Date: 2nd December 2024
Reference: 15-974 V24

GAS MEMBRANE VALIDATION – BENNETT STREET

Project Name:	Bennett Street
Project Number:	15-974
Client:	Kellen Homes
Date:	02-12-2024
Project Manager:	M. Dee
Engineer:	S. Juhasz
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:	60-65

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 100-104, 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 60-65 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

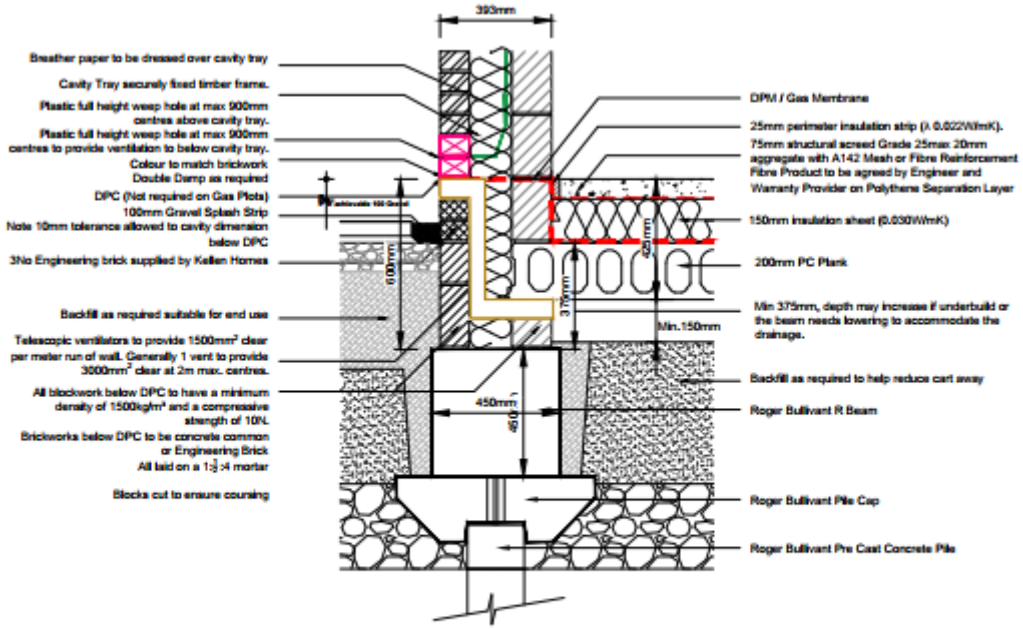
GP® TITANFLEX®

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/m²
Hydraulic Press	Water Vapour Transmission Rate	EN 1931	0.11 - 0.18 g/m²/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
	Resistance to Chemicals	EN 1296/EN 1928	Pass
Compliance and Certification	CE Mark - EN13967:2012		
	NHBC Standards Compliant		
	CIRIA C748 Compliant		
	BS 8485:2015 Compliant		
Vapour Permeability 100% Concentration	Transmission Rate of Benzene	EN ISO 15105-2	< 3.6 mg/m²/day
	Transmission Rate of Toluene	EN ISO 15105-2	< 13.8 mg/m²/day
	Transmission Rate of Ethyl Benzene	EN ISO 15105-2	< 2.7 mg/m²/day
	Transmission Rate of Xylenes (M,P,O)	EN ISO 15105-2	< 7.7 mg/m²/day
	Transmission Rate of Hexane	EN ISO 15105-2	< 0.6 mg/m²/day
	Transmission Rate of Vinyl Chloride	EN ISO 15105-2	< 0.05 mg/m²/day
	Transmission Rate of Trichloroethene (TCE)	EN ISO 15105-2	< 54.7 mg/m²/day
	Transmission Rate of Tetrachloroethene (PCE)	EN ISO 15105-2	< 26.2 mg/m²/day
	Transmission Rate of Naphthalene	EN ISO 15105-2	< 0.0006 mg/m²/day
	Transmission Rate of CIS-1,2-Dichloroethylene	EN ISO 15105-2	< 1.1 mg/m²/day
Gas Permeability	Methane Permeability	EN ISO 15105-1	0.13 ml/m²/day/atm
	Methane Permeability (Jointed)	EN ISO 15105-1	1.00 ml/m²/day/atm
	Carbon Dioxide Permeability	EN ISO 15105-1	3.01 ml/m²/day/atm
	Vinyl Chloride Gas Permeability	EN ISO 15105-1	0.04 ml/m²/day/atm
	Radon Permeability	K124/02/95	1.0 x 10^{-12} m²/S

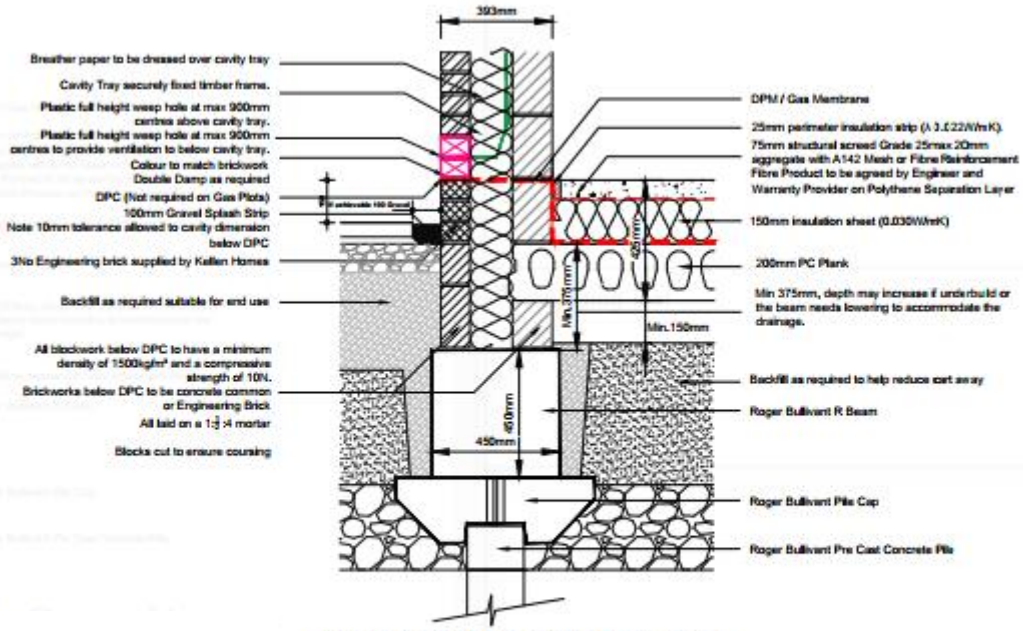
JUTA | TITANTECH

Juta.co.uk

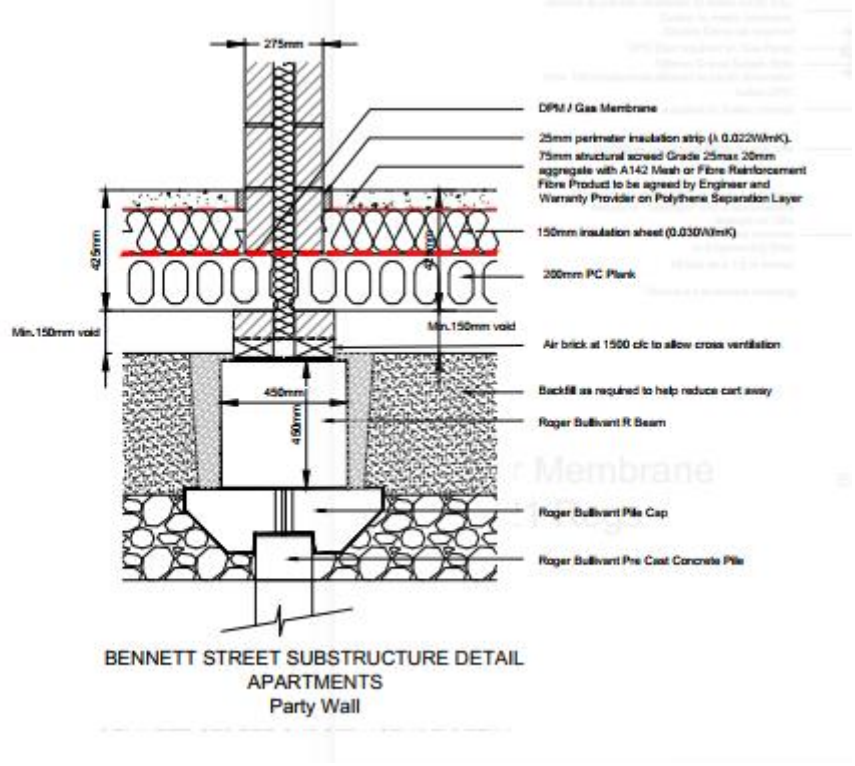
STRUCTURAL ENGINEER'S SUBSTRUCTURE DESIGN



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

WELDED GAS MEMBRANE VALIDATION

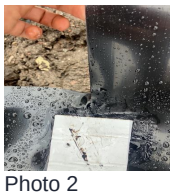
Complete

Score	73 / 73 (100%)	**Flagged items**	0	**Actions**	0

Site Name	Bennett Street
Location	131 Anthony Close Manchester England M12 5ED United Kingdom (53.470847215582815, -2.207613980002871)
Project Manager	Matt Dee
Project number	15-974
Developer	Kellen Homes Limited
Site representative Signature	 Martin 2 Dec 2024 11:15 AM GMT
Conducted on	2 Dec 2024 10:35 AM GMT
Prepared by	Sam Juhasz
Have you got the correct Gas Membrane detail (attached to the job in synergist)?	Yes

Gas Membrane Inspection	72 / 72 (100%)
Plot Inspection	72 / 72 (100%)
Plot Inspection 1	12 / 12 (100%)
Plot Number	60
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos were possible showing Label)	Juta TitanFlex
Installer's name, company and qualification	PRS
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
Are welds complete?	Yes

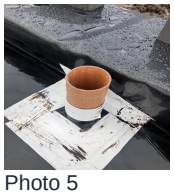

Photo 1


Photo 2

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 3


Photo 4


Photo 5

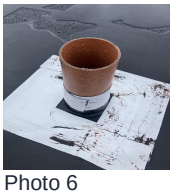

Photo 6


Photo 7


Photo 8

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


Photo 9


Photo 10


Photo 11


Photo 12


Photo 13


Photo 14

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 15


Photo 16


Photo 17

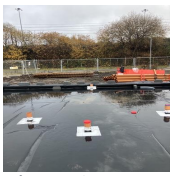

Photo 18


Photo 19


Photo 20

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 21

Slab / membrane condition (is membrane clear of snow, standing water, 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 22


Photo 23


Photo 24


Photo 25


Photo 26


Photo 27

Plot Inspection 2	12 / 12 (100%)
Plot Number	61
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos were possible showing Label)	Juta TitanFlex
Installer's name, company and qualification	PRS
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
Are welds complete?	Yes


Photo 28


Photo 29

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 30


Photo 31

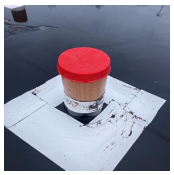

Photo 32


Photo 33


Photo 34


Photo 35

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


Photo 36


Photo 37


Photo 38


Photo 39

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 40


Photo 41


Photo 42


Photo 43


Photo 44


Photo 45

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 46

Slab / membrane condition (is membrane clear of snow, standing water, 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) Only on one side	Pass

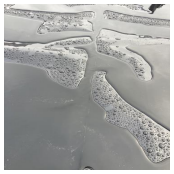

Photo 47


Photo 48

Plot Inspection 3	12 / 12 (100%)
Plot Number	62
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes

Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos were possible showing Label)	Juta TitanFlex
Installer's name, company and qualification	PRS
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
Are welds complete?	Yes


Photo 49


Photo 50

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 51


Photo 52


Photo 53


Photo 54


Photo 55


Photo 56


Photo 57

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


Photo 58


Photo 59


Photo 60

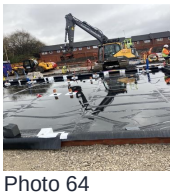

Photo 61

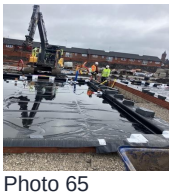

Photo 62

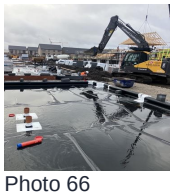

Photo 63

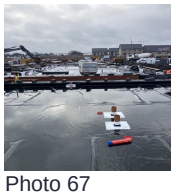
Are folds running in line with joints? (no joints cutting across folds)	Pass

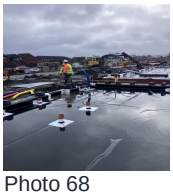
Extent of Coverage: Is the membrane covering the entire plot? Does membrane span over outside walls?	Yes


Photo 64


Photo 65


Photo 66


Photo 67


Photo 68

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 69

Slab / membrane condition (is membrane clear of snow, standing water, 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 70


Photo 71


Photo 72


Photo 73


Photo 74


Photo 75

Plot Inspection 4	12 / 12 (100%)
Plot Number	63
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos were possible showing Label)	Juta TitanFlex
Installer's name, company and qualification	PRS

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
Are welds complete?	Yes


Photo 76


Photo 77

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 78


Photo 79


Photo 80


Photo 81


Photo 82


Photo 83

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


Photo 84


Photo 85


Photo 86


Photo 87


Photo 88


Photo 89

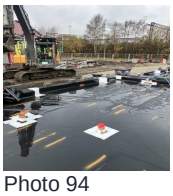

Photo 90

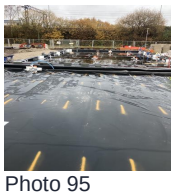

Photo 91


Photo 92


Photo 93

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 94


Photo 95

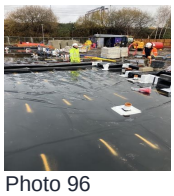
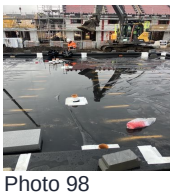

Photo 96


Photo 97


Photo 98

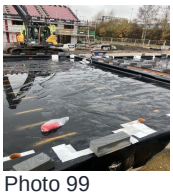

Photo 99


Photo 100

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 101

Slab / membrane condition (is membrane clear of snow, standing water, 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

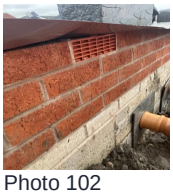

Photo 102


Photo 103

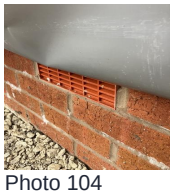

Photo 104


Photo 105


Photo 106

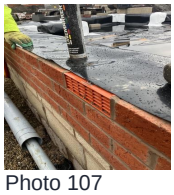

Photo 107


Photo 108


Photo 109


Photo 110


Photo 111

Plot Inspection 5	12 / 12 (100%)
Plot Number	64
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos were possible showing Label)	Juta TitanFlex
Installer's name, company and qualification	PRS
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
Are welds complete?	Yes

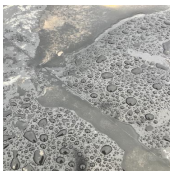

Photo 112


Photo 113

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 114


Photo 115


Photo 116

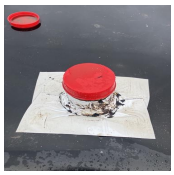

Photo 117


Photo 118

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


Photo 119


Photo 120


Photo 121


Photo 122


Photo 123


Photo 124


Photo 125


Photo 126

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 127


Photo 128


Photo 129


Photo 130


Photo 131

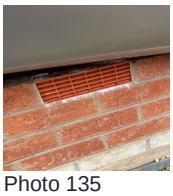

Photo 132

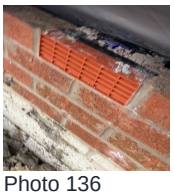

Photo 133

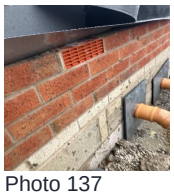
Condition of sub-grade and underside of gas membrane: Check that the subgrade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria. (Lift back the membrane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

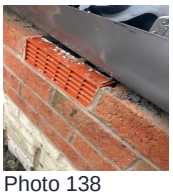

Photo 134

Slab / membrane condition (is membrane clear of snow, standing water, 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 135


Photo 136


Photo 137


Photo 138

Plot Inspection 6	12 / 12 (100%)
Plot Number	65
Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos were possible showing Label)	Juta TitanFlex
Installer's name, company and qualification	PRS
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
Are welds complete?	Yes


Photo 139

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 140


Photo 141


Photo 142


Photo 143


Photo 144


Photo 145

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


Photo 146


Photo 147


Photo 148


Photo 149


Photo 150


Photo 151

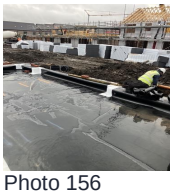

Photo 152

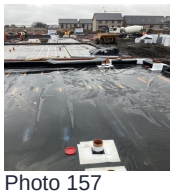

Photo 153


Photo 154


Photo 155

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 156


Photo 157

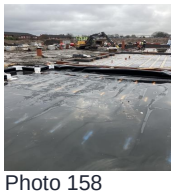
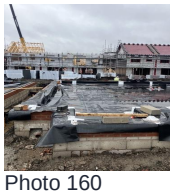

Photo 158


Photo 159


Photo 160

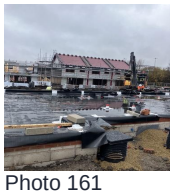

Photo 161


Photo 162


Photo 163

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 164

Slab / membrane condition (is membrane clear of snow, standing water, 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

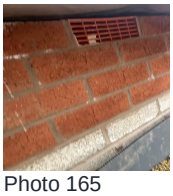
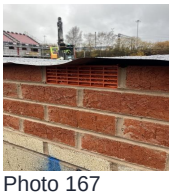
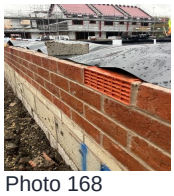
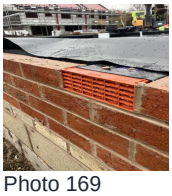
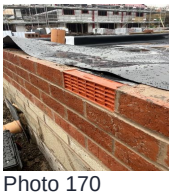

Photo 165

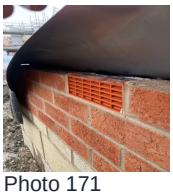

Photo 166


Photo 167


Photo 168


Photo 169


Photo 170


Photo 171

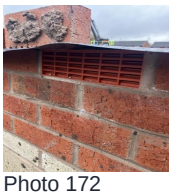

Photo 172


Photo 173

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

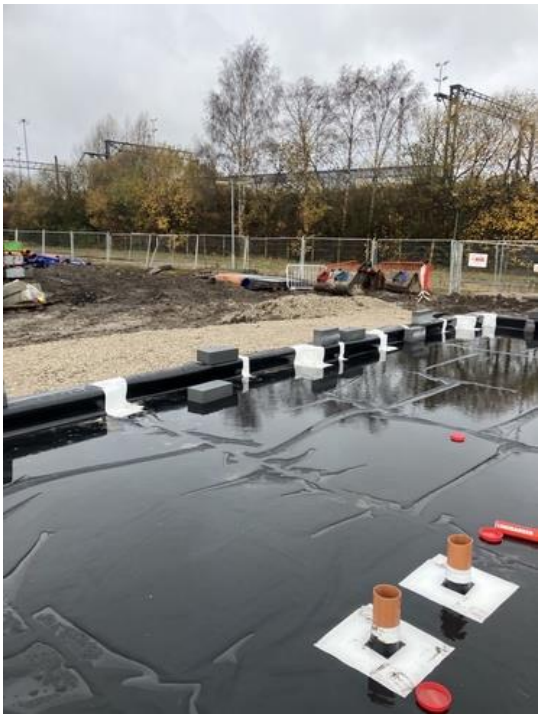


Photo 42



Photo 43



Photo 44



Photo 45



Photo 46



Photo 47



Photo 48



Photo 49



Photo 50



Photo 51



Photo 52



Photo 53



Photo 54



Photo 55



Photo 56



Photo 57



Photo 58



Photo 59



Photo 60



Photo 61



Photo 62



Photo 63



Photo 64



Photo 65



Photo 66



Photo 67



Photo 68



Photo 69



Photo 70



Photo 71



Photo 72



Photo 73



Photo 74



Photo 75



Photo 76



Photo 77



Photo 78



Photo 79



Photo 80



Photo 81



Photo 82



Photo 83



Photo 84



Photo 85



Photo 86



Photo 87



Photo 88



Photo 89



Photo 90



Photo 91



Photo 92



Photo 93



Photo 94

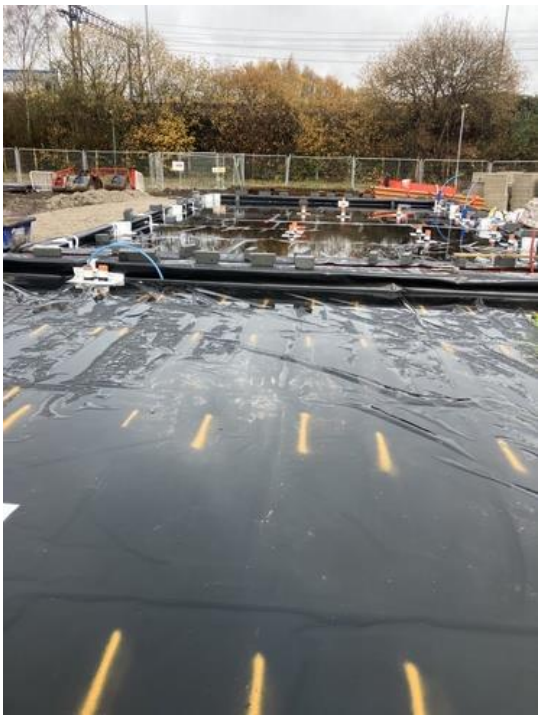


Photo 95



Photo 96



Photo 97



Photo 98



Photo 99



Photo 100



Photo 101



Photo 102



Photo 103



Photo 104



Photo 105



Photo 106



Photo 107



Photo 108



Photo 109



Photo 110



Photo 111



Photo 112



Photo 113



Photo 114



Photo 115



Photo 116

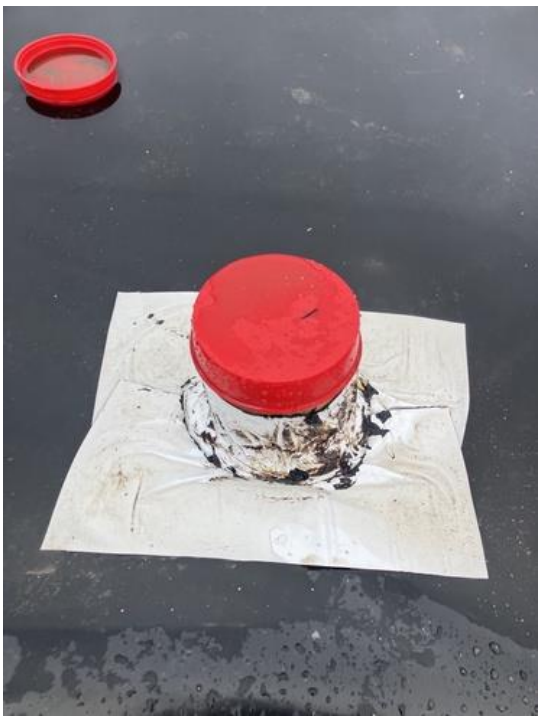


Photo 117



Photo 118



Photo 119



Photo 120



Photo 121



Photo 122



Photo 123



Photo 124



Photo 125



Photo 126



Photo 127



Photo 128



Photo 129



Photo 130



Photo 131



Photo 132



Photo 133



Photo 134



Photo 135



Photo 136



Photo 137



Photo 138



Photo 139



Photo 140



Photo 141



Photo 142



Photo 143



Photo 144



Photo 145



Photo 146



Photo 147



Photo 148



Photo 149



Photo 150



Photo 151



Photo 152



Photo 153



Photo 154



Photo 155



Photo 156



Photo 157



Photo 158



Photo 159



Photo 160



Photo 161

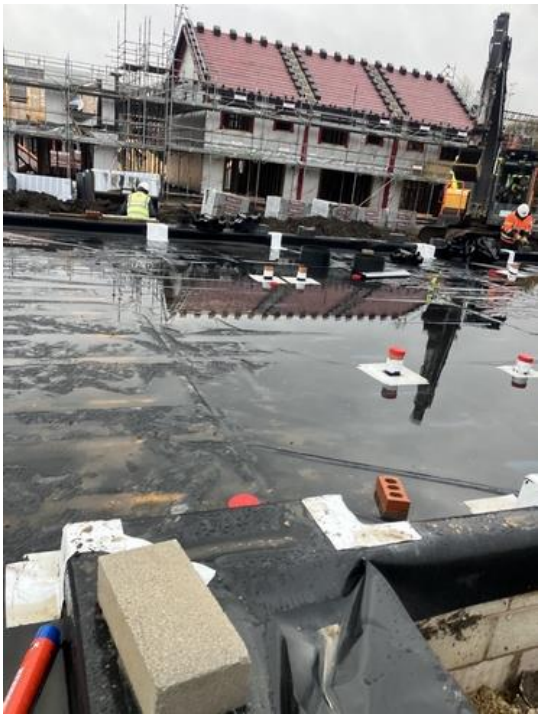


Photo 162



Photo 163



Photo 164



Photo 165



Photo 166



Photo 167



Photo 168



Photo 169



Photo 170



Photo 171



Photo 172



Photo 173

SUB-FLOOR VOID PHOTOS

	
Plot 101	Plot 102
	
Plot 103	Plot 104



Plot 101/102