

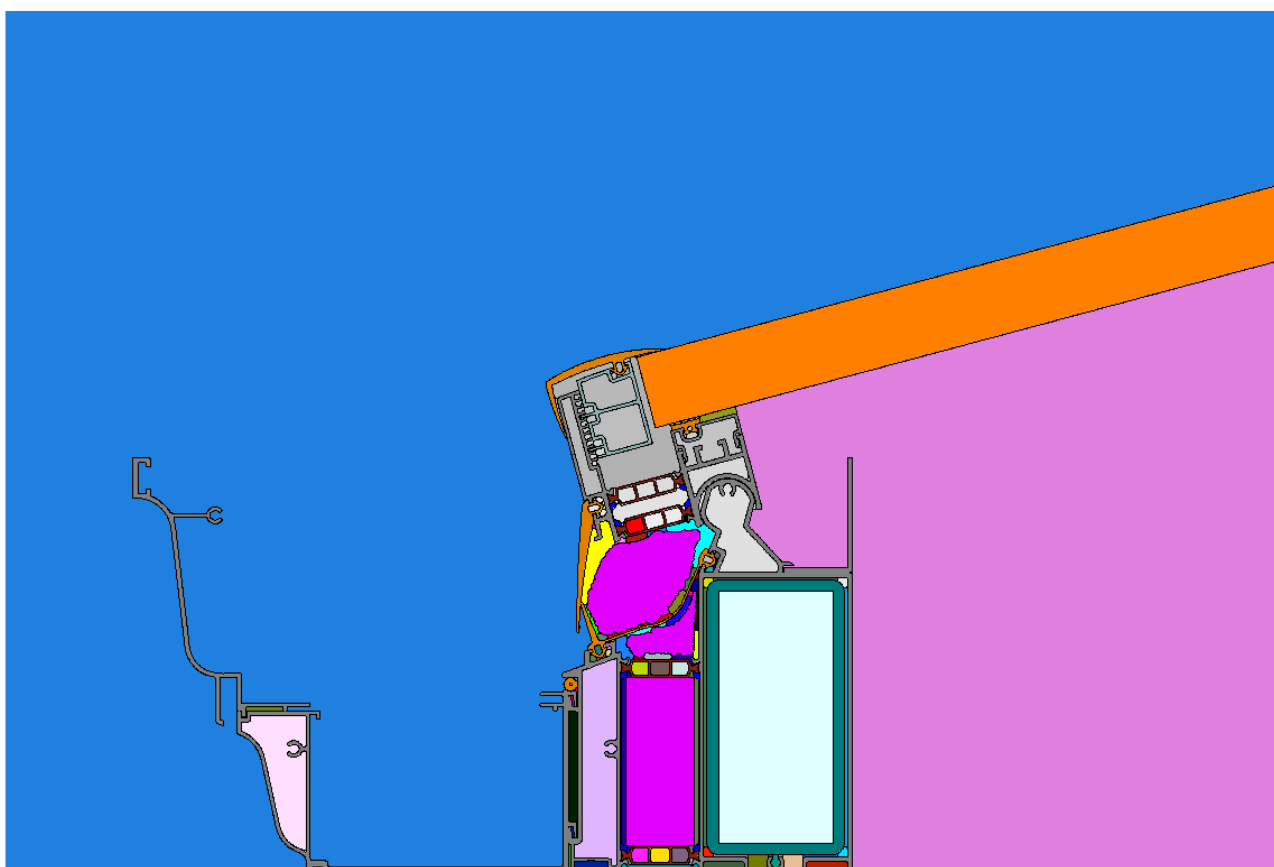
REPORT NR. VR0012011.doc

Thermal transmittance report
According EN10077-2

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REPORT NR. VR0012011.doc
Thermal transmittance report
According EN10077-2

1. Section (VR6123-VR6121-VR6110-VR60174)



2. Table of material thermal conductivities:

Col.	Name	lambda [W/mK]	eps [-]
2	aluminium e=0.3	160.000	0.30
8	aluminium	160.000	0.90
13	steel	50.000	0.90
28	insulation	0.035	0.90
38	PE-foam (Lohmann)	0.036	0.90
41	PVC rigid	0.170	0.90
44	PA reinf.	0.300	0.90
60	EPDM	0.250	0.90
253	cavity <1x1 mm2	0.028	0.90

3. Boundary conditions

Exterior: T = 0°C, h = 25.0 W/m²K
 Interior (normal): T = 20°C, h = 7.7 W/m²K
 Interior (reduced): T = 20°C, h = 5.0 W/m²K

5. Input data

BISCO - Input Data

BISCO data file: VR6123-VR6121-VR6110-VR6017.bsc

Bitmap file: VR6123-VR6121-VR6110-VR6017.bmp

1 pixel = 0.0001 m

Col.	Width [pixels]	Width [m]	Height [pixels]	Height [m]	Area [pixels]	Zones	Triang.Size [pixels]
0	14	0.0014	34	0.0034	374	1	5.00
2	395	0.0395	1614	0.1614	8782	6	5.00
4	82	0.0082	73	0.0073	4333	1	5.00
5	216	0.0216	211	0.0211	13186	1	5.00
6	19	0.0019	40	0.0040	349	1	5.00
7	148	0.0148	364	0.0364	21378	1	5.00
8	3148	0.3148	2108	0.2108	380954	13	5.00
9	17	0.0017	25	0.0025	263	1	5.00
10	100	0.0100	44	0.0044	1135	1	5.00
11	28	0.0028	32	0.0032	350	1	5.00
12	92	0.0092	47	0.0047	2379	1	5.00
13	600	0.0600	1200	0.1200	167766	1	5.00
14	57	0.0057	31	0.0031	816	1	5.00
15	26	0.0026	21	0.0021	171	1	5.00
16	26	0.0026	26	0.0026	561	1	5.00
17	44	0.0044	38	0.0038	1088	1	5.00
18	37	0.0037	53	0.0053	434	1	5.00
19	64	0.0064	122	0.0122	1960	1	5.00
20	30	0.0030	58	0.0058	540	1	5.00
21	37	0.0037	27	0.0027	838	1	5.00
22	11	0.0011	23	0.0023	120	1	5.00
23	44	0.0044	46	0.0046	1507	1	5.00
24	552	0.0552	19	0.0019	7168	1	5.00
25	44	0.0044	46	0.0046	1506	1	5.00
26	36	0.0036	56	0.0056	1597	1	5.00
27	19	0.0019	1144	0.1144	17088	1	5.00
28	2843	0.2843	1071	0.1071	928120	1	5.00

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29	19	0.0019	1144	0.1144	17091	1	5.00
30	31	0.0031	46	0.0046	511	1	5.00
31	78	0.0078	104	0.0104	3680	1	5.00
32	23	0.0023	182	0.0182	2523	1	5.00
33	500	0.0500	1100	0.1100	550000	1	5.00
34	111	0.0111	130	0.0130	4041	1	5.00
35	76	0.0076	146	0.0146	1972	1	5.00
36	290	0.0290	117	0.0117	3129	1	5.00
37	196	0.0196	76	0.0076	2603	1	5.00
38	495	0.0495	1385	0.1385	412037	3	5.00
39	28	0.0028	129	0.0129	2938	1	5.00
40	46	0.0046	32	0.0032	1166	1	5.00
41	330	0.0330	424	0.0424	24070	1	5.00
42	81	0.0081	106	0.0106	5207	1	5.00
43	45	0.0045	23	0.0023	310	1	5.00
44	401	0.0401	1709	0.1709	38450	4	5.00
45	36	0.0036	44	0.0044	1085	1	5.00
46	21	0.0021	18	0.0018	215	1	5.00
47	25	0.0025	31	0.0031	662	1	5.00
48	54	0.0054	35	0.0035	437	1	5.00
49	120	0.0120	28	0.0028	2791	1	5.00
50	101	0.0101	50	0.0050	1806	1	5.00
51	31	0.0031	30	0.0030	775	1	5.00
52	54	0.0054	15	0.0015	407	1	5.00
53	22	0.0022	34	0.0034	372	1	5.00
54	183	0.0183	905	0.0905	129533	1	5.00
55	77	0.0077	60	0.0060	4337	1	5.00
56	80	0.0080	60	0.0060	4771	1	5.00
57	77	0.0077	60	0.0060	4334	1	5.00
58	49	0.0049	798	0.0798	15497	1	5.00
59	49	0.0049	798	0.0798	15498	1	5.00
60	745	0.0745	1500	0.1500	62791	4	5.00
61	29	0.0029	19	0.0019	233	1	5.00
62	37	0.0037	86	0.0086	804	1	5.00
63	193	0.0193	48	0.0048	3286	1	5.00
64	38	0.0038	484	0.0484	18255	1	5.00
65	286	0.0286	591	0.0591	95058	1	5.00
66	38	0.0038	78	0.0078	735	1	5.00
67	16	0.0016	126	0.0126	1246	1	5.00
68	42	0.0042	45	0.0045	1441	1	5.00
69	42	0.0042	45	0.0045	1442	1	5.00
70	77	0.0077	60	0.0060	4338	1	5.00
71	80	0.0080	60	0.0060	4771	1	5.00
72	77	0.0077	60	0.0060	4333	1	5.00
73	161	0.0161	21	0.0021	1898	1	5.00
74	161	0.0161	21	0.0021	1897	1	5.00
75	92	0.0092	57	0.0057	4879	1	5.00
76	27	0.0027	14	0.0014	239	1	5.00
77	42	0.0042	57	0.0057	1788	1	5.00
78	27	0.0027	14	0.0014	239	1	5.00
79	92	0.0092	57	0.0057	4880	1	5.00
80	24	0.0024	33	0.0033	372	1	5.00
81	24	0.0024	33	0.0033	371	1	5.00
82	144	0.0144	50	0.0050	6078	1	5.00
83	180	0.0180	45	0.0045	7513	1	5.00
84	180	0.0180	45	0.0045	7513	1	5.00
85	345	0.0345	38	0.0038	11495	1	5.00
86	50	0.0050	16	0.0016	642	1	5.00
170	5603	0.5603	3762	0.3762	12722575	2	

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171	165	0.0165	72	0.0072	4950	1	5.00
174	2411	0.2411	2682	0.2682	4941260	1	
192	120	0.0120	31	0.0031	510	1	5.00
193	366	0.0366	587	0.0587	65346	1	5.00
194	31	0.0031	34	0.0034	466	1	5.00
195	33	0.0033	45	0.0045	1028	1	5.00
196	271	0.0271	158	0.0158	11672	1	5.00
197	59	0.0059	58	0.0058	854	1	5.00
198	22	0.0022	25	0.0025	194	1	5.00
199	25	0.0025	27	0.0027	543	1	5.00
200	243	0.0243	158	0.0158	25816	1	5.00
201	32	0.0032	28	0.0028	553	1	5.00
202	182	0.0182	431	0.0431	22727	1	5.00
203	51	0.0051	164	0.0164	1152	1	5.00
204	32	0.0032	30	0.0030	554	1	5.00
205	243	0.0243	208	0.0208	33133	1	5.00
206	42	0.0042	35	0.0035	1136	1	5.00
207	35	0.0035	30	0.0030	580	1	5.00
208	38	0.0038	31	0.0031	357	1	5.00
209	42	0.0042	35	0.0035	1159	1	5.00
210	22	0.0022	16	0.0016	165	1	5.00
211	296	0.0296	217	0.0217	30045	1	5.00
212	26	0.0026	17	0.0017	208	1	5.00
213	41	0.0041	17	0.0017	324	1	5.00
214	39	0.0039	27	0.0027	561	1	5.00
215	30	0.0030	12	0.0012	205	1	5.00
216	26	0.0026	11	0.0011	165	1	5.00
217	33	0.0033	29	0.0029	553	1	5.00
218	19	0.0019	19	0.0019	287	1	5.00
219	16	0.0016	41	0.0041	257	1	5.00
220	30	0.0030	50	0.0050	318	1	5.00
221	49	0.0049	31	0.0031	1161	1	5.00
222	32	0.0032	30	0.0030	558	1	5.00
223	18	0.0018	16	0.0016	152	1	5.00
224	20	0.0020	47	0.0047	293	1	5.00
225	42	0.0042	34	0.0034	1123	1	5.00
226	36	0.0036	29	0.0029	587	1	5.00
227	41	0.0041	31	0.0031	371	1	5.00
228	42	0.0042	35	0.0035	1149	1	5.00
229	19	0.0019	13	0.0013	152	1	5.00
230	40	0.0040	29	0.0029	564	1	5.00
231	21	0.0021	51	0.0051	240	1	5.00
232	267	0.0267	162	0.0162	17938	1	5.00
233	29	0.0029	25	0.0025	462	1	5.00
234	28	0.0028	31	0.0031	355	1	5.00
235	22	0.0022	28	0.0028	220	1	5.00
236	81	0.0081	74	0.0074	4334	1	5.00
237	90	0.0090	76	0.0076	4770	1	5.00
238	17	0.0017	23	0.0023	253	1	5.00
239	319	0.0319	390	0.0390	66177	1	5.00
240	81	0.0081	73	0.0073	4338	1	5.00
241	335	0.0335	151	0.0151	20962	1	5.00
242	33	0.0033	162	0.0162	1417	1	5.00
243	14	0.0014	34	0.0034	364	1	5.00
244	19	0.0019	19	0.0019	186	1	5.00
245	30	0.0030	27	0.0027	641	1	5.00
246	34	0.0034	29	0.0029	275	1	5.00
247	26	0.0026	43	0.0043	340	1	5.00
248	24	0.0024	22	0.0022	262	1	5.00

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249	55	0.0055	35	0.0035	1244	1	5.00
250	23	0.0023	22	0.0022	253	1	5.00
251	82	0.0082	73	0.0073	4336	1	5.00
252	29	0.0029	33	0.0033	758	1	5.00
253	1982	0.1982	1698	0.1698	1988	22	5.00
254	90	0.0090	76	0.0076	4766	1	5.00
255	47	0.0047	21	0.0021	296	1	5.00

Col.	Type	CEN-rule	Name	lambda [W/mK]	eps [-]	t [°C]	h [W/m²K]	q [W/m²]
0	TRANSMAT		NUSSELT=1	0.025				
2	MATERIAL		aluminium e=0.3	160.000	0.30			
4	TRANSMAT		NUSSELT=1	0.025				
5	TRANSMAT		NUSSELT=1	0.025				
6	TRANSMAT		NUSSELT=1	0.025				
7	TRANSMAT		NUSSELT=1.443	0.036				
8	MATERIAL		aluminium	160.000	0.90			
9	TRANSMAT		NUSSELT=1	0.025				
10	TRANSMAT		NUSSELT=1	0.025				
11	TRANSMAT		NUSSELT=1	0.025				
12	TRANSMAT		NUSSELT=1	0.025				
13	MATERIAL		steel	50.000	0.90			
14	TRANSMAT		NUSSELT=1	0.025				
15	TRANSMAT		NUSSELT=1	0.025				
16	TRANSMAT		NUSSELT=1	0.025				
17	TRANSMAT		NUSSELT=1	0.025				
18	TRANSMAT		NUSSELT=1	0.025				
19	TRANSMAT		NUSSELT=1	0.025				
20	TRANSMAT		NUSSELT=1	0.025				
21	TRANSMAT		NUSSELT=1	0.025				
22	TRANSMAT		NUSSELT=1	0.025				
23	TRANSMAT		NUSSELT=1	0.025				
24	TRANSMAT		NUSSELT=1	0.025				
25	TRANSMAT		NUSSELT=1	0.025				
26	TRANSMAT		NUSSELT=1	0.025				
27	TRANSMAT		NUSSELT=1	0.025				
28	MATERIAL		insulation	0.035	0.90			
29	TRANSMAT		NUSSELT=1	0.025				
30	TRANSMAT		NUSSELT=1	0.025				
31	TRANSMAT		NUSSELT=1	0.025				
32	TRANSMAT		NUSSELT=1	0.025				
33	TRANSMAT		NUSSELT=6.92	0.173				
34	TRANSMAT		NUSSELT=1	0.025				
35	TRANSMAT		NUSSELT=1	0.025				
36	TRANSMAT		NUSSELT=1	0.025				
37	TRANSMAT		NUSSELT=1	0.025				
38	MATERIAL		PE-foam (Lohman)	0.036	0.90			
39	TRANSMAT		NUSSELT=1	0.025				
40	TRANSMAT		NUSSELT=1	0.025				
41	MATERIAL		PVC rigid	0.170	0.90			
42	TRANSMAT		NUSSELT=1	0.025				
43	TRANSMAT		NUSSELT=1	0.025				
44	MATERIAL		PA reinf.	0.300	0.90			
45	TRANSMAT		NUSSELT=1	0.025				
46	TRANSMAT		NUSSELT=1	0.025				
47	TRANSMAT		NUSSELT=1	0.025				
48	TRANSMAT		NUSSELT=1	0.025				
49	TRANSMAT		NUSSELT=1	0.025				
50	TRANSMAT		NUSSELT=1	0.025				

51	TRANSMAT	NUSSELT=1	0.025					
52	TRANSMAT	NUSSELT=1	0.025					
53	TRANSMAT	NUSSELT=1	0.025					
54	TRANSMAT	NUSSELT=5.035	0.126					
55	TRANSMAT	NUSSELT=1	0.025					
56	TRANSMAT	NUSSELT=1	0.025					
57	TRANSMAT	NUSSELT=1	0.025					
58	TRANSMAT	NUSSELT=1	0.025					
59	TRANSMAT	NUSSELT=1	0.025					
60	MATERIAL	EPDM	0.250	0.90				
61	TRANSMAT	NUSSELT=1	0.025					
62	TRANSMAT	NUSSELT=1	0.025					
63	TRANSMAT	NUSSELT=1	0.025					
64	TRANSMAT	NUSSELT=1	0.025					
65	TRANSMAT	NUSSELT=2.788	0.070					
66	TRANSMAT	NUSSELT=1	0.025					
67	TRANSMAT	NUSSELT=1	0.025					
68	TRANSMAT	NUSSELT=1	0.025					
69	TRANSMAT	NUSSELT=1	0.025					
70	TRANSMAT	NUSSELT=1	0.025					
71	TRANSMAT	NUSSELT=1	0.025					
72	TRANSMAT	NUSSELT=1	0.025					
73	TRANSMAT	NUSSELT=1	0.025					
74	TRANSMAT	NUSSELT=1	0.025					
75	TRANSMAT	NUSSELT=1	0.025					
76	TRANSMAT	NUSSELT=1	0.025					
77	TRANSMAT	NUSSELT=1	0.025					
78	TRANSMAT	NUSSELT=1	0.025					
79	TRANSMAT	NUSSELT=1	0.025					
80	TRANSMAT	NUSSELT=1	0.025					
81	TRANSMAT	NUSSELT=1	0.025					
82	TRANSMAT	NUSSELT=1	0.025					
83	TRANSMAT	NUSSELT=1	0.025					
84	TRANSMAT	NUSSELT=1	0.025					
85	TRANSMAT	NUSSELT=1	0.025					
86	TRANSMAT	NUSSELT=1	0.025					
170	BC_SIMPL	HE exterior			0.0	25.00		0
171	EQUIMAT	CEN_Yx_E slightly ventil	0.082	0.90				
174	BC_SIMPL	HI_NORML interior (norma			20.0	7.70		0
192	TRANSMAT	NUSSELT=1	0.025					
193	TRANSMAT	NUSSELT=2.037	0.051					
194	TRANSMAT	NUSSELT=1	0.025					
195	TRANSMAT	NUSSELT=1	0.025					
196	TRANSMAT	NUSSELT=1	0.025					
197	TRANSMAT	NUSSELT=1	0.025					
198	TRANSMAT	NUSSELT=1	0.025					
199	TRANSMAT	NUSSELT=1	0.025					
200	TRANSMAT	NUSSELT=1	0.025					
201	TRANSMAT	NUSSELT=1	0.025					
202	TRANSMAT	NUSSELT=1.459	0.036					
203	TRANSMAT	NUSSELT=1	0.025					
204	TRANSMAT	NUSSELT=1	0.025					
205	TRANSMAT	NUSSELT=1.059	0.026					
206	TRANSMAT	NUSSELT=1	0.025					
207	TRANSMAT	NUSSELT=1	0.025					
208	TRANSMAT	NUSSELT=1	0.025					
209	TRANSMAT	NUSSELT=1	0.025					
210	TRANSMAT	NUSSELT=1	0.025					
211	TRANSMAT	NUSSELT=1	0.025					

212	TRANSMAT	NUSSELT=1	0.025	
213	TRANSMAT	NUSSELT=1	0.025	
214	TRANSMAT	NUSSELT=1	0.025	
215	TRANSMAT	NUSSELT=1	0.025	
216	TRANSMAT	NUSSELT=1	0.025	
217	TRANSMAT	NUSSELT=1	0.025	
218	TRANSMAT	NUSSELT=1	0.025	
219	TRANSMAT	NUSSELT=1	0.025	
220	TRANSMAT	NUSSELT=1	0.025	
221	TRANSMAT	NUSSELT=1	0.025	
222	TRANSMAT	NUSSELT=1	0.025	
223	TRANSMAT	NUSSELT=1	0.025	
224	TRANSMAT	NUSSELT=1	0.025	
225	TRANSMAT	NUSSELT=1	0.025	
226	TRANSMAT	NUSSELT=1	0.025	
227	TRANSMAT	NUSSELT=1	0.025	
228	TRANSMAT	NUSSELT=1	0.025	
229	TRANSMAT	NUSSELT=1	0.025	
230	TRANSMAT	NUSSELT=1	0.025	
231	TRANSMAT	NUSSELT=1	0.025	
232	TRANSMAT	NUSSELT=1	0.025	
233	TRANSMAT	NUSSELT=1	0.025	
234	TRANSMAT	NUSSELT=1	0.025	
235	TRANSMAT	NUSSELT=1	0.025	
236	TRANSMAT	NUSSELT=1	0.025	
237	TRANSMAT	NUSSELT=1	0.025	
238	TRANSMAT	NUSSELT=1	0.025	
239	TRANSMAT	NUSSELT=1.789	0.045	
240	TRANSMAT	NUSSELT=1	0.025	
241	TRANSMAT	NUSSELT=1	0.025	
242	TRANSMAT	NUSSELT=1	0.025	
243	TRANSMAT	NUSSELT=1	0.025	
244	TRANSMAT	NUSSELT=1	0.025	
245	TRANSMAT	NUSSELT=1	0.025	
246	TRANSMAT	NUSSELT=1	0.025	
247	TRANSMAT	NUSSELT=1	0.025	
248	TRANSMAT	NUSSELT=1	0.025	
249	TRANSMAT	NUSSELT=1	0.025	
250	TRANSMAT	NUSSELT=1	0.025	
251	TRANSMAT	NUSSELT=1	0.025	
252	TRANSMAT	NUSSELT=1	0.025	
253	MATERIAL	cavity <1x1 mm2	0.028	0.90
254	TRANSMAT	NUSSELT=1	0.025	
255	TRANSMAT	NUSSELT=1	0.025	

Col.	ta	hc	Pc	tr	C1	C2	C3
	[°C]	[W/m²K]	[W/m]	[°C]	[-]	[-]	[-]
170							
171					0.025	0.73	0.333333
174							

Calculation parameters

Contour approximation margin (triangulation) = 0 pixels

Iteration cycles = 5

Linear radiation

Automatic recalculation of CEN values

Use default temperatures in recalculation of CEN values

Default temperature difference across airspace = 10°C

Bitmap border is no axis of symmetry



Smallest accepted viewfactor = 0.001
 Number of visibility rays between radiative surfaces = 100
 Black radiation heat transfer coeff. (linear radiation) = 5.1 W/(m².K)
 Maximum number of iterations (per iteration cycle) = 10000
 Maximum temperature difference = 0.0001°C
 Heat flow divergence for total object = 0.001 %
 Heat flow divergence for worst node = 1 %

6. Results

BISCO Calculation Results

BISCO data file: VR6123-VR6121-VR6110-VR6017.bsc

Number of nodes = 174526
 Heat flow divergence for total object = 3.56759e-005
 Heat flow divergence for worst node = 0.969294

Col.	Type	Name	tmin [°C]	tmax [°C]	ta [°C]	flow in [W/m]	flow out [W/m]
0	TRANSMAT	NUSSELT=1	15.15	16.74		0.01	0.02
2	MATERIAL	aluminium e=0.3	0.61	17.10			
4	TRANSMAT	NUSSELT=1	2.86	7.46		0.09	0.09
5	TRANSMAT	NUSSELT=1	11.62	17.21		0.09	0.15
6	TRANSMAT	NUSSELT=1	1.30	1.87		0.01	0.00
7	TRANSMAT	NUSSELT=1.443	0.27	2.29		0.14	0.09
8	MATERIAL	aluminium	0.01	17.68			
9	TRANSMAT	NUSSELT=1	1.88	3.73		0.01	0.00
10	TRANSMAT	NUSSELT=1	7.11	11.83		0.02	0.02
11	TRANSMAT	NUSSELT=1	1.89	3.77		0.03	0.01
12	TRANSMAT	NUSSELT=1	1.89	7.66		0.02	0.03
13	MATERIAL	steel	17.27	17.36			
14	TRANSMAT	NUSSELT=1	1.89	3.45		0.02	0.01
15	TRANSMAT	NUSSELT=1	17.20	17.21		0.00	0.00
16	TRANSMAT	NUSSELT=1	17.20	17.22		0.00	0.00
17	TRANSMAT	NUSSELT=1	17.02	17.20		0.00	0.00
18	TRANSMAT	NUSSELT=1	17.20	17.23		0.00	0.00
19	TRANSMAT	NUSSELT=1	14.08	16.83		0.03	0.05
20	TRANSMAT	NUSSELT=1	16.14	17.20		0.01	0.02
21	TRANSMAT	NUSSELT=1	17.20	17.23		0.00	0.00
22	TRANSMAT	NUSSELT=1	17.20	17.21		0.00	0.00
23	TRANSMAT	NUSSELT=1	17.19	17.30		0.00	0.00
24	TRANSMAT	NUSSELT=1	17.22	17.53		0.02	0.02
25	TRANSMAT	NUSSELT=1	17.35	17.55		0.00	0.00
26	TRANSMAT	NUSSELT=1	15.35	17.20		0.02	0.03
27	TRANSMAT	NUSSELT=1	17.05	17.30		0.09	0.09
28	MATERIAL	insulation	0.36	17.62			
29	TRANSMAT	NUSSELT=1	17.33	17.58		0.09	0.09
30	TRANSMAT	NUSSELT=1	14.57	16.10		0.02	0.02
31	TRANSMAT	NUSSELT=1	11.47	14.74		0.05	0.05
32	TRANSMAT	NUSSELT=1	16.02	17.18		0.05	0.07
33	TRANSMAT	NUSSELT=6.92	17.27	17.36		0.03	0.03
34	TRANSMAT	NUSSELT=1	10.83	15.52		0.05	0.07
35	TRANSMAT	NUSSELT=1	0.31	0.94		0.03	0.02
36	TRANSMAT	NUSSELT=1	0.88	12.30		0.04	0.04
37	TRANSMAT	NUSSELT=1	3.04	11.33		0.04	0.03
38	MATERIAL	PE-foam (Lohman)	0.56	16.96			

39	TRANSMAT	NUSSELT=1	15.96	17.12	0.04	0.06
40	TRANSMAT	NUSSELT=1	0.50	1.23	0.01	0.00
41	MATERIAL	PVC rigid	1.29	10.67		
42	TRANSMAT	NUSSELT=1	0.59	3.47	0.10	0.06
43	TRANSMAT	NUSSELT=1	0.59	1.72	0.02	0.00
44	MATERIAL	PA reinf.	0.60	17.10		
45	TRANSMAT	NUSSELT=1	0.49	0.58	0.00	0.00
46	TRANSMAT	NUSSELT=1	0.59	0.59	0.00	0.00
47	TRANSMAT	NUSSELT=1	0.57	0.59	0.00	0.00
48	TRANSMAT	NUSSELT=1	0.55	0.58	0.00	0.00
49	TRANSMAT	NUSSELT=1	5.56	11.58	0.03	0.02
50	TRANSMAT	NUSSELT=1	11.32	17.08	0.03	0.04
51	TRANSMAT	NUSSELT=1	0.54	0.55	0.00	0.00
52	TRANSMAT	NUSSELT=1	2.76	5.78	0.02	0.01
53	TRANSMAT	NUSSELT=1	0.60	2.57	0.03	0.01
54	TRANSMAT	NUSSELT=5.035	0.44	0.65	0.06	0.06
55	TRANSMAT	NUSSELT=1	1.59	6.69	0.10	0.10
56	TRANSMAT	NUSSELT=1	6.75	11.25	0.09	0.09
57	TRANSMAT	NUSSELT=1	11.31	16.12	0.09	0.09
58	TRANSMAT	NUSSELT=1	0.62	2.85	0.16	0.16
59	TRANSMAT	NUSSELT=1	14.75	17.09	0.16	0.16
60	MATERIAL	EPDM	0.00	17.21		
61	TRANSMAT	NUSSELT=1	0.48	0.52	0.00	0.00
62	TRANSMAT	NUSSELT=1	0.45	0.50	0.00	0.00
63	TRANSMAT	NUSSELT=1	0.05	0.06	0.00	0.00
64	TRANSMAT	NUSSELT=1	0.43	0.46	0.00	0.00
65	TRANSMAT	NUSSELT=2.788	0.06	0.11	0.00	0.00
66	TRANSMAT	NUSSELT=1	0.43	0.45	0.00	0.00
67	TRANSMAT	NUSSELT=1	0.39	0.48	0.00	0.00
68	TRANSMAT	NUSSELT=1	17.10	17.28	0.00	0.00
69	TRANSMAT	NUSSELT=1	17.33	17.43	0.00	0.00
70	TRANSMAT	NUSSELT=1	1.67	6.50	0.09	0.09
71	TRANSMAT	NUSSELT=1	6.54	10.73	0.08	0.08
72	TRANSMAT	NUSSELT=1	10.62	15.93	0.10	0.10
73	TRANSMAT	NUSSELT=1	17.13	17.29	0.01	0.01
74	TRANSMAT	NUSSELT=1	17.32	17.39	0.00	0.00
75	TRANSMAT	NUSSELT=1	17.19	17.30	0.00	0.00
76	TRANSMAT	NUSSELT=1	17.25	17.30	0.00	0.00
77	TRANSMAT	NUSSELT=1	17.25	17.31	0.00	0.00
78	TRANSMAT	NUSSELT=1	17.27	17.31	0.00	0.00
79	TRANSMAT	NUSSELT=1	17.27	17.33	0.00	0.00
80	TRANSMAT	NUSSELT=1	0.61	2.88	0.05	0.00
81	TRANSMAT	NUSSELT=1	14.54	17.10	0.00	0.06
82	TRANSMAT	NUSSELT=1	0.48	0.58	0.00	0.00
83	TRANSMAT	NUSSELT=1	17.10	17.21	0.00	0.00
84	TRANSMAT	NUSSELT=1	17.31	17.41	0.00	0.00
85	TRANSMAT	NUSSELT=1	0.60	17.10	0.25	0.40
86	TRANSMAT	NUSSELT=1	0.58	0.77	0.16	0.00
170	BC_SIMPL	exterior	0.00	1.83	0.00	11.75
171	EQUIMAT	slightly ventil	16.09	17.01		
174	BC_SIMPL	interior (norma	16.73	17.68	11.75	0.00
192	TRANSMAT	NUSSELT=1	0.56	1.03	0.02	0.01
193	TRANSMAT	NUSSELT=2.037	0.81	16.71	0.86	0.91
194	TRANSMAT	NUSSELT=1	0.81	1.38	0.01	0.00
195	TRANSMAT	NUSSELT=1	0.89	1.65	0.01	0.01
196	TRANSMAT	NUSSELT=1	0.40	1.81	0.12	0.11
197	TRANSMAT	NUSSELT=1	1.37	2.30	0.01	0.02
198	TRANSMAT	NUSSELT=1	1.37	1.73	0.00	0.00
199	TRANSMAT	NUSSELT=1	1.48	2.08	0.00	0.00

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200	TRANSMAT	NUSSELT=1	1.39	5.05	0.18	0.18
201	TRANSMAT	NUSSELT=1	1.81	1.83	0.00	0.00
202	TRANSMAT	NUSSELT=1.459	1.76	1.87	0.01	0.01
203	TRANSMAT	NUSSELT=1	0.74	1.79	0.04	0.05
204	TRANSMAT	NUSSELT=1	1.81	1.87	0.00	0.00
205	TRANSMAT	NUSSELT=1.059	2.13	9.98	0.39	0.39
206	TRANSMAT	NUSSELT=1	1.83	2.58	0.00	0.01
207	TRANSMAT	NUSSELT=1	1.82	1.93	0.00	0.00
208	TRANSMAT	NUSSELT=1	1.83	2.12	0.01	0.00
209	TRANSMAT	NUSSELT=1	1.84	2.77	0.00	0.01
210	TRANSMAT	NUSSELT=1	16.05	16.50	0.00	0.00
211	TRANSMAT	NUSSELT=1	16.67	16.78	0.01	0.01
212	TRANSMAT	NUSSELT=1	15.94	16.45	0.00	0.00
213	TRANSMAT	NUSSELT=1	15.74	16.40	0.01	0.01
214	TRANSMAT	NUSSELT=1	1.84	2.08	0.01	0.00
215	TRANSMAT	NUSSELT=1	15.63	16.41	0.01	0.01
216	TRANSMAT	NUSSELT=1	15.00	16.25	0.01	0.01
217	TRANSMAT	NUSSELT=1	1.85	1.99	0.00	0.00
218	TRANSMAT	NUSSELT=1	16.52	16.64	0.00	0.00
219	TRANSMAT	NUSSELT=1	16.67	16.70	0.00	0.00
220	TRANSMAT	NUSSELT=1	16.60	16.69	0.00	0.00
221	TRANSMAT	NUSSELT=1	16.63	16.69	0.00	0.00
222	TRANSMAT	NUSSELT=1	1.85	2.01	0.00	0.00
223	TRANSMAT	NUSSELT=1	16.77	16.77	0.00	0.00
224	TRANSMAT	NUSSELT=1	16.77	16.78	0.00	0.00
225	TRANSMAT	NUSSELT=1	1.86	3.29	0.00	0.01
226	TRANSMAT	NUSSELT=1	1.86	2.15	0.01	0.00
227	TRANSMAT	NUSSELT=1	1.86	2.50	0.01	0.00
228	TRANSMAT	NUSSELT=1	1.87	3.61	0.00	0.02
229	TRANSMAT	NUSSELT=1	16.69	16.69	0.00	0.00
230	TRANSMAT	NUSSELT=1	1.87	2.38	0.01	0.00
231	TRANSMAT	NUSSELT=1	16.69	16.71	0.00	0.00
232	TRANSMAT	NUSSELT=1	16.71	16.82	0.01	0.00
233	TRANSMAT	NUSSELT=1	1.87	1.95	0.05	0.00
234	TRANSMAT	NUSSELT=1	14.81	16.71	0.01	0.05
235	TRANSMAT	NUSSELT=1	16.81	16.82	0.00	0.00
236	TRANSMAT	NUSSELT=1	11.02	15.77	0.09	0.09
237	TRANSMAT	NUSSELT=1	7.08	11.06	0.08	0.08
238	TRANSMAT	NUSSELT=1	14.92	16.72	0.00	0.02
239	TRANSMAT	NUSSELT=1.789	17.19	17.40	0.02	0.02
240	TRANSMAT	NUSSELT=1	2.73	7.09	0.08	0.08
241	TRANSMAT	NUSSELT=1	1.87	16.74	0.13	0.13
242	TRANSMAT	NUSSELT=1	16.74	17.19	0.02	0.04
243	TRANSMAT	NUSSELT=1	1.87	3.48	0.04	0.01
244	TRANSMAT	NUSSELT=1	16.73	16.75	0.00	0.00
245	TRANSMAT	NUSSELT=1	1.79	1.86	0.00	0.00
246	TRANSMAT	NUSSELT=1	1.68	1.85	0.00	0.00
247	TRANSMAT	NUSSELT=1	1.80	1.87	0.00	0.00
248	TRANSMAT	NUSSELT=1	1.87	3.67	0.02	0.00
249	TRANSMAT	NUSSELT=1	1.38	1.81	0.00	0.00
250	TRANSMAT	NUSSELT=1	14.99	16.74	0.00	0.02
251	TRANSMAT	NUSSELT=1	11.53	15.86	0.08	0.08
252	TRANSMAT	NUSSELT=1	1.81	1.87	0.00	0.00
253	MATERIAL	cavity <1x1 mm2	0.11	17.44		
254	TRANSMAT	NUSSELT=1	7.48	11.60	0.08	0.08
255	TRANSMAT	NUSSELT=1	1.72	1.87	0.00	0.00

Thermal transmittance of frame (EN ISO 10077-2)

$U_f = (Q / (t_i - t_e) - U_{p1} * w_{p1} - U_{p2} * w_{p2}) / w_f = 2.086 \text{ W}/(\text{m}^2 \cdot \text{K})$

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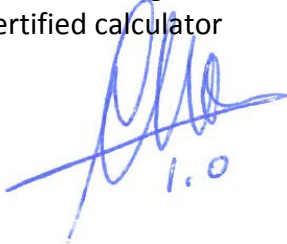
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Q = 11.751 W/m
ti = 20.00°C
te = 0.00°C
Up1 = 0.894 W/(m².K) (right edge of bitmap)
wp1 = 0.1654 m (distance no. 2)
Up2 = 0.000 W/(m².K)
wp2 = 0.0000 m
wf = 0.2108 m (distance no. 1)

Thermal transmittance (Uf) = 2.086 W/(m².K)**7. Comments**

- This calculation result is only valid for the given λ -values of the materials and dimensions of the profiles.
- This standardized calculation ignores the colors of the used materials.
- The long-wave emissivity of the cavities in between the thermal breaks is set to 0.3 (oxidized aluminum)

Pietro Van Seghbroeck
Certified calculator

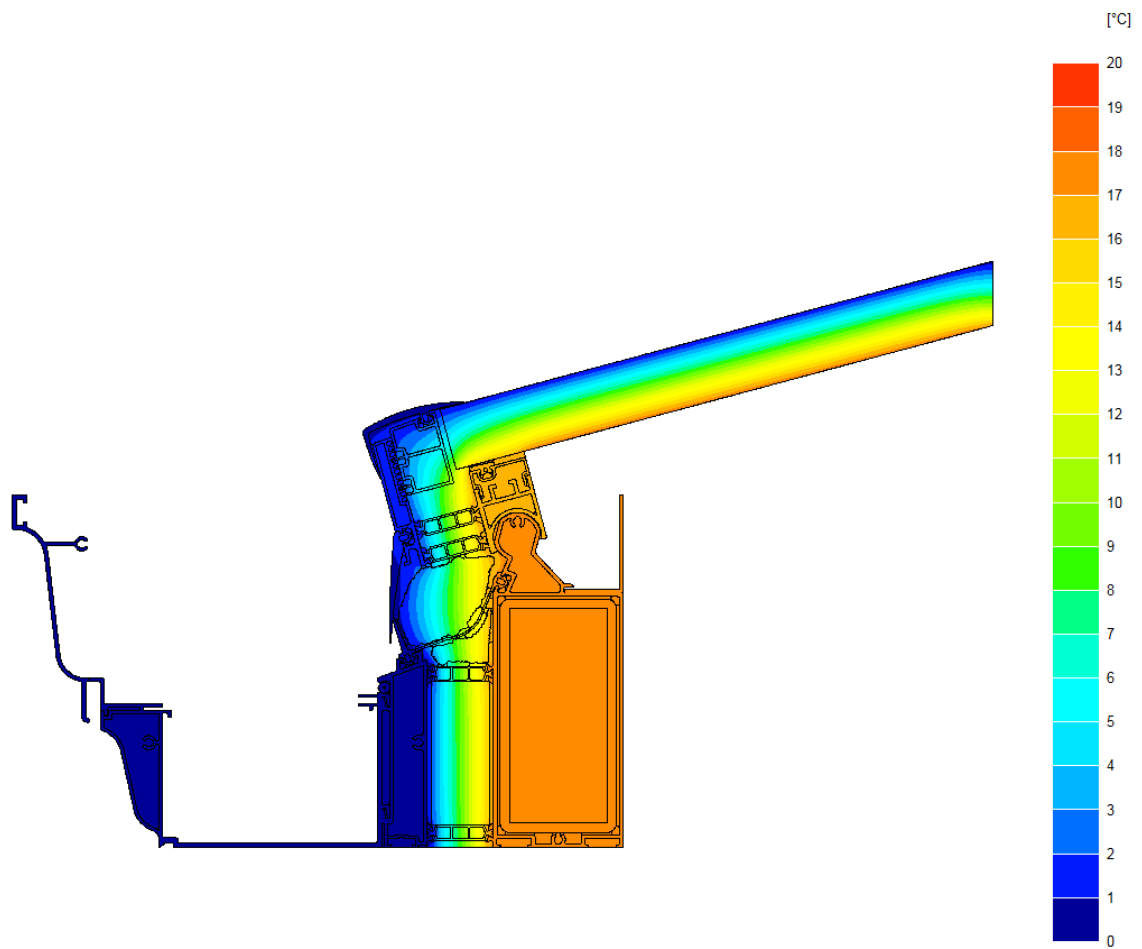


Dries Wynendaele
R&D Manager



8. Annex

8.1 ISOTHERMS



8.2 HEAT FLOW LINES

