

The thermal bridge calculations listed here come from the **thermal bridge catalogue for window installation in new buildings, version 2.0** from the Energy Institute Vorarlberg and are shown here as an overview.

Further information can be found here:

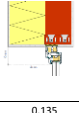
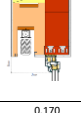
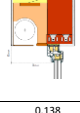
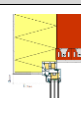
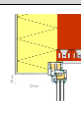
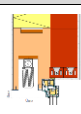
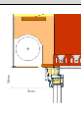
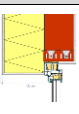
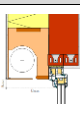
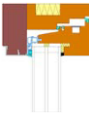
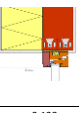
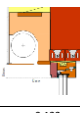
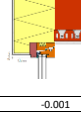
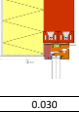
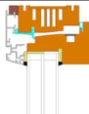
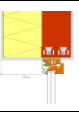
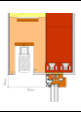
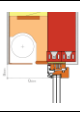
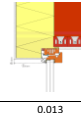
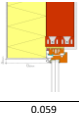
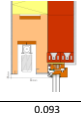
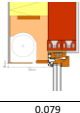
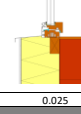
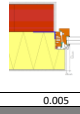
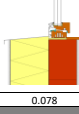
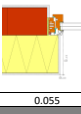
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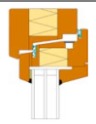
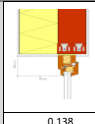
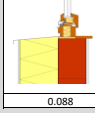
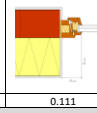
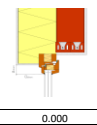
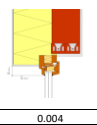
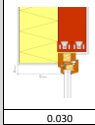
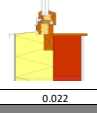
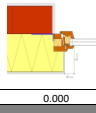
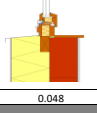
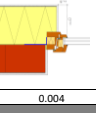
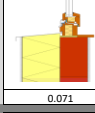
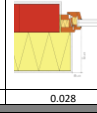
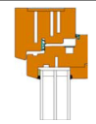
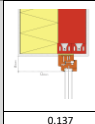
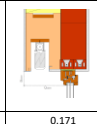
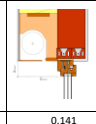
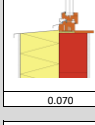
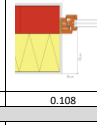
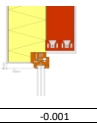
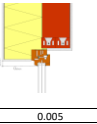
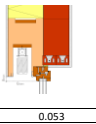
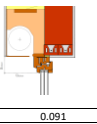
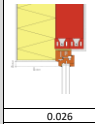
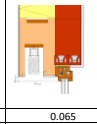
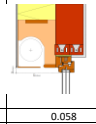
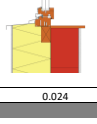
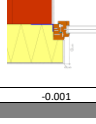
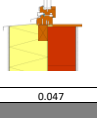
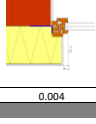
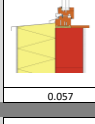
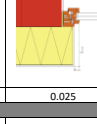
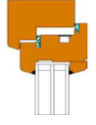
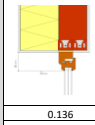
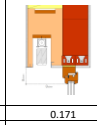
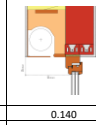
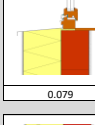
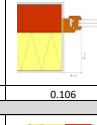
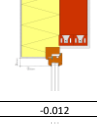
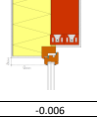
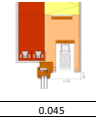
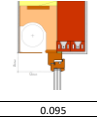
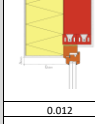
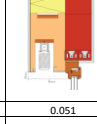
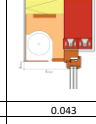
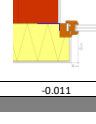
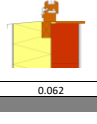
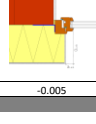
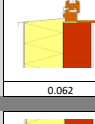
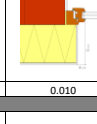
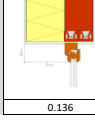
There are other calculated window installation situations for renovation.

Many thanks to Mr. Martin Ploß for creating the catalogue!

A large number of window connection situations were examined for presentation in the thermal bridge catalogue. The variants analysed are selected using a matrix of:

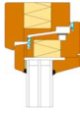
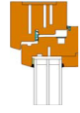
- *four external wall types in solid and wooden construction with U-values of 0.12 W/(m²K)*
- *eight frame types of different energy quality, seven of which are frames for triple glazing*
- *four window installation types, from not over-insulated to arranging the frames in the insulation level*

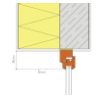
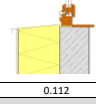
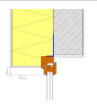
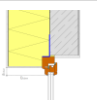
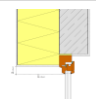
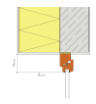
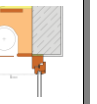
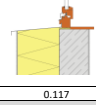
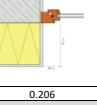
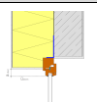
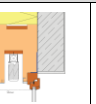
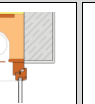
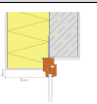
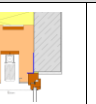
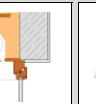
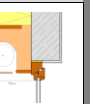
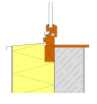
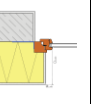
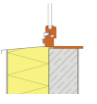
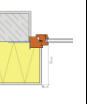
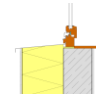
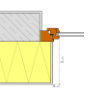
Masonry wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 8 PVC optimised aluplast GmbH aluplast energeto 8000 I foam inside	not covered with insulation							 0.135	 0.170	 0.138
	covered with insulation	 0.000	 0.056		 0.006	 0.052	 0.095	 0.022	 0.062	 0.054
 Window frames 7 O2 Wood Efficiency class pH A pro Passivhausfenster GmbH SmartWin	not covered with insulation							 0.128	 0.163	 0.122
	covered with insulation	 -0.001			 0.000			 0.030	 0.067	 0.059
 Window frames 6 O1 Wood Efficiency class pH A Sigg Tischlerei GmbH Sigg Passivhaus-Venster Holz Alu	not covered with insulation							 0.139	 0.174	 0.144
	covered with insulation	 0.005			 0.013	 0.058		 0.059	 0.093	 0.079
		 0.025	 0.005		 0.050	 0.014		 0.078	 0.055	

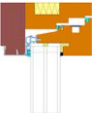
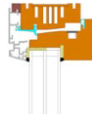
Masonry wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 5 wood optimised (PU insulation) VARIOTEC GmbH & Co. KG Variotec 'Energyframe'	not covered with insulation							 0.138		
								 0.088	 0.111	
	covered with insulation	 0.000			 0.004			 0.030		
		 0.022	 0.000		 0.048	 0.004		 0.071	 0.028	
 Window frames 4 wood optimised (air shields) Sigg Tischlerei GmbH Sigg 'Passivhaus Venster'	not covered with insulation							 0.137	 0.171	 0.141
								 0.070	 0.108	
	covered with insulation	 -0.001			 0.005	 0.053	 0.091	 0.026	 0.065	 0.058
		 0.024	 -0.001		 0.047	 0.004		 0.057	 0.025	
 Window frames 3 wood 88 mm	not covered with insulation							 0.136	 0.171	 0.140
								 0.079	 0.106	
	covered with insulation	 -0.012	 0.057		 -0.006	 0.045	 0.095	 0.012	 0.051	 0.043
		 0.028	 -0.011		 0.062	 -0.005		 0.062	 0.010	
	not covered with insulation							 0.136		

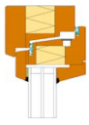
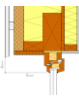
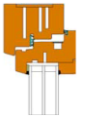
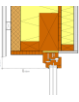
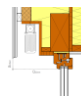
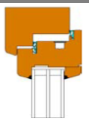
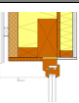
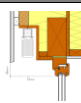
Masonry wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
Window frames 2 wood 78 mm										
								0.077	0.108	
covered with insulation										
		-0.014			-0.008			0.005		
										
		0.035	-0.013		0.071	-0.007		0.059	0.004	
not covered with insulation										
								0.138	0.173	0.140
Window frames 1 wood 68 mm										
								0.081	0.108	
covered with insulation										
		-0.017	0.043	0.095	-0.110	0.036	0.108	0.000	0.040	0.033
										
		0.045	-0.017		0.037	-0.110		0.065	-0.003	

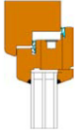
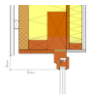
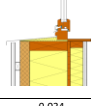
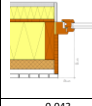
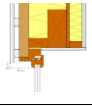
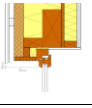
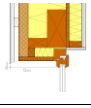
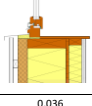
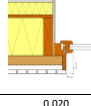
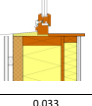
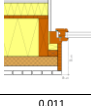
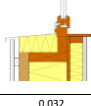
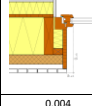
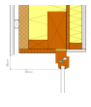
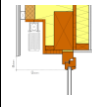
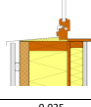
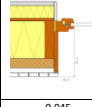
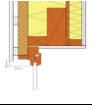
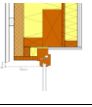
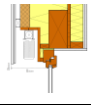
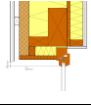
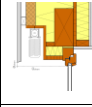
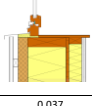
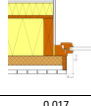
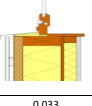
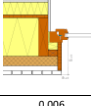
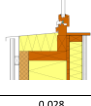
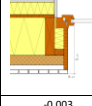
Reinforced concrete	Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
Reference point frame not covered with insulation  Window frames 8 PVC optimised aluplast GmbH aluplast energeto 8000 I foam inside							 0.199  0.102	 0.225  0.199	 0.176 
covered with insulation	 -0.001  0.031	 0.042  0.001	 0.078  	 0.009  0.079	 0.045  	 0.096  	 0.029  0.083	 0.060  0.029	 0.054 
not covered with insulation  Window frames 7 O2 Wood Efficiency class pH A pro Passivhausfenster GmbH SmartWin							 0.204  0.212	 0.228  0.204	 0.175 
covered with insulation	 -0.001  0.023			 0.002  0.047			 0.036  0.172	 0.067  0.036	 0.060 
not covered with insulation  Window frames 6 O1 Wood Efficiency class pH A Sigg Tischlerei GmbH Sigg Passivhaus-Venster Holz Alu							 0.214  0.158	 0.241  0.214	 0.195 
covered with insulation	 0.008  0.030			 0.020  0.064	 0.049  0.020	 0.084  	 0.079  0.113	 0.108  0.079	 0.096 

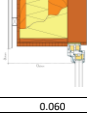
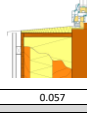
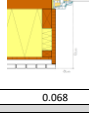
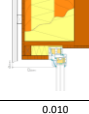
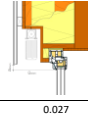
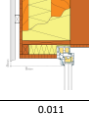
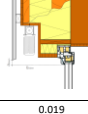
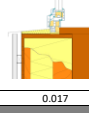
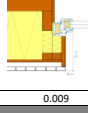
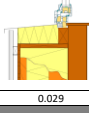
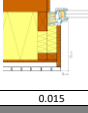
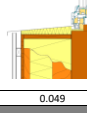
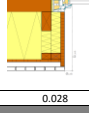
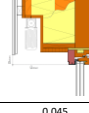
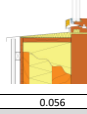
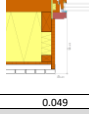
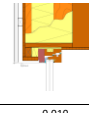
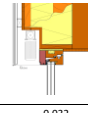
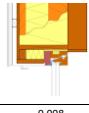
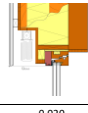
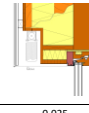
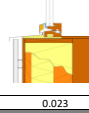
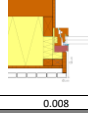
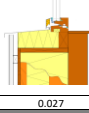
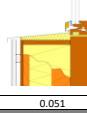
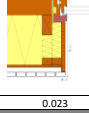
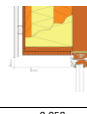
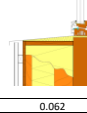
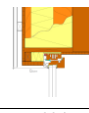
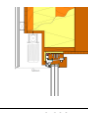
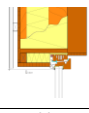
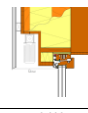
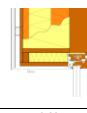
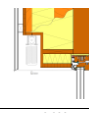
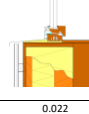
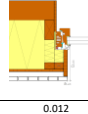
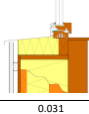
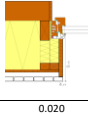
Reinforced concrete		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 5 wood optimised (PU insulation) VARIOTEC GmbH & Co. KG Variotec 'Energyframe'	not covered with insulation							 0.217  0.129		
	covered with insulation	 0.001  0.025			 0.007  0.058			 0.039  0.098		
 Window frames 4 wood optimised (air shields) Sigg Tischlerei GmbH Sigg 'Passivhaus Fenster'	not covered with insulation							 0.213  0.100	 0.238  0.213	 0.186 
	covered with insulation	 0.001  0.029	 0.048  0.001		 0.009  0.061	 0.045  0.009	 0.089  	 0.035  0.081	 0.066  0.035	 0.060 
 Window frames 3 wood 88 mm	not covered with insulation							 0.212  0.116	 0.228  0.212	 0.183 
	covered with insulation	 -0.009  0.034	 0.039  -0.009	 0.079  	 -0.002  0.083	 0.036  -0.002	 0.096  	 0.020  0.089	 0.051  0.020	 0.045 

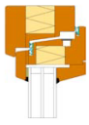
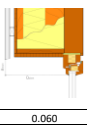
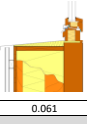
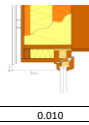
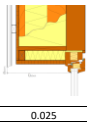
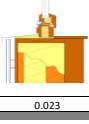
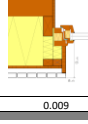
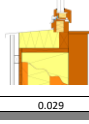
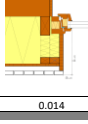
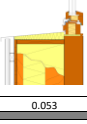
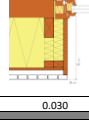
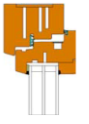
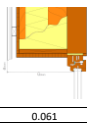
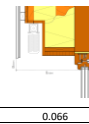
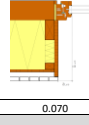
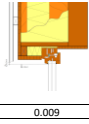
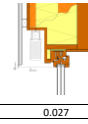
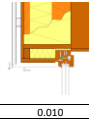
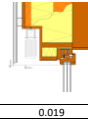
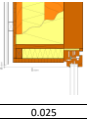
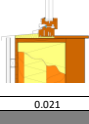
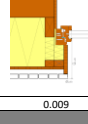
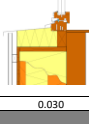
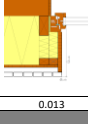
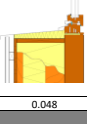
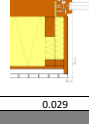
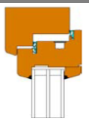
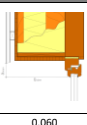
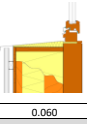
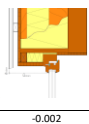
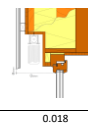
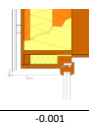
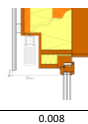
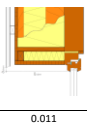
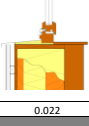
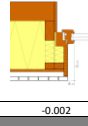
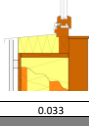
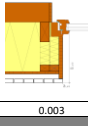
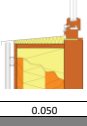
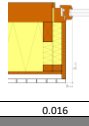
Reinforced concrete		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 2 wood 78 mm	not covered with insulation							 0.209		
								 0.112		
	covered with insulation	 -0.011			 -0.003			 0.013		
 Window frames 1 wood 68 mm	not covered with insulation							 0.206	 0.231	 0.176
								 0.117	 0.206	
	covered with insulation	 -0.015	 0.026	 0.085	 -0.007	 0.028	 0.115	 0.004	 0.036	 0.030
		 0.054	 -0.015		 0.048	 -0.007		 0.091	 0.004	

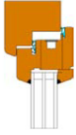
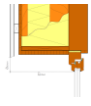
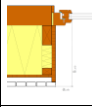
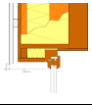
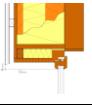
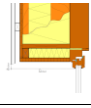
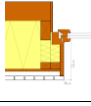
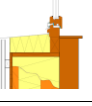
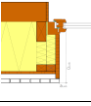
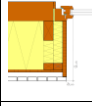
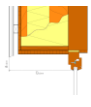
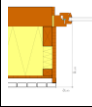
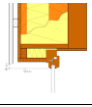
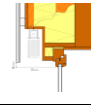
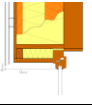
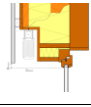
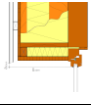
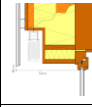
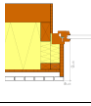
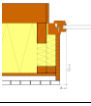
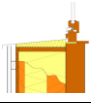
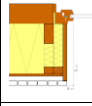
Timber stud wall	Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
Reference point frame not covered with insulation  Window frames 8 PVC optimised aluplast GmbH aluplast energeto 8000 I foam inside							 0.055  0.024	 0.063  0.041	
covered with insulation	 0.035  0.022	 0.031  0.031		 0.030  0.020	 0.056  0.024		 0.027  0.027	 0.039  0.019	
not covered with insulation  Window frames 7 O2 Wood Efficiency class pH A pro Passivhausfenster GmbH SmartWin							 0.039  0.033	 0.051  0.029	
covered with insulation	 0.028  0.033	 0.024  0.024		 0.027  0.033	 0.053  0.021		 0.024  0.027	 0.041  0.017	
not covered with insulation  Window frames 6 O1 Wood Efficiency class pH A Sigg Tischlerei GmbH Sigg Passivhaus-Venster Holz Alu							 0.049  0.034	 0.058  0.037	
covered with insulation	 0.034  0.034	 0.030  0.030		 0.033  0.032	 0.052  0.025		 0.032  0.030	 0.042  0.022	

Timber stud wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 5 wood optimised (PU insulation) VARIOTEC GmbH & Co. KG Variotec 'Energyframe'	not covered with insulation							 0.051		
								 0.034	 0.039	
	covered with insulation	 0.033			 0.030			 0.027		
		 0.036	 0.029		 0.033	 0.024		 0.030	 0.019	
 Window frames 4 wood optimised (air shields) Sigg Tischlerei GmbH Sigg 'Passivhaus Fenster'	not covered with insulation							 0.051	 0.060	
								 0.031	 0.039	
	covered with insulation	 0.033			 0.029	 0.055		 0.026	 0.038	
		 0.033	 0.029		 0.030	 0.023		 0.029	 0.018	
 Window frames 3 wood 88 mm	not covered with insulation							 0.054	 0.062	
								 0.033	 0.040	
	covered with insulation	 0.024			 0.019	 0.049		 0.015	 0.028	
		 0.034	 0.021		 0.031	 0.013		 0.030	 0.007	

Timber stud wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 2 wood 78 mm	not covered with insulation							 0.056		
								 0.034	 0.043	
	covered with insulation	 0.023			 0.016			 0.013		
		 0.036	 0.020		 0.033	 0.011		 0.032	 0.004	
 Window frames 1 wood 68 mm	not covered with insulation							 0.060	 0.068	
								 0.035	 0.045	
	covered with insulation	 0.021			 0.012	 0.043		 0.009	 0.021	
		 0.037	 0.017		 0.033	 0.006		 0.028	 -0.003	

Solid timber wall	Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
Reference point frame  not covered with insulation Window frames 8 PVC optimised aluplast GmbH aluplast energeto 8000 I foam inside							 0.060	 0.065	
							 0.057	 0.068	
covered with insulation	 0.010	 0.027		 0.011	 0.019		 0.023	 0.029	
	 0.017	 0.009		 0.029	 0.015		 0.049	 0.028	
not covered with insulation  Window frames 7 O2 Wood Efficiency class pH A pro Passivhausfenster GmbH SmartWin							 0.040	 0.045	
							 0.056	 0.049	
covered with insulation	 0.010	 0.032		 0.008	 0.020		 0.019	 0.025	
	 0.023	 0.008		 0.027	 0.010		 0.051	 0.023	
not covered with insulation  Window frames 6 O1 Wood Efficiency class pH A Sigg Tischlerei GmbH Sigg Passivhaus-Venster Holz Alu							 0.058	 0.063	
							 0.062	 0.067	
covered with insulation	 0.012	 0.028		 0.014	 0.022		 0.034	 0.038	
	 0.022	 0.012		 0.031	 0.020		 0.053	 0.038	

Solid timber wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 5 wood optimised (PU insulation) VARIOTEC GmbH & Co. KG Variotec 'Energyframe'	not covered with insulation							 0.060		
								 0.061	 0.069	
	covered with insulation	 0.010			 0.010			 0.025		
		 0.023	 0.009		 0.029	 0.014		 0.053	 0.030	
 Window frames 4 wood optimised (air shields) Sigg Tischlerei GmbH Sigg 'Passivhaus Fenster'	not covered with insulation							 0.061	 0.066	
								 0.055	 0.070	
	covered with insulation	 0.009	 0.027		 0.010	 0.019		 0.025	 0.030	
		 0.021	 0.009		 0.030	 0.013		 0.048	 0.029	
 Window frames 3 wood 88 mm	not covered with insulation							 0.060	 0.065	
								 0.060	 0.068	
	covered with insulation	 -0.002	 0.018		 -0.001	 0.008		 0.011	 0.017	
		 0.022	 -0.002		 0.033	 0.003		 0.050	 0.016	

Solid timber wall		Window in insulation layer			Window partly in insulation layer			Window flush in masonry		
Reference point frame		No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter	No external sun shading	Venetian blind	Roller shutter
 Window frames 2 wood 78 mm	not covered with insulation							 0.059		
								 0.060	 0.068	
	covered with insulation	 -0.005			 -0.004			 0.006		
		 0.022	 -0.004		 0.035	 0.000		 0.049	 0.012	
 Window frames 1 wood 68 mm	not covered with insulation							 0.060	 0.064	
								 0.062	 0.068	
	covered with insulation	 -0.008	 0.009		 -0.007	 0.001		 0.001	 0.007	
		 0.023	 -0.010		 0.037	 -0.005		 0.052	 0.005	