Input Data-Sheet

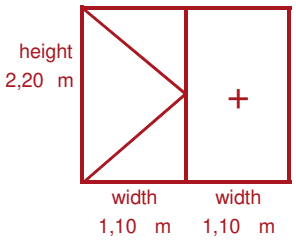
Short report | Based on ISO 10077-2 | Performed by: Passive House Institute Dr. Wolfgang Feist, Author: Dr.-Ing. Benjamin Krick

On behalf of: Moralt AG, Hausham, GERMANY
Project/Product: FERRO PASSIV FireSafe EI30

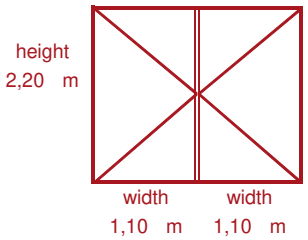
Description	Door leaf / Glazing U_{dl}-value [W/(m²K)]	U_g-value [W/(m²K)]	Uf value [W/(m²K)] Lock s.	Hinge s.	Sill	Head	Frame Width [m] Lock s.	Hinge s.	Sill	Head	Glazing Edge Ψ-value [W/(m²K)] Lock s.	Hinge s.	Sill	Head	Temperature factor (min) $f_{Rsi=0,25}$ [-]	Overall U-value [W/(m²K)]
FERRO PASSIV FireSafe EI30	0,48		0,97	1,09	1,69	1,09	0,199	0,114	0,080	0,114	0,001	0,001	0,002	0,001	0,46	**0,69**
FERRO PASSIV FireSafe EI30 side light		0,63	0,99	0,99	0,99	0,99	0,087	0,087	0,087	0,087	0,064	0,064	0,064	0,064	0,71	**0,87**
Flying mullion	0,48	0,63	0,92				0,284				0,001				0,76	
Mullion 1 casement	0,48	0,63	0,98				0,252				0,033				0,67	
Transom 1 casement	0,48	0,63	1,07				0,167				0,033				0,67	
Glass insert	0,48	0,63									0,084				0,69	

Drawings and material data were provided by the manufacturer. The sole resonibility for the provided information lies with the manufacturer.
fRsi and PSIg- values of side- and top light were determined with Ug=0,7 W/(m²K).

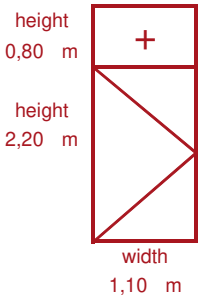
With side light



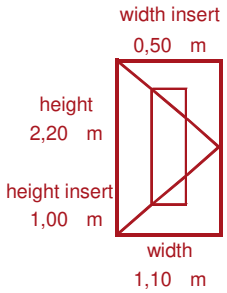
Double wing



With top light



With glass insert



comfort criterion for cool-temperate climate zone achieved

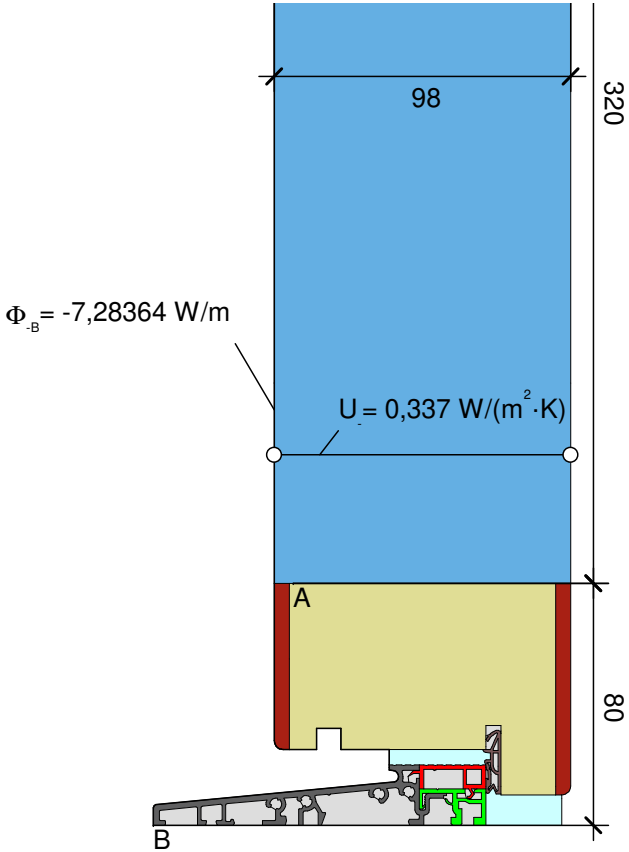
U-value U_D [W/(m²K)]	With side light	Double wing	With top light	With glass insert
	0,77	**0,67**	**0,77**	**0,83**

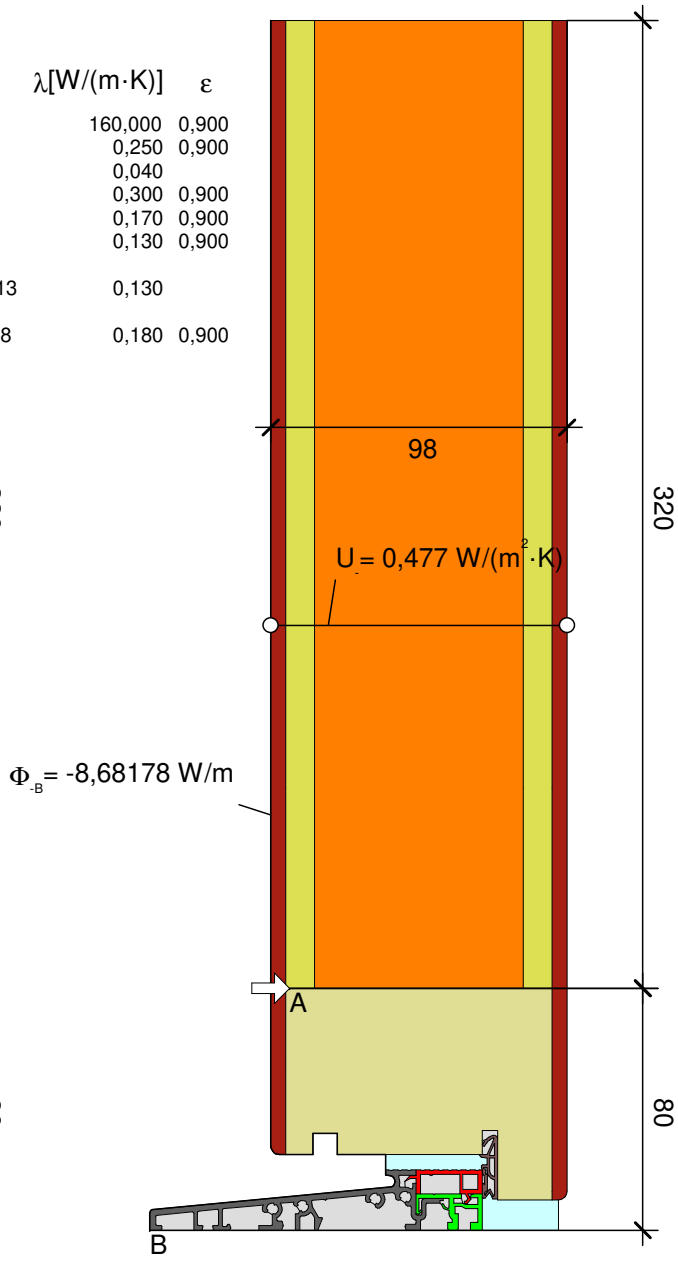
Suitable for climate zone

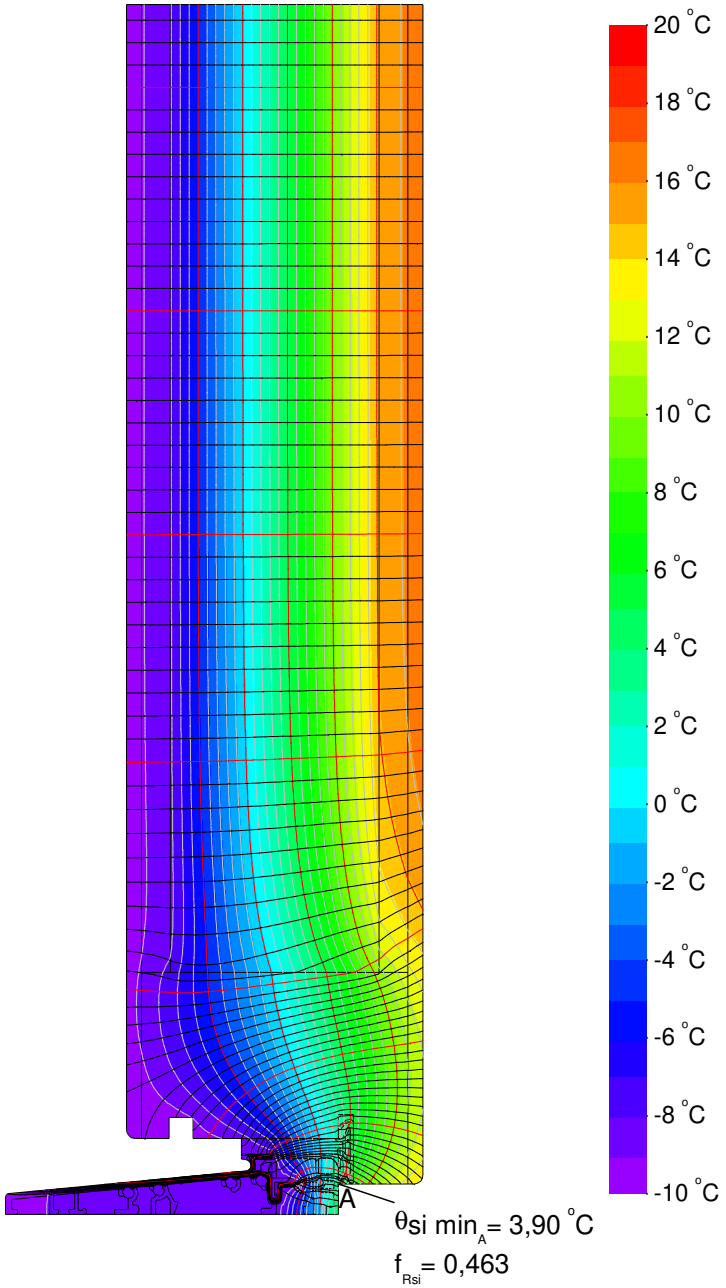
arctic	cold	cool-temperate	warm-temperate	warm	hot	very hot
		✓	✓	✓	✓	✓

Material	λ[W/(m·K)]	ε
Aluminum I Aluminium 10456	160,000	0,900
EPDM	0,250	0,900
Insulation I Wärmedämmung 040	0,040	
Polyamide 25% Glassfiber	0,300	0,900
Polyvinylchloride (PVC)	0,170	0,900
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
slightly vent. cav. I leicht bel. Hohlr. **		
wooden-based material I Holzwerkstoff 0.18	0,180	0,900

** EN ISO 10077-2:2017, 6.4.3



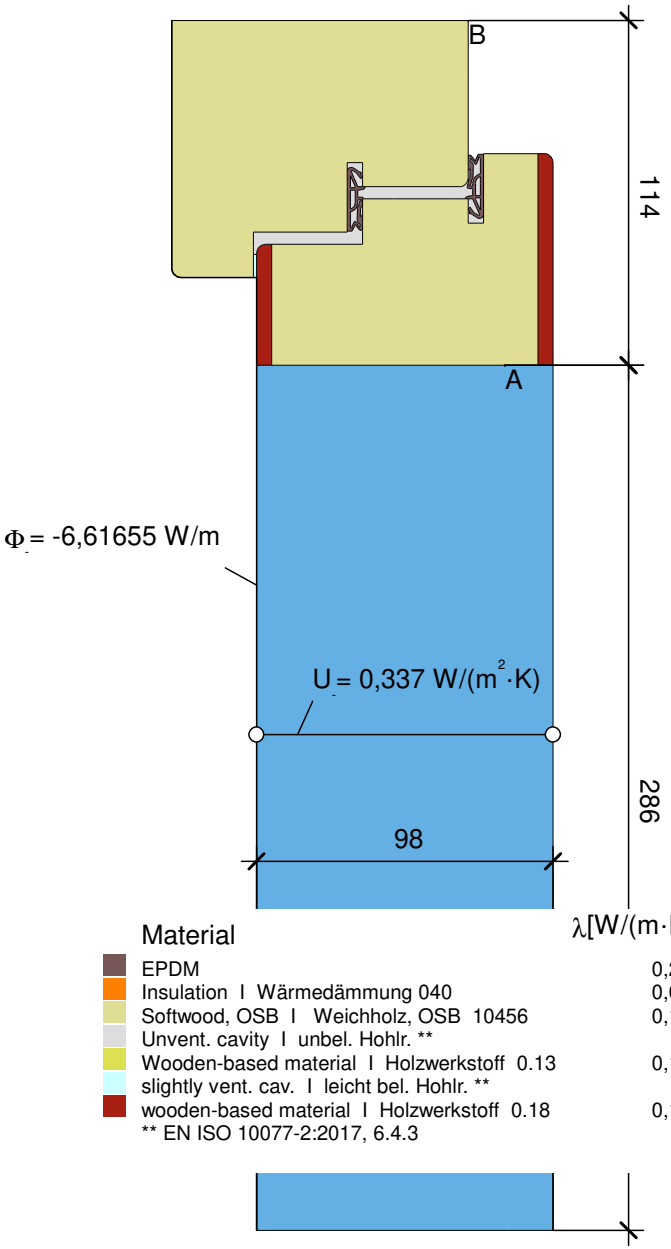


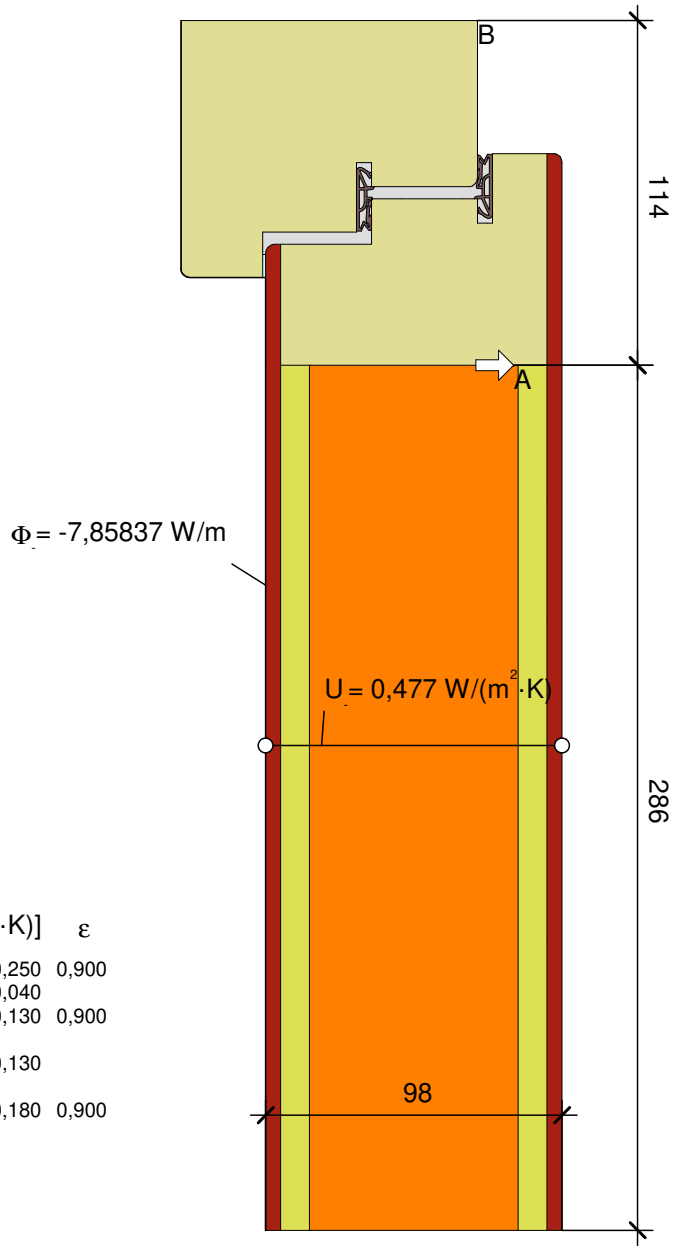


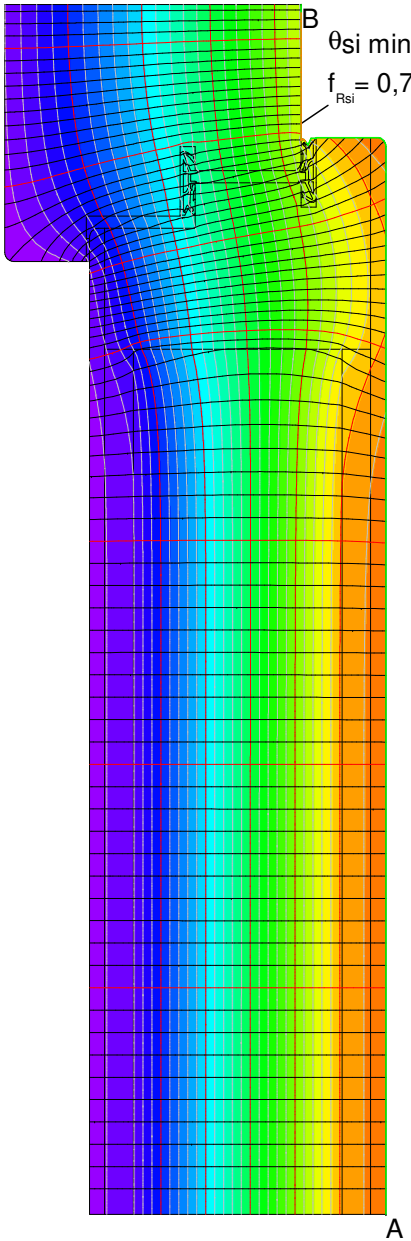
$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{7,284}{30,000} - 0,337 \cdot 0,320}{0,080} = 1,688\ \text{W/(m}^2\text{·K)}$$

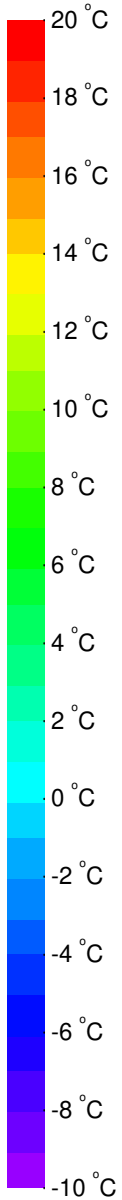
$$\Psi_A = \frac{\Phi}{\Delta T} - U_g \cdot b_g - U_f \cdot b_f = \frac{8,682}{30,000} - 0,477 \cdot 0,320 - 1,688 \cdot 0,080 = 0,002\ \text{W/(m·K)}$$

th - THRESHOLD I SCHWELLE









Material	λ[W/(m·K)]	ε
EPDM	0,250	0,900
Insulation I Wärmedämmung 040	0,040	
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
slightly vent. cav. I leicht bel. Hohlr. **		
wooden-based material I Holzwerkstoff 0.18	0,180	0,900

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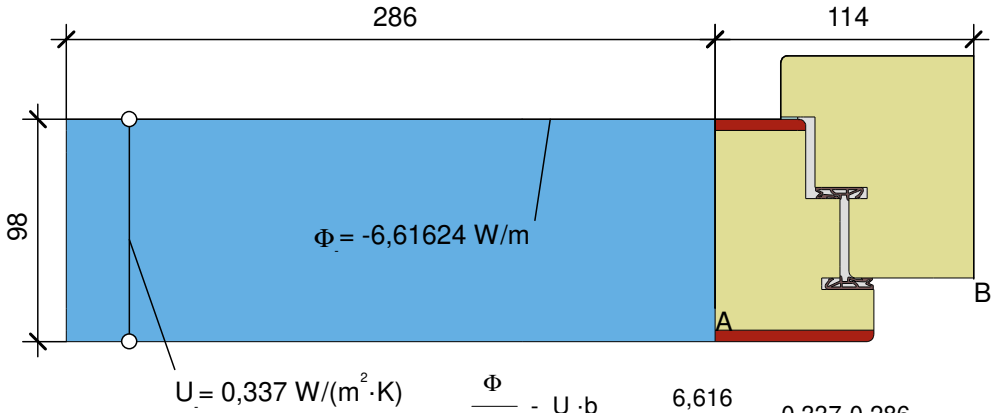
$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{6{,}617}{30{,}000} - 0{,}337 \cdot 0{,}286}{0{,}114} = 1{,}090\ \mathrm{W/(m^2 \cdot K)}$$

$$\psi_A = \frac{\Phi}{\Delta T} - U_g \cdot b_g - U_f \cdot b_f = \frac{7{,}858}{30{,}000} - 0{,}477 \cdot 0{,}286 - 1{,}090 \cdot 0{,}114 = 0{,}001\ \mathrm{W/(m \cdot K)}$$

to - TOP I OBEN



$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{6{,}616}{30{,}000} - 0{,}337 \cdot 0{,}286}{0{,}114} = 1{,}090\ \mathrm{W/(m^2 \cdot K)}$$

Material	λ[W/(m·K)]	ε
EPDM	0,250	0,900
Insulation I Wärmedämmung 040	0,040	
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
slightly vent. cav. I leicht bel. Hohlr. **		
wooden-based material I Holzwerkstoff 0.18	0,180	0,900

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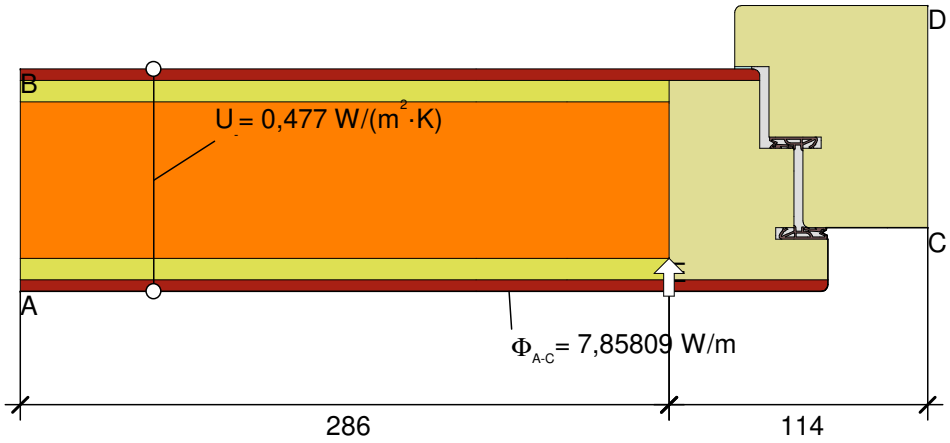
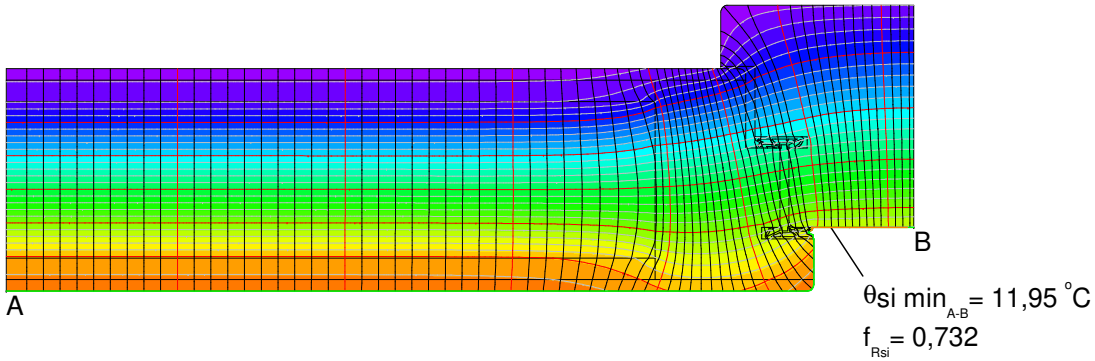
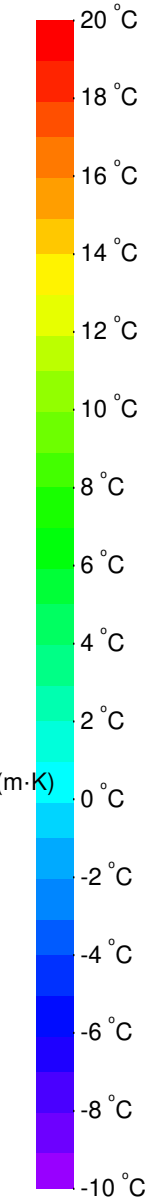


Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
Interior, frame, normal		20,000	0,130	
Interior, frame, reduced		20,000	0,200	
e 0,9 Cavity I Hohlraum				0,900

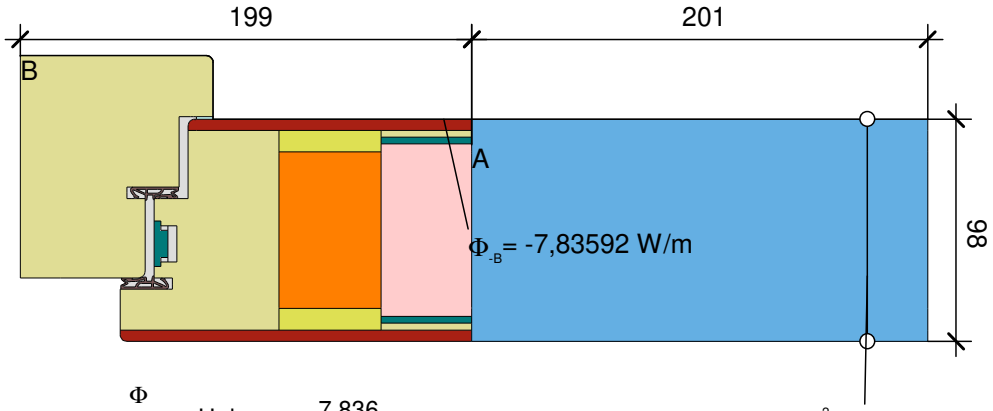
$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{7{,}858}{30{,}000} - 0{,}477 \cdot 0{,}286 - 1{,}090 \cdot 0{,}114 = 0{,}001\ \mathrm{W/(m \cdot K)}$$



Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
e 0,9 Cavity I Hohlraum				0,900
fRsi: Interior | Innen		20,000	0,250	



si HINGE SIDE I BANDSEITE



$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{7,836}{30,000} - 0,337 \cdot 0,201}{0,199} = 0,972\ W/(m^2 \cdot K)$$

U_{-}= 0,337 W/(m²·K)

Material	λ[W/(m·K)]	ε
Balsa qsenkrecht 0.11 W/(mK)	0,110	
EPDM	0,250	0,900
Insulation I Wärmedämmung 040	0,040	
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Steel I Stahl	50,000	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
slightly vent. cav. I leicht bel. Hohlr. **		
wooden-based material I Holzwerkstoff 0.18	0,180	0,900

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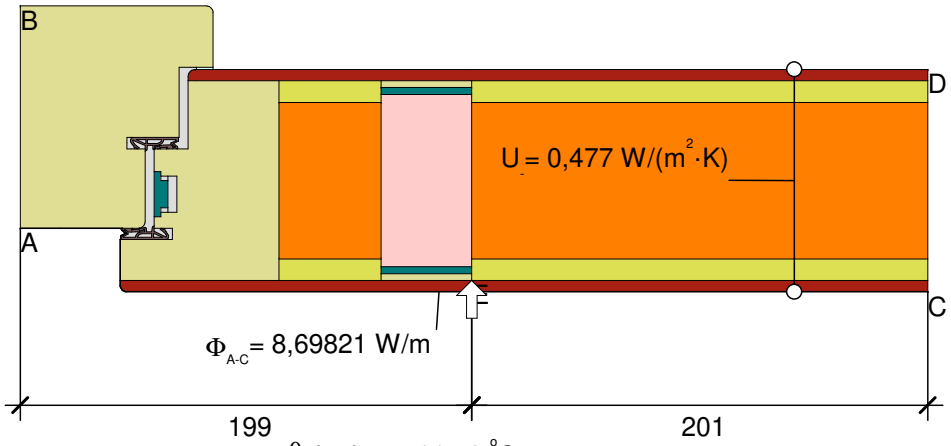
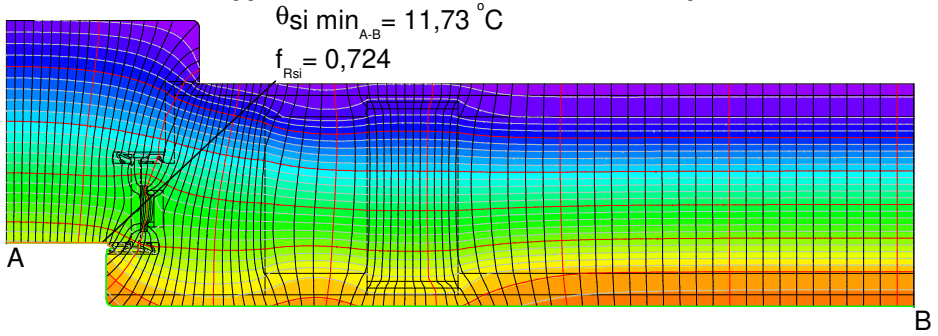
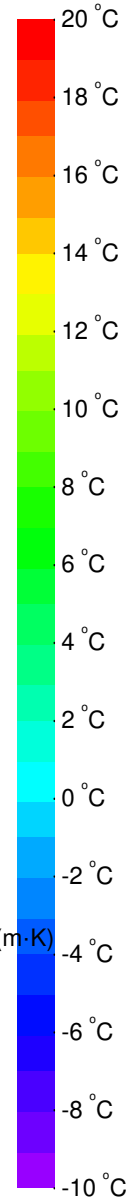


Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
Interior, frame, normal		20,000	0,130	
Interior, frame, reduced		20,000	0,200	
e 0,9 Cavity I Hohlraum				0,900

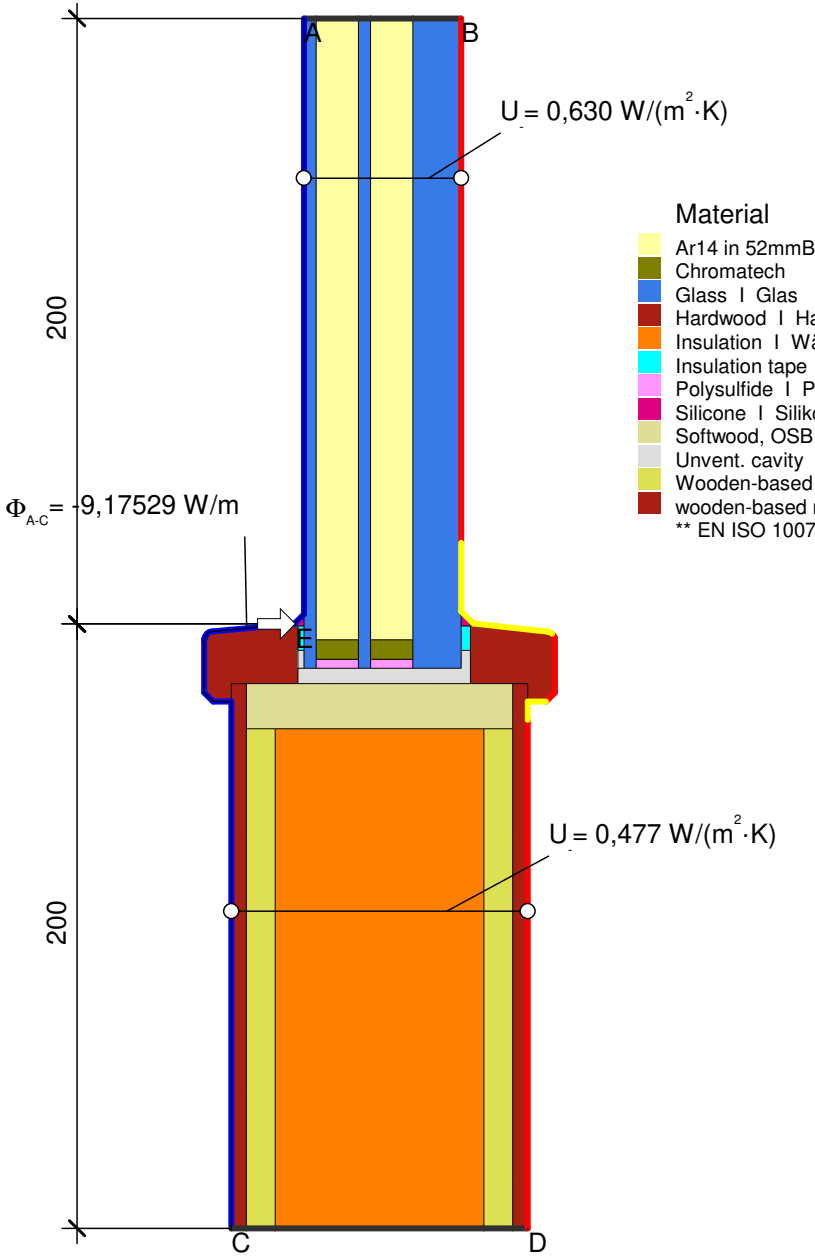
$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{8,698}{30,000} - 0,972 \cdot 0,199 - 0,477 \cdot 0,201 = 0,001\ W/(m \cdot K)$$



Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
e 0,9 Cavity I Hohlraum				0,900
fRsi: Interior | Innen		20,000	0,250	



sh - LOCK SIDE | SCHLOSS SEITE



Material	λ[W/(m·K)]	ε
Ar14 in 52mmBrandschGlas U 0,63	0,020	
Chromatech	0,810	
Glass I Glas	1,000	0,900
Hardwood I Hartholz 0.18 700 kg/m3 10456	0,180	0,900
Insulation I Wärmedämmung 040	0,040	
Insulation tape | Vorlegeband	0,060	0,900
Polysulfide I Polysulfid	0,400	0,900
Silicone I Silikon	0,350	
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
wooden-based material I Holzwerkstoff 0.18	0,180	

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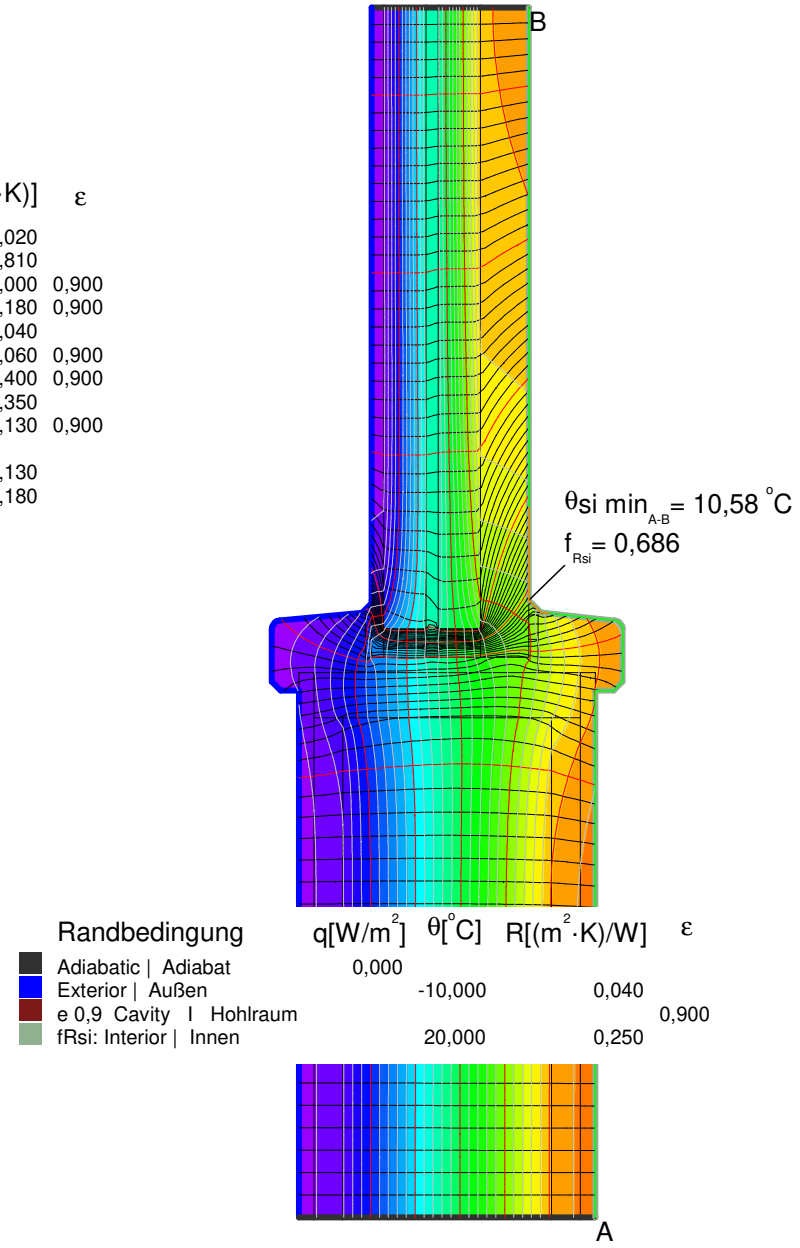
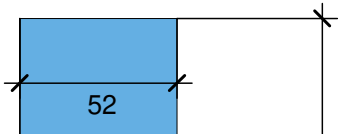


Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
e 0,9 Cavity I Hohlraum				0,900
fRsi: Interior | Innen		20,000	0,250	

$$\psi_{A\text{-}E\text{-}C} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{9{,}175}{30{,}000} - 0{,}630 \cdot 0{,}200 - 0{,}477 \cdot 0{,}200 = 0{,}084 \text{ W/(m·K)}$$



Material	λ[W/(m·K)]	ε
Ar14 in 52mmBrandschGlas U 0,63	0,020	
Chromatech	0,810	
Glass I Glas	1,000	0,900
Insulation tape | Vorlegeband	0,060	0,900
Polysulfide I Polysulfid	0,400	0,900
Silicone I Silikon	0,350	
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Spruce, Fir I Fichte, Tanne	0,110	0,900
Unvent. cavity I unbel. Hohlr. **		

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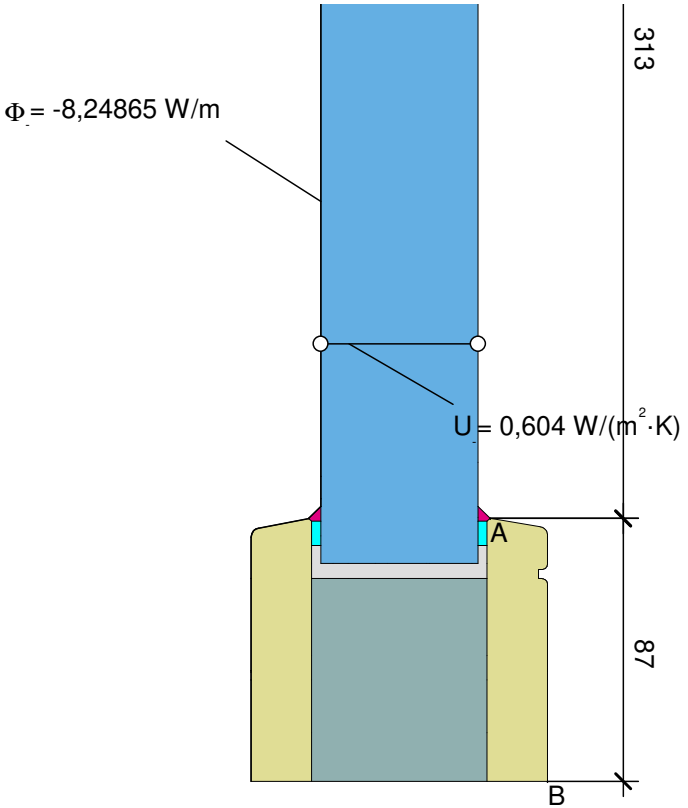
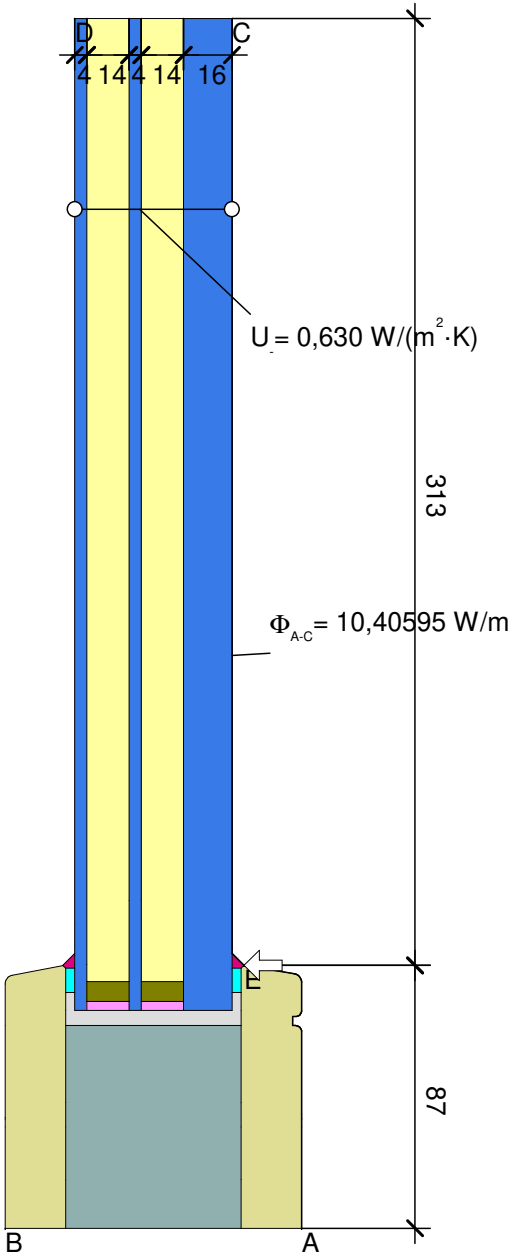
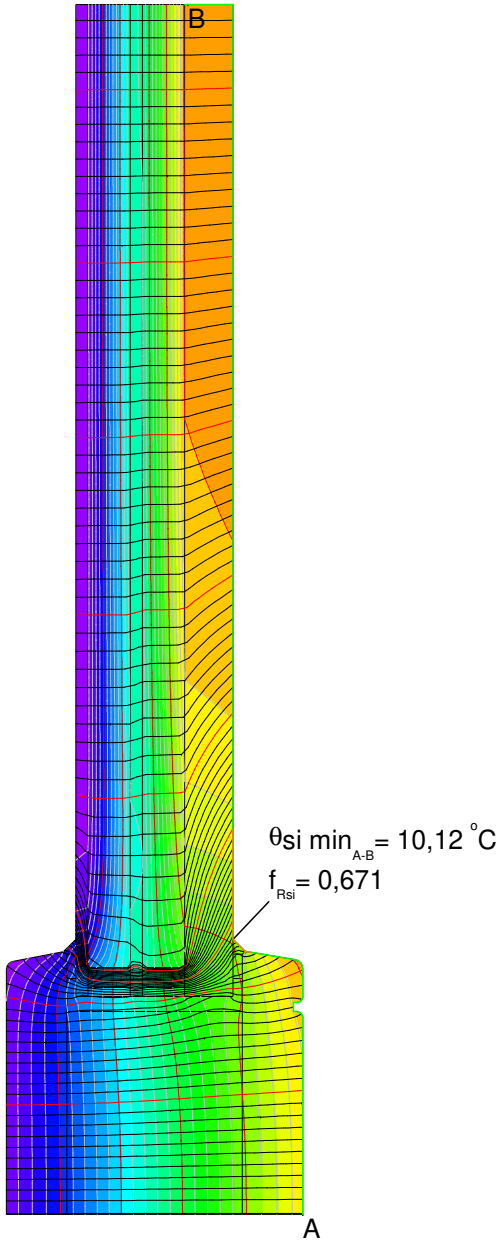
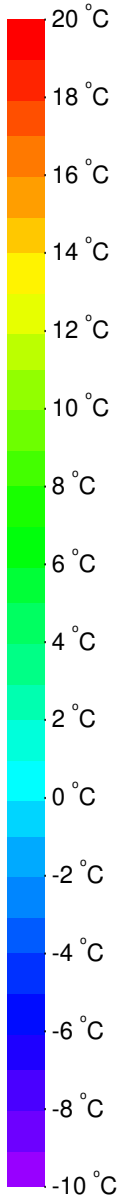




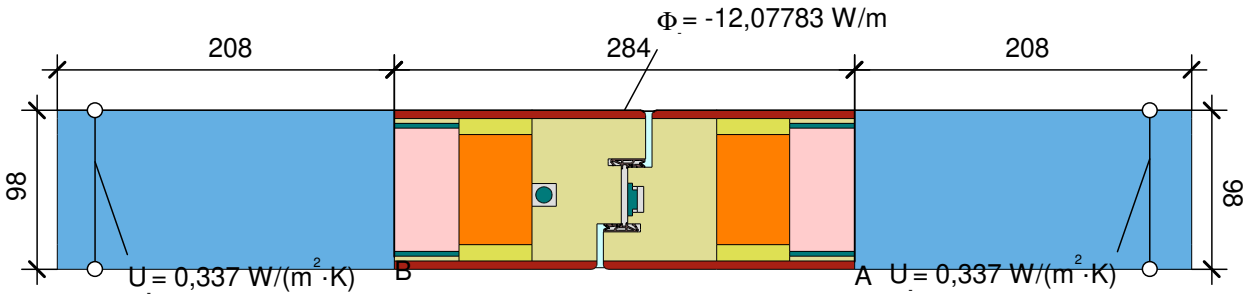




$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{8,249}{30,000} - 0,604 \cdot 0,313}{0,087} = 0,988\ W/(m^2 \cdot K)$$

$$\Psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{10,406}{30,000} - 0,988 \cdot 0,087 - 0,630 \cdot 0,313 = 0,064\ W/(m \cdot K)$$

bof - BOTTOM FIXED | UNTEN FEST VERGLAST



$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_{p1}\cdot b_{p1} - U_{p2}\cdot b_{p2}}{b_f} = \frac{\frac{12,078}{30,000} - 0,337\cdot 0,208 - 0,337\cdot 0,208}{0,284} = 0,924\ W/(m^2\cdot K)$$

Material	λ[W/(m·K)]	ε
Balsa qsenkrecht 0.11 W/(mK)	0,110	
EPDM	0,250	0,900
Insulation I Wärmedämmung 040	0,040	0,900
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Steel I Stahl	50,000	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
slightly vent. cav. I leicht bel. Hohlr. **		
wooden-based material I Holzwerkstoff 0.18	0,180	0,900

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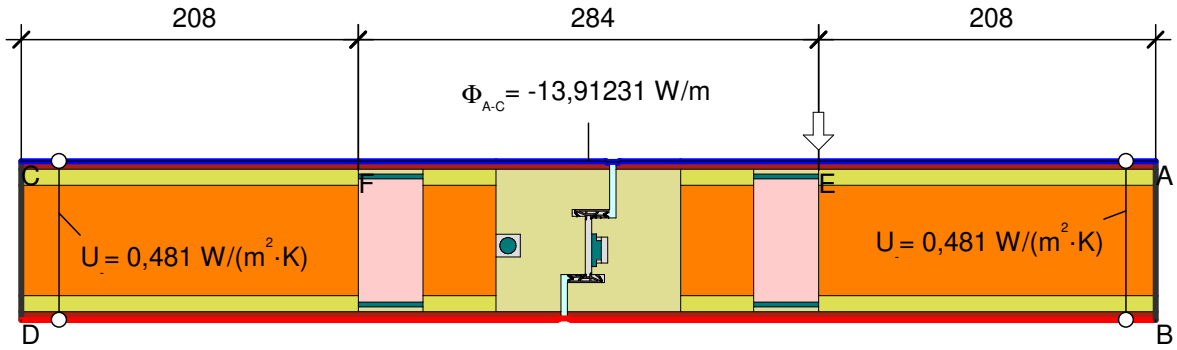
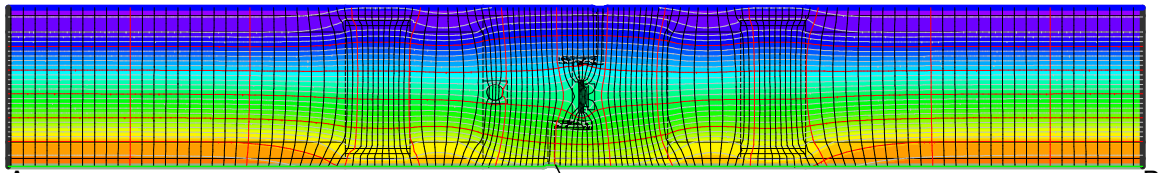


Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
Interior, frame, normal		20,000	0,130	
e 0,9 Cavity I Hohlraum				0,900

$$\Psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1\cdot b_1 - U_2\cdot b_2 - U_3\cdot b_3 = \frac{13,912}{30,000} - 0,481\cdot 0,208 - 0,924\cdot 0,284 - 0,481\cdot 0,208 = 0,001\ W/(m\cdot K)$$

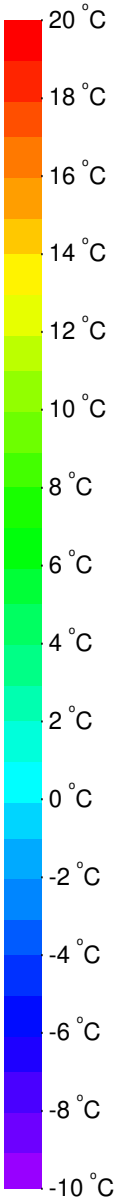
Psi(E) = Psi(F) = Psi(A-E-C) / 2 = 0,001 / 2 = 0,001 W/(mK)



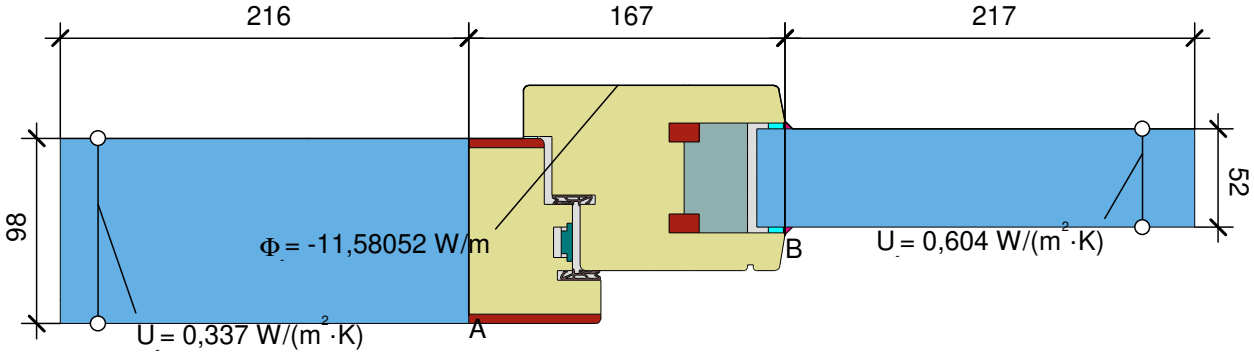
θsi min A-B = 12,77 °C

f Rsi = 0,759

Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0,000			
Exterior | Außen		-10,000	0,040	
e 0,9 Cavity I Hohlraum				0,900
fRsi: Interior | Innen		20,000	0,250	



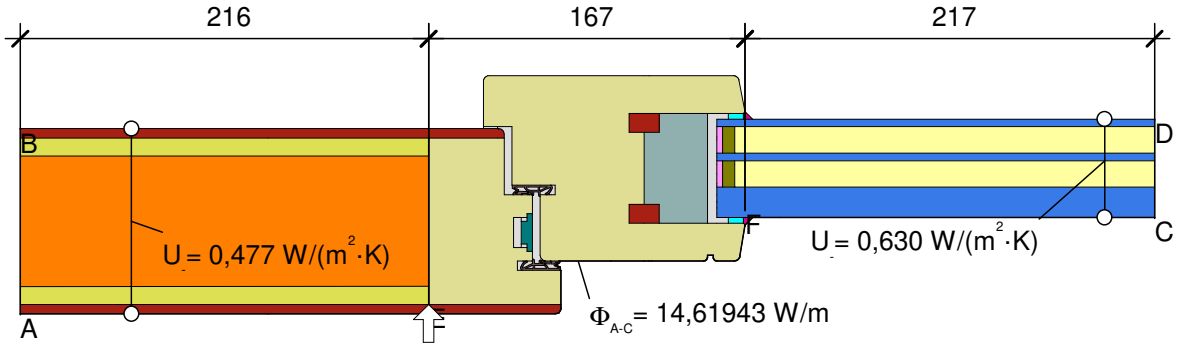
fm FLYING MULLION | STULP



$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_{p1}\cdot b_{p1} - U_{p2}\cdot b_{p2}}{b_f} = \frac{\frac{11{,}581}{30{,}000} - 0{,}337\cdot 0{,}216 - 0{,}604\cdot 0{,}217}{0{,}167} = 1{,}090\ \mathrm{W/(m^2\cdot K)}$$

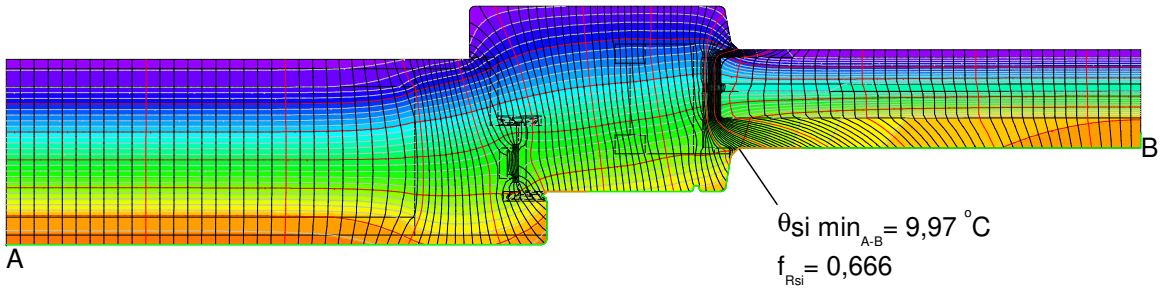
Material	λ[W/(m·K)]	ε
Ar14 in 52mmBrandschGlas U 0,63	0,020	
Chromatech	0,810	
EPDM	0,250	0,900
Glass I Glas	1,000	0,900
Hardwood I Hartholz 0.18 700 kg/m3 10456	0,180	
Insulation I Wärmedämmung 040	0,040	
Insulation tape | Vorlegeband	0,060	0,900
Polysulfide I Polysulfid	0,400	0,900
Silicone I Silikon	0,350	
Softwood, OSB I Weichholz, OSB 10456	0,130	0,900
Spruce, Fir I Fichte, Tanne	0,110	0,900
Steel I Stahl	50,000	0,900
Unvent. cavity I unbel. Hohlr. **		
Wooden-based material I Holzwerkstoff 0.13	0,130	
slightly vent. cav. I leicht bel. Hohlr. **		
wooden-based material I Holzwerkstoff 0.18	0,180	0,900

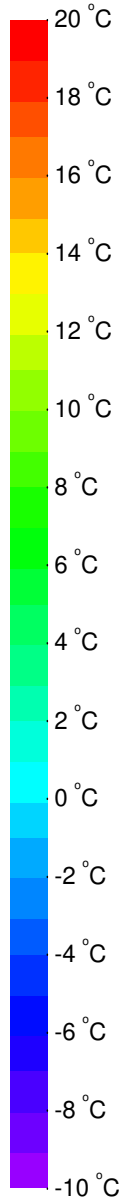
** EN ISO 10077-2:2017, 6.4.3



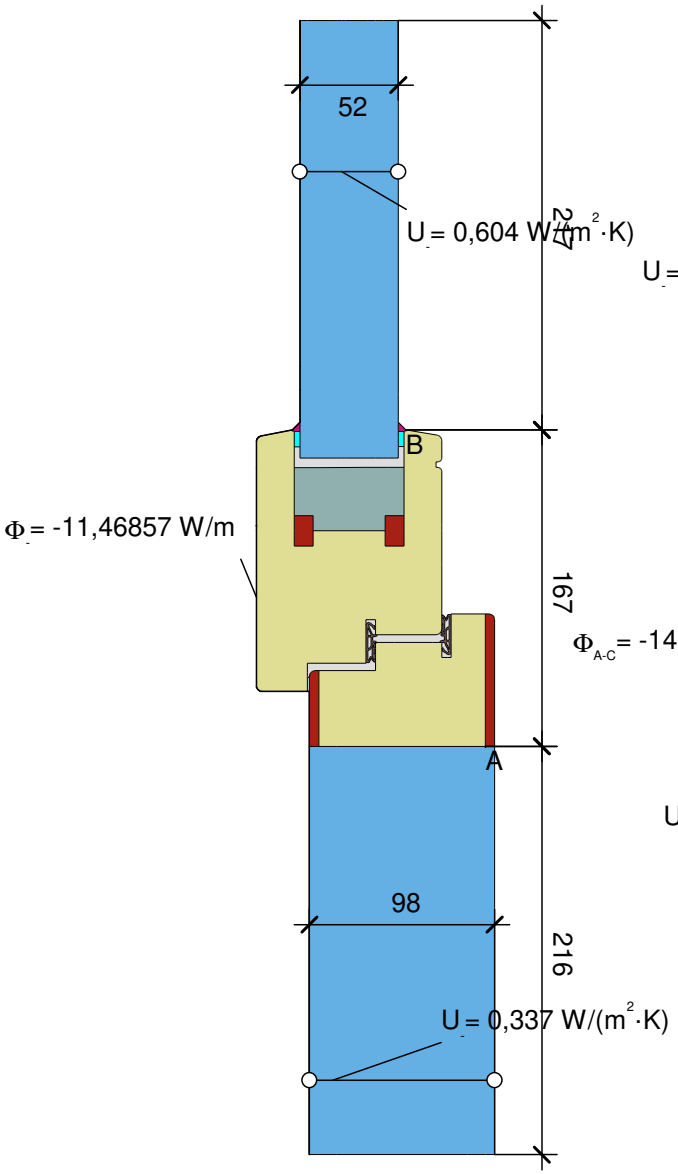
$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1\cdot b_1 - U_2\cdot b_2 - U_3\cdot b_3 = \frac{14{,}619}{30{,}000} - 0{,}477\cdot 0{,}216 - 1{,}090\cdot 0{,}167 - 0{,}630\cdot 0{,}217 = 0{,}065\ \mathrm{W/(m\cdot K)}$$

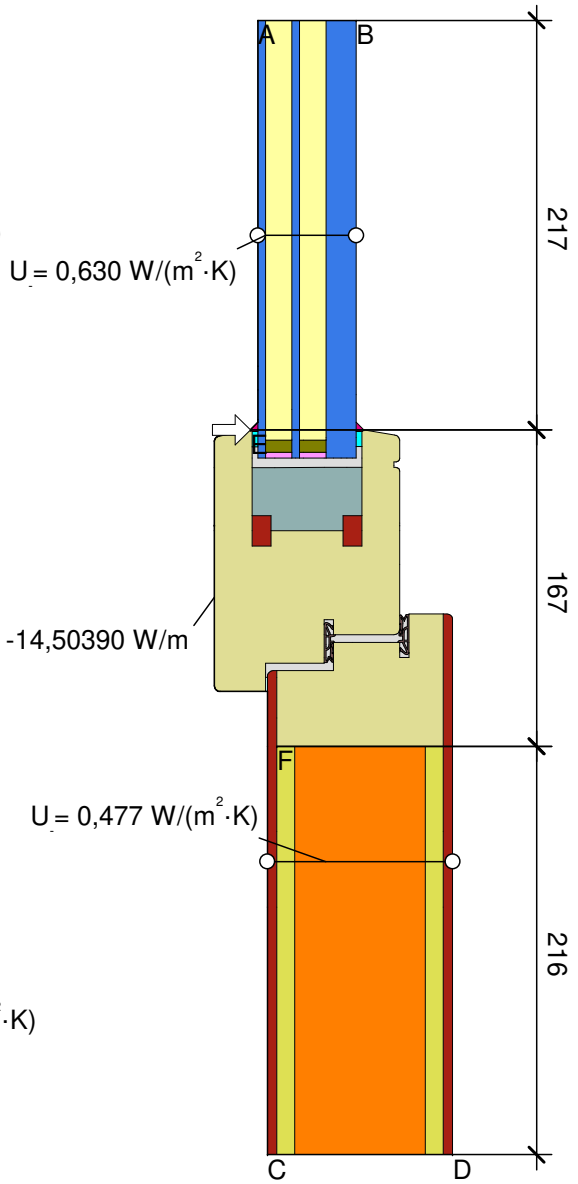
Psi(E) = Psi(F) = Psi(A-E-C) / 2 = 0,065 W/(mK) / 2 = 0,033 W/(mK)

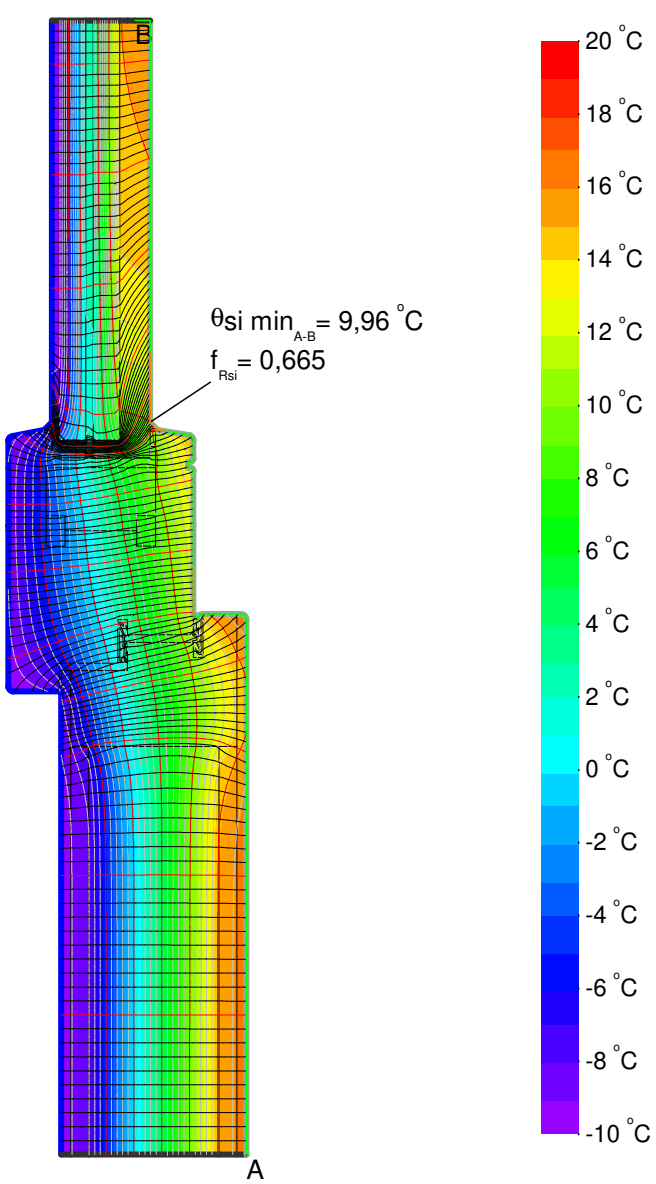




m1 MULLION, 1 SASH | PFOSTEN 1 FLÜGEL







$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_{p1}\cdot b_{p1} - U_{p2}\cdot b_{p2}}{b_f} = \frac{\frac{11{,}469}{30{,}000} - 0{,}337\cdot 0{,}216 - 0{,}604\cdot 0{,}217}{0{,}167} = 1{,}068\ \text{W/(m}^2\cdot\text{K)}$$

$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1\cdot b_1 - U_2\cdot b_2 - U_3\cdot b_3 = \frac{14{,}504}{30{,}000} - 0{,}630\cdot 0{,}217 - 1{,}068\cdot 0{,}167 - 0{,}477\cdot 0{,}216 = 0{,}065\ \text{W/(m·K)}$$

Psi(E) = Psi(F) = Psi(A-E-C) / 2 = 0,065 / 2 = 0,033 W/(mK)

m1 MULLION, 1 SASH | PFOSTEN 1 FLÜGEL