PresWall

Technical and Operational Commentary

December 2010

Second publication 18th February 2011

Introduction

"PresWall" delivers a certified high performance closed wall system delivering the fabric performance to meet the increasingly demanding regulations.

System Description

The external wall panels are described as "PresWall 17" and "PresWall 21". Please note the capitalisation of the words which mimic our PresWeb and PresPeak nomenclature.

The 17 system delivers a minimum U value of 0.17 W/m²K and the 21 system a value of 0.21 W/m²K, but note from the table the slight variances between cladding and masonry. The table below describes the construction as applied to buildings with either Masonry (M) or lightweight cladding (C)

Table 1 PresWall Construction

	PresWall 17M	PresWall 17C
PresWall 17	Masonry	Cladding + 25mm cavity
	50mm cavity	50mm Dritherm (by Client)
	TF200 Thermo	TF200 Membrane
	9mm OSB	9mm OSB
	140mm Stud	140mm Stud
	130mm Celotex XR4130	130mm Celotex XR4130
	VC Foil	VC Foil
	25mm Batten	25mm Batten
	0.17 W/m²K	0.16 W/m²K

	PresWall 21M	PresWall 21C
PresWall 21	Masonry	Cladding + 25mm cavity
	50mm cavity	
	TF200 Membrane	TF200 Membrane
	9mm OSB	9mm OSB
	140mm Stud	140mm Stud
	120mm Celotex XR4130	**120**mm Celotex XR4130
	VC Foil	VC Foil
	25mm Batten	25mm Batten
	0.2 W/m²K	0.21 W/m²K

(Note: Celotex Insulation can be substituted with any compliant 0.022 rigid insulation. Technical approval required for substitutes)

Typical thicknesses are 327mm (Ex plasterboard) for masonry and 261mm for cladding (Ex plasterboard) allowing a 12mm thick cladding board.

In addition the system also includes pre-insulated party wall which consists of the following:

25mm batten; polythene barrier; 89mm stud filled with Isowool, 9mm OSB (9mm Multipro if a fire compartment wall) 54mm gap and then repeat the panel.

These walls systems are combined with an air leakage membrane around the floor zone (Glidevale FCM750)

Technical Commentary

The energy performance of a building's fabric is dependent on three functions:

1. *Air Leakage*
   Warm air inside a building which leaks uncontrollably through the fabric represents a waste of energy. The 2010 regulations limit this to a maximum value of 10m³/h.m² at 50 Pa although it is far more usual for designers to require 5 m³/h.m² or even less.
   It should be noted that we cannot guarantee the achievement of a particular value. Air leakage is a team game which requires good workmanship from external joinery, services installation and plumbers. We can however assist by detailing our frame with wide DPCs at soleplate to lap with the internal VCL combined with floor edge wraps which similarly lap to the wall VCL. It should be noted the Approved Document L treats individual apartments as dwellings which means the air leakage ratings are to be achieved for each apartment. On this basis floor wrap should be installed around the perimeter of each apartment including party walls.

2. *U Value*
   A U Value is a rating which indicates how much heat energy is lost through a typical 1m² of fabric. Edge conditions are completely ignored in this calculation and as such a U value only applies to a flat imperforate wall.
   The 2010 regulations limit the U value of walls to a minimum of 0.03 W/m².K. A graph showing the increase in cost vs the increase in insulation is shaped like a hockey stick with costs increasing disproportionately against insulation at 0.17 W/m².K. This is the reason why we chose 0.17 as our best U value in the system.

3. *Y Value*
   U Values only deal with blank walls with no edges but buildings have corners, junctions and perforations. The energy loss through these elements is dealt with by calculating the y value. The thermal modelling we have provides the SAP Assessor with Psi values. These values are applied to the **actual** lengths of the various junctions to yeald the resultant y value. It is therefore impossible to promise what a y value will be for any project until the actual calculation has been done. Generically, however, we can say that it will be better than the accredited details default value of 0.08. The impact of thermal modelling on the calculation of heat loss is greater for detached dwellings and least for apartments. This is due to the degree of influence of the external wall on the total fabric in any one dwelling.

The U Value and thermal modelling calculations for the system are based on 0.022 rigid insulation and Glidevale reflective membrane / foils.

To prevent excessive moisture uptake during site erection it is essential that all quilts within party walls are silicone treated (e.g. Isover quilt).

4. Vented or ventilated?

PresWall 17M relies on an external thermal membrane to achieve the U value. These membranes work by reflecting heat into the cavity thereby creating a warm blanket of air. Clearly if this "warm blanket" is ventilated away as it's created there is no performance enhancement.

Masonry cladding is "vented" as opposed to "ventilated". The open perpend joists only exist at one edge of the cavity (top or bottom but usually bottom to aid drainage) and are limited to an equivalent of one per 1.2m along each storey. This is very limited and only allows "vapour pressure" to dissipate from the cavity rather than promote positive cavity air movement. This is why the thermal membrane is effective for masonry but ineffective on ventilated cladding systems. The only way to caveat to this is where cladding systems are sealed with very limited venting equivalent to the masonry scenario. The NHBC only require ad drained and "VENTED" cavity behind cladding and as such it is possible to detail a cladding system that can utilise thermal breather membrane effectively. If in doubt, however, we should assume that the cavity on cladding systems is ventilated as this in reality is the far more common practice.

The Value of the PresWall Approach

- Efficiency of site process
- Time saving
- Less site waste
- Increased energy performance without additional cost which may result in cost savings either in fabric insulation or reduction in "renewable energy" technology
- Quality assurance

Appendices

Appendix 1 U Value Calculations for PresWall Systems

Appendix 2 Psi Values

Appendix 3 External Wall Options

Appendix 4 Standard Details

Publication History
First published 1st February 2011

Second publication 18th February 2011: Thermal modelling certificates and summary added. Manufacturing amended to explain correct position of insulation reflective face. Expanded explanation of vented and ventilated wall claddings added. Appendix expanded to include details.

Appendix 1 U Value Calculations for PresWall Systems

U-value calculation
by BRE U-value Calculator version 2.01
Printed on 02 Dec 2010 at 09:03

Filename: PresWall Plus 21 (Celotex version).uva (File saved: 02 Dec 2010 09:02)

Element type: Wall - Timber framed - insulation between studs
Calculation Method: BS EN ISO 6946

PresWall Plus 21 M

Layer	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.185			0.068		Plasterboard
2	25	R-value	0.120	0.150	0.780	0.208	Cavity unventilated
3							VC Foil
4	20	R-value	0.120	0.150	0.363	0.167	Cavity unventilated low-E (0.2)
5	120	0.022	0.120	0.150	5.455	1.000	timber frame
6	9	0.130			0.069		OSB + TF200 membrane
7	50	R-value			0.180		Cavity unventilated
8	102.5	0.770			0.133		Brick outer leaf
					0.040		Rse
	339 mm (total wall thickness)				7.217		

Total resistance: Upper limit: 5.548 Lower limit: 4.751 Ratio: 1.168 Average: 5.149 m²K/W

U-value (uncorrected) 0.194

U-value corrections
Air gaps in layer 5 ΔU = 0.006 (Level 1)

Total ΔU 0.006

U-value (corrected) 0.200
U-value (rounded) 0.20 W/m²K

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U-value calculation
by BRE U-value Calculator version 2.01
Printed on 02 Dec 2010 at 09:04

Filename: PresWall Plus 21 Clad (Celotex version).uva (File saved: 08 Sep 2010 13:45)

Element type: Wall - Timber framed - insulation between studs
Calculation Method: BS EN ISO 6946

PresWall Plus 21 C

Layer	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.185			0.068		Plasterboard
2	25	R-value	0.120	0.150	0.780	0.208	Cavity unventilated
3							VC Foil vapour Control Layer
4	20	R-value	0.120	0.150	0.363	0.167	Cavity unventilated low-E (0.2)
5	120	0.022	0.120	0.150	5.455	1.000	timber frame
6	9	0.130			0.069		OSB + TF200 membrane
7	50	R-value					Cavity ventilated
8	10	0.360					cement board
					0.130 #		Rse
	247 mm (total wall thickness)				6.994		

this resistance substitutes for Rse and the resistance of layers 7-8 because of the ventilated air layer (layer 7)

Total resistance: Upper limit: 5.256 Lower limit: 4.528 Ratio: 1.161 Average: 4.892 m²K/W

U-value (uncorrected) 0.2044

U-value corrections
Air gaps in layer 5 ΔU = 0.0061 (Level 1)

Total ΔU 0.0061

U-value (corrected) 0.211
U-value (rounded) 0.21 W/m²K

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U-value calculation
by BRE U-value Calculator version 2.01
Printed on 02 Dec 2010 at 12:08

Filename: PresWall Plus 17 (Celotex version).uva (File saved: 02 Dec 2010 12:07)

Element type: Wall - Timber framed - insulation between studs
Calculation Method: BS EN ISO 6946

PresWall Plus 17 M

Layer	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.185			0.068		Plasterboard
2	25	R-value			0.780		Cavity unventilated
3							VC Foil vapour Control Layer
4	10	R-value	0.120	0.150	0.363	0.083	Cavity unventilated low-E (0.2)
5	130	0.022	0.120	0.150	5.909	1.083	timber frame
6	9	0.130			0.069		OSB + TF200 Thermo membrane
7	50	R-value			0.770		Cavity unventilated
8	102.5	0.770			0.133		Brick outer leaf
					0.040		Rse
	339 mm (total wall thickness)				8.262		

Total resistance: Upper limit: 6.649 Lower limit: 5.774 Ratio: 1.152 Average: 6.211 m²K/W

U-value (uncorrected) 0.161

U-value corrections
Air gaps in layer 5 ΔU = 0.005 (Level 1)

Total ΔU 0.005

U-value (corrected) 0.166
U-value (rounded) 0.17 W/m²K

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U-value calculation
by BRE U-value Calculator version 2.01
Printed on 02 Dec 2010 at 12:11

Filename: PresWall Plus 17 Clad (Celotex).uva (File saved: 02 Dec 2010 12:10)

Element type: Wall - Timber framed - insulation between studs
Calculation Method: BS EN ISO 6946

PresWall Plus 17 C

Layer	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.185			0.068		Plasterboard
2	25	R-value	0.120	0.150	0.780	0.208	Cavity unventilated
3							VC Foil
4	10	R-value[1]			0.363		Cavity unventilated
5	130	0.022	0.120	0.150	5.909	1.083	timber frame
6	9	0.130			0.069		OSB + TF200
7	50	0.035	0.120	0.150	1.429	0.417	Dritherm
8	25	R-value					Cavity ventilated
9	3	0.230					Cement-bonded particleboard
					0.130 #		Rse
	265 mm (total wall thickness)				8.877		

[1]Specified thermal resistance
this resistance substitutes for Rse and the resistance of layers 8-9 because of the ventilated air layer (layer 8)

Total resistance: Upper limit: 7.219 Lower limit: 5.902 Ratio: 1.223 Average: 6.560 m²K/W

U-value (uncorrected) 0.1524

U-value corrections
Air gaps in layer 5 ΔU = 0.0044 (Level 1)

Total ΔU 0.0044

U-value (corrected) 0.157
U-value (rounded) 0.16 W/m²K

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Appendix 2 Psi Values

Linear Thermal Transmittance (Ψ) and Temperature Factor (*f*)

Prestoplan Limited

TM #2

Preswall 17M

(102mm Brick/ 50mm Low-e Cavity/ 9mm OSB/ 140mm Stud + 130mm Celotex XR4130/ 25mm Low-e + Battens/ 12.5mm Plasterboard)

Description	Cert. No.	Initial y	Accredited	Improvement	Initial 'f'
External Corner	C4TM- 000489	0.040	0.090	55.6%	0.863
Internal Corner	C4TM- 000490	-0.023	-0.090	74.4%	0.958
Party Wall	C4TM- 000491	0.079	0.060	-31.7%	0.930
Intermediate Floor	C4TM- 000492	0.067	0.070	4.3%	0.887
Party Floor	C4TM- 000493	0.106	0.140	24.3%	0.926
Eaves, Minimum Roof U-value 0.11	C4TM- 000494	0.052	0.060	12.9%	0.894
Gable, Minimum Roof U-value 0.11	C4TM- 000495	0.036	0.240	85.0%	0.917
Lintel @ Eaves	C4TM- 000496	0.092	0.500	81.7%	0.879
Lintel @ Intermediate Floor	C4TM- 000497	0.028	0.500	94.4%	0.909
Cill	C4TM- 000498	0.070	0.040	-75.0%	0.840
Jamb	C4TM- 000499	0.050	0.050	0.0%	0.891

Preswall 17C

(Cladding/ 25mm Cavity/ 50mm MW/ 9mm OSB/ 140mm Stud + 130mm Celotex XR4130/ 25mm Low-e + Battens/ 12.5mm Plasterboard)

Description	Cert. No.	Initial y	Accredited	Improvement	Initial 'f'
External Corner	C4TM- 000500	0.040	0.090	55.6%	0.899
Internal Corner	C4TM- 000501	-0.026	-0.090	71.1%	0.975
Party Wall	C4TM- 000502	0.071	0.060	-18.3%	0.953
Intermediate Floor	C4TM- 000503	0.052	0.070	25.7%	0.923
Party Floor	C4TM- 000504	0.134	0.140	4.3%	0.957
Eaves, Minimum Roof U-value 0.11	C4TM- 000505	0.055	0.060	8.3%	0.895
Gable, Minimum Roof U-value 0.11	C4TM- 000506	0.035	0.240	85.4%	0.925
Lintel @ Eaves	C4TM- 000507	0.089	0.500	82.2%	0.879
Lintel @ Intermediate Floor	C4TM- 000508	0.036	0.500	92.8%	0.901
Cill	C4TM- 000509	0.027	0.040	32.5%	0.923
Jamb	C4TM- 000510	0.039	0.050	22.0%	0.910

Prestoplan Limited

TM #2

Preswall 21M

(102mm Brick/ 50mm Ordinary Cavity/ 9mm OSB/ 140mm Stud + 120mm Celotex XR4120/ 25mm Low-e + Battens/ 12.5mm Plasterboard)

Description	Cert. No.	Initial y	Accredited	Improvement	Initial 'f'
External Corner	C4TM- 000511	0.043	0.090	52.2%	0.853
Internal Corner	C4TM- 000512	-0.015	-0.090	83.3%	0.946
Party Wall	C4TM- 000513	0.081	0.060	-35.0%	0.924
Intermediate Floor	C4TM- 000514	0.079	0.070	-12.9%	0.895
Party Floor	C4TM- 000515	0.125	0.140	10.7%	0.927
Eaves, Minimum Roof U-value 0.11	C4TM- 000516	0.050	0.060	16.7%	0.894
Gable, Minimum Roof U-value 0.11	C4TM- 000517	0.041	0.240	82.9%	0.910
Lintel @ Eaves	C4TM- 000518	0.094	0.500	81.2%	0.879
Lintel @ Intermediate Floor	C4TM- 000519	0.035	0.500	93.0%	0.895
Cill	C4TM- 000520	0.070	0.040	-75.0%	0.840
Jamb	C4TM- 000521	0.065	0.050	-30.0%	0.869

Preswall 21C

(Cladding/ 25mm Well Ventilated Cavity/ 9mm OSB/ 140mm Stud + 120mm Celotex XR4120/ 25mm Low-e + Battens/ 12.5mm Plasterboard)

Description	Cert. No.	Initial y	Accredited	Improvement	Initial 'f'
External Corner	C4TM- 000522	0.046	0.090	48.9%	0.882
Internal Corner	C4TM- 000523	-0.003	-0.090	96.7%	0.955
Party Wall	C4TM- 000524	0.100	0.060	-66.7%	0.937
Intermediate Floor	C4TM- 000525	0.088	0.070	-25.7%	0.888
Party Floor	C4TM- 000526	0.139	0.140	0.7%	0.922
Eaves, Minimum Roof U-value 0.11	C4TM- 000527	0.051	0.060	15.0%	0.908
Gable, Minimum Roof U-value 0.11	C4TM- 000528	0.047	0.240	80.4%	0.910
Lintel @ Eaves	C4TM- 000529	0.093	0.500	81.4%	0.879
Lintel @ Intermediate Floor	C4TM- 000530	0.036	0.500	92.8%	0.893
Cill	C4TM- 000531	0.034	0.040	15.0%	0.906
Jamb	C4TM- 000532	0.062	0.050	-24.0%	0.878

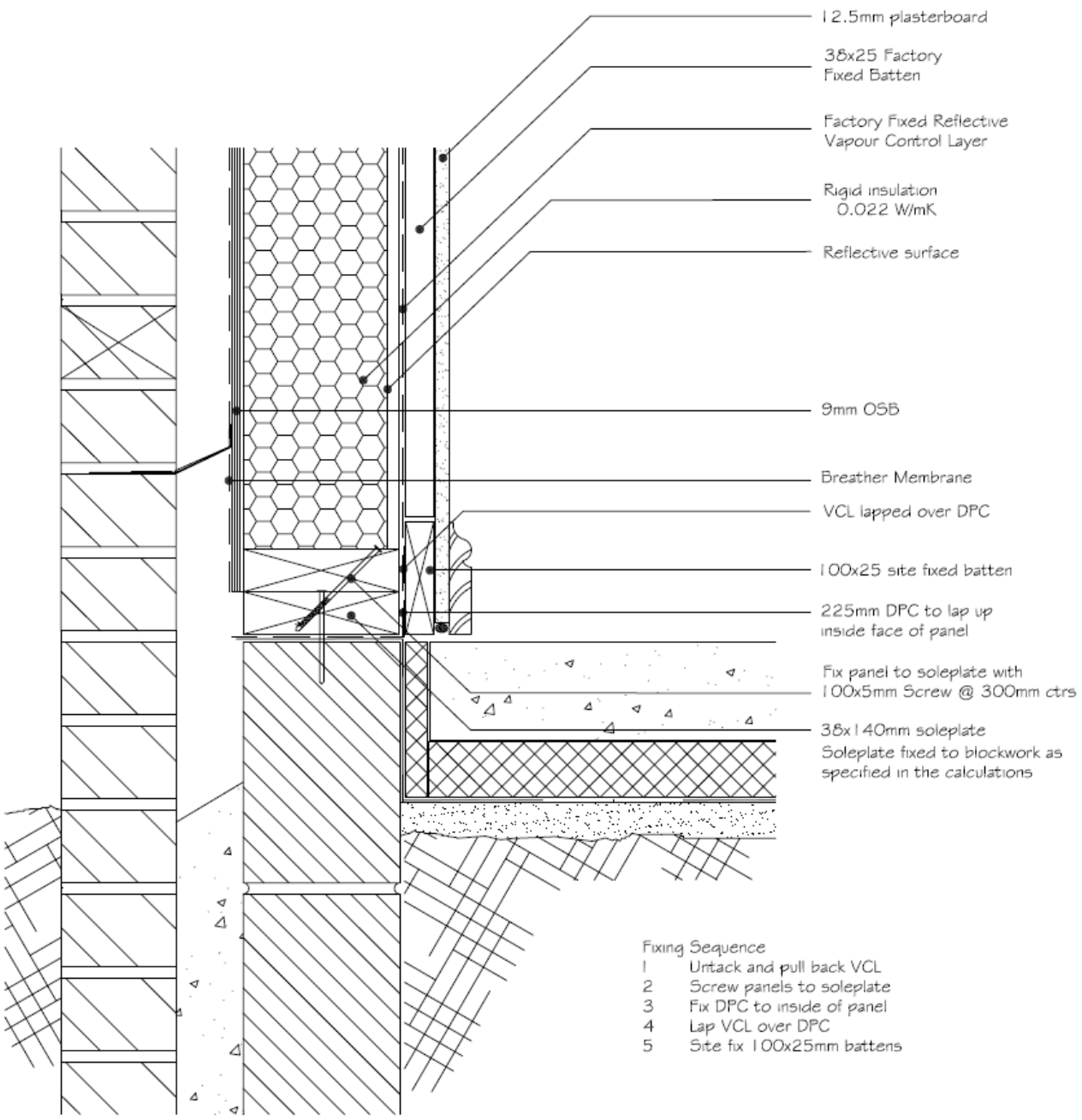
Appendix 3 External Wall Options

89 mm Stud options (Masonry)					
No	Cavity	Outer Membrane	Stud fill	Inner Membrane	U Value W/m^2K
1	Clear	TF200	80mm Celotex	Polythene + battens	0.32
2	Clear	TF200 Thermo	80mm Celotex	Polythene + battens	0.27
3	Clear	TF200	80mm Celotex	VC Foil + battens	0.25
4	Clear	TF200 Thermo	80mm Celotex	VC Foil + battens	0.22
5	50mm Dritherm	TF200	80mm Celotex	VC Foil + battens	0.2

140 mm Stud options (Masonry)					
No	Cavity	Outer Membrane	Stud fill	Inner Membrane	U Value W/m^2K
1	Clear	TF200	100mm Celotex	Polythene + battens	0.26
2	Clear	TF200 Thermo	100mm Celotex	Polythene + battens	0.22
3	Clear	TF200 Thermo	100mm Celotex	VC Foil + battens	0.19
4	50mm Dritherm	TF200	100mm Celotex	VC Foil + battens	0.18
5	50mm Dritherm	TF200	120mm Celotex	VC Foil + battens	0.16

140 mm Stud options (Cladding)					
No	Cavity	Outer Membrane	Stud fill	Inner Membrane	U Value W/m^2K
1	Clear	TF200	100mm Celotex	Polythene + battens	0.26
2	Clear	TF200	120mm Celotex	Polythene + battens	0.23
3	Clear	TF200	130mm Celotex	Polythene + battens	0.23
4	Clear	TF200	100mm Celotex	VC Foil + battens	0.23
5	Clear	TF200	120mm Celotex	VC Foil + battens	0.21
6	Clear	TF200	130mm Celotex	VC Foil + battens	0.2
7	50mm Dritherm	TF200	100mm Celotex	VC Foil + battens	0.18
8	50mm Dritherm	TF200	130mm Celotex	Polythene + battens	0.17
9	50mm Dritherm	TF200	130mm Celotex	VC Foil + battens	0.16

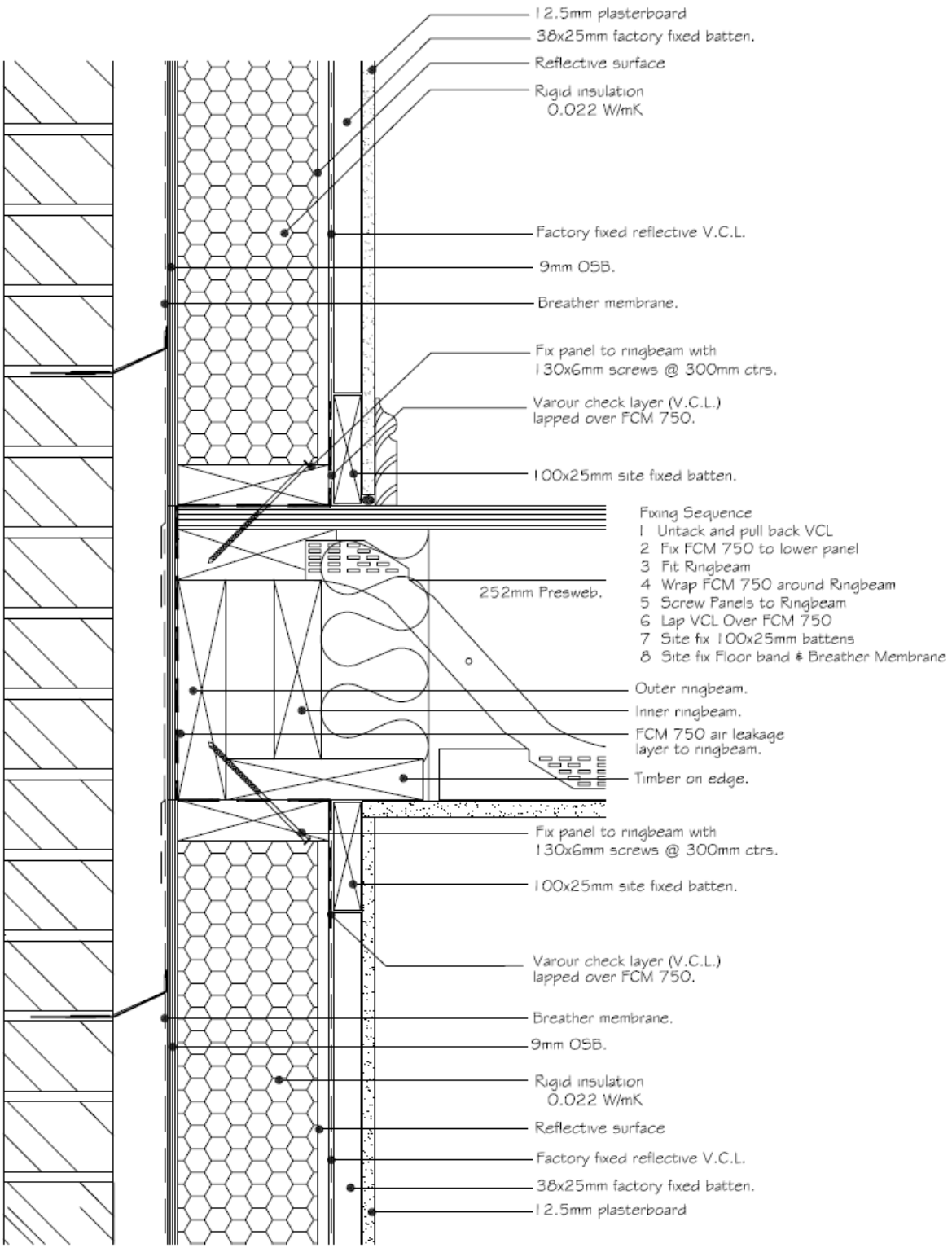
Appendix 4 Standard Details



Fixing Sequence

1 Untack and pull back VCL
2 Screw panels to soleplate
3 Fix DPC to inside of panel
4 Lap VCL over DPC
5 Site fix 100x25mm battens

Prestoplan	PANEL FIXING TO SOLEPLATE	Detail N°. 3.300
		Revision: AA
	Section: 3.3 PRESWALL	Scale 1/5



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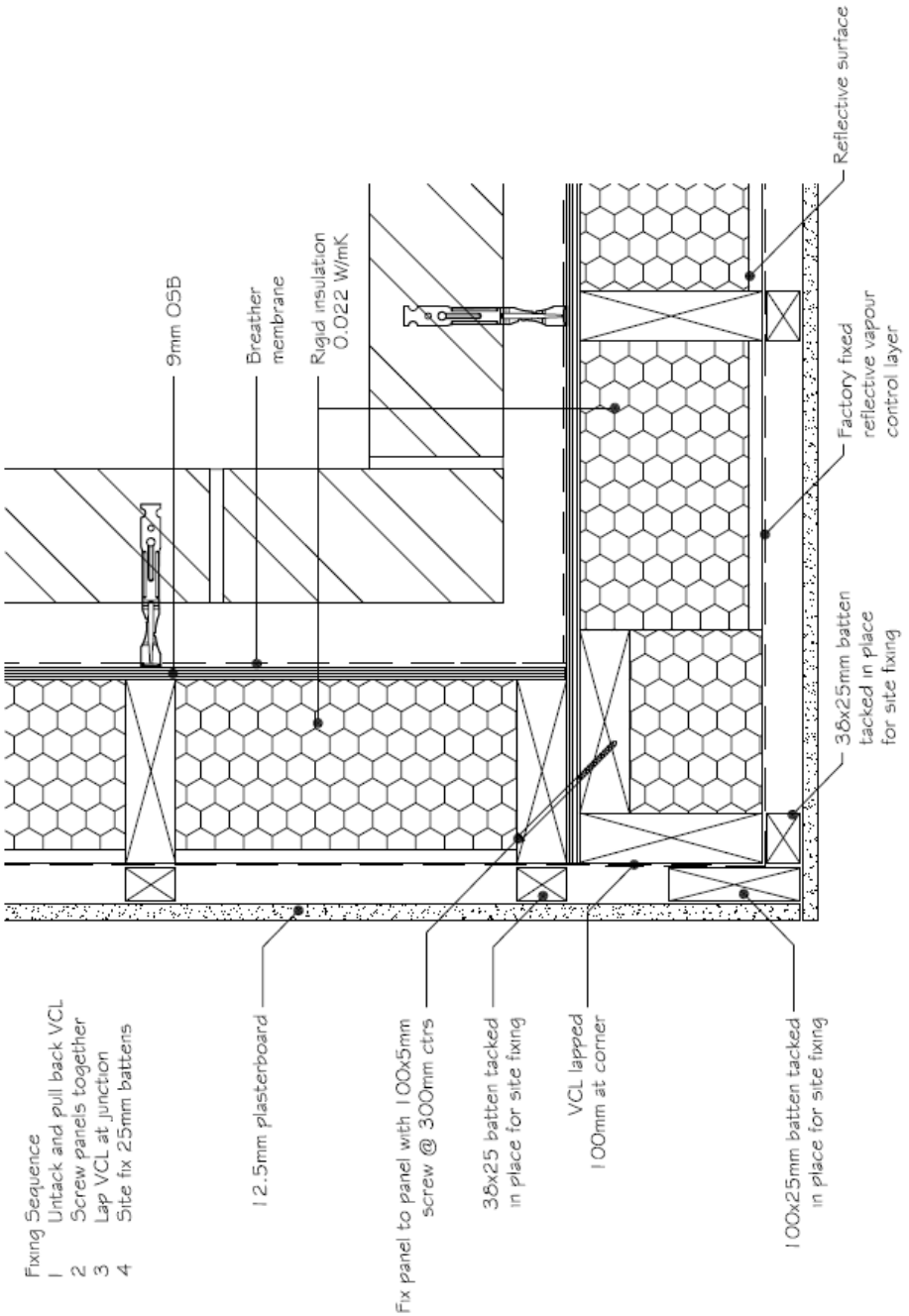
		Revision:	AA
	Section: 3.3 PRESWALL	Scale	1/5



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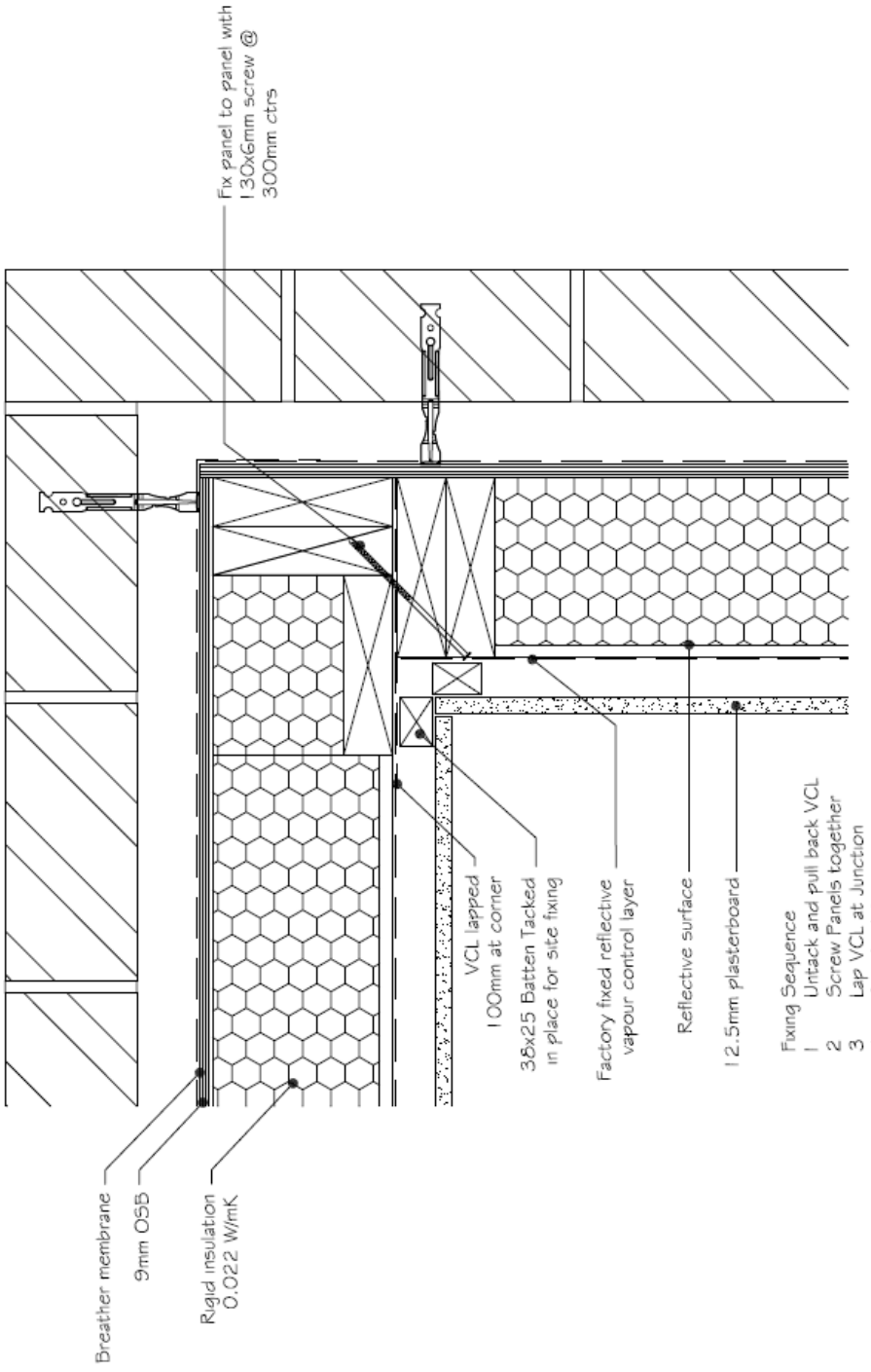
		Revision: AA
	Section: 3.3 PRESWALL	Scale 1/5



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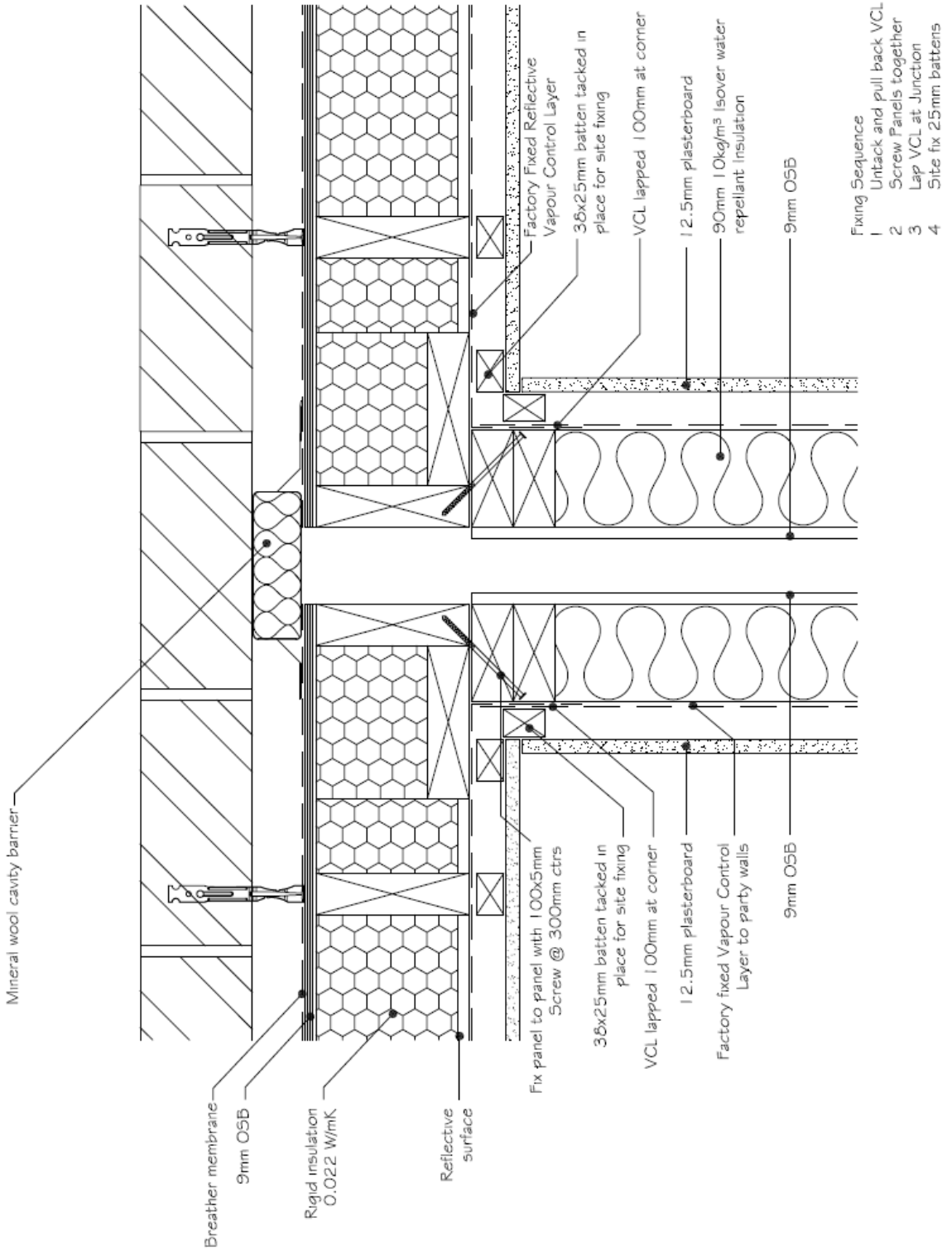
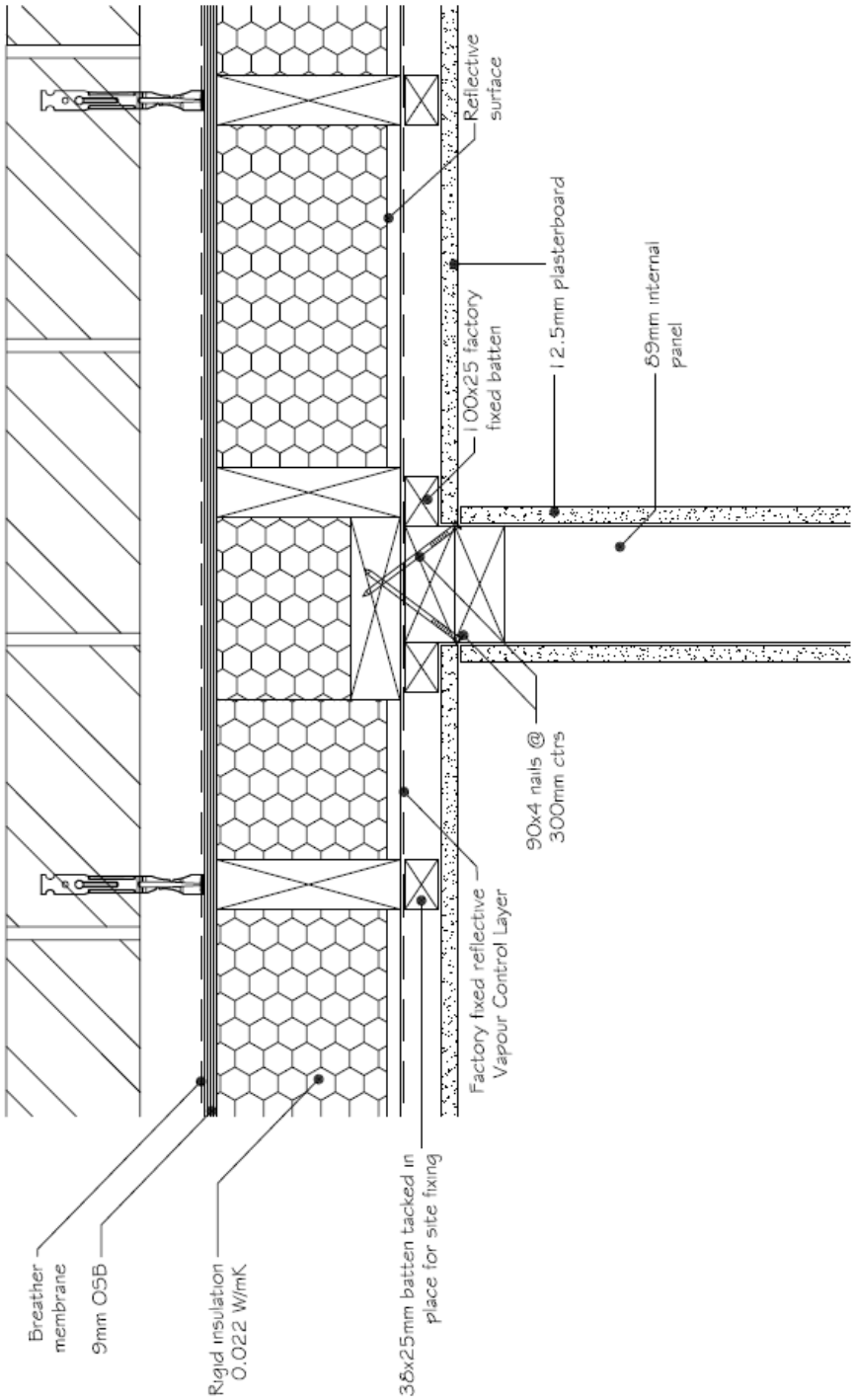
		Revision:	AA
	Section: 3.3 PRESWALL	Scale	1/5



Prestoplan	PARTY WALL JUNCTION	Detail N°. 3.340
		Revision: AA
	Section: 3.3 PRESWALL	Scale 1/5



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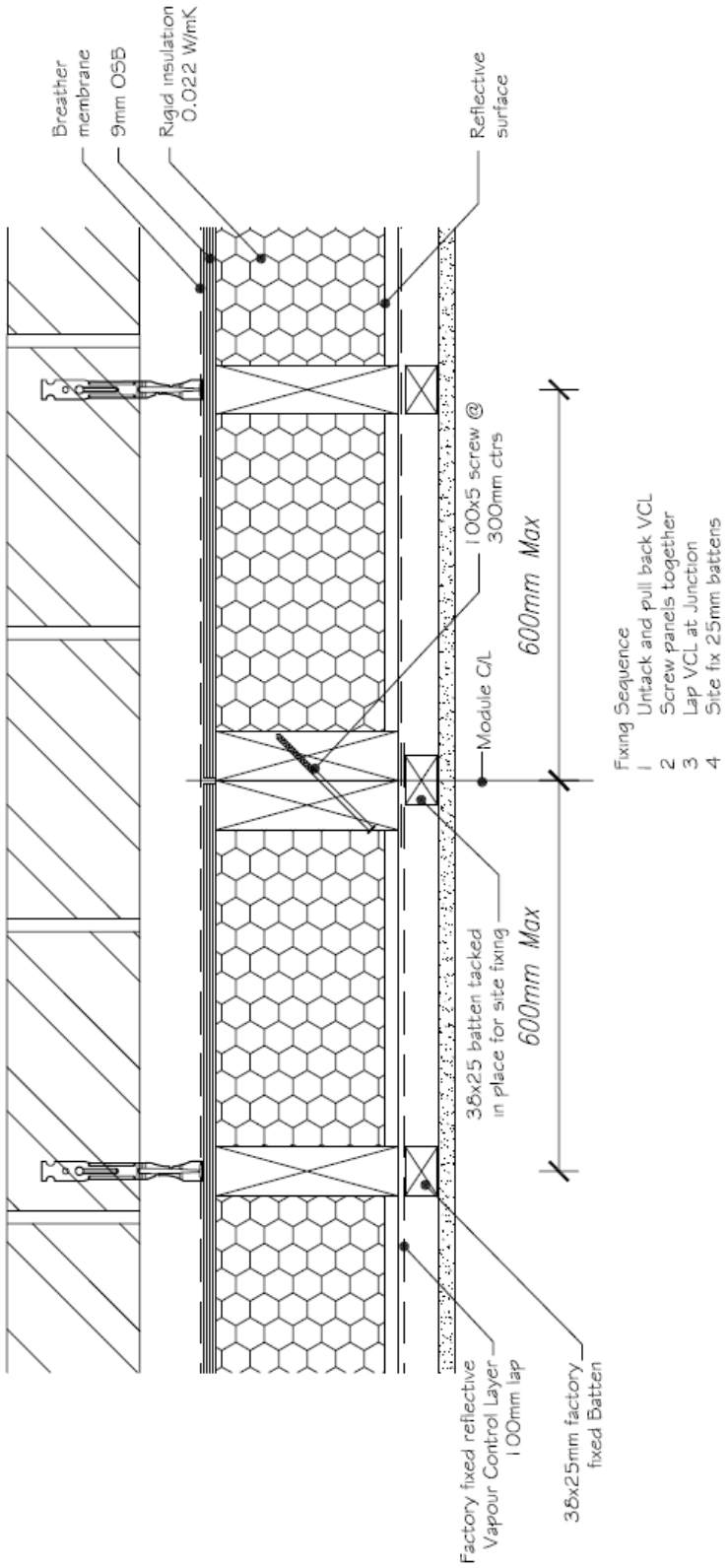
		Revision:	AA
	Section: 3.3 PRESWALL	Scale	1/5



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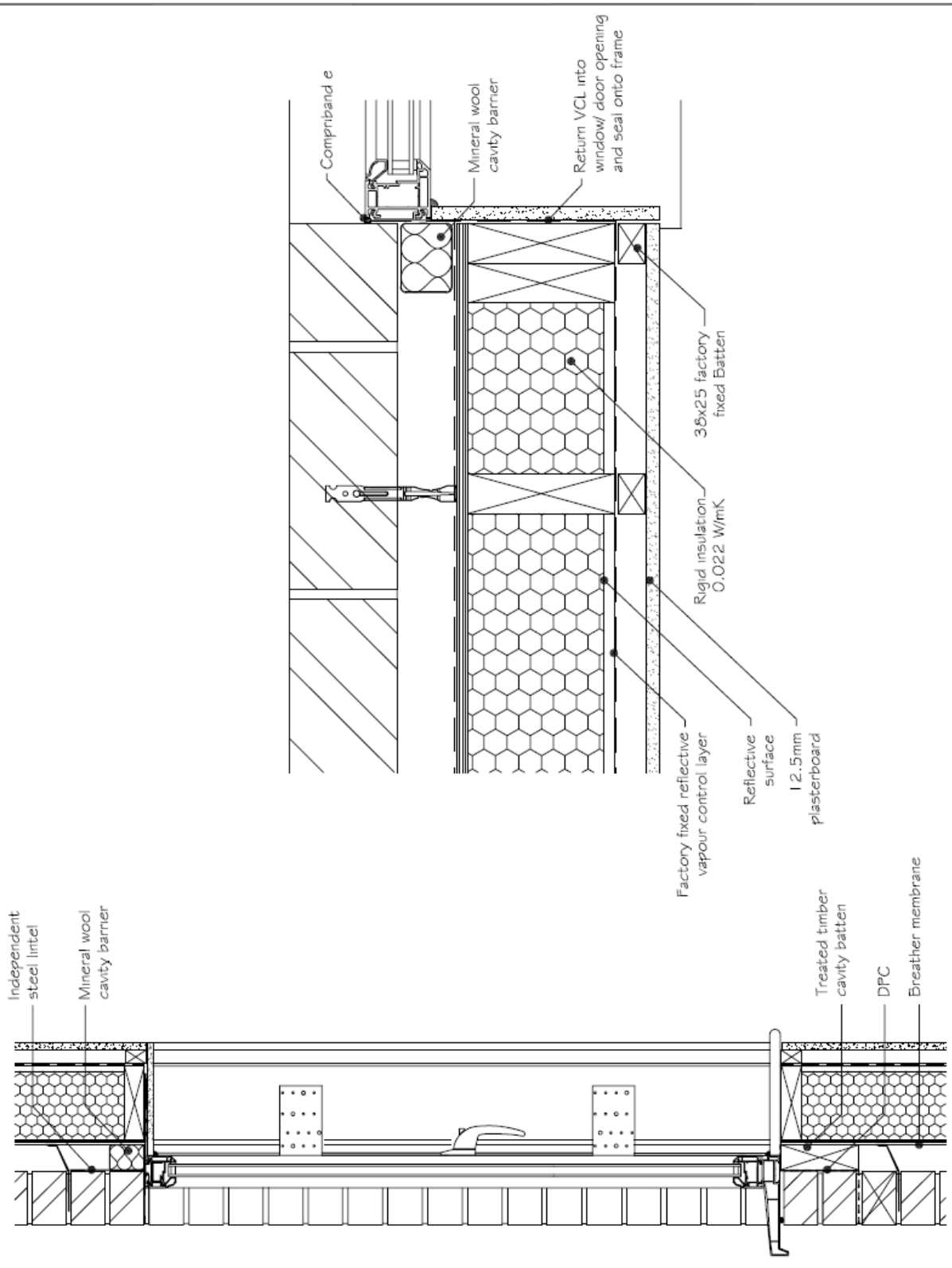

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		Revision:	AA
	Section: 3.3 PRESWALL	Scale	1/5