

GAS MEMBRANE VALIDATION – BENNETT STREET

Project Name: Bennett Street
Project Number: 15-974
Client: Kellen Homes
Date: 01-11-2023
Project Manager: Matt Dee
E3P Engineer: J. James
Gas Membrane Installers Name & Qualifications: JCW Gas Membranes Ltd, NVQ Level 2 – Installation of Gas Membranes in Construction
Ground Gas Risk Assessment: Vapour Membranes Required
Plots: 18 & 19

OVERVIEW

The membrane comprised a Juta TITANFLEX (black) gas and hydrocarbon barrier, in line with the required specification set out in the agreed Build Phase Contamination Risk Mitigation Strategy (report ref: 15-974-R5). E3P can confirm there were no holes or rips at the inspection time. Upon being laid, the membrane is to be covered with a Celotex (closed cell) floor insulation material which is considered to provide a high degree of protection.

E3P inspected all external joints, and E3P can confirm that the membrane was overlapped and welded. Corners and patch repairs were sealed with a GP TITAN butyl tape, resistant to vapour and bulk ground gas. Plots have service duct(s) located at the outer edge of the property. E3P inspected each one and can confirm that the top hats have been adequately sealed against the membrane using a self-adhesive gas style product and fixed with a layer of GP TITAN butyl tape.

As per the Build Phase Contamination Risk Mitigation Strategy (report ref: 15-974-R5), sub-floor voids require inspection and validation at 50% ratio of substructures completed. E3P undertook subfloor void inspections during the previous visit on 24th October 2023 for Plots 18 and 19, inspections confirmed there was a minimum void space of 150 mm for each plot. Validation photographs included within letter 15-974-V2.

Based on the information provided within this report, the site inspection and validation checklists, E3P can confirm that Plots 18 & 19 have been installed with gas & vapour protection measures in line with the agreed Build Phase Contamination Risk Mitigation Strategy (report ref: 15-974-R5) to an acceptable level of workmanship.

A list of plots requiring validation and their associated validation letters is presented in Table 1.



Geo-Environmental



Acoustics

Remediation and
Enabling Earthworks
Design

Arboriculture

Compliance
& Due Diligence

Ecology



Industrial Permitting



Geotechnical

MEMBRANE SPECIFICATION: JUTA TITANFLEX (BLACK)

GROUND GAS PROTECTION
GP[®] TITANFLEX[®]
TECHNICAL DATA SHEET



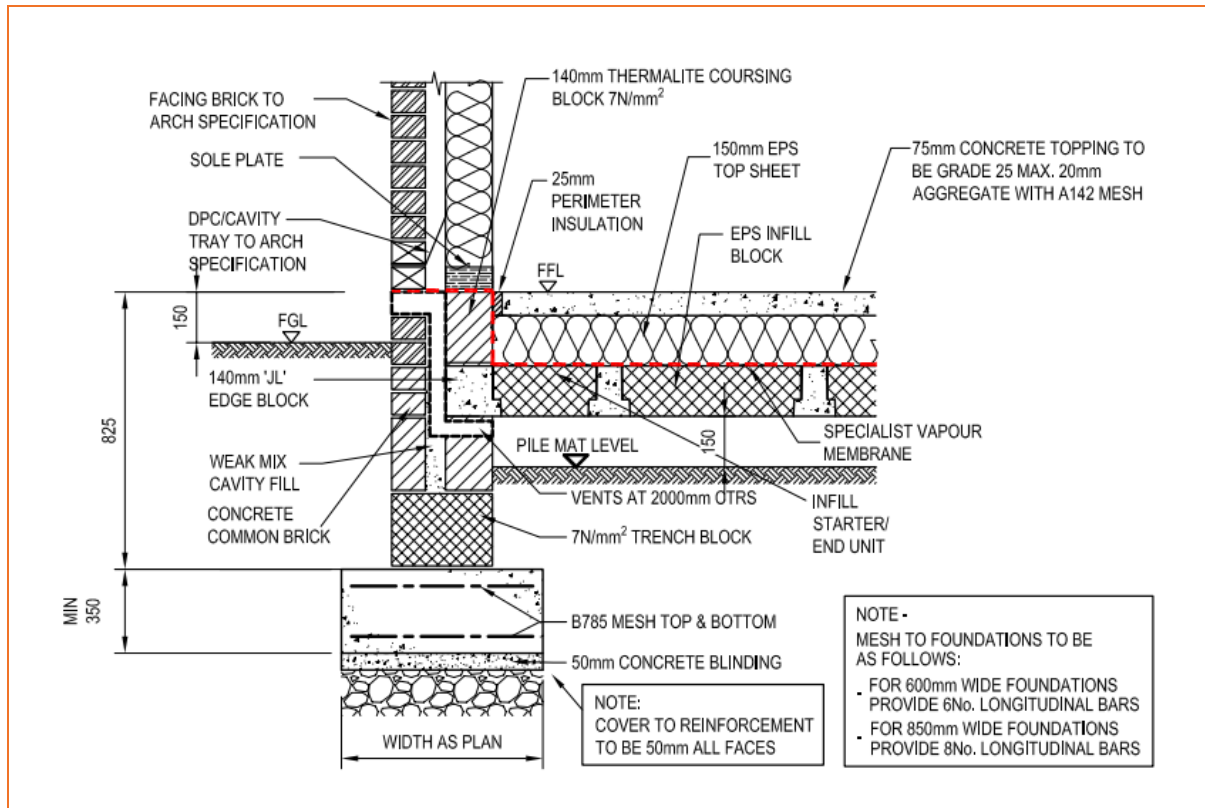
GP[®] TITANFLEX[®]

Feature	Characteristics	Test Method	GP [®] TITANFLEX [®]
Physical Properties	Thickness	EN 1849-2	0.5 mm
	Width	EN 1849-2	2 m
	Length	EN 1849-2	50 m
	Weight	EN 1849-2	500 g/m ²
Hydraulic Press	Water Vapour Transmission Rate	EN 1931	0.11 - 0.18 g/m ² /day
	Water Tightness (60 kPa)	EN 1928	Pass
	Water Tightness (196 kPa - 20 m Water Head) (Basement Application)	EN 1928	Pass
Mechanical Properties	Resistance to Static Load	EN 12730-B	≥ 20 kg
	Puncture Resistance	EN 12236	≥ 2.0 kN
	Tensile Strength (MD)	EN 12311-1	> 550 N/50mm
	Tensile Strength (CMD)	EN 12311-1	> 400 N/50mm
	Tensile Elongation (MD/CMD)	EN 12310-1	> 550 %
	Tear Resistance (MD/CMD)	EN 12310-1	> 300 N
	Resistance to Impact	EN 12691-B	650 mm
	Reaction to Fire	EN 13501-1	E Class
	Resistance to Artificial Ageing	EN 1296/EN 1928	Pass
Compliance and Certification	Resistance to Chemicals	EN 1296/EN 1928	Pass
	CE Mark - EN13967:2012		
	NHBC Standards Compliant		
	CIRIA C748 Compliant		
Vapour Permeability 100% Concentration	BS 8485:2015 Compliant		
	Transmission Rate of Benzene	EN ISO 15105-2	< 3.6 mg/m ² /day
	Transmission Rate of Toluene	EN ISO 15105-2	< 13.8 mg/m ² /day
	Transmission Rate of Ethyl Benzene	EN ISO 15105-2	< 2.7 mg/m ² /day
	Transmission Rate of Xylenes (M,P,O)	EN ISO 15105-2	< 7.7 mg/m ² /day
	Transmission Rate of Hexane	EN ISO 15105-2	< 0.6 mg/m ² /day
	Transmission Rate of Vinyl Chloride	EN ISO 15105-2	< 0.05 mg/m ² /day
	Transmission Rate of Trichloroethene (TCE)	EN ISO 15105-2	< 54.7 mg/m ² /day
	Transmission Rate of Tetrachloroethene (PCE)	EN ISO 15105-2	< 26.2 mg/m ² /day
Gas Permeability	Transmission Rate of Naphthalene	EN ISO 15105-2	< 0.0006 mg/m ² /day
	Transmission Rate of CIS-1,2-Dichloroethylene	EN ISO 15105-2	< 1.1 mg/m ² /day
	Methane Permeability	EN ISO 15105-1	0.13 ml/m ² /day/atm
	Methane Permeability (Jointed)	EN ISO 15105-1	1.00 ml/m ² /day/atm
	Carbon Dioxide Permeability	EN ISO 15105-1	3.01 ml/m ² /day/atm
	Vinyl Chloride Gas Permeability	EN ISO 15105-1	0.04 ml/m ² /day/atm
	Radon Permeability	K124/02/95	1.0 x 10 ⁻¹² m ² /S




Juta.co.uk

STRUCTURAL ENGINEER'S SUBSTRUCTURE DESIGN



PROPOSED DEVELOPMENT PLAN



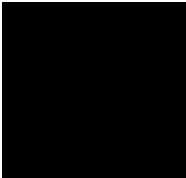
The gas membrane validation photographs are enclosed within this letter. For information, Table 1 includes references and validation dates of previously validated plots.

TABLE 1 – VALIDATION LETTER REFERENCE

PLOT NUMBER	DATE	REPORT REFERENCE
9-15	19-10-2023	V1
16 & 17	24-10-2023	V2
18 & 19	01-11-2023	V3

GAS MEMBRANE VALIDATION

Complete

Site Name	Bennett st
Location	Manchester England M12 5LP United Kingdom (53.46870637588279, - 2.2078843996108617)
Project Manager	Matt Dee
Project number	15974
Developer	Kellen
Site representative Signature	 Wayne Kellen 1 Nov 2023 10:10 AM GMT
Conducted on	1 Nov 2023 10:07 AM GMT
Prepared by	Jordan james

Inspection Gas Membrane

Plot Inspection

Plot Inspection 1

Plot Number 19

Type of Development: Other add note House

Foundation Type: Other add note Suspended Floor

Gas Membrane Type: Manufacturer, gauge, and colour. Juta Titan Flex

Gas Membrane Condition: Open punctures, tears, rips, stretching, Presence of debris, Repairs, Signs of weakness such as raised or sunken indentations, Protection plan in place to restrict access to lain gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED

Pass

Laps, welds, and joints seals: Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap insured? Sections taped twice? Are welds complete? Appropriate joining/double-sided tape used, Folds running in line with joints? (no joints cutting across folds)

Pass

Service entries seals: Top hats seal arrangements fixed around service entries? Use of Jubilee clips?

Yes



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

Type of joints/ Lapping

Welded

Corners / Internal joints: Check all corners are correctly formed or contractor has used preformed corners.

Pass



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15

Extent of Coverage: Is the membrane covering the entire plot? Does membrane span over outside walls?

Yes



Photo 16



Photo 17

Condition of sub-grade and underside of gas membrane: Check that the subgrade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.

Pass

Slab / membrane condition (is membrane clear of debris or insulation): Can membrane be fully seen and photographed – ask contractor to remove an debris so membrane can be fully seen an inspected – this is a requirement of NHBC and local authorities.

Pass

External Wall Air bricks: Numbers, size. positions as design drawing? (Minimum of 3 walls)

Pass



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22

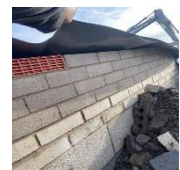


Photo 23



Photo 24

Plot Inspection 2

Plot Number

18

Type of Development: Other add note

House

Foundation Type: Other add note	Suspended Floor
Gas Membrane Type: Manufacturer, gauge, and colour.	Juta Titan Flex
Gas Membrane Condition: Open punctures, tears, rips, stretching, Presence of debris, Repairs, Signs of weakness such as raised or sunken indentations, Protection plan in place to restrict access to lain gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED	
	Pass
Laps, welds, and joints seals: Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap insured? Sections taped twice? Are welds complete? Appropriate joining/double-sided tape used, Folds running in line with joints? (no joints cutting across folds)	
	Pass
Service entries seals: Top hats seal arrangements fixed around service entries? Use of Jubilee clips?	
	Yes
      Photo 25 Photo 26 Photo 27 Photo 28 Photo 29 Photo 30	
Type of joints/ Lapping	Welded
Corners / Internal joints: Check all corners are correctly formed or contractor has used preformed corners.	
	Pass
      Photo 31 Photo 32 Photo 33 Photo 34 Photo 35 Photo 36   Photo 37 Photo 38	
Extent of Coverage: Is the membrane covering the entire plot? Does membrane span over outside walls?	
	Yes



Photo 39



Photo 40



Photo 41

Condition of sub-grade and underside of gas membrane: Check that the subgrade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.

Pass

Slab / membrane condition (is membrane clear of debris or insulation): Can membrane be fully seen and photographed – ask contractor to remove an debris so membrane can be fully seen an inspected – this is a requirement of NHBC and local authorities.

Pass

External Wall Air bricks: Numbers, size. positions as design drawing? (Minimum of 3 walls)

Pass



Photo 42



Photo 43

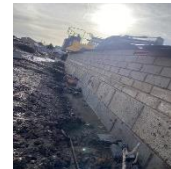


Photo 44



Photo 45



Photo 46

Passive Venting

Sub-floor Void: Is a check possible on future plots (insert Plot number or NO in text box)

No

Media summary



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22



Photo 23



Photo 24



Photo 25



Photo 26



Photo 27



Photo 28



Photo 29



Photo 30



Photo 31



Photo 32



Photo 33



Photo 34



Photo 35



Photo 36



Photo 37



Photo 38



Photo 39



Photo 40



Photo 41



Photo 42



Photo 43



Photo 44



Photo 45



Photo 46