)	ASTM D1000	N/mm	2

Functional Data	Method	Units	Data
Water Vapour Transmission	ASTM E96	g/m ² /24h	<0.1
Methane Gas Permeability	-	ml/m ² /24 hrs	<0.03
Radon Diffusion	-	m ² /s	5.0 X 10 ⁻¹⁴
Dimensional Stability	MOAT 27 5.1.6	%	
	(80°C)		
Longitudinal			0
Lateral			0

ATAL FLO BOARD CM8 TECHNICAL DATASHEET

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Structural Waterproofing Systems

DESCRIPTION

Cm8 cavity drain membrane is an 8 mm studded membrane, suitable for type c waterproofing and delivering a grade 3 environment to bs8102:2009 and nhbc chapter 5.4. Cm8 is available in both 500g or 700g densities. We recommend using the cm8 hd700 when a heavier, denser membrane is deemed necessary by the Atal technical department. Please always take advice from our technical experts when making product selections.

ADVANTAGES

- Creates dry, habitable living space in areas previously suffering from damp-wet conditions.
- waterproof, salt inhibiting, root and contaminate resistant.
- quick to install - minimal preparation needed to wall surfaces.
- easily cut down using a sharp blade.
- no drying out process - redecoration can occur immediately.
- little or no damage to the existing structure.
- low and high temperature tolerance.
- part of a type c cavity drain membrane system in line with bs8102:2009.
- clear for easy application and fixing of Atal plugs.

typical uses

Walls, floors, vaults, tunnels, above and below ground level, waterproofing applications and damp-proofing applications.

SUBSTRATE PREPERATION

1. When used in new construction, the concrete slab must be laid in accordance with bs 8204-1:2003+a1:2009 to achieve a flat surface not deviating more than 5 mm from the underside of a 3000 mm straight edge.
2. Unsound plaster, render or screed should be removed and surfaces made level, with floors to the above tolerances. This can be achieved using Atal universal mortar, or a 3:1 sand:cement mix incorporating renderproof waterproofing additive. Leave all new works to dry thoroughly before cm8 membranes are fixed.
3. In case of walls suffering from mould or masonry fungi, prior to fixing the membrane, remove surface contamination by brushing, then apply microtech biocide in line with the relevant technical data sheet
4. If dry rot (*serpula lacrymans*) is present in the walls, this will require detailed assessment before proceeding. Contact the Atal technical department for further advice.
5. Above ground level it is recommended, that where possible, all sources of moisture are alleviated at the source using a dpc such as ultracure, before applying cm8 membrane. This reduces potential damage to masonry and timber etc.

CONDITIONS AND LIMITATIONS

Flat soffits below ground should never be lined with Atal cm8 membrane as it requires a minimum slope of 10%.

Take care when running cm8 membrane around internal and external corners to ensure the sheet is fixed tight to the angle, ensuring well defined edges for subsequent finishes.

APPLICATION

With studs facing the wall, fixing is carried out using Atal CM Brick Plugs.

1. we recommend an application of atal microsealer to the concrete walls and slab, before an application of cm8, to prevent lime efflorescence and dusting, which can block perimeter drainage channels.
2. Drill a hole through the centre of the stud. Take care when drilling holes to avoid excessive masonry dust from falling into the cavity.
3. Place the chosen plug (with seal for all underground waterproofing applications) into the hole and drive the fixing home with a rubber mallet or club hammer.
4. We would suggest that spacing between plug fixings should be no greater than 600 mm, to ensure a tight fix to the wall. However, this may vary depending on the exact batten/board size and site conditions may dictate otherwise.
5. Seal the membrane at the flanges (a band of membrane running along the edge where no studs are present) with a tape.
6. Ensure flanges run vertically on walls and are positioned in front of the preceding width of membrane. In the case of horizontal joints, the lower sheet is positioned to the front.
7. Where there is or could be severe water ingress, joints may also be closed off with Atal Overseal Tape.
8. Seal the stud to stud joints with Atal Rope.

Vaulted Ceilings: These can be successfully lined using Atal CM8, taking care to seal all mitred joints with Atal Tape/ Rope/Overseal Tape/Corner Detail/Atal Fibre Tape

Technical Data	Result	Test Standards
Material	HDPE	N/A
Unit Weight	0.5 Kg/m ²	N/A
Sheet Thickness	0.45 mm	EN 149-2
Stud Height	7 mm	N/A
Colour	Clear	N/A
Water tightness 60 kPa; 24h	Pass	EN 1928
Working Temperature	-50°C to +80°C	N/A
Softening Temperature	126°C	N/A
Tensile Strength MD	416 N	BS 12311-2
Tensile Strength CD	488 N	BS 12311-2
Resistance to Static Loading	>20 Kg	BS 12730
Compressive Strength	180 kN	BS EN ISO 25619-2
Reaction to Fire	Class F	BS EN 13501-1:200-1
Type of Application	Type V	N/A

FINISHING

STUD FRAME:

When using this finishing method, Atal brick plugs should be applied in a vertical line, roughly corresponding to the stud locations and battens (minimum of 25 x 38mm). Fix the stud frame to the plugs using no. 10 screws (5 mm). If the plugs cannot be applied in a straight line, 'gyproc' brackets can be used to hold the battens in place. Ensure the screw depth does not perforate the cm8 membrane.

DOT AND DAB DRY LINING:

On reasonably flat walls, Atal cm brick plugs can be used to provide a key for board adhesives. Their unique serrated head allows for the dab to be applied directly to the head of the brick plug. For below ground applications, ensure the brick plugs have a rubber seal. Use a conventional bonding plaster in dabs, to a minimum thickness of 8 mm and covering at least 50% of the membrane surface area.

FLOORS:

Cm8 membrane may be overlaid with closed cell insulation before laying t&g flooring, ensuring a 10 mm expansion joint all around. Alternatively, a conventional 65 mm of sand and cement screed can be laid. However, site conditions may vary, therefore if doubt exists, please take advice from the Atal technical department. Normal decorating materials can be used as soon as the floor, screed or plaster finishes are dry.

while applying, ensure atmospheric moisture levels are below 70% rh. Impermeable floor finishes should not be laid until screed moisture content is below 75% rh.

AFTERCARE

Atal cm8 membranes provide a dry, warm and habitable living space in basements and other areas suffering from chronically damp conditions. However, it is equally important that areas which lack natural ventilation are provided with adequate means of condensation control, especially in wet areas such as kitchens, bathrooms etc.

This is best achieved through the provision of an effective mechanical ventilation system. Please consult the Atal technical department for further advice.

STORAGE AND SHELF LIFE

Store in an upright position, under cover and away from high temperatures and open flames. Shelf life is the lifetime of the structure, when stored and installed in line with the datasheet recommendations.

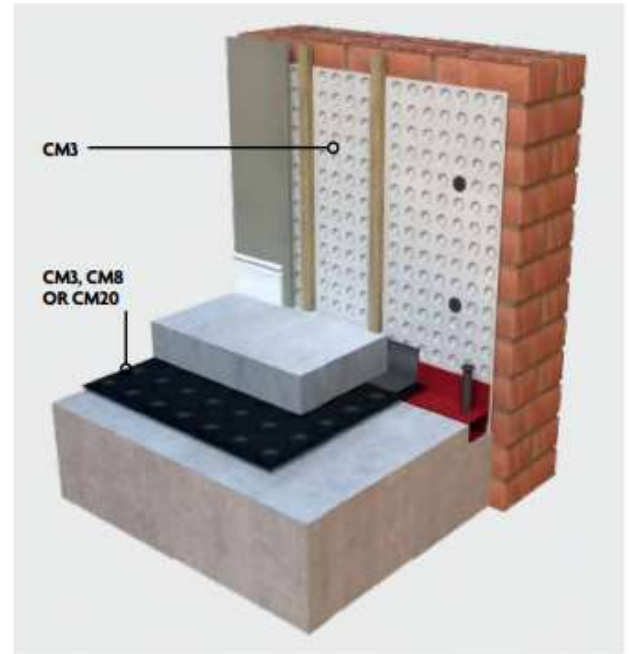
HEALTH AND SAFETY

No specific hazards are likely to arise while using any Atal Waterproofing Membranes or ancillaries; neither are classified as hazardous in respect to CHIP II Regulations 1999. However, general precaution should be exercised in the use of drills etc. Taking particular note of the special risks associated with working in confined spaces (basements) with restricted access/egress.

Pack Size	Coverage
2 m x 10 m	20 m ²
2 m x 20 m	40 m ²
2.4 x 20 m	m 48 m ²
2.4 m x 20 m	48 m ²

Disclaimer:

The technical information reflects our current knowledge of Flo Board CM8. It is intended only as information for users. As we do not know the envisaged applications and installation conditions, it is the responsibility of the user to carefully check that the product is fit for purpose. Due to the different components at the installation site and the in-situ working conditions, MASTERTEC cannot provide any guarantee whatsoever for the result of the work. Claims arising from any legal relationship can only be recognised in the event of wilful intent or gross negligence, irrespective of the statements made here or advice provided verbally. In this case the user must prove that he has provided MASTERTEC in writing with all the information required to correctly assess the installation situation in good time. Subject to necessary product specifications or further developments. By providing this informaon ATAL does not intend to infringe third-party rights. The latest data sheet in each case applies. Our corresponding terms and condions of sale and delivery apply.



ANNEX C
Installer Daily Log Sheets

Installer Daily Log



(Prepare one installer log sheet per day per plot)

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

(Delete as appropriate)

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

ANNEX D
Protection Method Statement



Post Installation protection of gas membrane

- To prevent any ongoing damage of the gas membrane following installation, contractors and staff members will be instructed not to cross the area where the membrane is in place, unless required to do so to facilitate the construction of the slab and associated elements such as pipe penetrations. High visible tape will be placed at waist level around the slab to highlight this and keep operatives from crossing.
- These interactions on top of the membrane will be kept to a minimum and will be monitored by the Site Manager.
- Scaffold boards will be used to cross the membrane where needed to allow installation of reinforcement and pipe penetrations.
- Any rebar stools or supports placed on top of the membrane will be done so with the utmost care.
- Prior to any pour of concrete, the membrane will be inspected to ensure no damage has occurred during installation of the reinforcement. Any defects will be reported to the Site Manager who will ensure a satisfactory repair is undertaken and validated prior to any actual concrete pour occurring.
- During concrete pouring, tamping will only take place from above the top level of reinforcement.



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