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## **Sealection U-Value Calculation Report**

**Client:** Rodstown Ltd.

**Address:** Barlath, Kells, Co. Meath.

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## Introduction:

This study calculated the thickness of spray foam *Sealection* insulation products required to reach specific U-Values for different fabrics of a building as specified by the client. The products evaluated were Sealection 500, Sealection Agribalance and Heatlock Soy. The fabric areas investigated were flat ceilings, pitched roofs, internally insulating external walls, and externally insulating external walls.

## Procedure:

### References

The U-Value calculation method as specified in I.S. EN ISO 6946: 1997 was used to calculate the U-Values.

The conductivity of HEATLOK SOY as specified in the study "ASTM C 518-04 Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus" by Intertek ETL SEMKO on October 3, 2008 was taken ( $\lambda = 0.022$  W/mK).

The conductivity of SEALECTION AGRIBALANCE as specified in the study "ASTM C 518-04 Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus" by Intertek ETL SEMKO on June 30, 2008 was taken ( $\lambda = 0.032$  W/mK).

The conductivity of SEALECTION 500 as specified in the study "Determination of DECLARED LAMDA ( $\lambda$ ) VALUE in accordance to the ISO 10456-07" from Demilec LLC was taken. ( $\lambda = 0.036$  W/mK)

The above conductivity values were rounded to do 2 significant figures.

## Results:

### 1. Flat Ceiling

Table 1A illustrates the depth of insulation required to reach the specific U-Values. It is assumed that the joists are 400mm cc apart with 12.5 % timber bridging. It is assumed that the joists are the same depth of the insulation except where indicated.

**Table 1A Insulation between and over joists on horizontal at ceiling level**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	340	360
0.14	290	310
0.16	250	270
0.2	200	220
0.27	140	155
0.45	*65	*75
0.87	*24	*26

\*Joist is 100mm deep

It is assumed that the ceiling has a 13mm plasterboard finish with a conductivity of 0.25 W/mK.

## 2. Rafter Insulation

Thickness of insulation required for rafters of 400mm cc and 600mm cc spacing respectively are calculated. It is assumed that the rafters are the same depth as the insulation except where indicated.

**Table 2A – Heated Attic Space -Insulation Between Rafters - 400 mm cc**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	350	370
0.14	300	320
0.16	260	280
0.2	210	220
0.37	*100	*110
0.45	*74	*83
0.87	*28	*32

\*Rafter depth 125mm

**Table 2B – Heated Attic Space - Insulation Between Rafters - 600 mm cc**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	320	350
0.14	270	300
0.16	240	260
0.2	190	210
0.37	*90	*100
0.45	*68	*77
0.87	*28	*32

\* Rafter depth 125mm

The assumed roof construction for 2A and 2B are:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Surface			0.1
Insulation in timber joists		Timber joist - 0.13	
Plasterboard	0.013	0.25	0.05

**Table 2C – Unheated Attic Space -Insulation Between Rafters - 400 mm cc**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	330	350
0.14	280	300
0.16	240	260
0.2	180	200
0.37	125	140
0.45	*57	*65
0.87	*19	*21

\* Rafter depth 125mm

**Table 2D – Unheated Attic Space -Insulation Between Rafters - 600 mm cc**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	300	320
0.14	250	280
0.16	220	240
0.2	170	190
0.37	*120	130
0.45	*57	*65
0.87	*20	*22

\* Rafter depth 125mm

The assumed roof construction for 2C and 2D are:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Surface	0.019	0.57	0.1
Insulation in timber joists		Timber joist - 0.13	
Attic Space (35° slope)			0.15
Timber Joists	0.1	0.13	0.77
Plasterboard	0.013	0.25	0.05

**Table 2E – Unheated Attic Space – 100mm fibreglass between horizontal joist and spray foam between rafters – 400mm cc**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	260	280
0.14	210	220
0.16	170	180
0.2	*110	*120
0.37	*40	*50
0.45	0	0
0.87	0	0

\* Rafter depth 125mm

**Table 2F – Unheated Attic Space – 100mm fibreglass between horizontal joist and spray foam between rafters – 600mm cc**

U-Value / W/m <sup>2</sup> K	Agribalance/mm	Sealection 500 /mm
0.12	230	250
0.14	180	200
0.16	140	160
0.2	*90	*100
0.37	*50	*40
0.45	0	0
0.87	0	0

\* Rafter depth 125mm

The assumed roof construction for 2D and 2F is:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Surface	0.019	0.57	0.1
Insulation in timber joists		Timber joist - 0.13	
Attic Space (35° slope)			0.15
Fibreglass between joists	0.1	0.04	2.5
Timber joists	0.1	0.13	0.77
Plasterboard	0.013	0.25	0.05

### 3. Internal Dry-Lining

Three options with an internal dry-lining finish were examined. The options are a 300mm block cavity with no insulation in the 100mm cavity, a 300mm cavity wall pump filled with bead insulation and a 300mm hollow block wall. The construction of each wall type is given along with the results. It is assumed the studding is 400mm cc in each case. It is assumed the studs are the same depth of insulation except where indicated.

**Table 3A - Block Cavity - No Insulation in Cavity - studs 400mm cc ( 12% bridging)**

U-Value	Heatlok / mm	Agribalance/mm	Sealection 500 /mm
0.12	260	320	360
0.16	190	240	260
0.27	100	130	145
0.3	*85	115	125
0.34	*70	100	110
0.43	*45	*65	*75
1	*8	*10	*15

\*Joist is 100mm deep

The assumed wall construction for wall 3A is:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Render	0.019	0.57	0.03
Outer leaf concrete block	0.1	1.33	0.08
Cavity – air filled	0.1		0.18
Inner leaf concrete block	0.1	1.33	0.08
Insulation in timber studs		Timber stud - 0.13	
Plasterboard	0.013	0.25	.05

**Table 3B - Block Cavity - Cavity fully filled - studs 400mm cc ( 12% bridging)**

U-Value	Heatlok / mm	Agribalance/mm	Sealection 500 /mm
0.12	150	190	210
0.16	80	110	120
0.27	5	10	10
0.3	0	0	0
0.34	0	0	0
0.43	0	0	0
1	0	0	0

\*Stud depth 100mm

The assumed wall construction for wall 3B is:

Layer	Thickness / m	Conductivity / W/mK
External Render	0.019	0.57
Outer leaf concrete block	0.1	1.33
Bead Insulation in cavity	0.1	0.033
Inner leaf concrete block	0.1	1.33
Insulation in timber studs		Timber stud - 0.13
Plasterboard	0.013	0.25

Table 3C - Hollow block - studs 400mm cc ( 12% bridging)

U-Value	Heatlok / mm	Agribalance/mm	Sealection 500 /mm
0.12	250	320	350
0.16	190	240	260
0.27	100	130	140
0.3	*98	115	125
0.34	*66	*95	105
0.43	*43	*63	*70
1	*7	*10	*10

\* Stud depth 100mm

The assumed wall construction for wall 3B is:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Render	0.019	0.57	
225mm concrete hollow block			0.4
Insulation in timber studs		Timber stud - 0.13	
Plasterboard	0.013	0.25	

## 4. External Insulation

Two options using external insulation were investigated. The options are a hollow block or a solid brick wall construction.

**Table 4A - Hollow Block - Studs 400mm cc ( 12% bridging)**

U-Value	Heatlok / mm
0.12	250
0.16	180
0.27	*95
0.3	*80
0.36	*60
0.43	*40
1	*7

\* Stud depth 100mm

The assumed wall construction for wall 4A is:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Render	0.019	0.57	0.03
Insulation in timber studs		Timber stud - 0.13	
225mm concrete hollow block			0.4
Plaster	0.013	0.18	0.07

**Table 4B - Solid Brick - Studs 400 mm cc (12% bridging)**

U-Value / W/m <sup>2</sup> K	Heatlok / mm
0.12	260
0.16	200
0.27	110
0.3	*95
0.36	*67
0.43	*50
1	*12

\* Stud depth 100mm

The assumed wall construction for wall 4B is:

Layer	Thickness / m	Conductivity / W/mK	Resistance / m <sup>2</sup> K/W
External Render	0.019	0.57	0.03
Insulation in timber studs		Timber stud - 0.13	
225mm solid brick	0.225	1.33	0.17
Plaster	0.013	0.18	0.07

**Final Note:**

The results given above are calculated in accordance with I.S EN ISO 6946: 1997 and the stated assumptions. If the conditions change (e.g. fabric construction, thermal bridging factor, etc) the U-value should be recalculated.

Should any part of the report require clarification or in the event of further investigations please contact the report author.

**\*WOWenergy reserves the right to change or update the information given in this report at any time.**