

Date: 20th March 2025
Reference: 15-974 V33

GAS MEMBRANE VALIDATION – BENNETT STREET

Project Name:	Bennett Street
Project Number:	15-974
Client:	Kellen Homes
Date:	20-03-2025
Project Manager:	M. Dee
Engineer:	T. Walker
Ground Gas Risk Assessment:	Vapor Membranes Required
Gas Membrane Installers Name & Qualifications:	JCW Gas Membranes Ltd, NVQ Level 2 – Installation of Gas Membranes in Construction
Plot:	26-28

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 previously undertook subfloor void inspections for plots 24-25, inspections confirmed there was a minimum void space of 150 mm for each plot. Validation photographs included within this letter.

Based on the information provided within this report, the site inspection and validation checklists, E3P can confirm that plots 26-28 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.



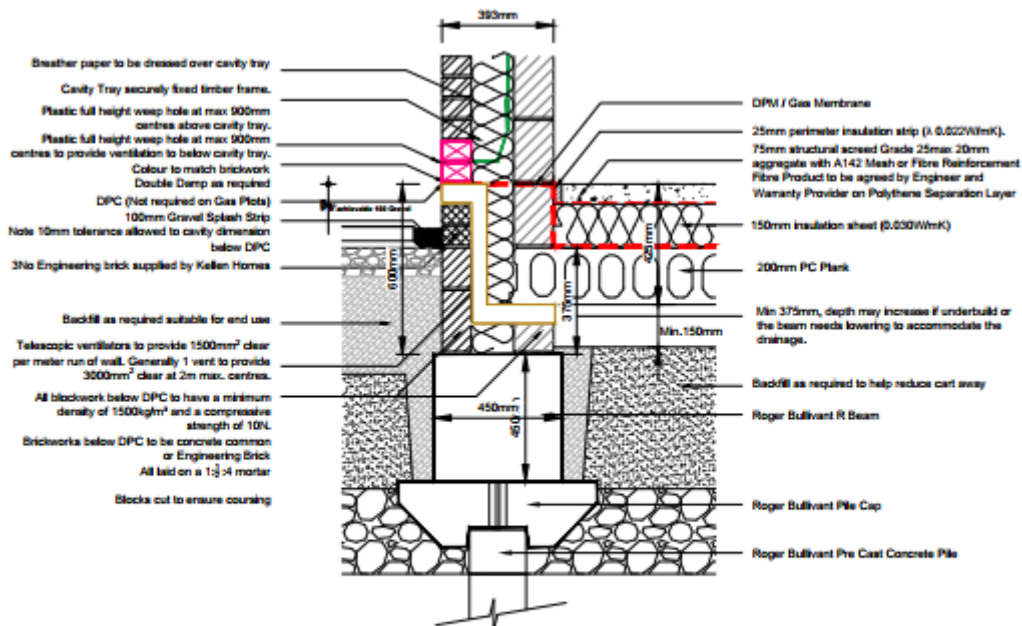


MEMBRANE SPECIFICATION: JUTA TITANFLEX (BLACK)

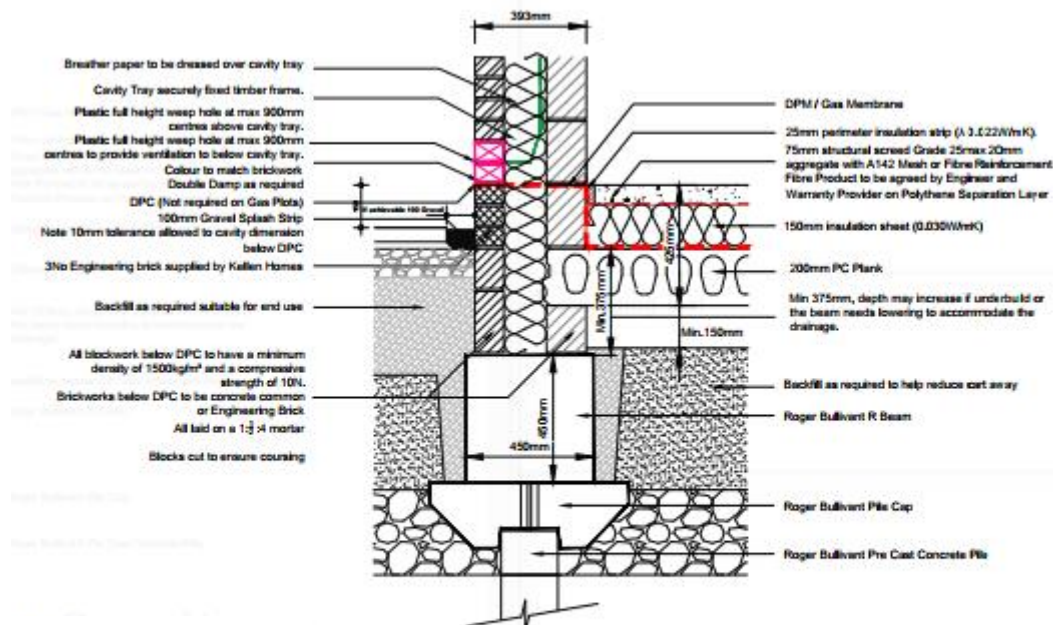
GROUND GAS PROTECTION GP[®] TITANFLEX[®] TECHNICAL DATA SHEET  GP[®] TITANFLEX[®]			
Feature	Characteristics	Test Method	GP [®] TITANFLEX [®]
Physical Properties	Thickness	EN 1849-2	0.5 mm
	Width	EN 1849-2	2 m
	Length	EN 1849-2	50 m
	Weight	EN 1849-2	500 g/m ²
Hydraulic Press	Water Vapour Transmission 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



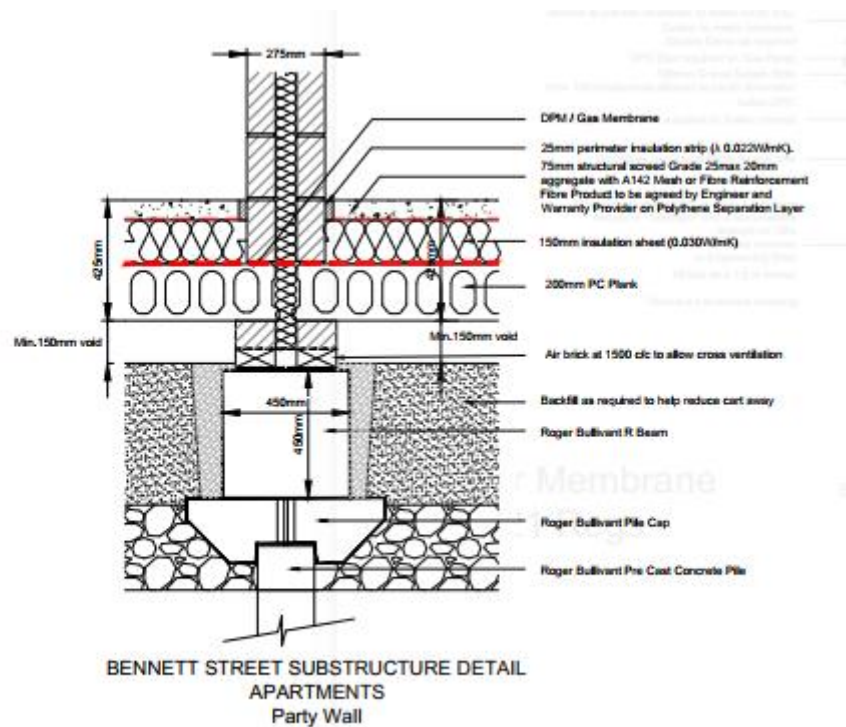
STRUCTURAL ENGINEER'S SUBSTRUCTURE DESIGN



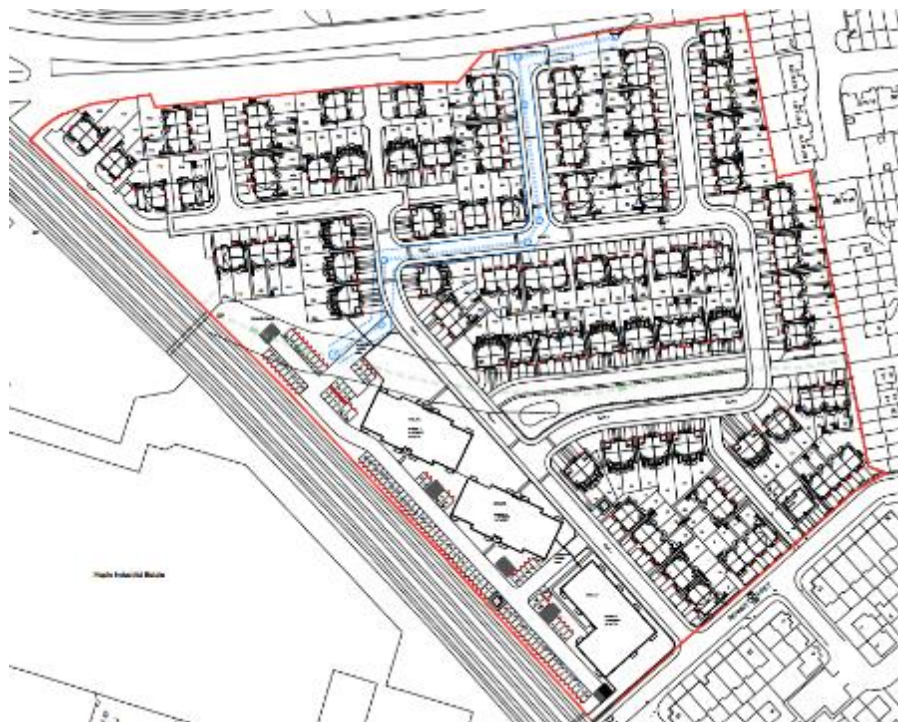
BENNETT STREET SUBSTRUCTURE DETAIL
APARTMENTS
Locations with Telescopic Vents



BENNETT STREET SUBSTRUCTURE DETAIL
APARTMENTS
Locations with Telescopic Vents



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.

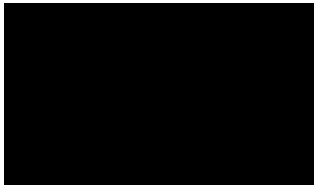
Table 1 – Validation Letter Reference

PLOT NUMBER	DATE	REPORT REFERENCE
9-15	19-10-2023	V1
16 & 17	24-10-2023	V2
18 & 19	01-11-2023	V3
Apartment Block 3	08-03-2024	V4
Apartment Block 1	14-03-2024	V5
Apartment Block 2	19-03-2024	V6
136-138 and 147-148	15-05-2024	V7
130-135	28-06-2024	V8
123-127	06-08-2024	V9
119-122	22-08-2024	V10
112-114	23-08-2024	V11
117-118	06-09-2024	V12
105 - 107	16-09-2024	V13
95, 96, 101-104, 128, 129	23-09-2024	V14
139-146	16-09-2024	V15
91-94, 97, 98	02-10-2024	V16
99-100 and 91-92 garages	04-10-2024	V17
80-86	11-10-2024	V18
89-90	06-11-2024	V19
71-76	14-11-2024	V20
77-79 and 87-88	12-11-2024	V21
170-172	22-11-2024	V22
162-169	28-11-2024	V23
60-65	02-12-2024	V24
66-70	04-12-2024	V25
49-59 and 149-150	22-01-2025	V26
20-23	27-01-2025	V27
24-25	30-01-2025	V28
43-48, 155-159	20-02-2025	V29
29-30, 151-154	04-03-2025	V30
1-4, 33-36	12-03-2025	V31
31-32	18-03-2025	V32
26-28	20-03-2025	V33



WELDED GAS MEMBRANE VALIDATION

Complete

Score	12 / 13 (92.31%)	Flagged items	0	Actions	0
Site Name	Bennett Street				
Location	10 Bennett Street Manchester England M12 5NL United Kingdom (53.46842984011208, - 2.2084154749775258)				
Project Manager	Matt Dee				
Project number	15974				
Developer	Kellen				
Site representative Signature	 Martin Hudson 20 Mar 2025 1:35 PM GMT				
Conducted on	20 Mar 2025 1:04 PM GMT				
Prepared by	Thomas Walker				
Have you got the correct Gas Membrane detail (attached to the job in synergist)?	Yes				



<u>Gas Membrane Inspection</u>	11 / 12 (91.67%)
<u>Plot Inspection</u>	11 / 12 (91.67%)
Plot Inspection 1	11 / 12 (91.67%)
Plot Number	26-28
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes
 Photo 1	
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos where possible showing Label)	Black GP Titanflex
Installer's name, company and qualification	JCW
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 laid gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED	Pass
 Photo 2	
Are welds complete?	Yes
    Photo 3 Photo 4 Photo 5 Photo 6	
Are Joints lapped and sealed in accordance with manufacturer's requirements/ specification?	Yes



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

Pass



Photo 7



Photo 8



Photo 9

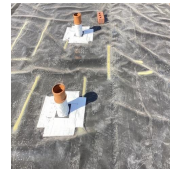


Photo 10

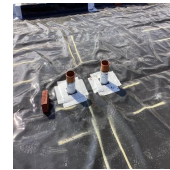


Photo 11



Photo 12



Photo 13



Photo 14



Photo 15

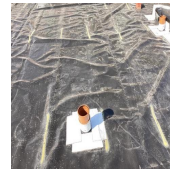


Photo 16

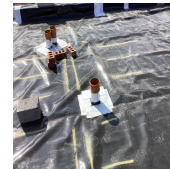


Photo 17



Photo 18



Photo 19



Photo 20

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

Pass



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



Photo 47

Are folds running in line with joints? (no joints cutting across folds)

Pass

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

Yes



Photo 48



Photo 49



Photo 50



Photo 51

Sealant to the underside of the membrane at the sole plate position (Check with PM if not noted on schedule)

N/A

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. (Lift back the membrane and photo the subfloor)

Pass



Photo 52

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

Pass



Photo 53

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



Photo 54



Photo 55



Photo 56

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





Photo 47



Photo 49



Photo 51



Photo 53

Photo 48



Photo 50



Photo 52



Photo 54



Photo 55



Photo 56



Floor Void Inspection

22 Jan 2025 / Jordan James

Complete

Score	4 / 4 (100%)
Site Name	Bennett st
Project Number	15974
Conducted on	22 Jan 2025 9:20 AM GMT
Prepared by	Jordan James

Location

20 Stone Yard Close
Manchester
England
M12
United Kingdom
(53.47074978574324, -
2.208280331766715)

<u>Plot Inspection</u>	4 / 4 (100%)
Plot Inspection 1	2 / 2 (100%)
Plot Number	24
Is the void clear?	Yes
Depth of Void	250



Photo 1

Are Sleeper Walls Vented?

Yes



Photo 2

Plot Inspection 2	2 / 2 (100%)
Plot Number	25
Is the void clear?	Yes
Depth of Void	200



Photo 3

Are Sleeper Walls Vented?

Yes



Photo 4



Media summary



Photo 1



Photo 2



Photo 3



Photo 4