



# Calculation of U-value

for OH Timber Composite Door Leaves

Carried out for:

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As agreed, the Danish Technological Institute, Building Technology has performed calculations of the U-value for vertical (90°) OH Exterior Timber Composite Door Leaves. The Door Leaves are used in exterior door sets.

## Basis

- Table from OH showing all the different Door Leaves to be calculated.
- Stated design values for the thermal conductivity of the materials used in the Door Leaves (if available values from EN 10077-2 are used).
- The calculation has been carried out in accordance with EN ISO 10077-2.

## Calculations

Design values for the thermal conductivity:

Material	Thermal conductivity $\lambda_p$ ( W/mK)
Polystyren (iso) $\leq 60$ mm (EPS or XPS)	0.034
Polystyren (iso) $> 60$ mm ( EPS or XPS)	0.036
Fibre board	0.048
HDF	0.13
Chenchen	0.13
Mahogany	0.13
Pine	0.13
Oak	0.18
Aluminium	160
Compact laminate	0.25

$$U_{\text{centre}} = 1 / ( R_{\text{se}} + d_{\text{pe}}/\lambda_{\text{pe}} + d_{\text{iso}}/\lambda_{\text{iso}} + d_{\text{pi}}/\lambda_{\text{pi}} + R_{\text{si}})$$

$$U_{\text{edge}} = 1 / ( R_{\text{se}} + d_{\text{pe}}/\lambda_{\text{pe}} + d_{\text{pine}}\lambda_{\text{pine}} + d_{\text{pi}}/\lambda_{\text{pi}} + R_{\text{si}})$$

$$U_{\text{leaf}} = ( U_{\text{centre}} \times A_{\text{centre}} + U_{\text{edge}} \times A_{\text{edge}} + I_{\Psi} \times \Psi ) / ( b \times h)$$

The linear thermal transmittance  $\Psi$  is negligible. Calculations using Therm ( LBNL) shows that  $\Psi = 0.002 \text{ W/m}^2\text{K}$  can be used for all the leaves.

## **Results**

The results of the calculations can be found in the attached tables in Appendix 1.

Aarhus, 3 February 2014  
Danish Technological Institute, Building Technology



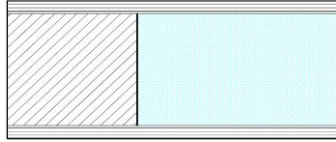
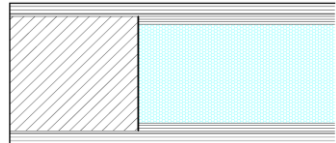
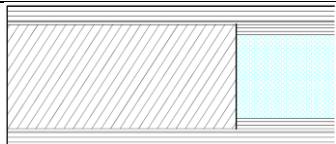
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## U-value calculated as centre value

<b>U<sub>centre</sub></b> (W/m <sup>2</sup> K)								
<b>OH Timber Composite door - ChenChen veneer for paint or stain</b>								
Facing: 6 mm cross banded veneer with 0.3 mm aluminium								
<b>Core</b>	<b>Polystyrene</b>		<b>Polystyrene 2x4 mm ply</b>		<b>Polystyrene 2x9 mm ply</b>		<b>Wooden fibre board</b>	
<b>Stiles/Rails</b>	55 mm pine	110 mm pine	55 mm pine	110 mm pine	55 mm pine	110 mm pine	55 mm pine	110 mm pine
<b>Thickness Door (mm)</b>								
44	0,831	0,831	0,971	0,971	1,231	1,231	1,076	1,076
54	0,668	0,668	0,755	0,755	0,904	0,904	0,879	0,879
56	0,642	0,642	0,723	0,723	0,858	0,858	0,848	0,848
58	0,619	0,619	0,694	0,694	0,817	0,817	0,819	0,819
60	0,597	0,597	0,667	0,667	0,779	0,779	0,792	0,792
68	0,524	0,524	0,576	0,576	0,659	0,659	0,700	0,700
73	0,511	0,511	0,531	0,531	0,600	0,600	0,652	0,652
78	0,477	0,477	0,493	0,493	0,552	0,552	0,611	0,611
80	0,465	0,465	0,479	0,479	0,534	0,534	0,596	0,596
88	0,421	0,421	0,452	0,452	0,475	0,475	0,542	0,542
98	0,377	0,377	0,402	0,402	0,437	0,437	0,487	0,487

Door leaf specifications:

	Core: Polystyrene Stiles/ rails: 55 mm
	Core: Polystyrene + 2 x 4 mm plywood Stiles/ rails: 55 mm
	Core: Polystyrene + 2 x 9 mm plywood Stiles/ rails: 110 mm

## U-value calculated as door leaf with stiles / rails

<b>U doorleave</b> ( $W/m^2K$ ) size 1000 mm x 2000 mm								
<b>OH Timber Composite door - ChenChen veneer for paint or stain</b> Facing: 6 mm cross banded veneer with 0.3 mm aluminium								
<b>Core</b>	<b>Polystyrene</b>		<b>Polystyrene 2x4 mm ply</b>		<b>Polystyrene 2x9 mm ply</b>		<b>Wooden fibre board</b>	
<b>Stiles/Rails</b>	55 mm pine	110 mm pine	55 mm pine	110 mm pine	55 mm pine	110 mm pine	55 mm pine	110 mm pine
<b>Thickness</b>								
<b>Door (mm)</b>								
44	1,02	1,21	1,13	1,28	1,35	1,46	1,22	1,35
54	0,84	1,01	0,91	1,05	1,04	1,15	1,02	1,14
56	0,81	0,98	0,88	1,02	0,99	1,11	0,98	1,10
58	0,78	0,95	0,85	0,98	0,95	1,07	0,95	1,07
60	0,76	0,92	0,82	0,95	0,91	1,03	0,92	1,04
68	0,68	0,83	0,72	0,85	0,79	0,90	0,82	0,93
73	0,65	0,78	0,67	0,79	0,73	0,84	0,77	0,88
78	0,61	0,73	0,63	0,74	0,68	0,79	0,73	0,83
80	0,60	0,72	0,61	0,73	0,66	0,77	0,71	0,81
88	0,55	0,66	0,57	0,68	0,59	0,70	0,65	0,74
98	0,49	0,60	0,52	0,61	0,54	0,64	0,59	0,67

<b>U doorleave</b> ( $W/m^2K$ ) size 1200 mm x 2400 mm								
<b>OH Timber Composite door - ChenChen veneer for paint or stain</b> Facing: 6 mm cross banded veneer with 0.3 mm aluminium								
<b>Core</b>	<b>Polystyrene</b>		<b>Polystyrene 2x4 mm ply</b>		<b>Polystyrene 2x9 mm ply</b>		<b>Wooden fibre board</b>	
<b>Stiles/Rails</b>	55 mm pine	110 mm pine	55 mm pine	110 mm pine	55 mm pine	110 mm pine	55 mm pine	110 mm pine
<b>Thickness</b>								
<b>Door (mm)</b>								
44	0,99	1,16	1,11	1,23	1,33	1,43	1,20	1,31
54	0,81	0,96	0,89	1,01	1,02	1,12	0,99	1,10
56	0,78	0,93	0,85	0,97	0,97	1,07	0,96	1,06
58	0,76	0,91	0,82	0,94	0,93	1,03	0,93	1,03
60	0,73	0,88	0,79	0,91	0,89	0,99	0,90	1,00
68	0,65	0,78	0,70	0,80	0,77	0,87	0,80	0,90
73	0,63	0,74	0,65	0,75	0,71	0,80	0,75	0,84
78	0,59	0,69	0,60	0,71	0,66	0,75	0,71	0,79
80	0,58	0,68	0,59	0,69	0,64	0,73	0,69	0,77
88	0,53	0,62	0,55	0,64	0,57	0,66	0,63	0,71
98	0,48	0,56	0,50	0,58	0,53	0,61	0,57	0,65