DELTA MEMBRANE SYSTEMS LTD

MS500 THERMAL PERFORMANCE

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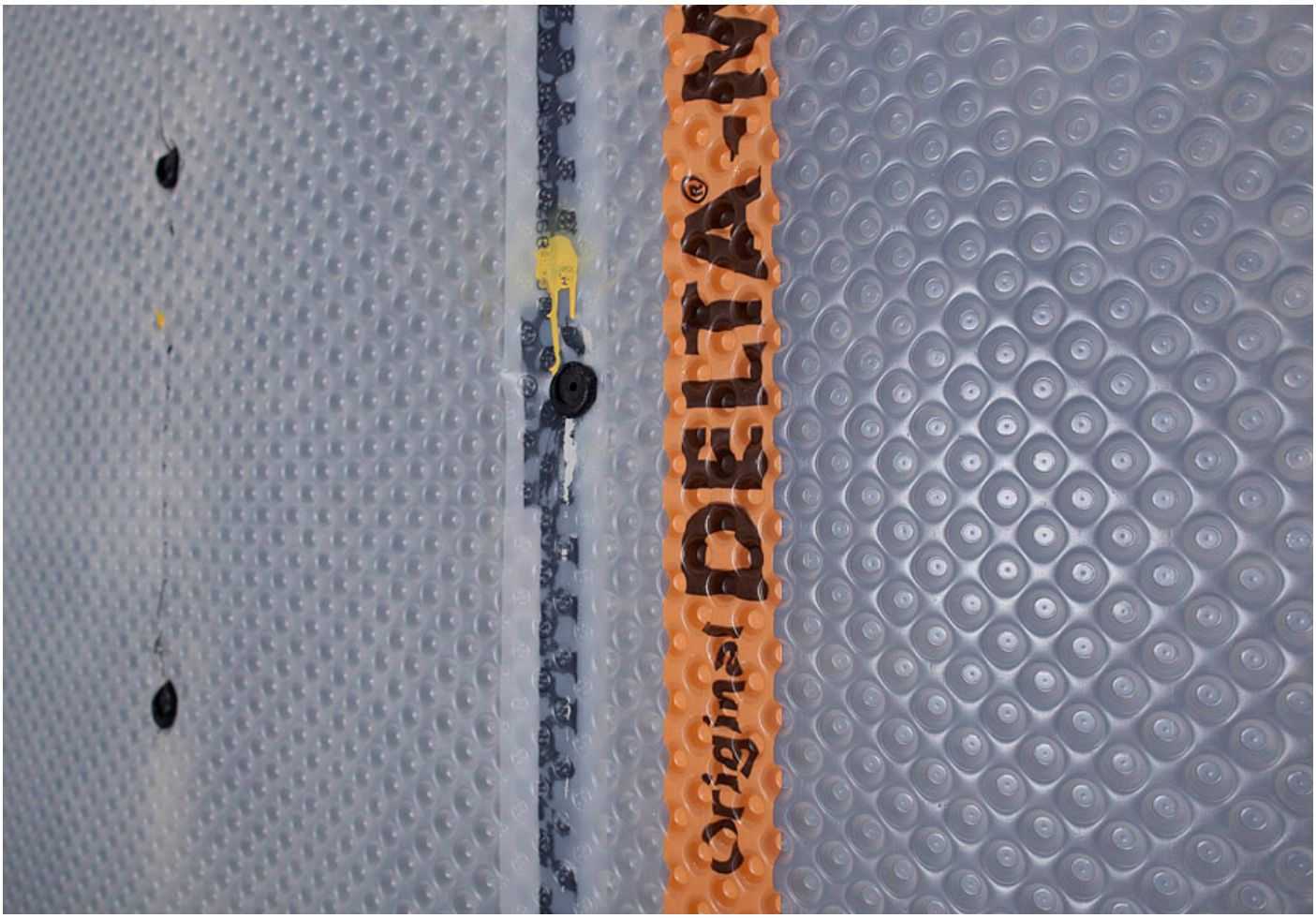
OVERVIEW

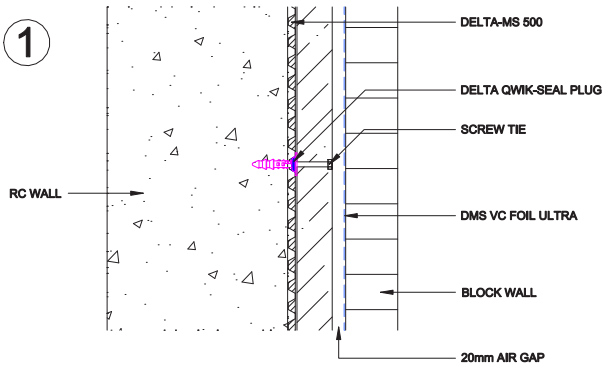
Thermal Performance refers to how well a structure responds to changes in external temperature during the daily and seasonal cycles.

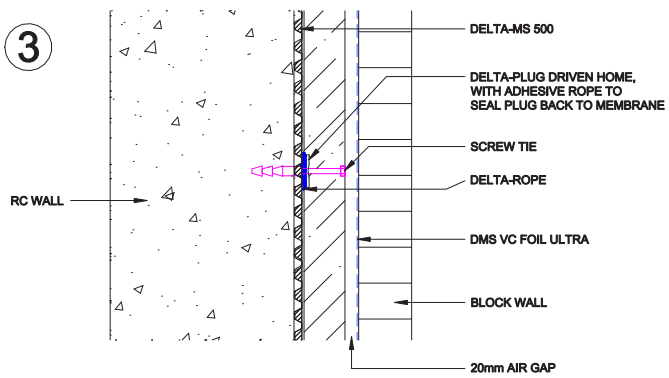
The coefficient of heat transmission or thermal transmittance, a U-Value is a measure of heat loss/transfer of heat through a structural element (which can be a single material or a composite). It is calculated on the rate at which heat transfers through 1 square metre of a structure, where the temperature difference between the inner and outer face is 1 degree Celsius.

U-value measures the rate of heat transfer. This means that products with a lower U-value will be more energy efficient. R-value is a product's resistance to heat flow which means that the higher the product's R-value, the better it is at insulating a home and improving energy efficiency.



U-Value Calculation: 50mm PIR Reinforced concrete





Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-508-1
U-Value Calculation 50mm PIR Reinforced concrete

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	50	0.022	0.120	0.150	2.273	0.417	PIR insulation / timber studs
5	0.6	R-value			0.120		Delta MS-500
6	250	2.300			0.109		Reinforced concrete
					0.040		Rse
	333 mm	(total wall thickness)			3.511		

Total resistance: Upper limit: 2.932 Lower limit: 2.423 Ratio: 1.210 Average: 2.677 m^2K/W

U-value (uncorrected) 0.3735

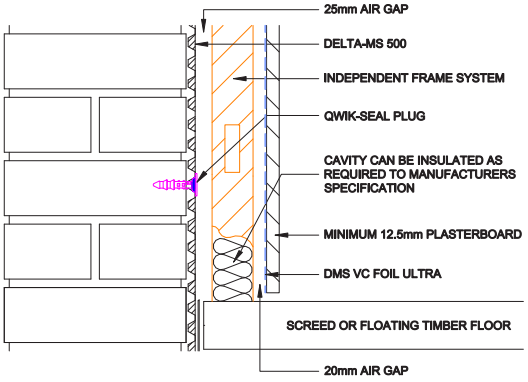
U-value corrections
Air gaps in layer 4 U = 0.0042 (Level 1)

Total U 0.0042

U-value (corrected) 0.378
U-value (rounded) 0.38 W/m^2K

U-Value Calculation: 50mm PIR

2



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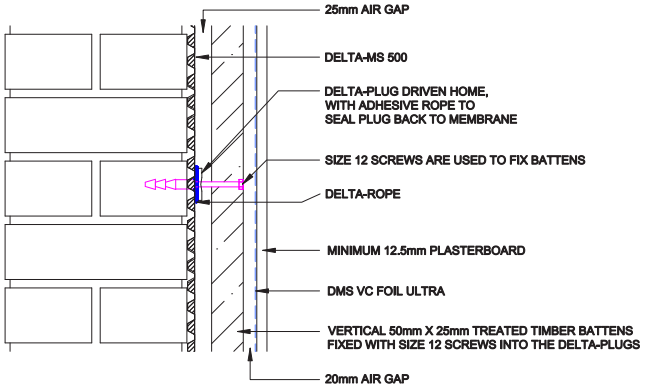


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-507-1
U-Value Calculation: 50mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	50	0.022	0.120	0.150	2.273	0.417	PIR insulation / timber studs
5	25	R-value	0.120	0.150	0.440	0.208	25mm cavity low-E (0.2)
6	0.6	R-value			0.120		Delta MS-500
7	220	0.770			0.286		Solid brickwork
					0.040		Rse
	328 mm (total wall thickness)				4.128		

Total resistance: Upper limit: 3.511 Lower limit: 2.977 Ratio: 1.179 Average: 3.244 m²K/W

U-value (uncorrected) 0.308

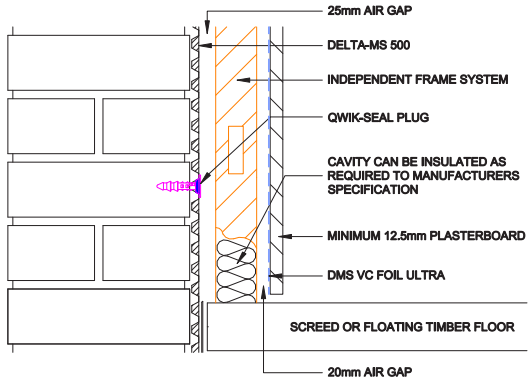
U-value corrections
Air gaps in layer 4 U = 0.003 (Level 1)

Total U 0.003

U-value (corrected) 0.311
U-value (rounded) 0.31 W/m²K

U-Value Calculation: 50mm PIR with TF InterFoil

2



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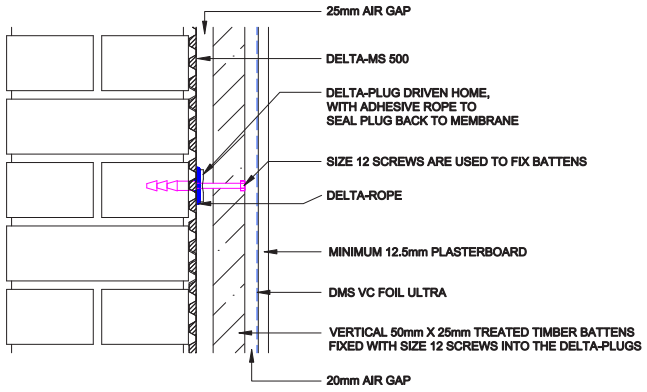


Element type: Basement Wall – Delta Membranes
Drawing Reference: DW-507-1

U-Value Calculation: 50mm PIR with TF InterFoil

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	50	0.022	0.120	0.150	2.273	0.417	PIR insulation / timber studs
5							Protect TF Interfoil
6	25	R-value	0.120	0.150	0.770	0.208	25mm cavity unventilated
low-E							
7	0.6	R-value			0.120		Delta MS-500
8	220	0.770			0.286		Solid brickwork
					0.040		Rse
	328 mm	(total wall thickness)			4.458		

Total resistance: Upper limit: 3.861 Lower limit: 3.149 Ratio: 1.226 Average: 3.505 m²K/W

U-value (uncorrected) 0.285

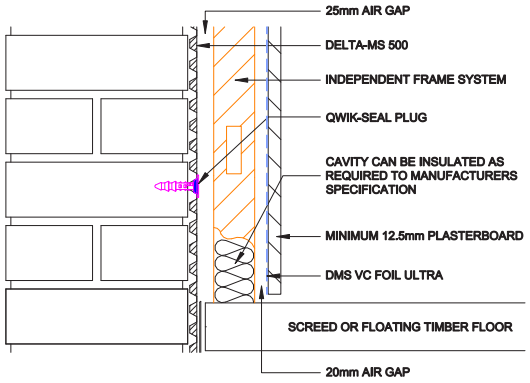
U-value corrections
Air gaps in layer 4 U = 0.003 (Level 1)

Total U 0.003

U-value (corrected) 0.288
U-value (rounded) 0.29 W/m²K

U-Value Calculation: 100mm PIR with TF InterFoil

2



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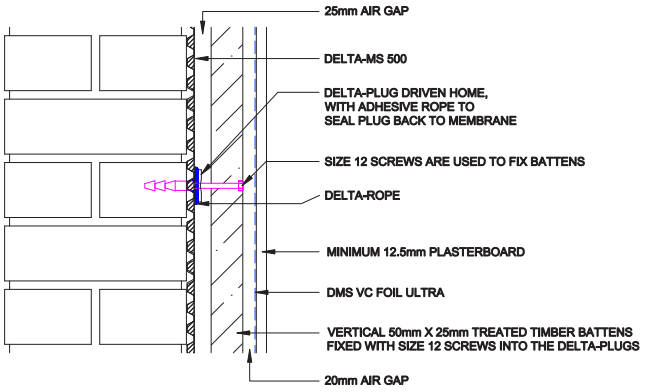


Element type: Basement Wall – Delta Membranes
Drawing Reference: DW-507-1

U-Value Calculation: 100mm PIR with TF InterFoil

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	100	0.022	0.120	0.150	4.545	0.833	PIR insulation / timber studs
5							Protect TF Interfoil
6	25	R-value	0.120	0.150	0.770	0.208	25mm cavity unventilated
low-E							
7	0.6	R-value			0.120		Delta MS-500
8	220	0.770			0.286		Solid brickwork
					0.040		Rse
	378 mm (total wall thickness)				6.731		

Total resistance: Upper limit: 5.508 Lower limit: 4.511 Ratio: 1.221 Average: 5.009 m²K/W

U-value (uncorrected) 0.1996

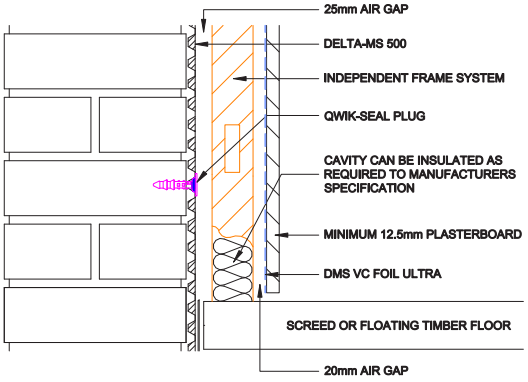
U-value corrections
Air gaps in layer 4 U = 0.0046 (Level 1)

Total U 0.0046

U-value (corrected) 0.204
U-value (rounded) 0.20 W/m²K

U-Value Calculations: 100mm PIR

2



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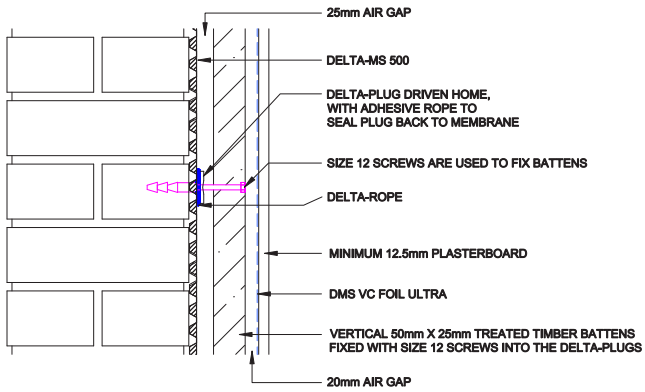


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-507-1
U-Value Calculation: 100mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	100	0.022	0.120	0.150	4.545	0.833	PIR insulation / timber studs
5	25	R-value	0.120	0.150	0.440	0.208	25mm cavity low-E (0.2)
6	0.6	R-value			0.120		Delta MS-500
7	220	0.770			0.286		Solid brickwork
					0.040		Rse
	378 mm	(total wall thickness)			6.401		

Total resistance: Upper limit: 5.086 Lower limit: 4.340 Ratio: 1.172 Average: 4.713 m^2K/W

U-value (uncorrected) 0.212

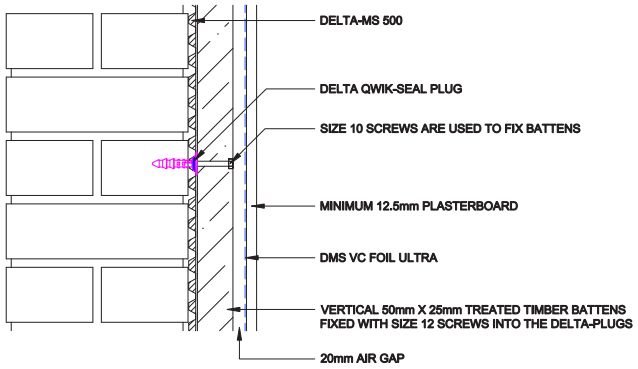
U-value corrections
Air gaps in layer 4 U = 0.005 (Level 1)

Total U 0.005

U-value (corrected) 0.217
U-value (rounded) 0.22 W/m^2K

U-Value Calculation: 100mm PIR

1



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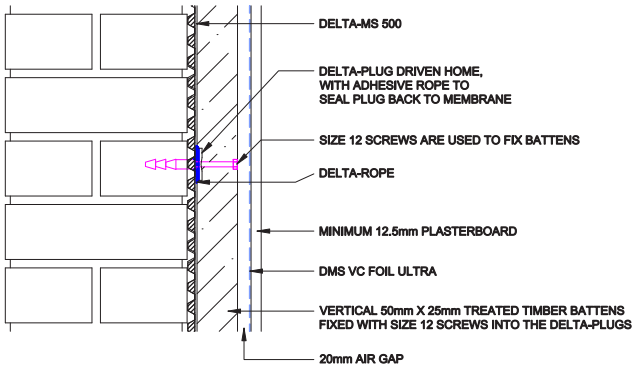


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-507-1
U-Value Calculation: 100mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	100	0.022	0.120	0.150	4.545	0.833	PIR insulation / timber studs
5	0.6	R-value			0.120		Delta MS-500
6	220	0.770			0.286		Solid brickwork
					0.040		Rse
	353 mm (total wall thickness)				5.961		

Total resistance: Upper limit: 4.703 Lower limit: 3.963 Ratio: 1.187 Average: 4.333 m²K/W

U-value (uncorrected) 0.231

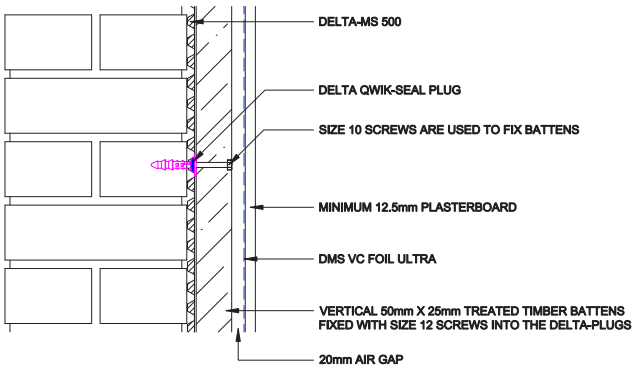
U-value corrections
Air gaps in layer 4 U = 0.006 (Level 1)

Total U 0.006

U-value (corrected) 0.237
U-value (rounded) 0.24 W/m²K

U-Value Calculations: 50mm PIR

1



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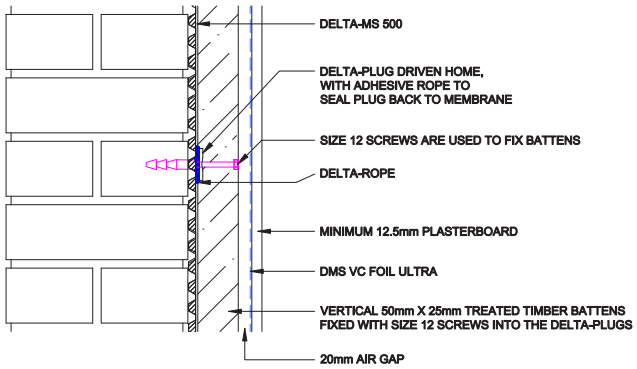


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-507-1
U-Value Calculation: 50mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2	20	R-value	0.120	0.0800	0.780	0.167	20mm x 25mm counterbatten
3							Protect VC Foil Ultra
4	50	0.022	0.120	0.150	2.273	0.417	PIR insulation / timber studs
5	0.6	R-value			0.120		Delta MS-500
6	220	0.770			0.286		Solid brickwork
					0.040		Rse
	303 mm	(total wall thickness)			3.688		

Total resistance: Upper limit: 3.131 Lower limit: 2.600 Ratio: 1.204 Average: 2.866 m²K/W

U-value (uncorrected) 0.349

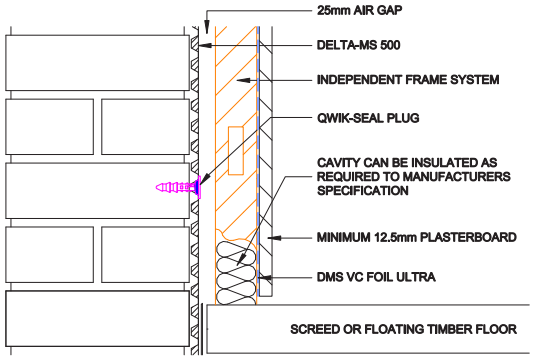
U-value corrections
Air gaps in layer 4 U = 0.004 (Level 1)

Total U 0.004

U-value (corrected) 0.353
U-value (rounded) 0.35 W/m²K

U-Value Calculation: 100mm PIR

2



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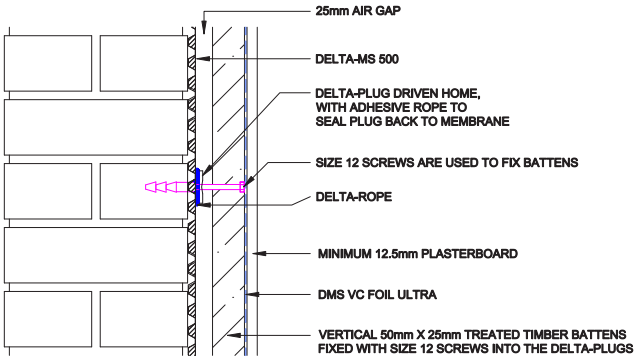


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-506-1
U-Value Calculation: 100mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2							Protect VC Foil Ultra
3	100	0.022	0.120	0.150	4.545	0.833	PIR insulation / timber studs
4	25	R-value	0.120	0.150	0.440	0.208	25mm cavity low-E (0.2)
5	0.6	R-value			0.120		Delta MS-500
6	220	0.770			0.286		Solid brickwork
					0.040		Rse
	358 mm (total wall thickness)				5.621		

Total resistance: Upper limit: 4.155 Lower limit: 3.737 Ratio: 1.112 Average: 3.946 m²K/W

U-value (uncorrected) 0.253

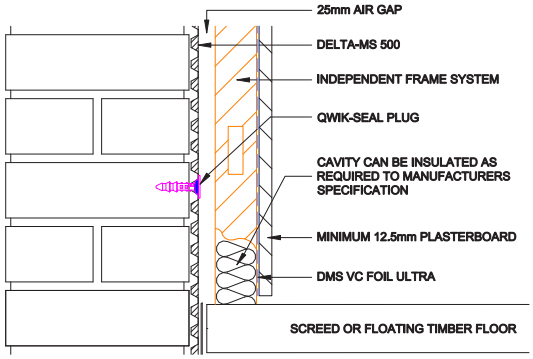
U-value corrections
Air gaps in layer 3 U = 0.007 (Level 1)

Total U 0.007

U-value (corrected) 0.260
U-value (rounded) 0.26 W/m²K

U-Value Calculations: 50mm PIR

2



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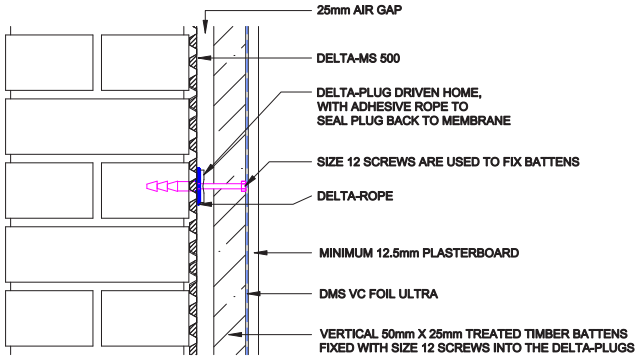


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-506-1
U-Value Calculation: 50mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2							Protect VC Foil Ultra
3	50	0.022	0.120	0.150	2.273	0.417	PIR insulation / timber studs
4	25	R-value	0.120	0.150	0.440	0.208	25mm cavity low-E (0.2)
5	0.6	R-value			0.120		Delta MS-500
6	220	0.770			0.286		Solid brickwork
					0.040		Rse
	308 mm (total wall thickness)				3.348		

Total resistance: Upper limit: 2.682 Lower limit: 2.375 Ratio: 1.129 Average: 2.528 m^2K/W

U-value (uncorrected) 0.3955

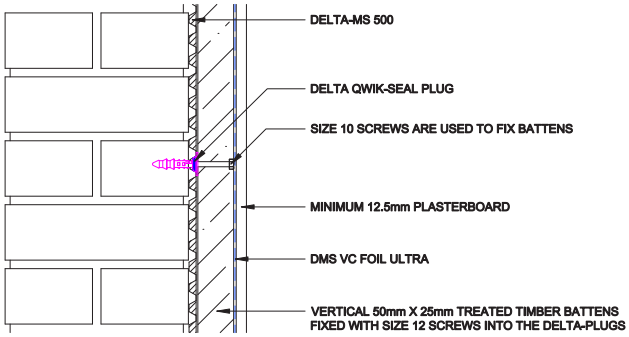
U-value corrections
Air gaps in layer 3 U = 0.0046 (Level 1)

Total U 0.0046

U-value (corrected) 0.400
U-value (rounded) 0.40 W/m^2K

U-Value Calculation: 100mm PIR

1



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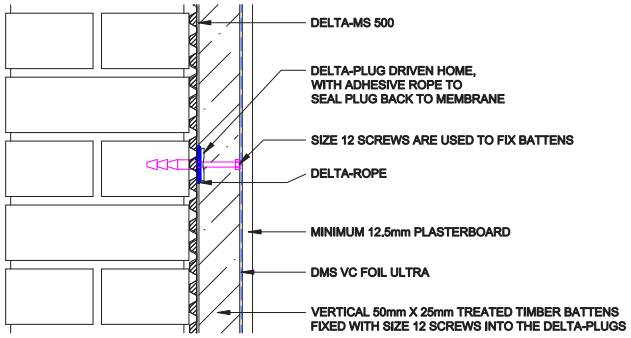


Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-506-1
U-Value Calculation: 100mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2							Protect VC Foil Ultra
3	100	0.022	0.120	0.150	4.545	0.833	PIR insulation / timber studs
4	0.6	R-value			0.120		Delta MS-500
5	220	0.770			0.286		Solid brickwork
					0.040		Rse
	333 mm (total wall thickness)				5.181		

Total resistance: Upper limit: 3.756 Lower limit: 3.360 Ratio: 1.118 Average: 3.558 m²K/W

U-value (uncorrected) 0.281

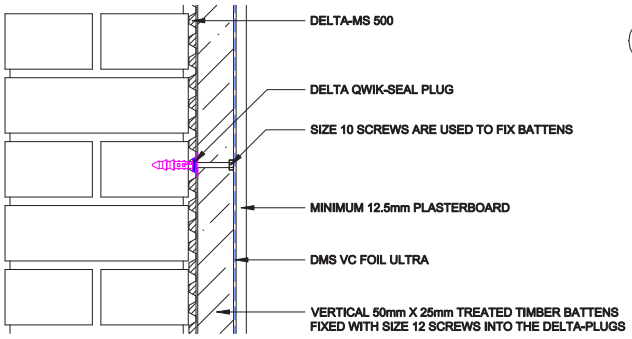
U-value corrections
Air gaps in layer 3 U = 0.008 (Level 1)

Total U 0.008

U-value (corrected) 0.289
U-value (rounded) 0.29 W/m²K

U-Value Calculations: 50mm PIR

1



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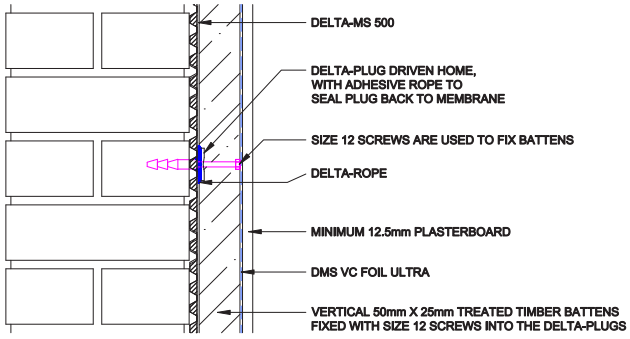

Element type: Basement Wall – Delta Membranes
Calculation Method: BS EN ISO 6946
Drawing Reference: DW-506-1
U-Value Calculation: 50mm PIR

Layer	d (mm)	layer	bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	12.5	0.210			0.060		Plasterboard
2							Protect VC Foil Ultra
3	50	0.022	0.120	0.150	2.273	0.417	PIR insulation / timber studs
4	0.6	R-value			0.120		Delta MS-500
5	220	0.770			0.286		Solid brickwork
					0.040		Rse
	283 mm (total wall thickness)				2.908		

Total resistance: Upper limit: 2.299 Lower limit: 1.998 Ratio: 1.151 Average: 2.149 m²K/W

U-value (uncorrected) 0.4654

U-value corrections
Air gaps in layer 3 U = 0.0061 (Level 1)

Total U 0.0061

U-value (corrected) 0.472
U-value (rounded) 0.47 W/m²K