Certification report | Zertifizierungsbericht

Passive House Institute

Building system
Wandsystem

for the warm temperate climate

für das warm-gemäßigtes Klima

Product I Produkt:	**Termoarcilla® Ventilated Rainscreen Wall**
Client I Auftraggeber:	**Consorcio Termoarcilla**
Construction | Konstruktion	**Solid construction with ventilated facade | Massivbauweise mit hinterlüfteter Fassade**
Contact person Ansprechpartner	María José García Adámez + 34 91 770 94 80
Website:	www.termoarcilla.com
Date I Datum: Author I Autor:	**14.06.2024** **M. Arch Soraya López García**
Component Assessor:	**Martin Amado Pousa**

Passive House Institute
Rheinstraße 44/46
64283 Darmstadt
GERMANY

+49.6151.82699.0
mail@passiv.de
www.passiv.de

Content

1 Introduction

Because a separate heating system is not necessarily required in Passive Houses, high demands are placed on the quality of the building components used. The colder the climate, the higher the requirements for the components. To cover this, PHI has identified regions of similar requirements, and defined certification criteria. These criteria are available for free download at the website of the Passive House Institute.

If the below summarized requirements are met and a well-designed airtightness layer is proven, the label "Certified Passive House Component" can be awarded by the Passive House Institute (PHI)

Table 1: Certification criteria depending on the climate zone

Climate zone	**Hygiene criterion[8]**	**Comfort criterion**	**Efficiency criteria**			**Moisture criteria[6]**	
	$f_{Rsi=0.25\ m^2K/W} \geq$[3]	U-value of the installed window[1] ≤	U-value of the exterior building component $U_{opaque} * f_{R\ PHI}$[2] ≤	Purely opaque details $f_{Rsi=0.25\ m^2K/W} \geq$[3]	Absence of thermal bridges $\Psi_a \leq$[4]	Condensation	Ma limit according to DIN EN ISO 13788 ≤
	[-]	[W/(m²K)]	[W/(m²K)]	[-]	[W/(mK)]	[-]	[g/m²]
1 Arctic	0.80	0.45 (0.35)	0.09	0.90	0.010[5]	Condensation should be completely evaporated at the end of 12 months	200[7]
2 Cold	0.75	0.65 (0.52)	0.12	0.88			
3 Cool, temperate	0.70	0.85 (0.70)	0.15	0.86			
4 Warm, temperate	0.65	1.05 (0.90)	0.25	0.82			
5 Warm	0.55	1.25 (1.10)	0.50	0.74			
6 Hot	None	1.25 (1.10)	0.50	0.74			
7 Very hot	None	1.05 (0.90)	0.25	0.82			

1 applies for vertical windows with a test size of 1.23*1.48 m. The criteria for other transparent building components can be taken from the relevant certification criteria. Value in brackets: respective reference glazing.

2 $f_{R,\ PHI}$: Reduction factor: always 1.0, exception: areas in contact with the ground and towards the unheated basement in the climate zones 1 – 4: 1.6; e. g. for climate zone 3 the U-value criterion becomes 0.25 W/(m²K).

3 $f_{Rsi=0.25\ m^2K/W} \geq$ see certification criteria.

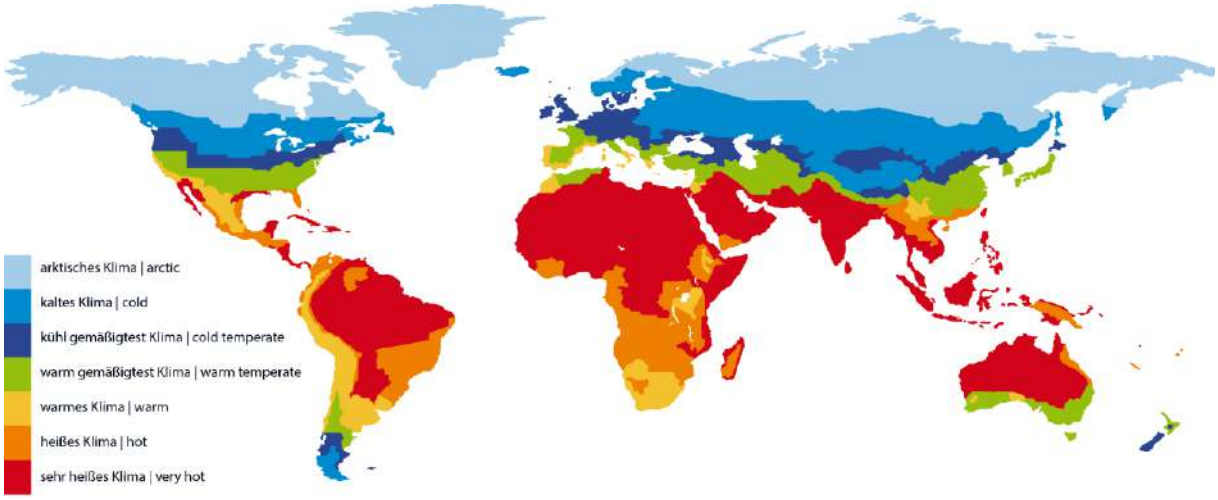
4 as a thermal bridge loss coefficient based on external dimensions and length. Specific constructions such as inner edges are exempted from this criterion.

5 Geometric thermal bridges, where the insulation thickness around the junction is consistent, but the calculation methodology results in a Psi-value of > 0.010 W/(mK), are exempt from this criterion.

6 These criteria are based on the Glaser Method and allow an assessment of the likelihood of the occurrence of interstitial condensation during the winter. This method brings more reliable results for lightweight and airtight components used in cool and non-humid locations away from the equator that do not contain materials with a large water or heat storage capacity. Where the criteria are not met following this approach, a dynamic simulation according to EN 15026 can be carried out to provide greater detail. It is the responsibility of the architect to ensure the appropriate assessments have been carried out for specific buildings, which may include more detailed analyses than those carried out for this certification. In addition on-site measurements like airtightness testing as well as trained tradespeople help to ensure construction quality.

7 The Ma limit (maximum accumulated moisture content) is based on the ISO 13788 and reflects the maximum amount of condensate in order to prevent run-off of liquid water from watertight surfaces. It may make sense in certain cases to calculate a more specific Ma limit according to the materials present in the wall, roof and floor constructions.

8 For door thresholds the dew point criterion applies according to the certification criteria.



2 Description of the certified system

2.1 Opaque building envelope

The system consists of a Termoarcilla® blocks wall with a 15 mm thick interior gypsum plaster, a ventilated facade system with 140 mm thick thermal insulation, and a gypsum board on the interior side with a 60 mm thick service cavity between the finish board and the wall.

The Termoarcilla® wall is formed by placing the blocks with horizontal mortar joints. The ventilated facade includes mineral wool insulation panels (0.040 W/(mK)) mechanically fixed to the blocks using the FLH R ventilated facade anchoring system from Fisher, which is Passive House certified. The interior wall finish is built with a galvanized steel structure on which the gypsum board is screwed.

The system has been assessed according to the Passive House Institute's criteria for opaque construction systems and has been validated as suitable for Passive House projects in the warm-temperate and warm climate zones.

2.2 Windows

For the purposes of certification, a standard passive house window (Uw = 1.00 W/(m²K) with Ug = 0.90 W/(m²K)) was used. The overall U-value of the installed window of standard size (1.23 m wide by 1.48 m tall) should be no more than 0.05 W/(m²K) greater than the Uw to ensure occupant comfort.

This criterion is met with a window installation solution aligned with the exterior thermal insulation. This construction solution is solved with a wooden support profile on the window sill and metal L-profile anchors on the jambs and lintel.

2.3 Airtightness concept

The system's airtightness is achieved as follows: the interior gypsum plaster layer serves as the airtight layer of the envelope. For junctions with windows and doors, special airtightness tapes are used on the interior face, maintaining continuity with the gypsum plaster. All junctions with other construction elements use special tapes or airtight paint solutions to ensure the airtightness line of the facade remains consistent in the interior gypsum plaster.

3 Evaluation

The Passive House Institute has defined international component criteria for seven climate zones based on hygiene, comfort and affordability criteria. In principle, components which have been certified for climate zones with higher requirements may also be used in climates with less stringent requirements. Their use might make economic sense in certain circumstances.

4 Summary of the results

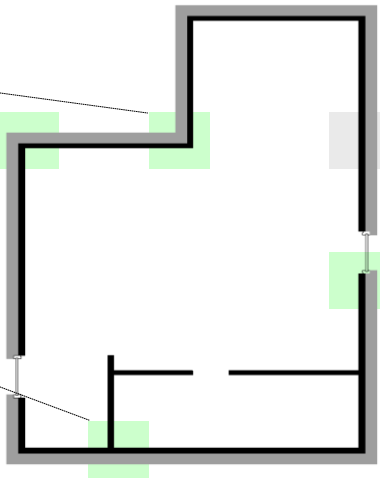
Thermal bridge not calculated
Criteria achieved

Efficieny criteria not achieved
Hygiene or comfort criterion not achieved

EWIC01	
Ext. wall-inner corner	
Ψ [W//mK]	0,028
$f_{Rsi=0,25\ m^2K/W}$	0,94

EWEC01	
Ext. wall-outer corner	
Ψ [W//mK]	-0,064
$f_{Rsi=0,25\ m^2K/W}$	0,83

EWIW01	
Ext. wall-int. wall	
Ψ [W//mK]	0,000
$f_{Rsi=0,25\ m^2K/W}$	0,94



EWEJ01		
Ext. wall-panel joint		
Ψ [W/(mK)]		
$f_{Rsi=0,25\ m^2K/W}$		

WISI			Window side
Type	1	2	3
b_f [m]	0,125		
U_f [W/m²K]	0,920		
Ψ_g [W/mK]	0,038		
Ψ_i [W/mK]	0,003		
$f_{Rsi=0,25\ m^2K/W}$	0,80		

ROVE01	
Verge	
Ψ [W//mK]	-0,026
$f_{Rsi=0,25\ m^2K/W}$	0,86

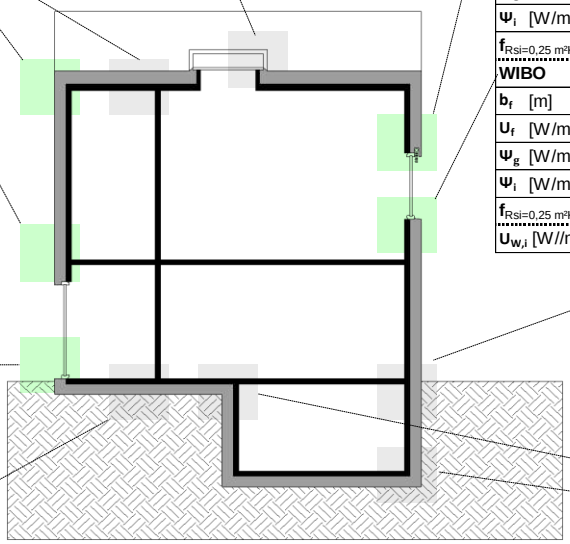
ROIW01	
Roof-internal wall	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

RWTO01	
Roof window top	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

EWCE01	
Ext. wall-ceiling	
Ψ [W//mK]	0,014
$f_{Rsi=0,25\ m^2K/W}$	0,94

WITH01	
Window threshold	
b_f [m]	0,125
U_f [W/m²K]	0,920
Ψ_g [W/mK]	0,038
Ψ_i [W/mK]	-0,009
$f_{Rsi=0,25\ m^2K/W}$	0,69
$U_{w,i}$ [W//m²K]	**0,98**

FSIW01 Fl. slab-int. w.	
Ortgang	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	



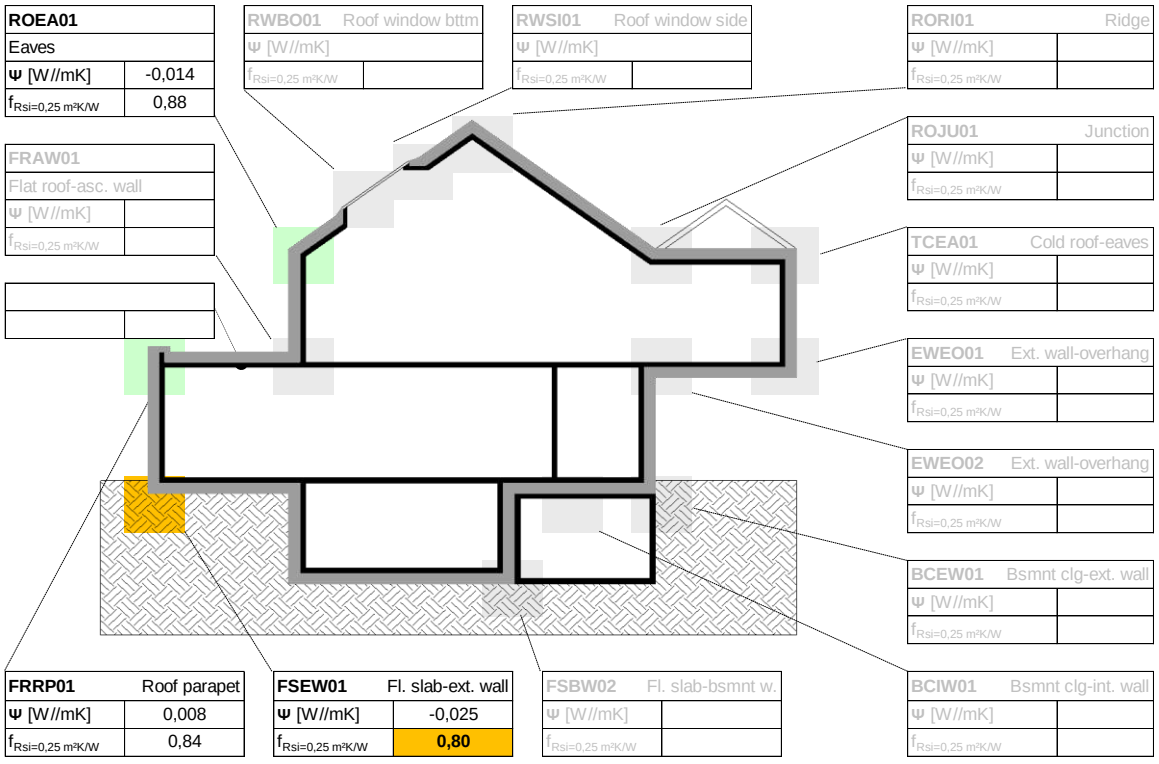
WITO			Window top
Typ	**1**	**2**	**3**
b_f [m]	0,125		
U_f [W/m²K]	0,920		
Ψ_g [W/mK]	0,038		
Ψ_i [W/mK]	0,008		
$f_{Rsi=0,25\ m^2K/W}$	0,80		

WIBO			Window bottom
b_f [m]	0,125		
U_f [W/m²K]	0,920		
Ψ_g [W/mK]	0,038		
Ψ_i [W/mK]	0,030		
$f_{Rsi=0,25\ m^2K/W}$	0,78		
$U_{w,i}$ [W//m²K]	**1,03**		

BWBC01 Bsmnt w.-bsmnt c.	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

BWFS01 Bsmnt w.-fl. slab	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

FSBW01 Fl. slab-bsmnt w.	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	



5 Using the results in the PHPP

The following points are relevant for working with the here presented results in the Passive House Planning Package (PHPP):

- For the system being certified here, the thermal bridges in the regular construction of the buildings shell resulting from regularly occurring interruptions are already included in the U-values by using equivalent thermal conductivities for the materials of the interrupted layers. They do not have to be considered further.
- The results of the calculation of the linear thermal transmittance are always determined based on the external dimensions.
- Additional point thermal bridges may have to be taken into account.

6 Legal information

The following information should be kept in mind when planning and executing the detail solutions documented in this report:

The detail drawings in this documentation are schematic and might be adapted for specific constructions. Sealing of the construction against moisture and the absence of condensation as well as the check of hygrothermal matters was not the subject of this examination. Where necessary, this should be carried out in accordance with the accepted technical standards. The responsibility for checking the above mentioned points lies with the applicant for the certification procedure and/or the user.

The present documentation does not allow conclusions to be drawn regarding other characteristics of the examined construction that may determine its performance and quality. In particular, this documentation is not a substitute for building authority approval.

The scope of the examination and accountability of the certification is limited to the testing routines with regard to compliance with the stated criteria of the Passive House Institute. A legal basis for making any claims against the Passive House Institute Darmstadt Dr. Wolfgang Feist based on the information provided in this report is excluded.

Appendix 1: U-value of building assemblies

Passive House Institute

Description of building assembly						Assembly no.
Rainscreen thermoclay wall - Fachada termoarcilla ventilada						02ud

Orientation of building assembly (or R_{si})	2-Wall				Interior insulation?	
Adjacent to (or R_{se})	3-Ventilated				U-value supplement [W/(m²K)]	0.013
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250					15
Air layer, unventilated, horizontal, thickness: 60 mm + steel stuts	0.361					60
Interior plaster I Gipsputz 10456	0.570					15
Thermoclay 19 + mortar joints	0.325					190
Mineral wool 040	0.040					140
Percentage of sec. 1:	100%	Percentage of sec. 2:		Percentage of sec. 3:		

Heat transmission resistance coefficients

Interior R_{si}:	0.13	m²K/W
Exterior R_{se}:	0.13	m²K/W

Total thickness [cm]: **42.0**

U-value [W/(m²K)]: **0.231**

Condensation check according to ISO 13788

Glaser Method, carried out using PHI Condensation Tool

EW1 - external wall

Location temperatures	Heating load [° C]	4.4	Cooling load [° C]	27.2	Hours	1

Assembly definition	θe [° C]	28.0	φe (θe)	90%	θi [° C]	20.0	φi (θi)	65%

Assembly no.	Building assembly description	Interior insulation?	Ft	Radiation effect	Solar rad.	Sol. rad. fact.	Eff. Solar rad.
EW02	Termoarcilla ventilada	No	1.00	Active	750 [W/m²]	1.0 [-]	750 [W/m²]

Heat transmission resistance [m²K/W] — DT Roof 13788

Orientation of building element:	2 - Wall	interior Rsi:	0.13	0.00	
Adjacent to:	3 - Ventilated	exterior Rse:	0.13		
For condensation or mould growth on opaque surfaces		interior Rsi:	0.25		

Radiation attributes

Reflectivity:	
Absorptivity:	0.45
Emissivity:	0.81

Clima zone	4
Region	Warm-temperate
Location	ES0001b-Madrid

Limits	PHI	User defined
U-value	0.30	
fRsi min 0,25	0.82	

Pos.	Area section	λ [W/(mK)]	Thickness [mm]	μ [-]	S_d [m]	R [m²K/W]	Temperature [° C]	p_v [Pa]	RH [%]
i	Interior air						**20.00**	**1519**	**65%**
0	Rsi - Interior surface					0.130	21.27	1519	60%
1	**Placa de yeso laminado**	**0.250**	**25**	**10.0**	0.25	0.100	22.25	1685	63%
2	**Air layer, unventilated, horizontal, thickness: 60 mm**	**0.333**	**60**	**1.0**	0.06	0.180	24.01	1725	58%
3	**Interior plaster I Gipsputz 10456**	**0.570**	**15**	**8.0**	0.12	0.026	24.27	1805	60%
4	**EQ_EW1 Termoarcilla 19 + mortar joints**	**0.325**	**190**	**10.0**	1.90	0.584	29.98	3068	72%
5	**Mörtel, Zement, Sand**	**1.000**	**10**	**8.0**	0.08	0.010	30.07	3121	73%
6	**Mineral wool 040**	**0.035**	**140.0**	**3.0**	0.42	4.000	69.18	3400	11%
7									
8									
9									
10									
0	Rse - Exterior surface					0.130	69.18	3400	11%
e	Exterior air						**70.45**	**3400**	**90%**
	Total Values		**44.00** [cm]		**2.83** [m]	**5.161** [m²K/W]	**-9.78** **q tot** [W/m2]	**-1.33E-07** **g** [kg/(m²s)]	**0** Cond. Interfaces

	Radiation effect	Surfaces DT				
	Active			SRI value		Aged SRI value
Exterior Sol-Air Temperature	**70.45** [°C]	**1.27** [Int DT°C]	**50.45** [Ext-Int DT°C]		**62** [-]	**48** [-]

Verifications

Condensation Rsi 0,25 [° C]		
T_{min}	T_{si} Project	Verified
13.22	**22.39**	**Yes**

Mold growth Rsi 0,25 [° C]		
T_{min}	T_{si} Project	Verified
16.69	**22.39**	**Yes**

f_{Rsi}		
$f_{Rsi\ min}$	f_{Rsi} Project	Verified
0.82	**0.95**	**Yes**

gc [g/m² * h]
g_c
0.00

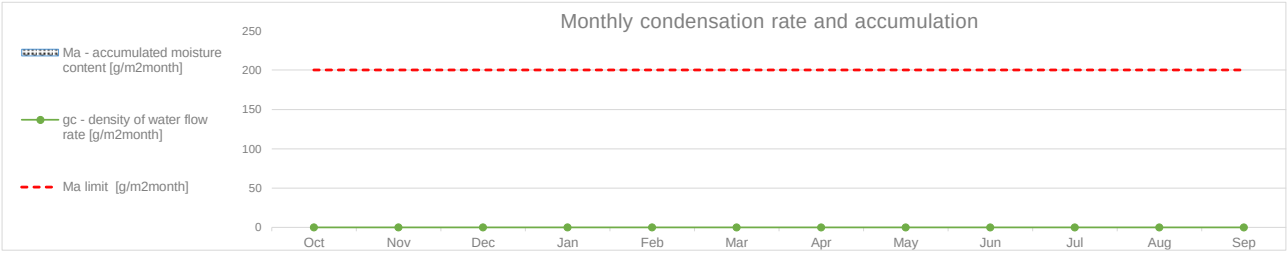
U-Value [W/(m²K)]		
min	Project	Verified
0.300	**0.194**	**Yes**

Condensation check according to ISO 13788

Glaser Method, carried out using PHI Condensation Tool

EW1 - external wall

Monthly Condensation rate and accumulation within the whole assembly



	10	11	12	1	2	3	4	5	6	7	8	9
Days	31	30	31	31	28	31	30	31	30	31	31	30
Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
gc - density of water flow rate [g/m²month]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ma - accumulated moisture content [g/m²month]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ma limit [g/m²month]	200	200	200	200	200	200	200	200	200	200	200	200
Comments												
Interfaces with condensation	0	0	0	0	0	0	0	0	0	0	0	0

Monthly Condensation rate and accumulation within each layer

Drying potential - Long term evaluation

Verifications

Assembly no.		**Verification status:**
EW1		**Assembly verified**

	Verification status per month: Is the assembly verified?											
Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Condensation Rsi 0,25 [° C]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	One or more months have internal surface condensation temperature not verified. Please revise the assembly.											
Mold growth Rsi 0,25 [° C]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	One or more months have internal surface mould growth temperature below the mould growth surface temperature											
f_{Rsi}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Temp. factor at the internal surface	One or more months have the temperature factor at the internal surface not verified. Please revise the assembly.											
Ma [g/m2month]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Max acc. Moisture content	Condensation is completely evaporated											
Ma [g/m2month]												Yes
Moisture evaporation	Maximum accumulation of condensate does not exceed the Ma limit											
Drying potential												Yes
Over 10 years	The drying potential of building component is verified over a period of 10 years.											

Appendix 2: Thermal simulations | Wärmestromsimulationen

Passive House Institute

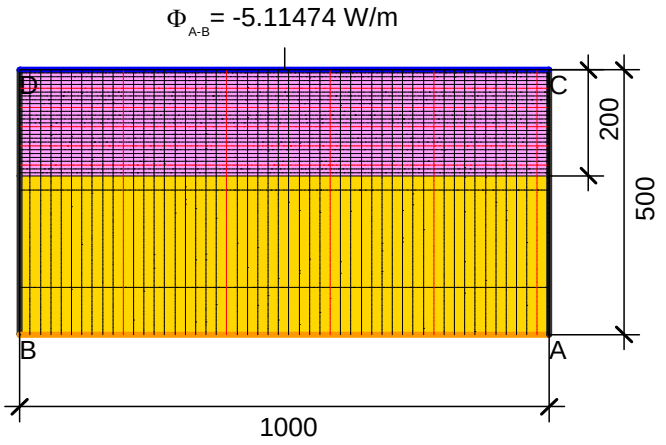
Wall, roof | Wand, Dach

Windows | Fenster

Ground | Boden

Wall, roof, ground | Wand, Dach, Boden

Flat Roof - RO1 (section 1)

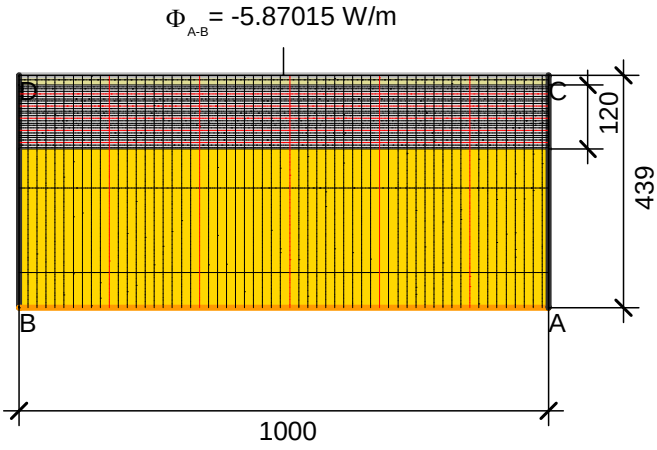


Material	λ[W/(m·K)]	ε
Clay slab filler block (300 mm; RT 0,32 m2·K/W)	0.938	0.900
XPS 038	0.037	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
Interior up. | Innen auf.		20.000	0.100	

$$U_{eq\ A-B} = \frac{\Phi}{\Delta T \cdot b} = \frac{5.115}{30.0 \cdot 1.0} = 0.170\ W/(m^2 \cdot K)$$

Pitched Roof - RO2 (section 1)

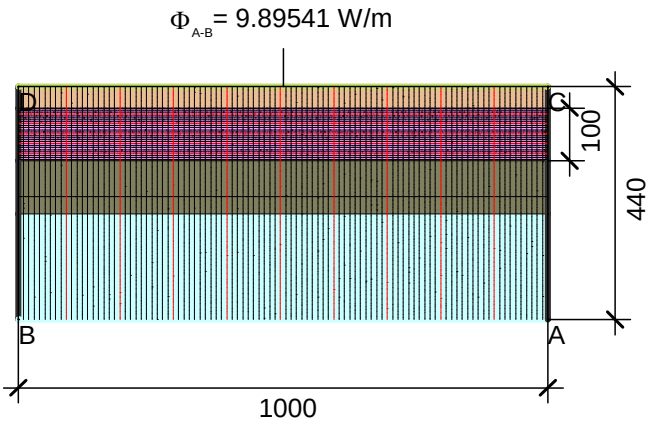


Material	λ[W/(m·K)]	ε
Clay slab filler block (300 mm; RT 0,32 m2·K/W)	0.938	0.900
Onduline PIR 027	0.027	0.900
Softwood, OSB I Weichholz, OSB 10456	0.130	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior roof | Außen Dach		-10.000	0.100	
Interior up. | Innen auf.		20.000	0.100	

$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{5.87}{30.0 \cdot 1.0} = 0.196\ W/(m^2 \cdot K)$$

Floor slab - FS1



Material	λ[W/(m·K)]	ε
Cement screed I Zement-Estrich 4108	1.400	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
Eq_ventilated crawl space	2.300	0.900
XPS 038	0.037	0.900

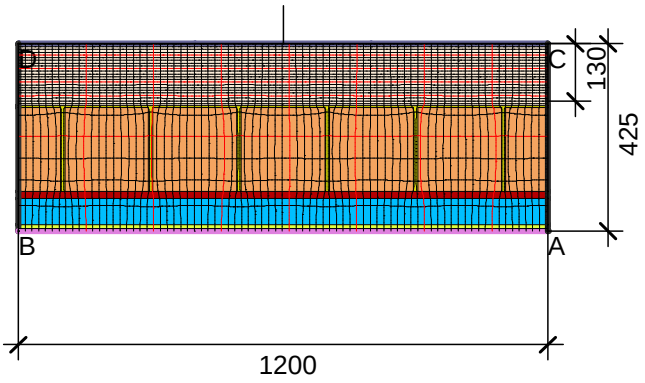
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Gorund I Erdreich		-10.000		
Int. flux down I Innen abwärts		20.000	0.170	

$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{9.895}{30.0 \cdot 1.0} = 0.330\ W/(m^2 \cdot K)$$

External wall 1 - EW1

Vertical section

$\Phi_{A\text{-}B}$ = -7.82251 W/m



Material	λ[W/(m·K)]	ε
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Thermoclay blocks 19 cm	0.292	0.900

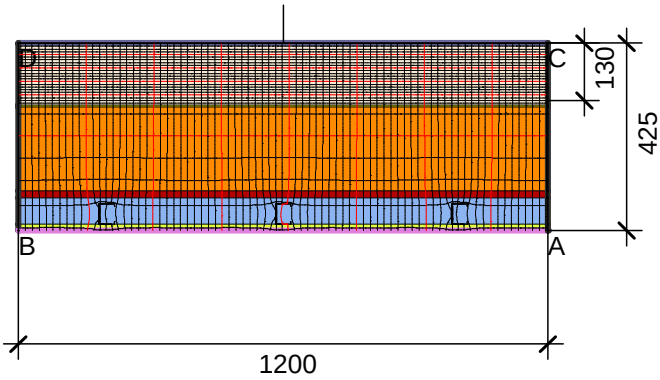
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior | Innen		20.000	0.130	

$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217\ W/(m^2 \cdot K)$$

External wall 1 - EW1

Horizontal section: Thermoclay blocks - no head mortar joints (vertical)

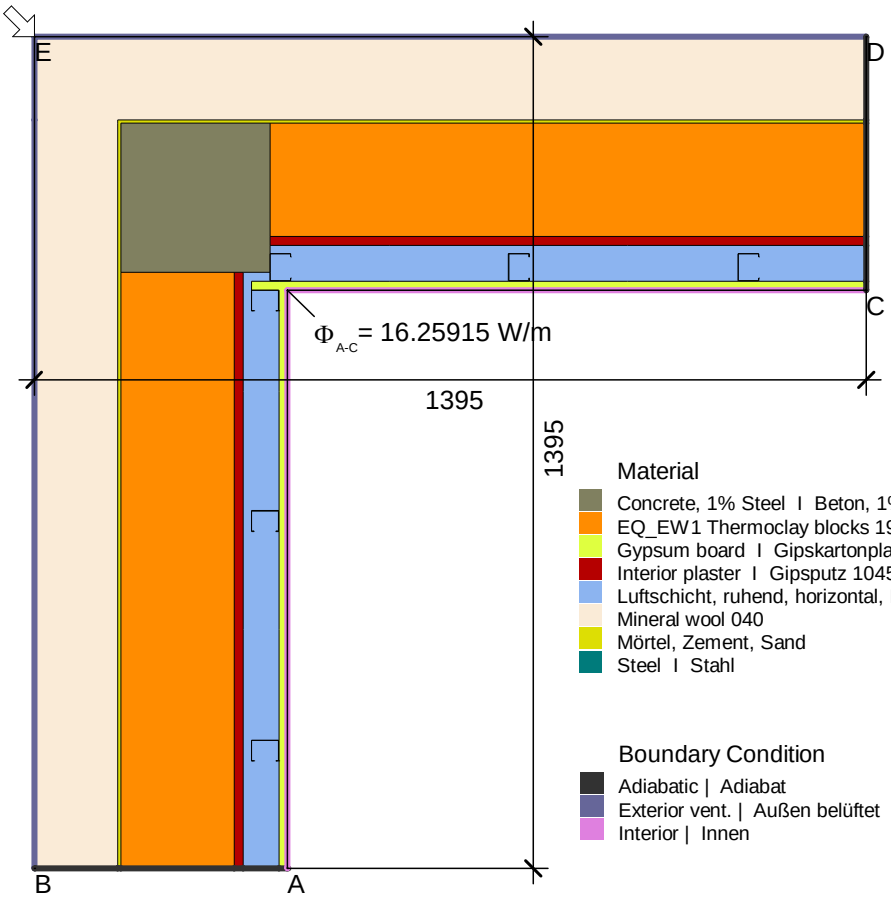
$\Phi_{A\text{-}B}$ = -7.82243 W/m

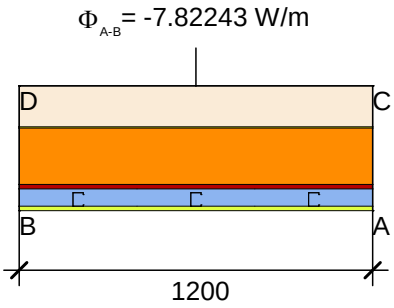


Material	λ[W/(m·K)]	ε
EQ_EW1 Thermoclay blocks 19 cm + mortar joints	0.325	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Luftschicht, ruhend, horizontal, Dicke: 60 mm	0.333	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Steel I Stahl	50.000	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior | Innen		20.000	0.130	

$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217\ W/(m^2 \cdot K)$$



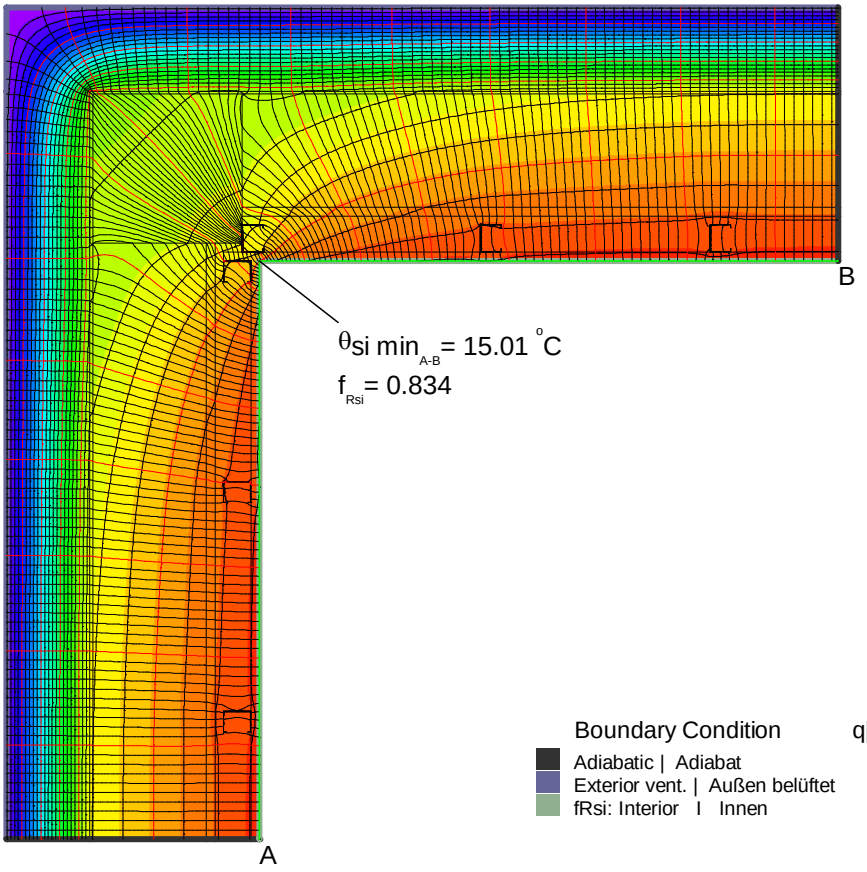


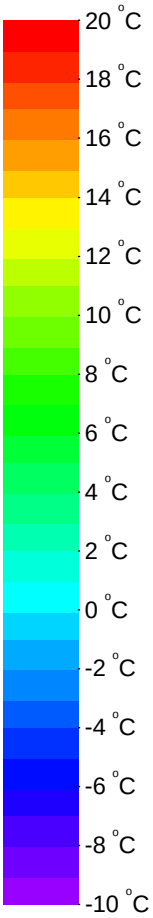
$$U_{eq\ A-B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217\ W/(m^2 \cdot K)$$

Material	λ[W/(m·K)]	ε
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Thermoclay blocks 19 cm + mortar joints	0.325	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Luftschicht, ruhend, horizontal, Dicke: 60 mm	0.333	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Steel I Stahl	50.000	0.900

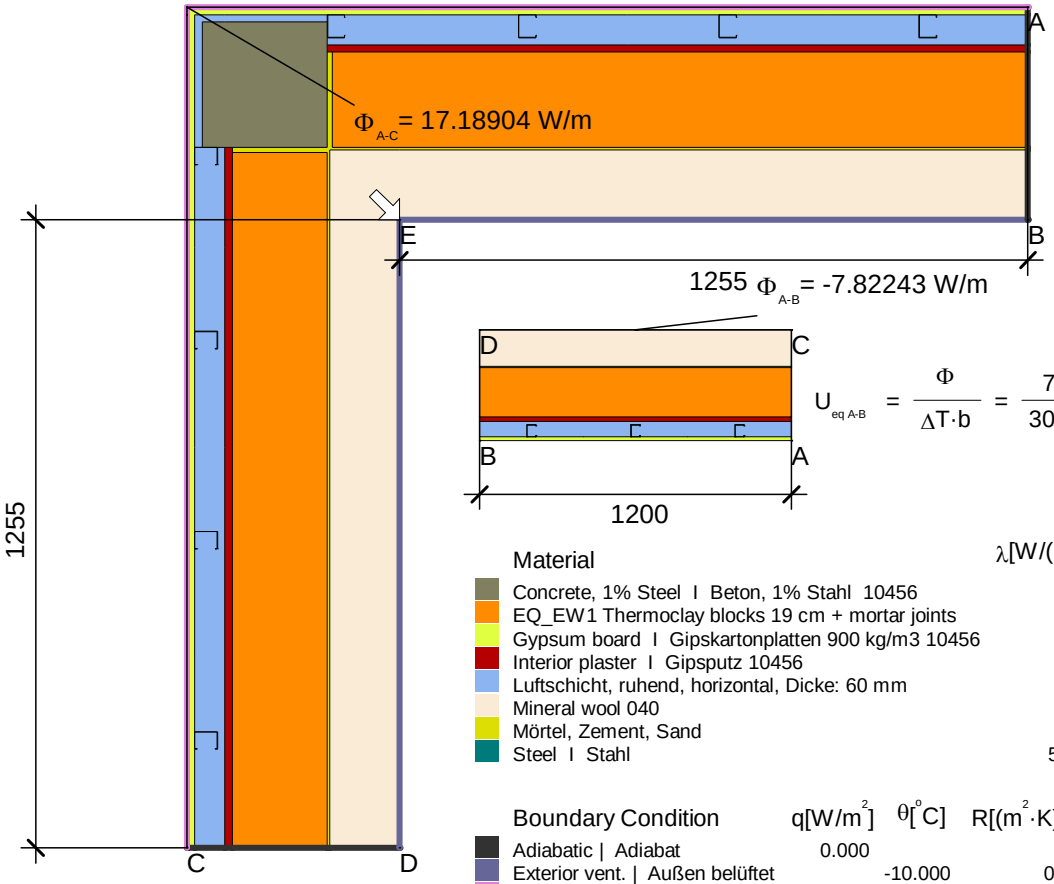
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior | Innen		20.000	0.130	

$$\Psi_{A-E-C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{16.259}{30.0} - 0.217 \cdot 1.395 - 0.217 \cdot 1.395 = -0.064\ W/(m \cdot K)$$





Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
fRsi: Interior I Innen		20.000	0.250	

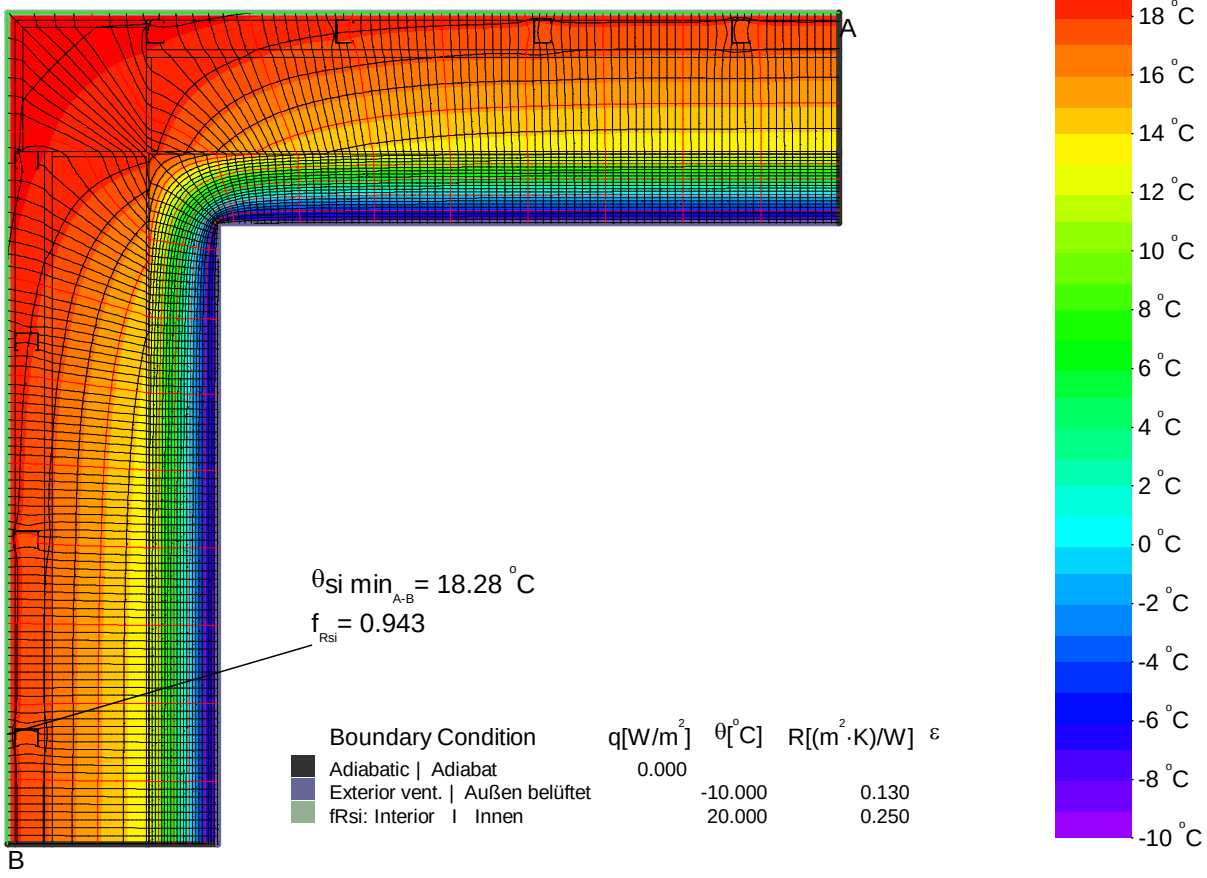


$$U_{eq\ A-B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217\ W/(m^2 \cdot K)$$

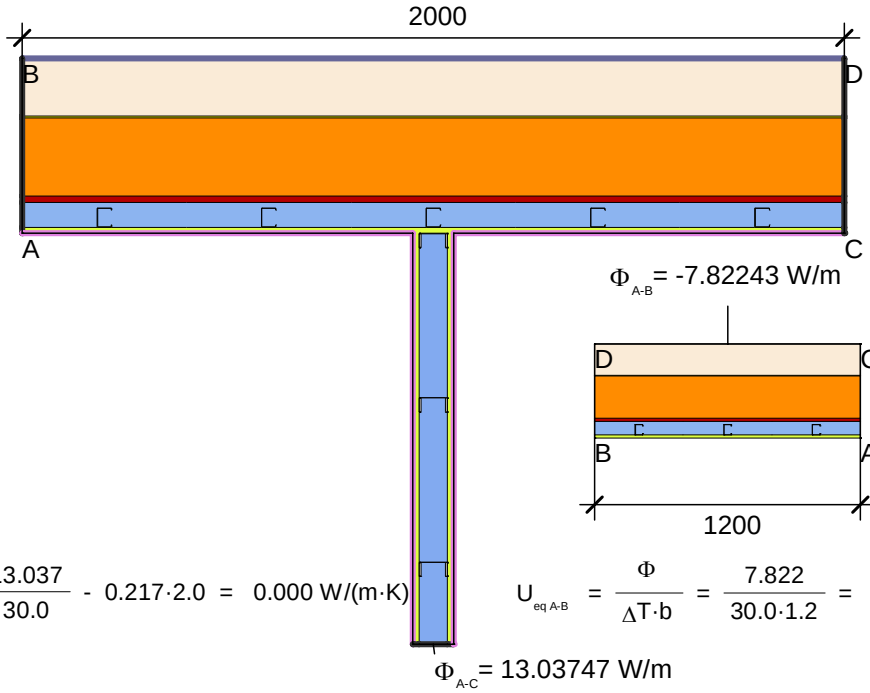
Material	λ[W/(m·K)]	ε
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Thermoclay blocks 19 cm + mortar joints	0.325	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Luftschicht, ruhend, horizontal, Dicke: 60 mm	0.333	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Steel I Stahl	50.000	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior | Innen		20.000	0.130	

$$\psi_{A-E-C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{17.189}{30.0} - 0.217 \cdot 1.255 - 0.217 \cdot 1.255 = 0.028\ W/(m \cdot K)$$



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
fRsi: Interior I Innen		20.000	0.250	



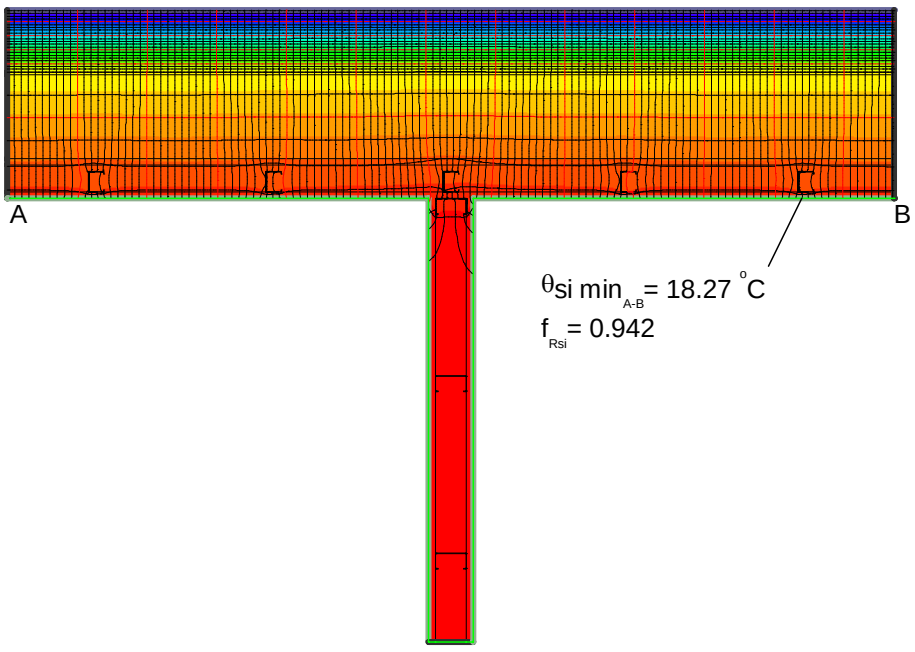
$$\psi_{A-C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 = \frac{13.037}{30.0} - 0.217 \cdot 2.0 = 0.000 \text{ W/(m·K)}$$

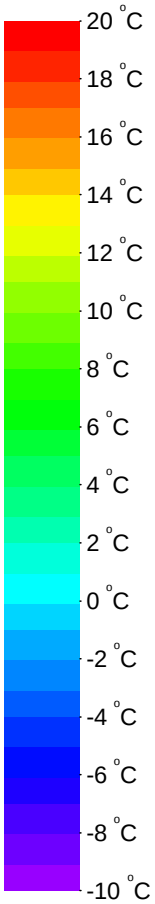
$$U_{eq\ A-B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217 \text{ W/(m}^2\text{·K)}$$

Material	λ[W/(m·K)]	ε
EQ_EW1 Thermoclay blocks 19 cm + mortar joints	0.325	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Luftschicht, ruhend, horizontal, Dicke: 60 mm	0.333	0.900
Luftschicht, ruhend, horizontal, Dicke: 70 mm	0.389	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Steel I Stahl	50.000	0.900
Unvent. cavity I unbel. Hohlr. *		

* EN ISO 10077-2:2017, 6.4.2

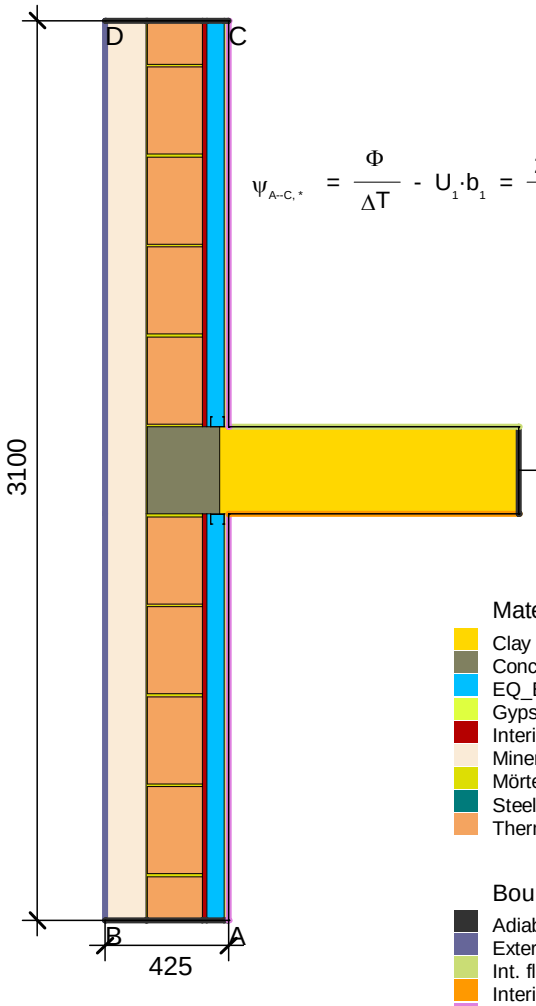
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior | Innen		20.000	0.130	
e 0,9 Cavity I Hohlraum				0.900





Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
fRsi: Interior I Innen		20.000	0.250	

Passive House Institute

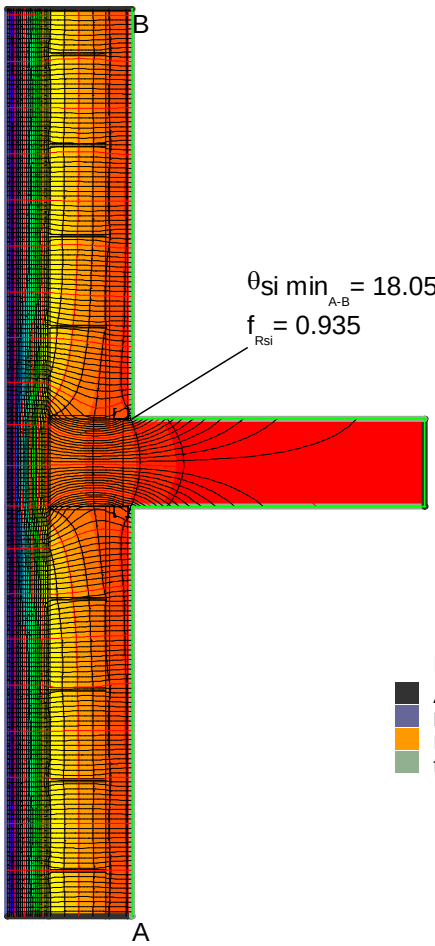


$$\psi_{A-C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 = \frac{20.618}{30.0} - 0.217 \cdot 3.1 = 0.014 \text{ W/(m·K)}$$

Φ_{A-C} = 20.61837 W/m

Material	λ[W/(m·K)]	ε
Clay slab filler block (300 mm; RT 0,32 m2·K/W)	0.938	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Steel I Stahl	50.000	0.900
Thermoclay blocks 19 cm	0.292	0.900

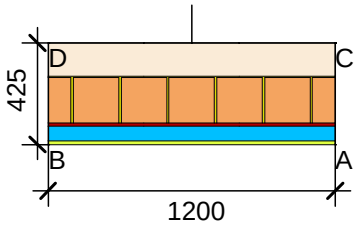
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Int. flux down I Innen abwärts		20.000	0.170	
Interior up. | Innen auf.		20.000	0.100	
Interior | Innen		20.000	0.130	



$\theta_{si\ min\ A-B}$ = 18.05 °C

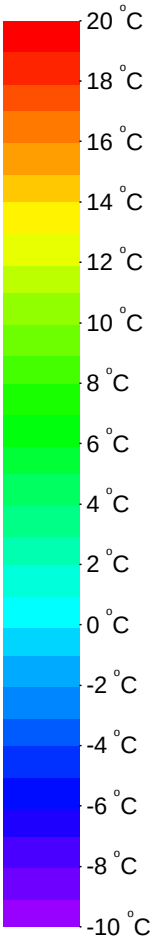
f_{Rsi} = 0.935

Φ_{A-B} = -7.82251 W/m

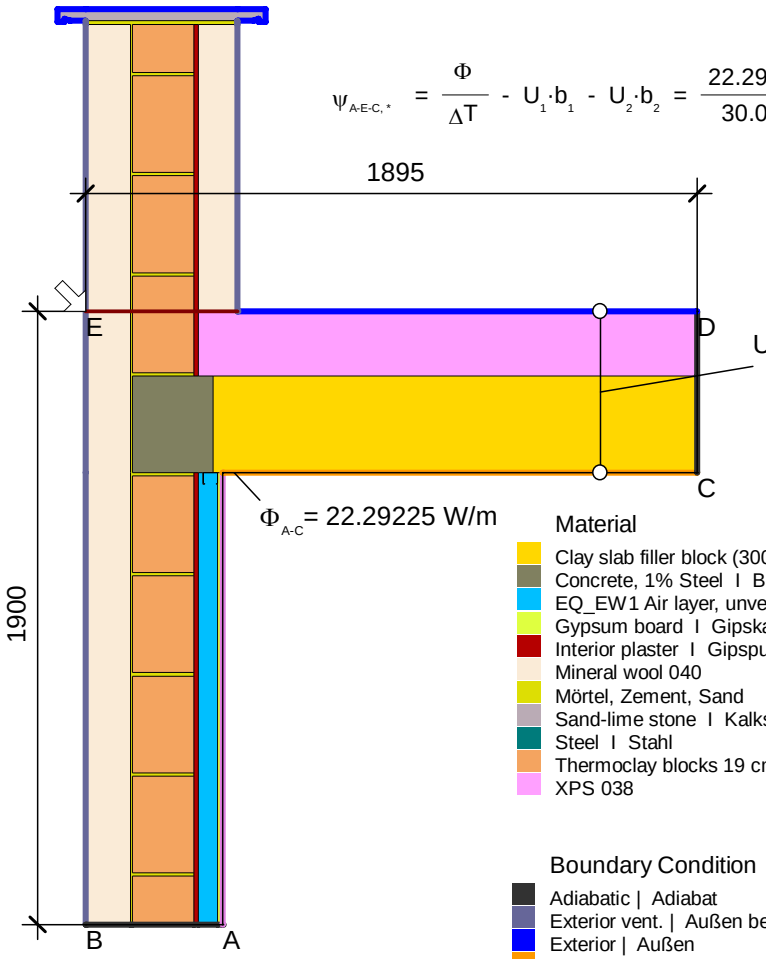


$$U_{eq\ A-B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217 \text{ W/(m²·K)}$$

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior up. | Innen auf.		20.000	0.100	
fRsi: Interior I Innen		20.000	0.250	

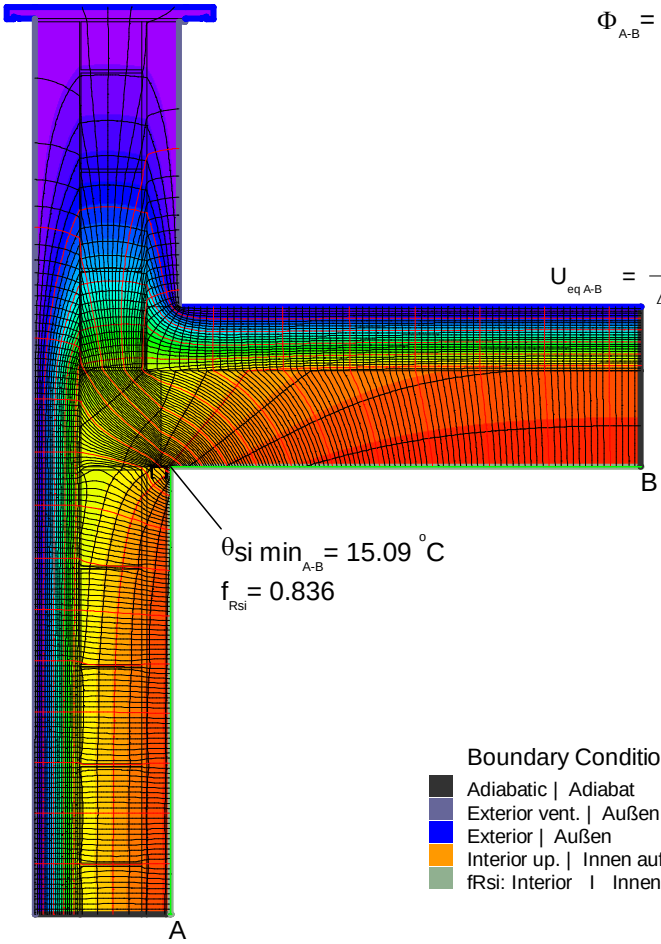


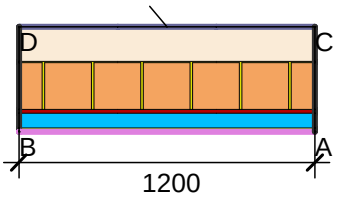
$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{22.292}{30.0} - 0.217 \cdot 1.9 - 0.17 \cdot 1.895 = 0.007 \text{ W/(m·K)}$$



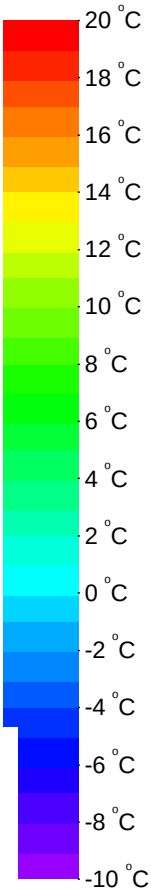
Material	λ[W/(m·K)]	ε
Clay slab filler block (300 mm; RT 0,32 m2·K/W)	0.938	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Sand-lime stone I Kalksandstein 1745	1.000	0.900
Steel I Stahl	50.000	0.900
Thermoclay blocks 19 cm	0.292	0.900
XPS 038	0.037	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Interior up. | Innen auf.		20.000	0.100	
Interior | Innen		20.000	0.130	

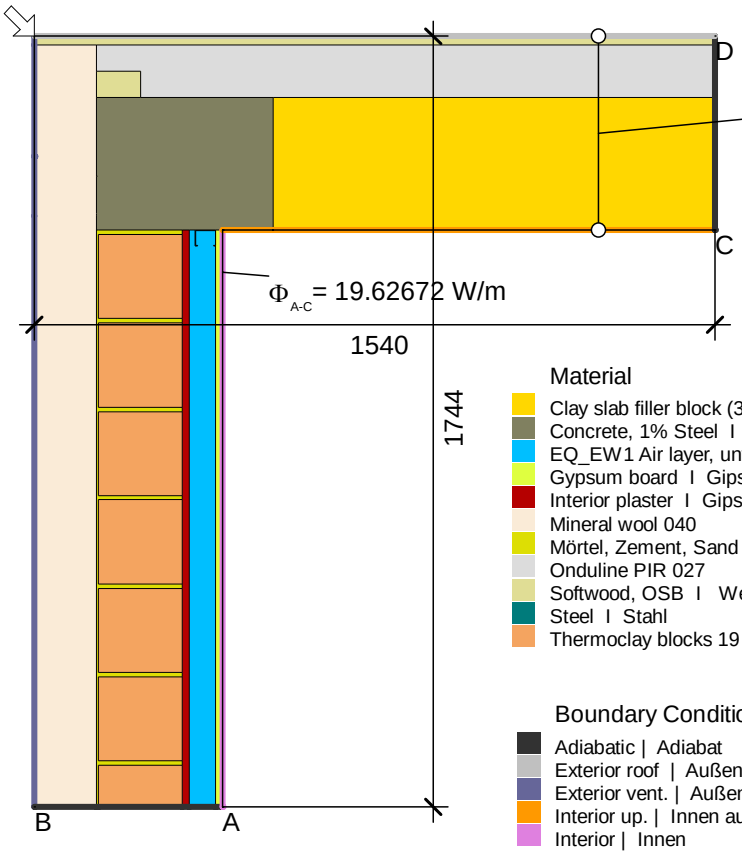




$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217 \text{ W/(m²·K)}$$



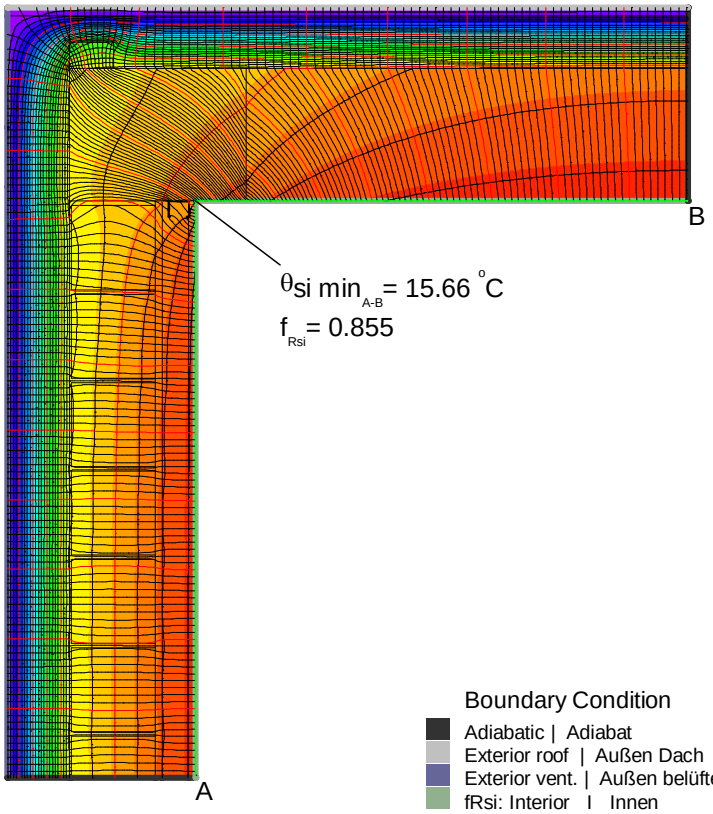
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Interior up. | Innen auf.		20.000	0.100	
fRsi: Interior I Innen		20.000	0.250	

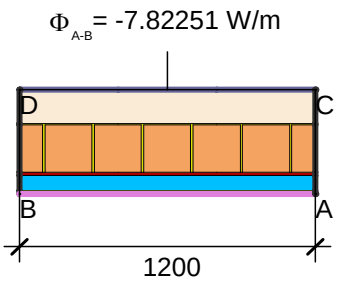


Material	λ[W/(m·K)]	ε
Clay slab filler block (300 mm; RT 0,32 m2·K/W)	0.938	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Onduline PIR 027	0.027	0.900
Softwood, OSB I Weichholz, OSB 10456	0.130	0.900
Steel I Stahl	50.000	0.900
Thermoclay blocks 19 cm	0.292	0.900

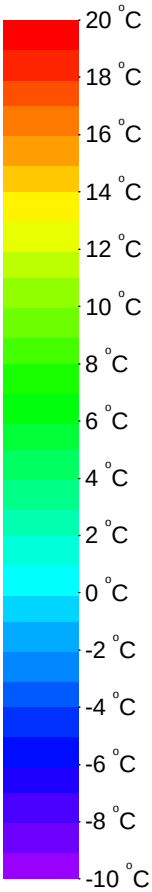
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior roof | Außen Dach		-10.000	0.100	
Exterior vent. | Außen belüftet		-10.000	0.130	
Interior up. | Innen auf.		20.000	0.100	
Interior | Innen		20.000	0.130	

$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{19.627}{30.0} - 0.217 \cdot 1.744 - 0.196 \cdot 1.54 = -0.026\ \text{W/(m·K)}$$

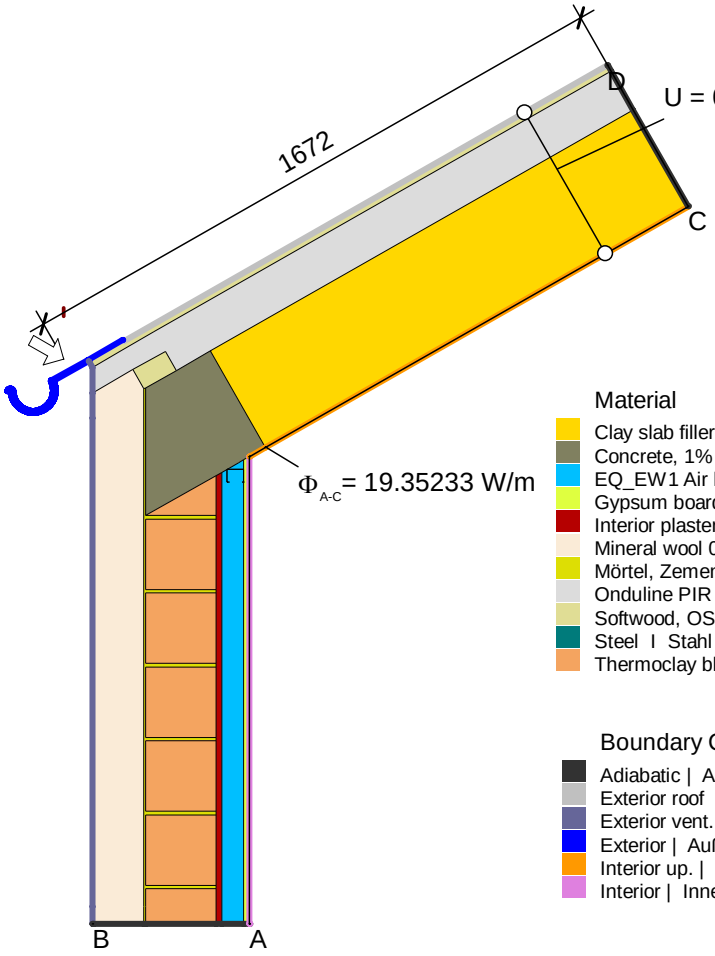




$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217\ \text{W/(m²·K)}$$



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior roof | Außen Dach		-10.000	0.100	
Exterior vent. | Außen belüftet		-10.000	0.130	
fRsi: Interior I Innen		20.000	0.250	



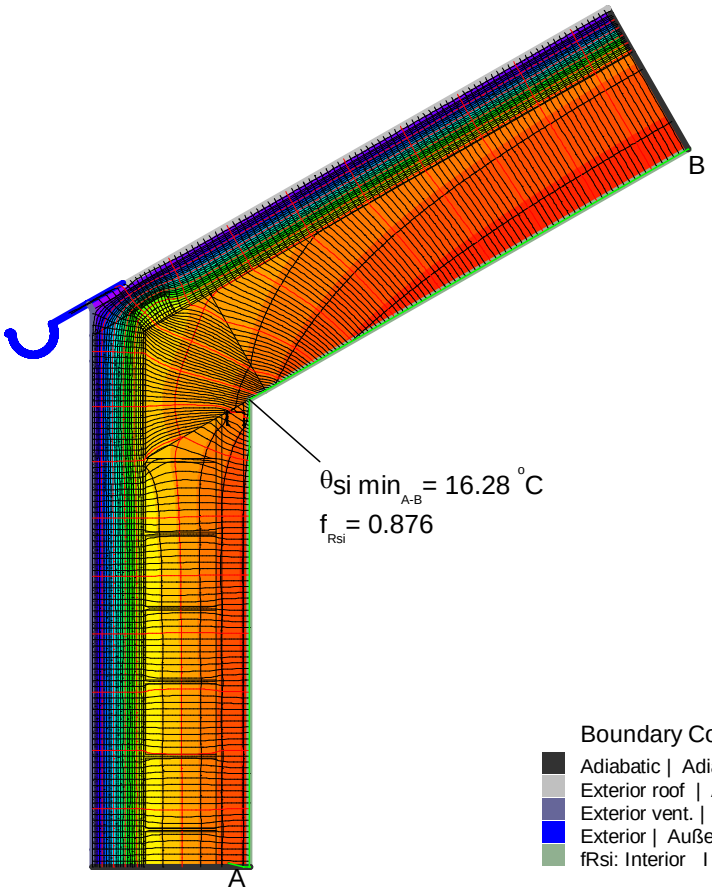
U = 0.196 W/(m²·K)

Φ_{A-C} = 19.35233 W/m

Material	λ[W/(m·K)]	ε
Clay slab filler block (300 mm; RT 0,32 m2·K/W)	0.938	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Onduline PIR 027	0.027	0.900
Softwood, OSB I Weichholz, OSB 10456	0.130	0.900
Steel I Stahl	50.000	0.900
Thermoclay blocks 19 cm	0.292	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior roof | Außen Dach		-10.000	0.100	
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Interior up. | Innen auf.		20.000	0.100	
Interior | Innen		20.000	0.130	

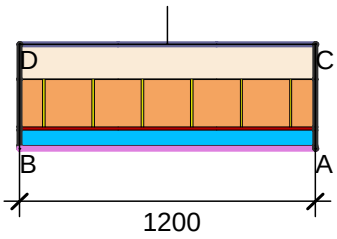
$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{19.352}{30.0} - 0.217 \cdot 1.527 - 0.196 \cdot 1.672 = -0.014 \text{ W/(m·K)}$$



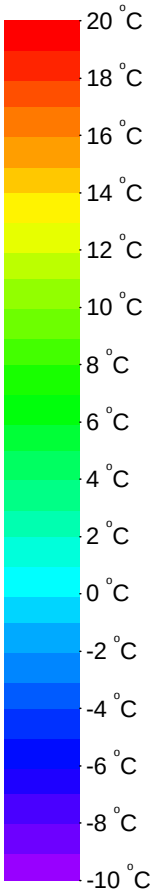
$\theta_{si\ min_{A-B}}$ = 16.28 °C

f_{Rsi} = 0.876

Φ_{A-B} = -7.82251 W/m



$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217 \text{ W/(m²·K)}$$

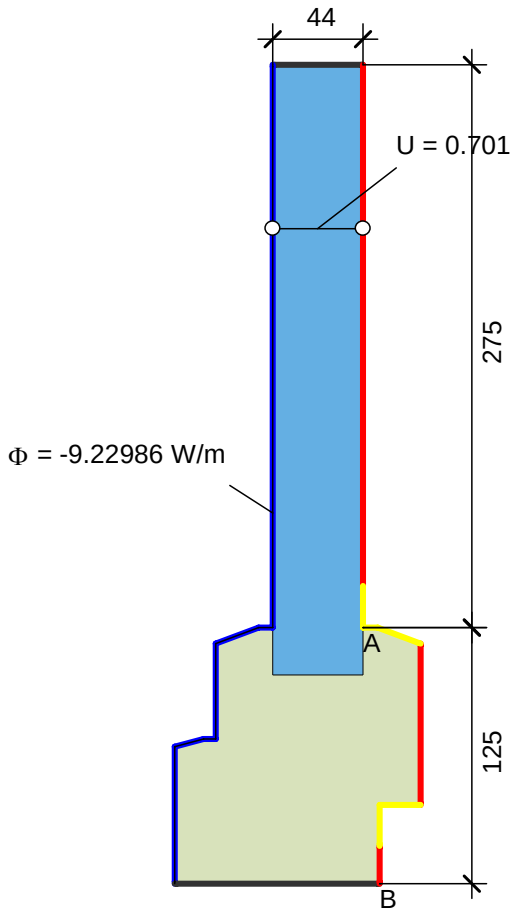


Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]
Adiabatic | Adiabat	0.000		
Exterior roof | Außen Dach		-10.000	0.100
Exterior vent. | Außen belüftet		-10.000	0.130
Exterior | Außen		-10.000	0.040
fRsi: Interior I Innen		20.000	0.250

Passive House Institute

Windows | Fenster

	Passive House Window		1			2			3			1
frame values | Rahmenwerte	Spacer I Abstandhalter: Swisspacer Ultimate with PU secondary seal		Bottom Unten	Top Oben	Side Seitl.	Bottom Unten	Top Oben	Side Seitl.	Bottom Unten	Top Oben	Side Seitl.	Bottom barrier-free Unten barri-erefrei
												
	Frame width Rahmenbreite	b_f [mm]	125	125	125							125
	U-value frame Rahmen-U-Wert	**Uf** [W/(m²K)]	0,92	0,92	0,92							0,92
	Ψ-glass edge Glasrand-Ψ-Wert	**Ψg** [W/(mK)]	0,038	0,038	0,038							0,038
	U-value window Fenster-U-Wert	**Uw** [W/(m²K)] @U_g = 0,52 W/(m²K)	**1,00**									
	Passive House effiziency class Passivhaus Effizienzklasse		**phC**									
Installation | Einbau												
		$f_{Rsi=0,25m²k/W}$	0,783	0,801	0,797							0,685
		$\Psi_{install}$ [W/(mK)]	0,030	0,008	0,003							-0,009
		$U_{W,\ installed}$ [W/(m²K)]	1,03									

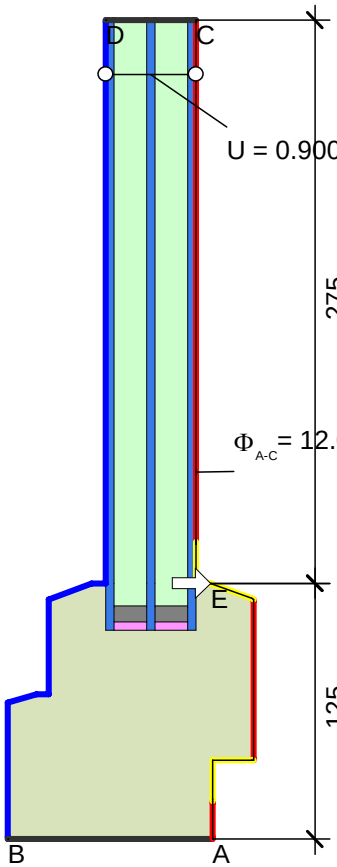


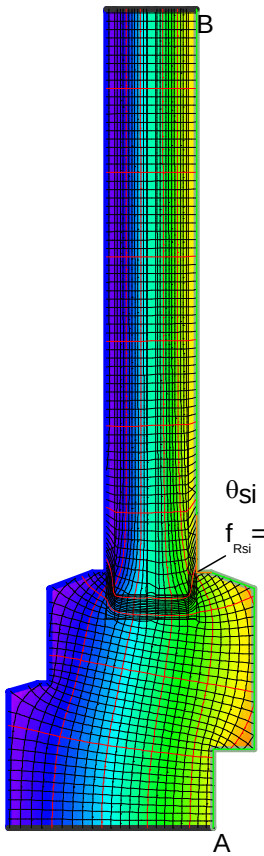
Material	λ[W/(m·K)]	ε
Panel I Maske	0.035	0.900
Standard frame | Standardrahmen	0.113	0.900

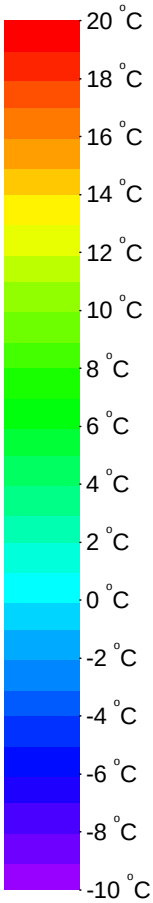
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
fRsi: Interior | Innen		20.000	0.250	

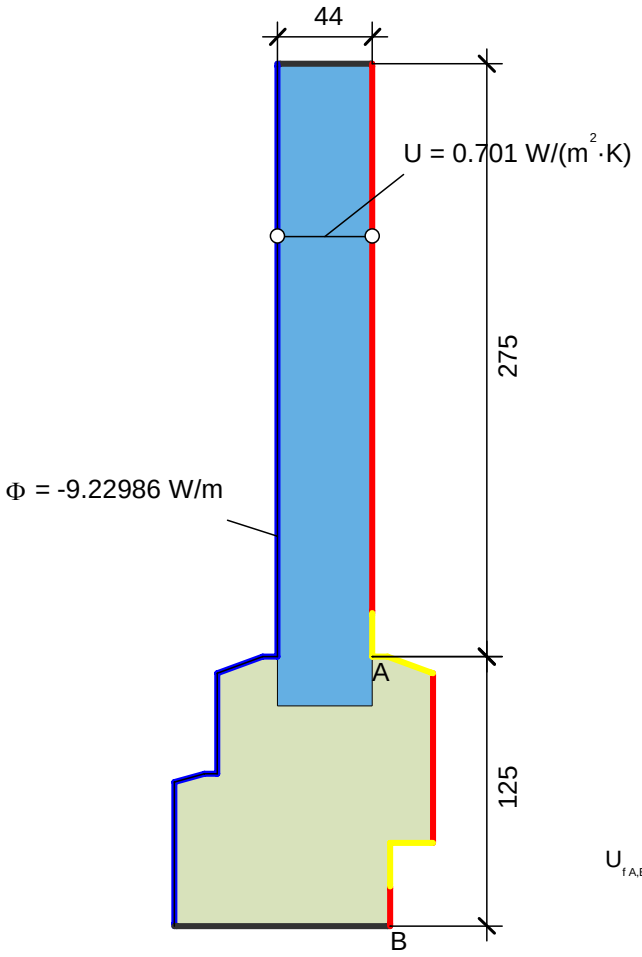
$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{9.23}{30.0} - 0.701 \cdot 0.275}{0.125} = 0.920\ \text{W/(m}^2\cdot\text{K)}$$







$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{12.01}{30.0} - 0.92 \cdot 0.125 - 0.9 \cdot 0.275 = 0.038\ \text{W/(m·K)}$$

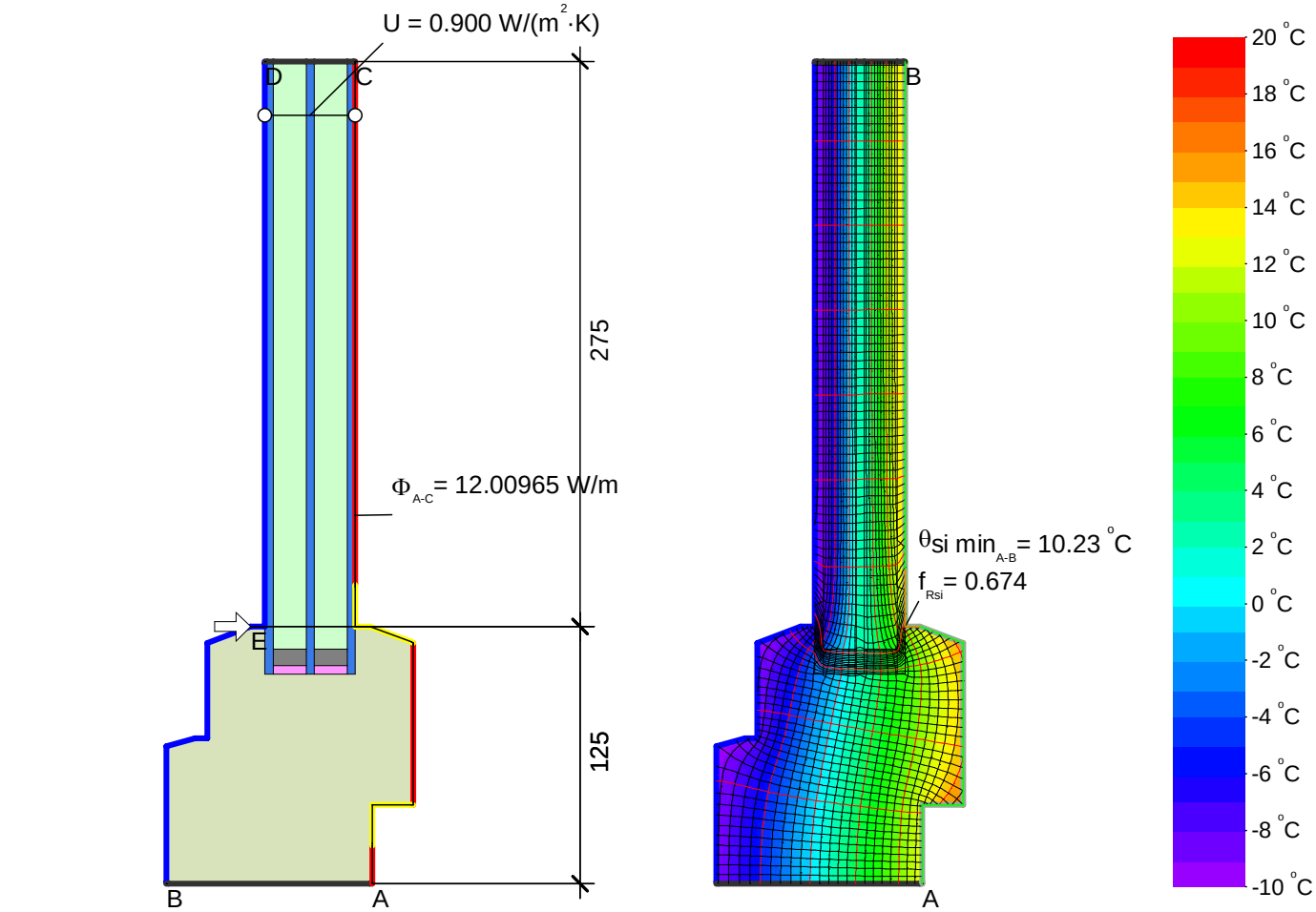


Material	λ[W/(m·K)]	ε
Panel I Maske	0.035	0.900
Standard frame | Standardrahmen	0.113	0.900

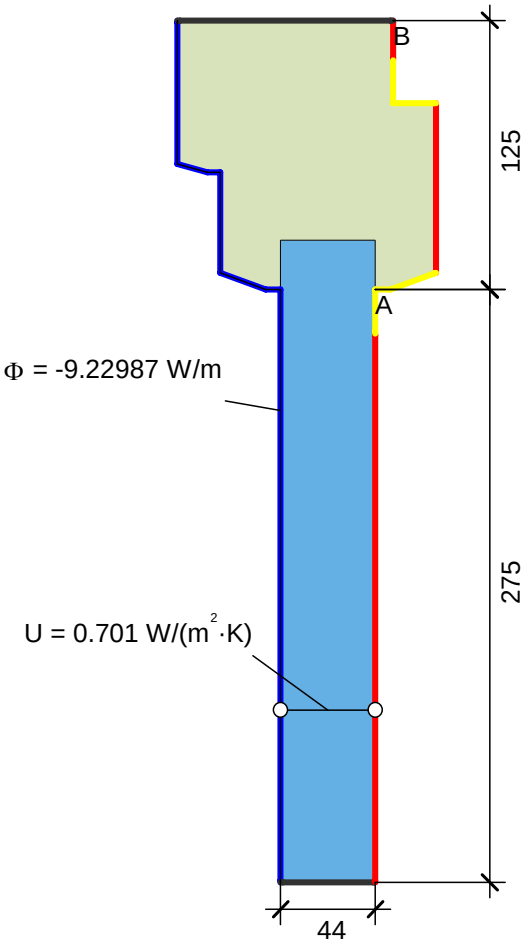
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
fRsi: Interior | Innen		20.000	0.250	

$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{9.23}{30.0} - 0.701 \cdot 0.275}{0.125} = 0.920\ \text{W/(m}^2\text{·K)}$$



$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{12.01}{30.0} - 0.92 \cdot 0.125 - 0.9 \cdot 0.275 = 0.038\ \text{W/(m·K)}$$

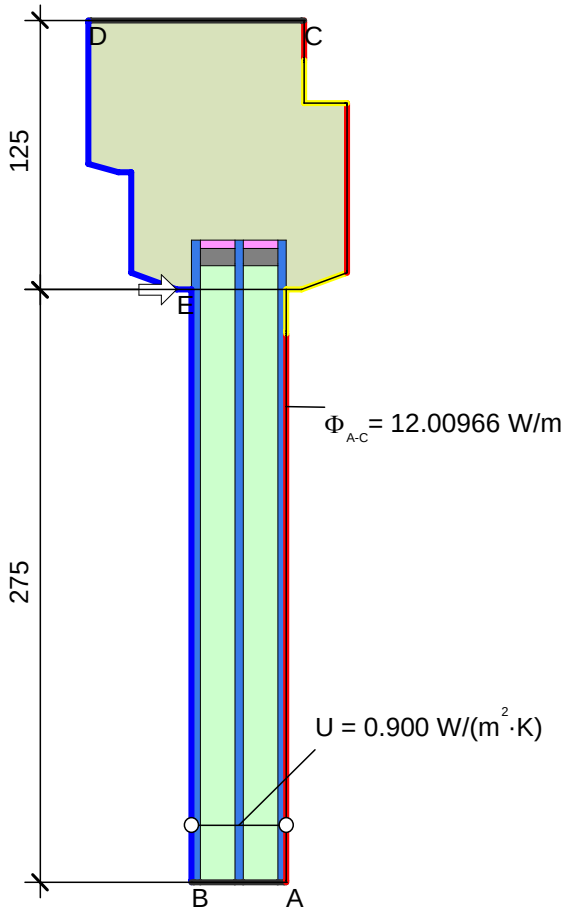


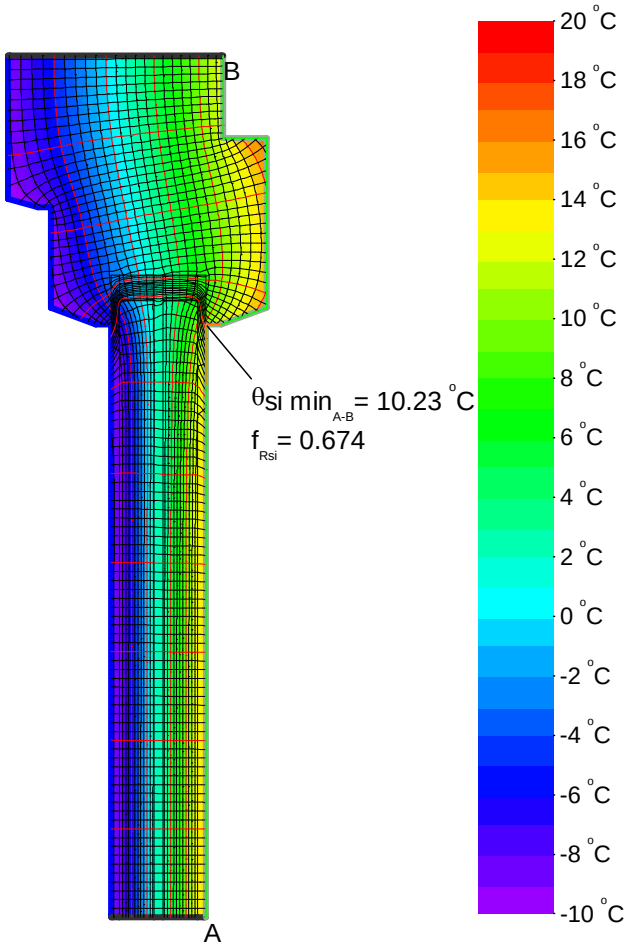
Material	λ[W/(m·K)]	ε
Panel I Maske	0.035	0.900
Standard frame | Standardrahmen	0.113	0.900

Boundary Condition	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	

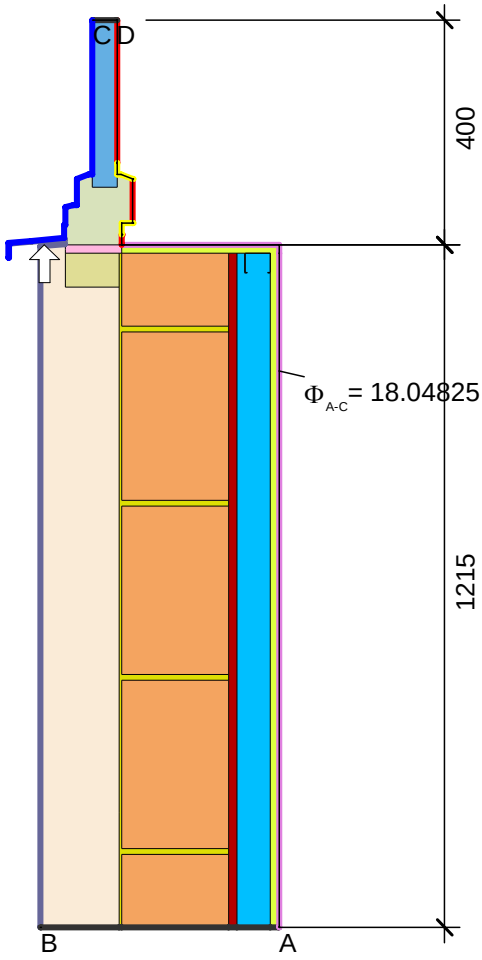
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
fRsi: Interior I Innen		20.000	0.250	

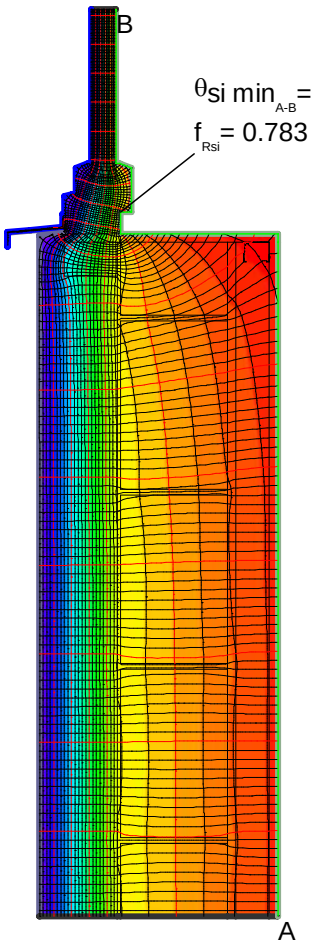
$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{9.23}{30.0} - 0.701 \cdot 0.275}{0.125} = 0.920\ \text{W/(m}^2\cdot\text{K)}$$

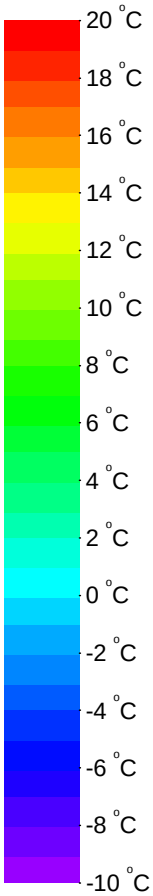




$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{12.01}{30.0} - 0.9 \cdot 0.275 - 0.92 \cdot 0.125 = 0.038\ \text{W/(m·K)}$$

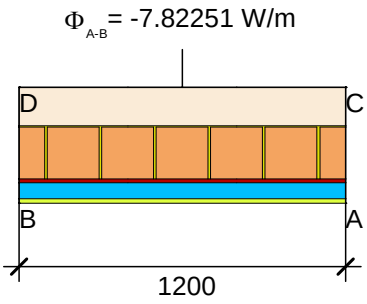






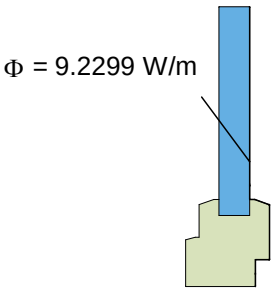
$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - \frac{\Phi_2}{\Delta T} = \frac{18.048}{30.0} - 0.217 \cdot 1.215 - \frac{9.23}{30.0} = 0.030\ \text{W/(m·K)}$$

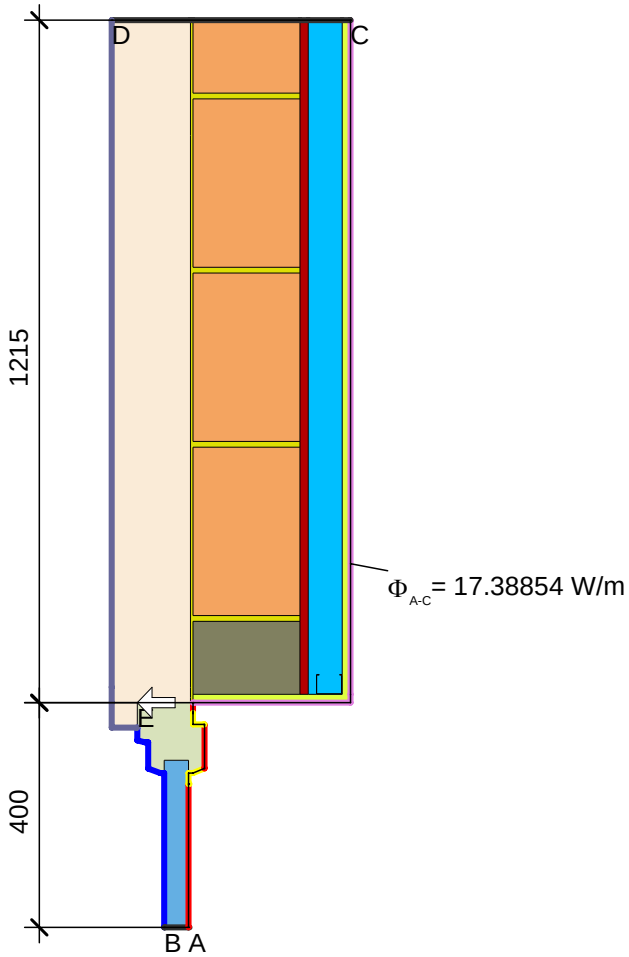
Material	λ[W/(m·K)]	ε
Aluminum I Aluminium 10456	160.000	0.900
EPDM	0.250	0.900
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
PU in-situ foam I PU-Ortschaum 040	0.040	0.900
Panel I Maske	0.035	0.900
Softwood, OSB I Weichholz, OSB 10456	0.130	0.900
Standard frame | Standardrahmen	0.113	0.900
Steel I Stahl	50.000	0.900
Thermoclay blocks 19 cm	0.292	0.900

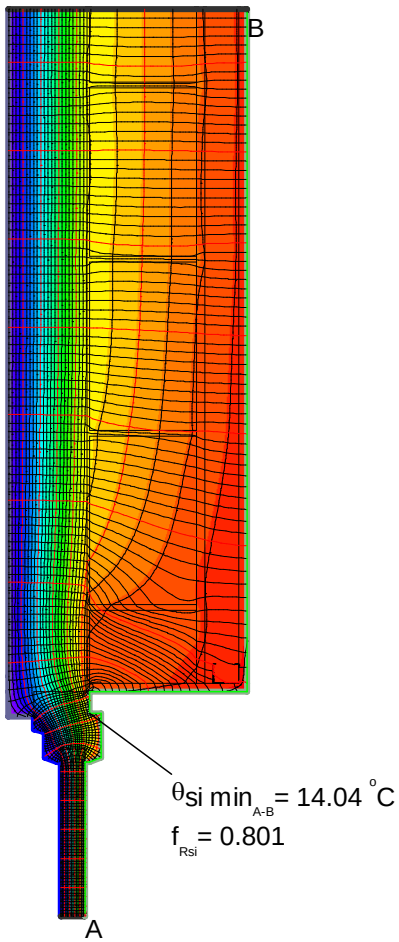


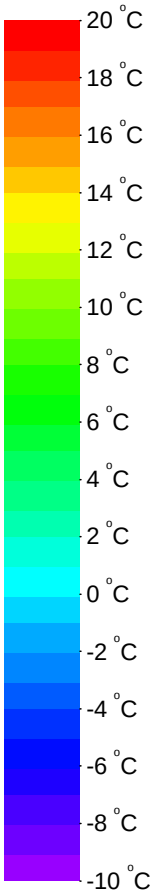
$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217\ \text{W/(m}^2\text{·K)}$$

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Interior | Innen		20.000	0.130	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	







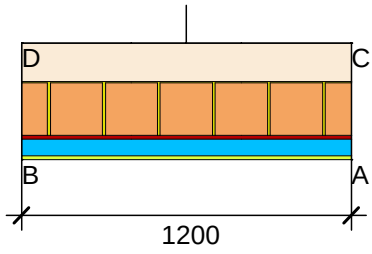


$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_i}{\Delta T} - U_2 \cdot b_2 = \frac{17.389}{30.0} - \frac{9.23}{30.0} - 0.217 \cdot 1.215 = 0.008\ \text{W/(m·K)}$$

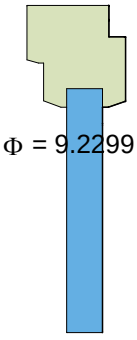
Material	λ[W/(m·K)]	ε
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
EQ_EW1 Air layer, unvent, horiz, thickness 60 mm + steel stuts	0.361	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Panel I Maske	0.035	0.900
Standard frame | Standardrahmen	0.113	0.900
Steel I Stahl	50.000	0.900
Thermoclay blocks 19 cm	0.292	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Interior | Innen		20.000	0.130	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	

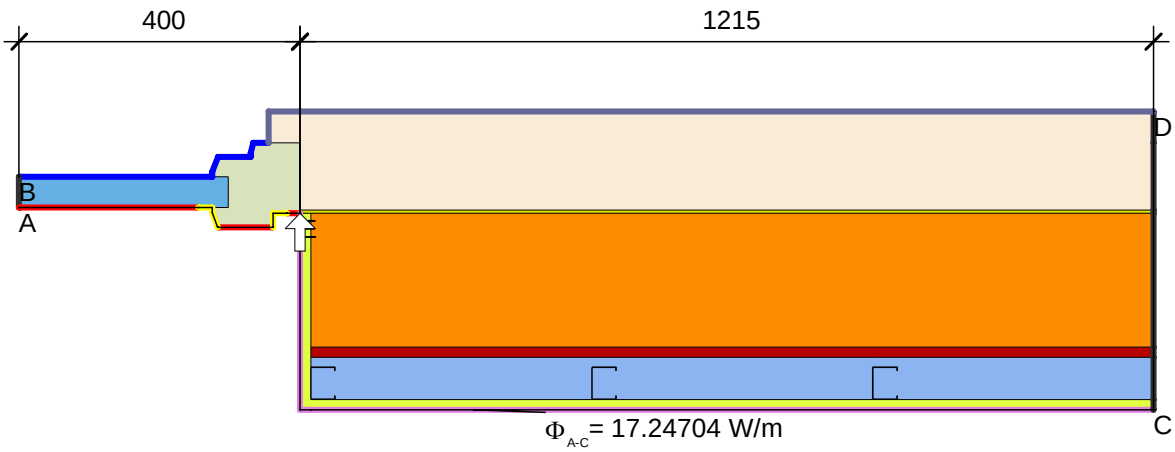
Φ_{A-B}= -7.82251 W/m



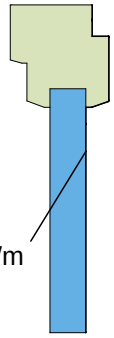
$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.823}{30.0 \cdot 1.2} = 0.217\ \text{W/(m}^2\text{·K)}$$



Φ = 9.2299 W/m



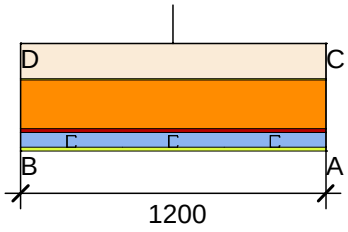
$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_I}{\Delta T} - U_2 \cdot b_2 = \frac{17.247}{30.0} - \frac{9.23}{30.0} - 0.217 \cdot 1.215 = 0.003 \text{ W/(m·K)}$$



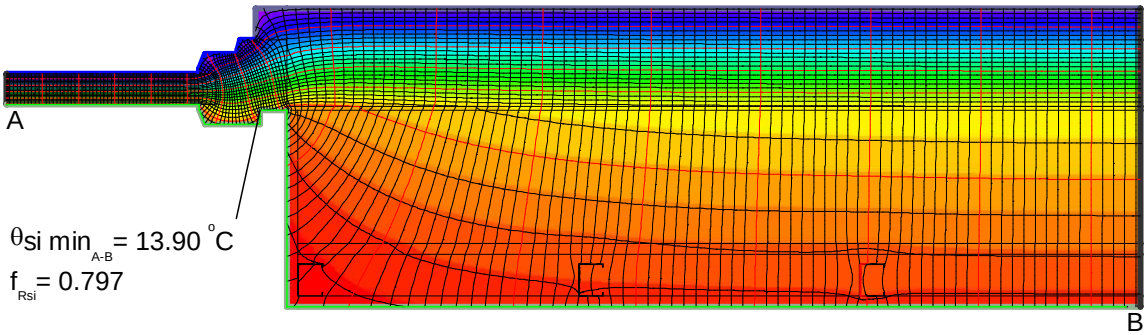
Material	λ[W/(m·K)]	ε
EQ_EW1 Thermoclay blocks 19 cm + mortar joints	0.325	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Luftschicht, ruhend, horizontal, Dicke: 60 mm	0.333	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
Panel I Maske	0.035	0.900
Standard frame | Standardrahmen	0.113	0.900
Steel I Stahl	50.000	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Interior | Innen		20.000	0.130	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	

$\Phi_{A\text{-}B}$ = -7.82243 W/m

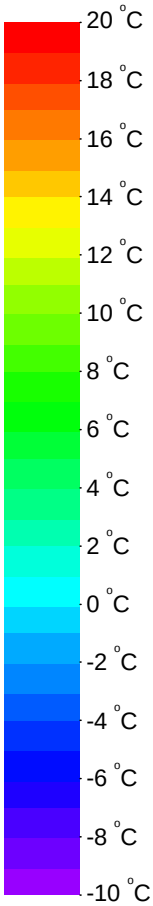


$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217 \text{ W/(m}^2\text{·K)}$$



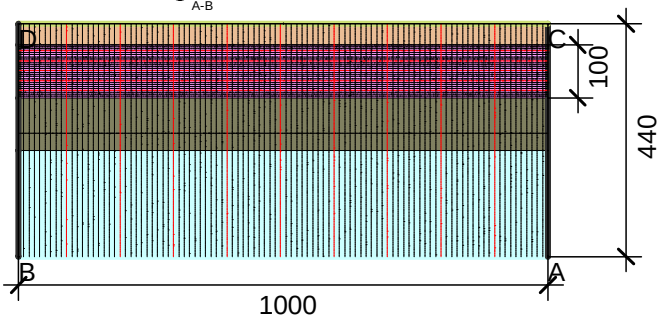
$\theta_{si\ min\ A\text{-}B}$ = 13.90 °C

f_{Rsi} = 0.797



Ground | Boden

$\Phi_{A\text{-}B}$ = 9.89541 W/m

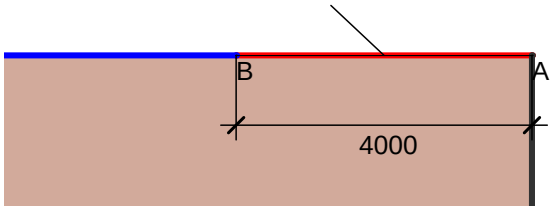


Material	λ[W/(m·K)]	ε
Cement screed I Zement-Estrich 4108	1.400	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
Eq_ventilated crawl space	2.300	0.900
XPS 037	0.037	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Gorund I Erdreich		-10.000		
Int. flux down I Innen abwärts		20.000	0.170	

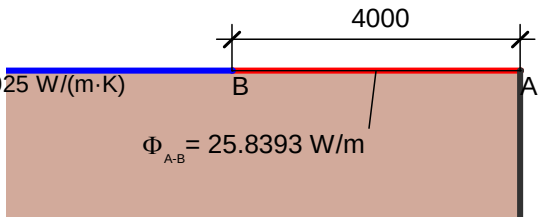
$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{9.895}{30.0 \cdot 1.0} = 0.330\ W/(m^2 \cdot K)$$

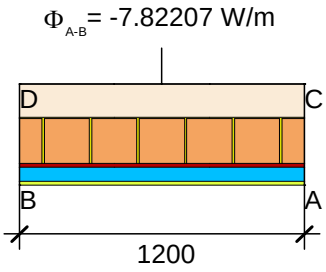
$\Phi_{A\text{-}B}$ = 25.8393 W/m



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
EQ FS: 1/Ufs		20.000	3.030	
Exterior | Außen		-10.000	0.040	

$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_I}{\Delta T} - U_2 \cdot b_2 = \frac{40.981}{30.0} - \frac{25.839}{30.0} - 0.217 \cdot 2.44 = -0.025 \text{ W/(m·K)}$$



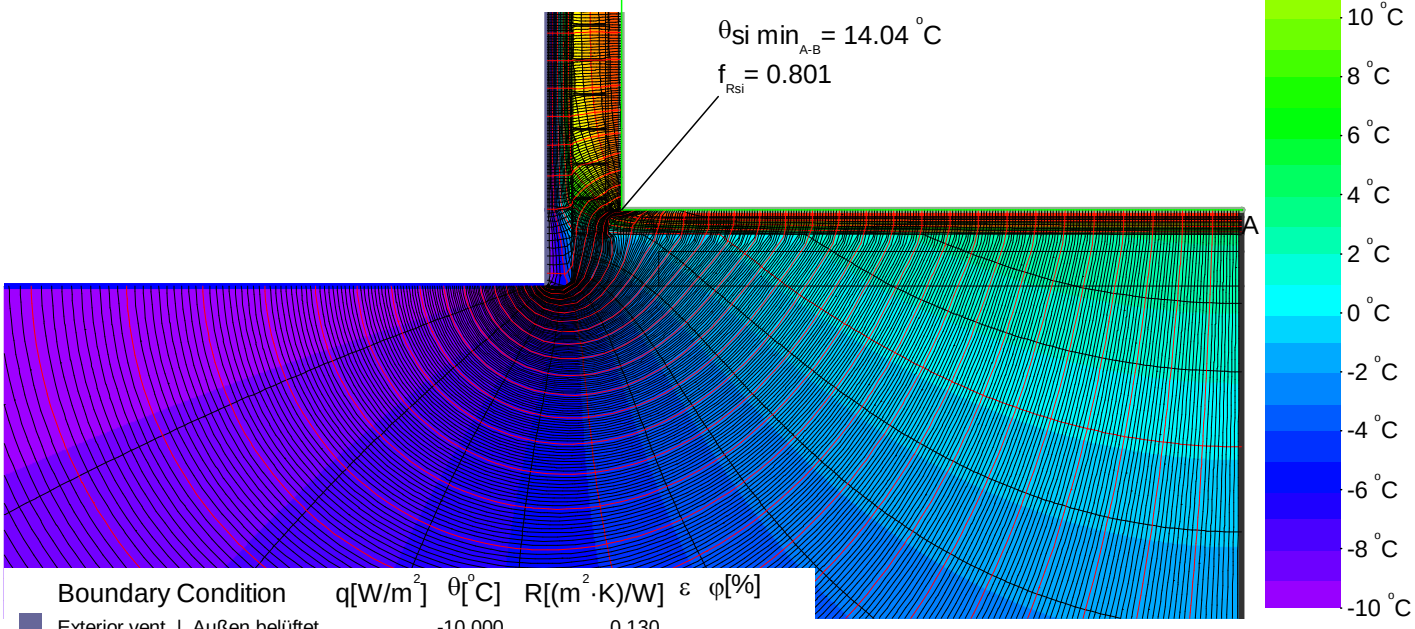


$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217 \text{ W/(m}^2\text{K)}$$

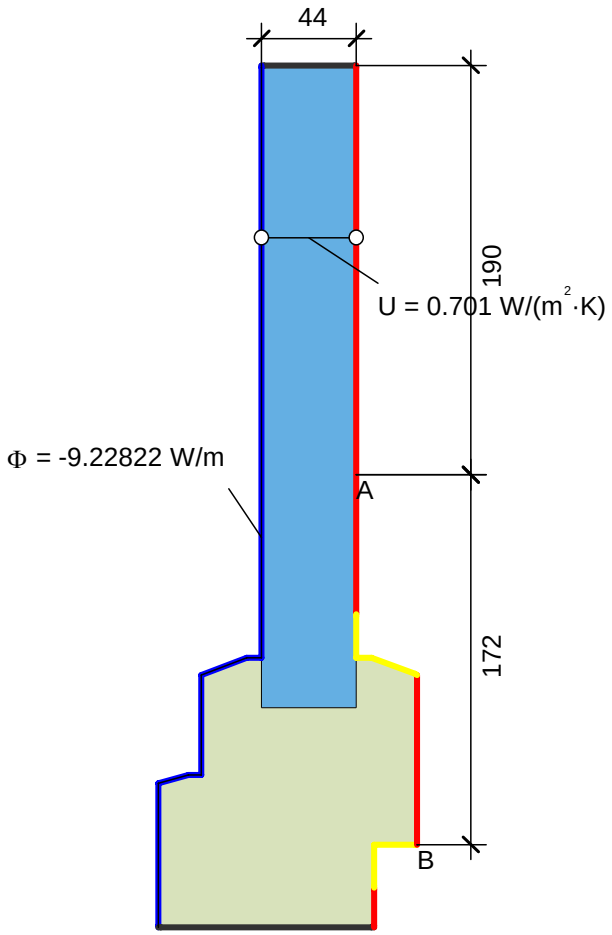
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
EQ FS: 1/Ufs		20.000	3.030	
Exterior | Außen		-10.000	0.040	

Material	λ[W/(m·K)]	ε
Air layer, unventilated, horizontal, thickness: 60 mm + steel stuts	0.361	0.900
Cement screed I Zement-Estrich 4108	1.400	0.900
Concrete, 1% Steel I Beton, 1% Stahl 10456	2.300	0.900
Eq_ventilated crawl space	2.300	0.900
Ground I Erdreich	2.000	0.900
Gypsum board I Gipskartonplatten 900 kg/m3 10456	0.250	0.900
Interior plaster I Gipsputz 10456	0.570	0.900
Mineral wool 040	0.040	0.900
Mörtel, Zement, Sand	1.000	0.900
PVC-U hart(Polyvinylchlorid)	0.170	0.900
Thermoclay blocks 19 cm	0.292	0.900
Steel I Stahl	50.000	0.900
XPS 037	0.037	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Int. flux down I Innen abwärts		20.000	0.170	
Interior | Innen		20.000	0.130	



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior vent. | Außen belüftet		-10.000	0.130		
Exterior | Außen		-10.000	0.040		
fRsi: Interior I Innen		20.000	0.250		
Adiabatic | Adiabat	0.000				

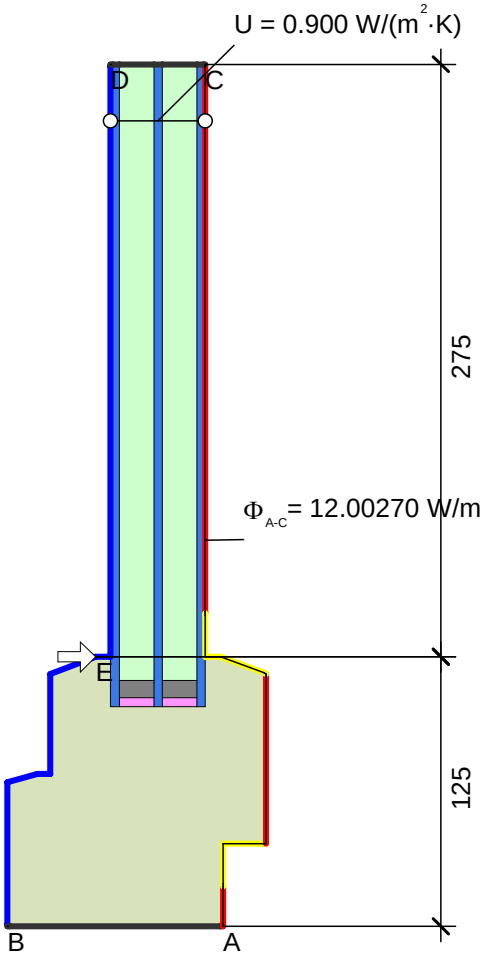


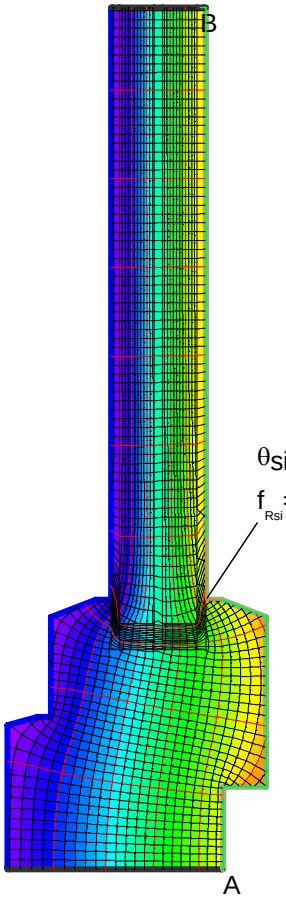
Material	λ[W/(m·K)]	ε
Panel I Maske	0.035	0.900
Standard frame | Standardrahmen	0.113	0.900

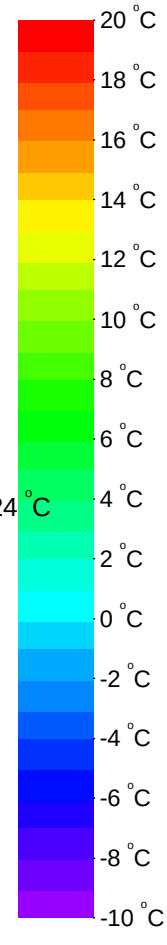
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	

$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{9.228}{30.0} - 0.701 \cdot 0.19}{0.172} = 1.017\ W/(m^2 \cdot K)$$

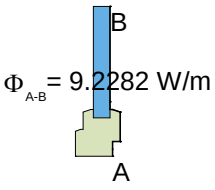
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior | Außen		-10.000	0.040	
fRsi: Interior | Innen		20.000	0.250	



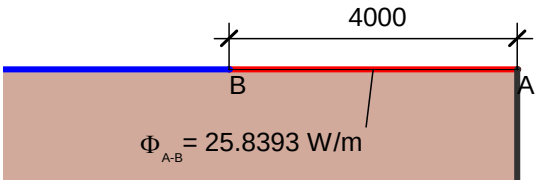




$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{12.003}{30.0} - 0.919 \cdot 0.125 - 0.9 \cdot 0.275 = 0.038\ W/(m \cdot K)$$

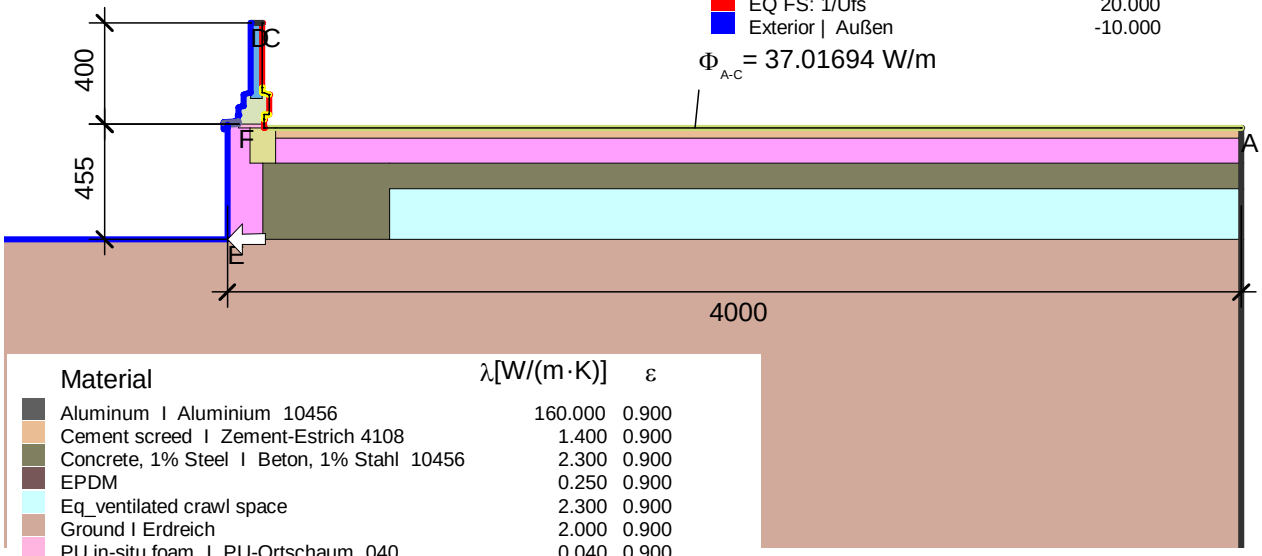


$\Phi_{A\text{-}B}$ = 9.2282 W/m



$\Phi_{A\text{-}B}$ = 25.8393 W/m

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
EQ FS: 1/Ufs		20.000	3.030	
Exterior | Außen		-10.000	0.040	

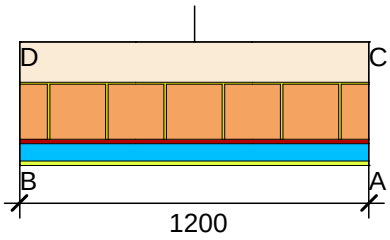


$\Phi_{A\text{-}C}$ = 37.01694 W/m

Material	λ[W/(m·K)]	ε
Aluminum | Aluminium 10456	160.000	0.900
Cement screed | Zement-Estrich 4108	1.400	0.900
Concrete, 1% Steel | Beton, 1% Stahl 10456	2.300	0.900
EPDM	0.250	0.900
Eq_ventilated crawl space	2.300	0.900
Ground | Erdreich	2.000	0.900
PU in-situ foam | PU-Ortschaum 040	0.040	0.900
Panel | Maske	0.035	0.900
Softwood, OSB | Weichholz, OSB 10456	0.130	0.900
Standard frame | Standardrahmen	0.113	0.900
XPS 038	0.038	0.900

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
Int. flux down | Innen abwärts		20.000	0.170	
Interior, frame, normal		20.000	0.130	
Interior, frame, reduced		20.000	0.200	

$\Phi_{A\text{-}B}$ = -7.82207 W/m



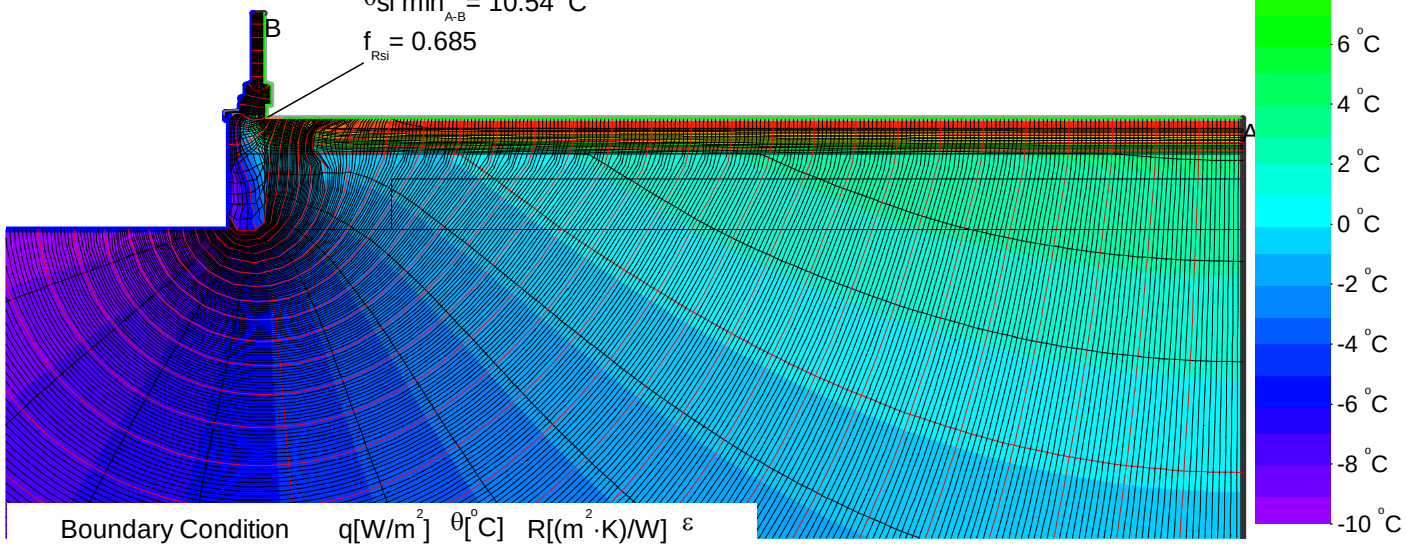
$$U_{eq\ A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{7.822}{30.0 \cdot 1.2} = 0.217\ W/(m^2 \cdot K)$$

$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_1}{\Delta T} - U_2 \cdot b_2 - \frac{\Phi_3}{\Delta T} = \frac{37.017}{30.0} - \frac{25.839}{30.0} - 0.217 \cdot 0.455 - \frac{9.228}{30.0} = -0.034\ W/(m \cdot K)$$

$$\Psi_{WITH} = \Psi_{FSEW+WITH} - \Psi_{FSEW01} = -0.080 - (-0.025) = 0.055\ W/mK$$

$\theta_{si\ min_{A\text{-}B}}$ = 10.54 °C

f_{Rsi} = 0.685



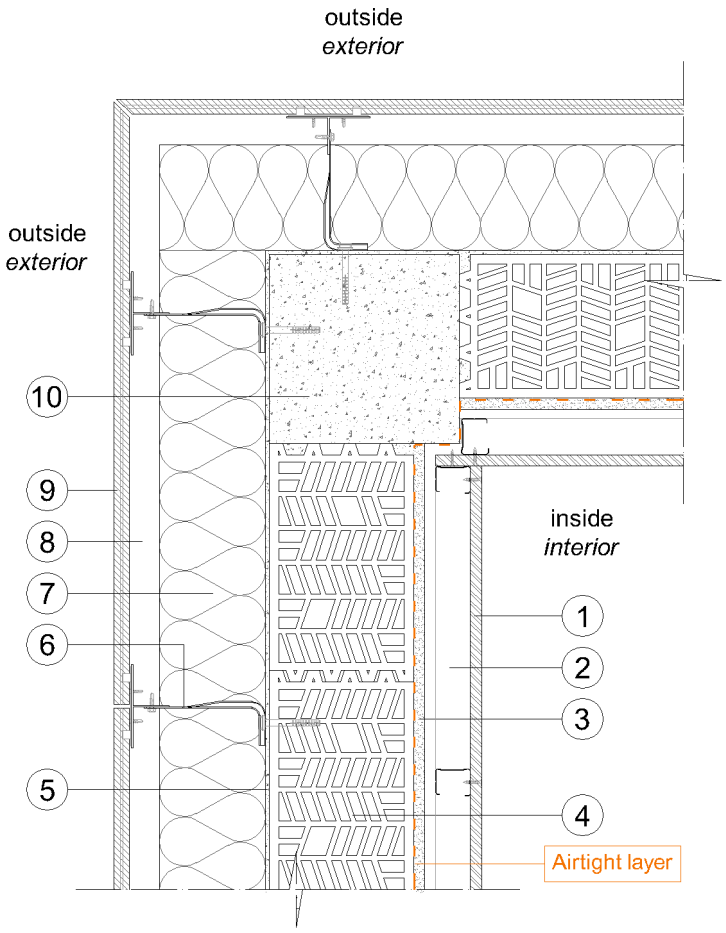
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Adiabatic | Adiabat	0.000			
Exterior vent. | Außen belüftet		-10.000	0.130	
Exterior | Außen		-10.000	0.040	
fRsi: Interior | Innen		20.000	0.250	

Appendix 3: Manufacturers drawings | Zeichnungen des Herstellers

Passive House Institute

Exterior wall – exterior corner ***Muro exterior – esquina exterior***	01 EW1_EW1_ec1 *01 EWec*	CONSORCIO TERMOARCILLA

Design drawing – **Horizontal cross-section** / *Detalle constructivo* – ***Sección horizontal***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

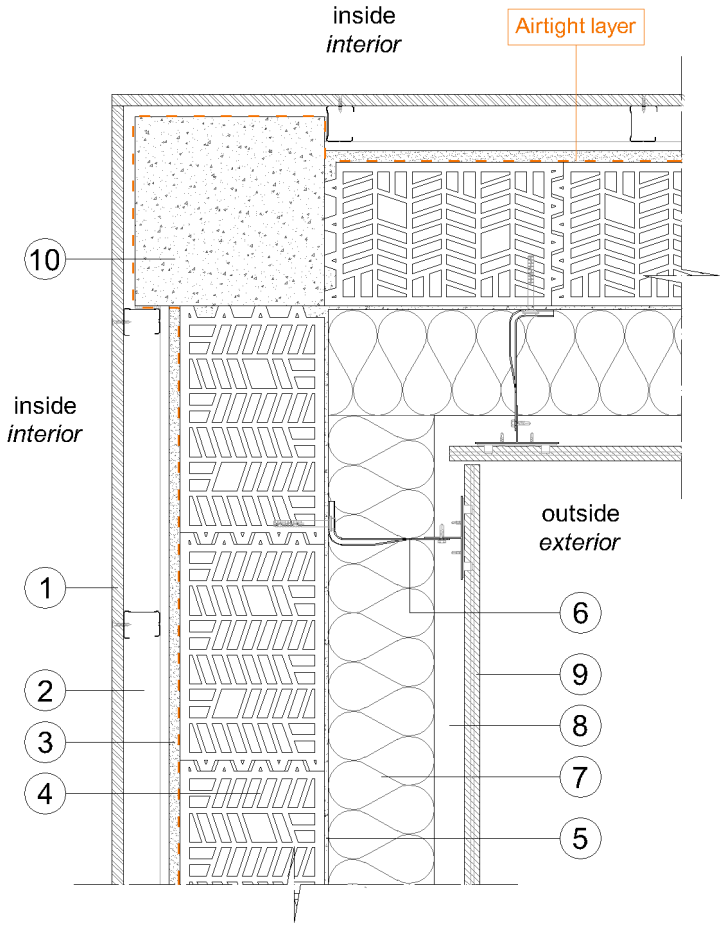
Capa hermética

La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

From the inside towards the outside		λ [W/(mK)]	Thickness [cm]	From the inside towards the outside		λ [W/(mK)]	Thickness [cm]
Standard component : Exterior wall							
1	Gypsum board / *Placa yeso laminado*	0.250	1.5				
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6				
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5				
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19				
5	Cement mortar / *Mortero de cemento*	1.000	0.5				
6	Stainless steel bracket / *Ménsula de acero inoxidable*	17.000	-				
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14				
8	Air cavity / *Cámara de aire ventilada*	-	-				
9	Ceramic tile / *Placa cerámica*	-	-				
				Other materials (materials not in the standard components)			
				10	Concrete column / Pilar de hormigón	2.300	-

Exterior wall – interior corner ***Muro exterior – esquina interior***	02 EW1_EW1_ic1 *02 EWic*	CONSORCIO TERMOARCILLA

Design drawing – **Horizontal cross-section** / *Detalle constructivo* – ***Sección horizontal***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied. Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

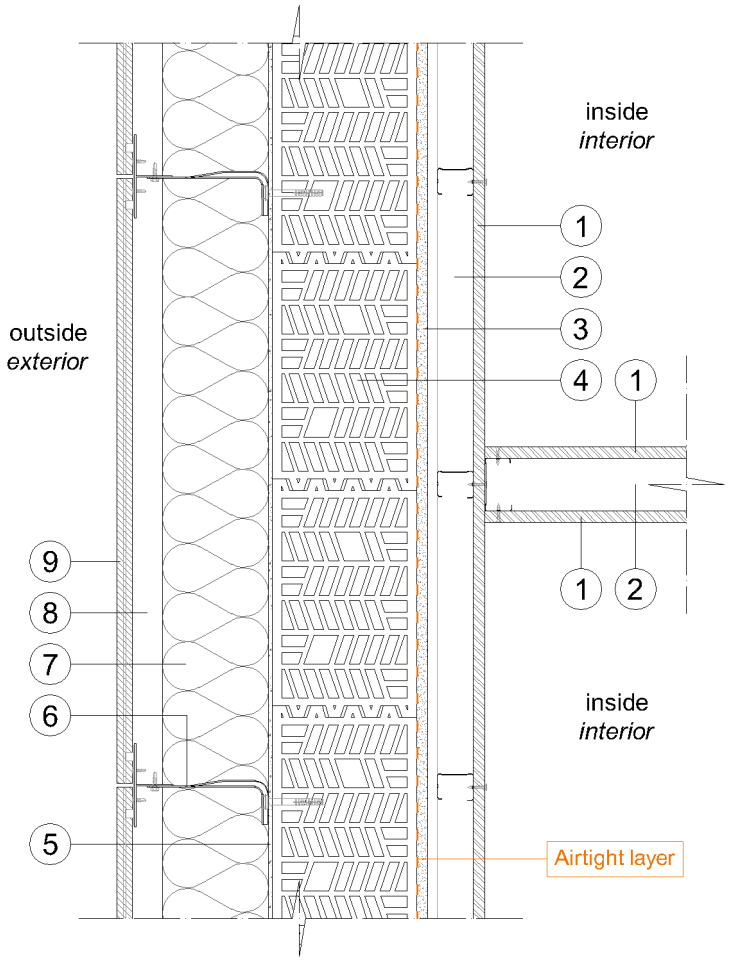
Capa hermética

La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

From the inside towards the outside		λ [W/(mK)]	Thickness [cm]	From the inside towards the outside		λ [W/(mK)]	Thickness [cm]
Standard component : Exterior wall							
1	Gypsum board / *Placa yeso laminado*	0.250	1.5				
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6				
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5				
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19				
5	Cement mortar / *Mortero de cemento*	1.000	0.5				
6	Stainless steel bracket / *Ménsula de acero inoxidable*	17.000	-				
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14				
8	Air cavity / *Cámara de aire ventilada*	-	-				
9	Ceramic tile / *Placa cerámica*	-	-				
				Other materials (materials not in the standard components)			
				10	Concrete column / Pilar de hormigón	2.300	-

Exterior wall – interior wall ***Muro exterior – tabique interior***	03 EW1_IW1 *03 EWIW*	CONSORCIO TERMOARCILLA

Design drawing – **Horizontal cross-section** / *Detalle constructivo* – ***Sección horizontal***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied. Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

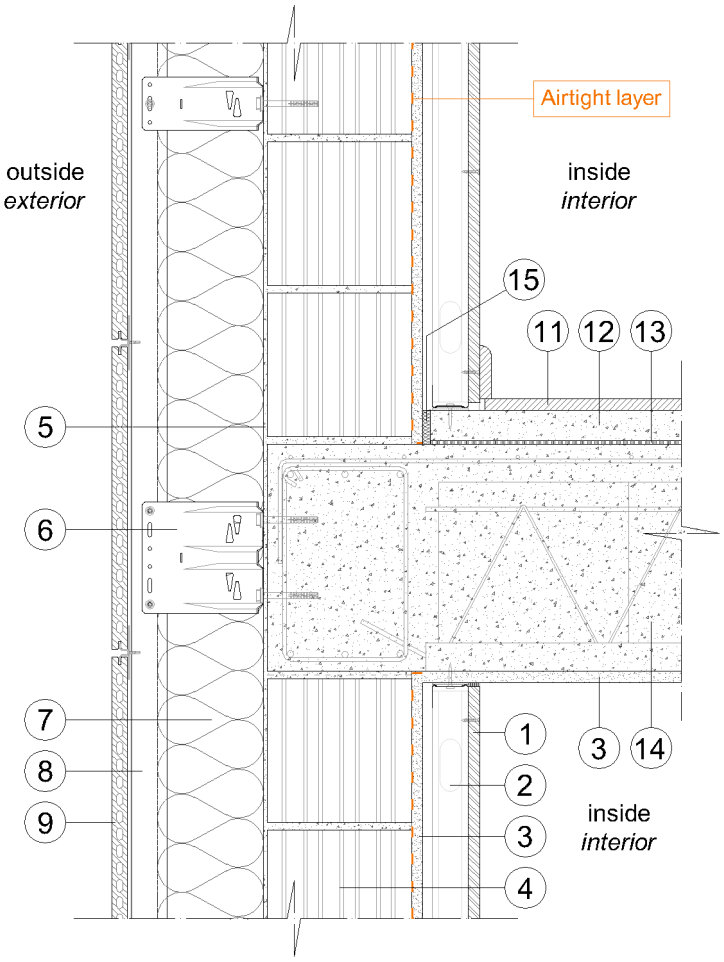
La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	17.000	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-
	Other materials (materials not in the standard components)		

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Interior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.389	7
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
	Other materials (materials not in the standard components)		

Ceiling connection ***Muro exterior – forjado intermedio***	04 EW1_EW1_CE1 *04 EWCE*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

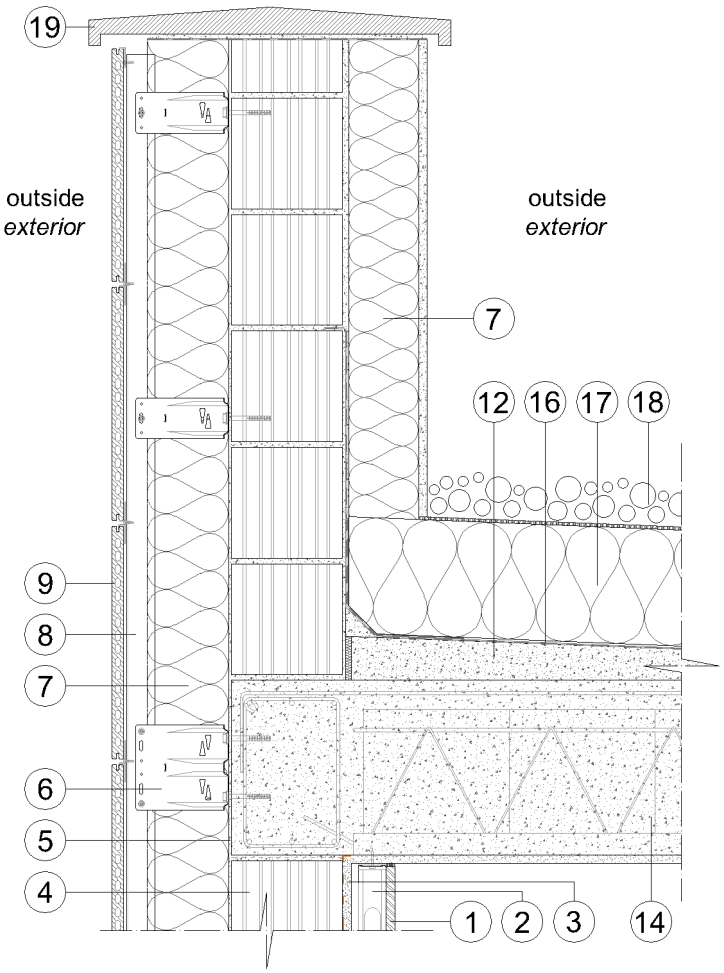
La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Ceiliing		
11	Ceramic finishing / *Baldosa cerámica*	-	-
12	Cement mortar / Mortero de cemento	-	-
13	Anti-impact sheet / *Lámina anti-impacto*	-	-
14	Beam and clay block floor slab / *Forjado de bovedilla cerámica*	0.938	30
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
	Other materials (materials not in the standard components)		
15	Joint / *Junta*	-	-

Parapet ***Muro exterior – cubierta plana***	05 EW1_RO1_pp1 *05 EWRO*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Flat roof		
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
14	Beam and clay block floor slab / *Forjado de bovedilla cerámica*	0.938	30
12	Cement mortar / Mortero de cemento	-	-
16	Waterproofing / Impermeabilización	-	-
17	Thermal insulation XPS / *Aislamiento térmico XPS*	0.037	20
18	Gravel / *Grava*	-	-
	Other materials (materials not in the standard components)		
19	Coping stone / *Albardilla*	1.000	-

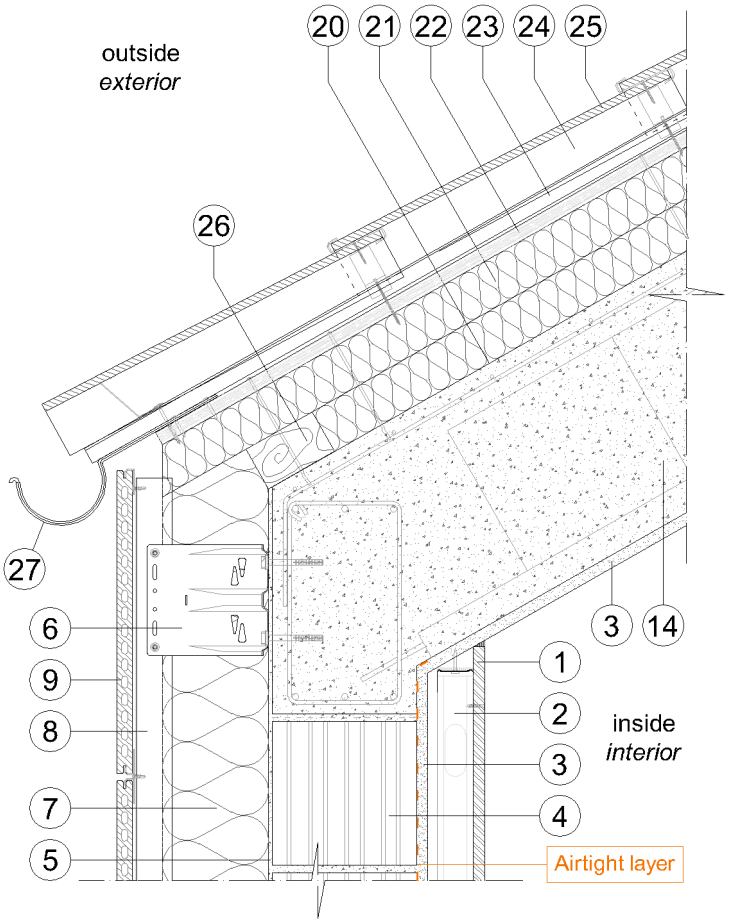
Eaves
Muro exterior – cubierta inclinada

06 EW1_RO2_ea1

06 EWRO

CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied. Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

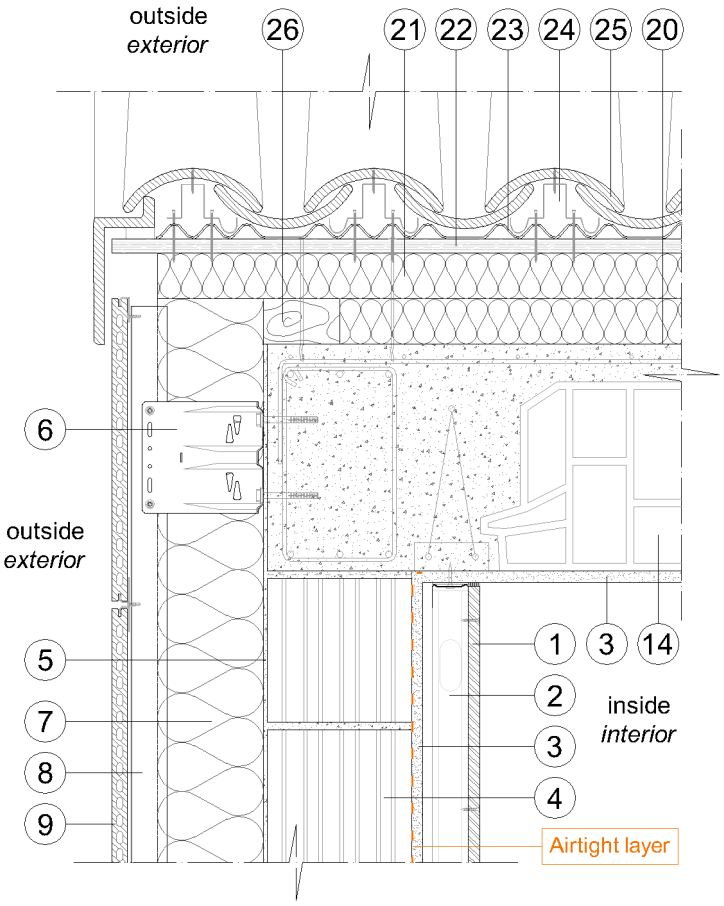
La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Pitched roof		
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
14	Beam and clay block floor slab / *Forjado de bovedilla cerámica*	0.938	30
20	Vapor barrier / Barrera de vapor	-	-
21	Thermal insulation PIR / *Aislamiento térmico PIR*	0.027	12
22	Wooden board / *Tablero de madera*	0.130	1.9
23	Waterproofing / Impermeabilización	-	-
24	Air layer / Cámara de aire	-	-
25	Tiles / Tejas	-	-
	Other materials (materials not in the standard components)		
26	Softwood / Madera	0.130	-
27	Gutter / Canalón	-	-

Verge ***Muro exterior – cubierta inclinada***	07 EW1_RO2_ve1 *07 ROVE*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

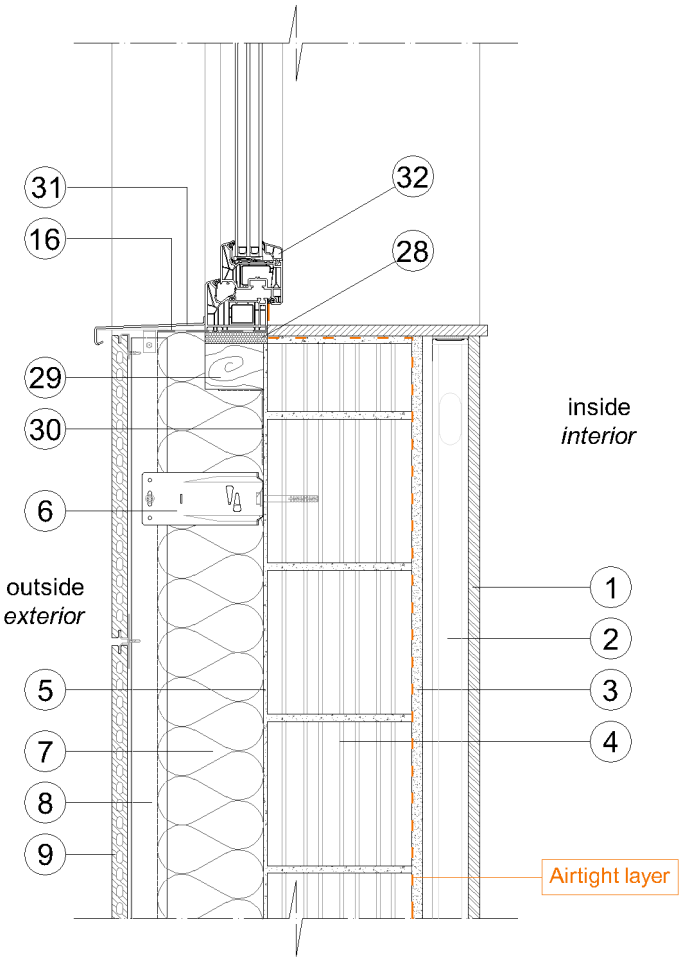
Capa hermética

La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]		From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
Standard component : Exterior wall				Standard component : Pitched roof			
1	Gypsum board / *Placa yeso laminado*	0.250	1.5	3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6	14	Beam and clay block floor slab / *Forjado de bovedilla cerámica*	0.938	30
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5	20	Vapor barrier / Barrera de vapor	-	-
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19	21	Thermal insulation PIR / *Aislamiento térmico PIR*	0.027	12
5	Cement mortar / *Mortero de cemento*	1.000	0.5				
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-	22	Wooden board / *Tablero de madera*	0.130	1.9
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14	23	Waterproofing / Impermeabilización	-	-
8	Air cavity / *Cámara de aire ventilada*	-	-	24	Air layer / Cámara de aire	-	-
9	Ceramic tile / *Placa cerámica*	-	-	25	Tiles / Tejas	-	-
				Other materials (materials not in the standard components)			
				26	Softwood / Madera	0.130	-

Window bottom connection ***Instalación inferior ventana***	08 EW1_OB1_1 *08 WIBO*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

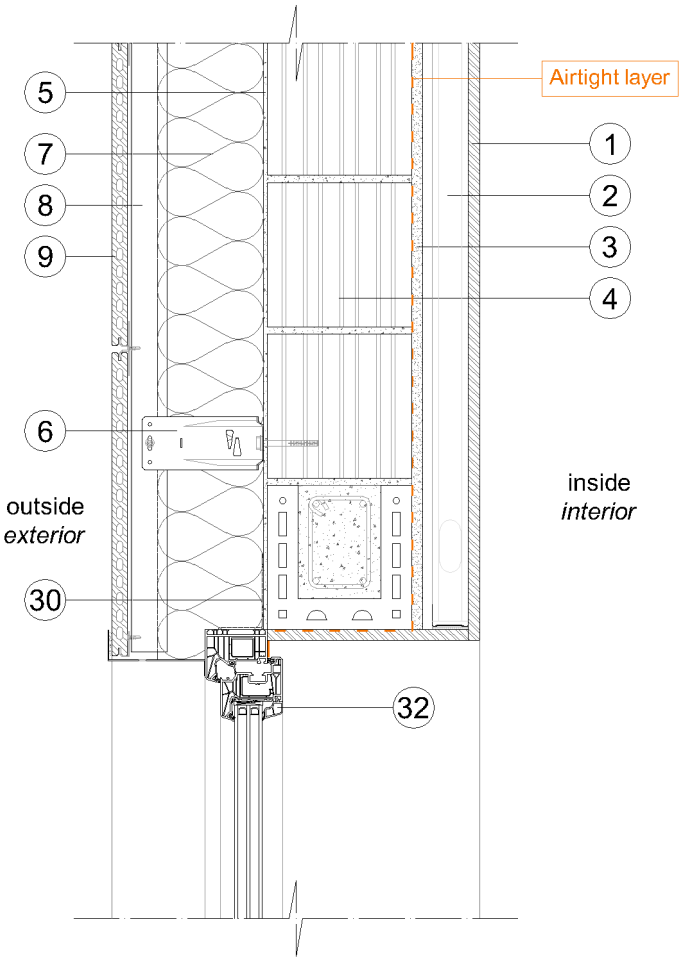
La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Other materials (materials not in the standard components)		
16	Waterproofing / *Impermeabilización*	0.250	-
28	PU in-situ foam / *Espuma de poliuretano*	0.040	1.5
29	Wooden subframe / *Precerco de madera*	0.130	-
30	Steel piece / *Pieza acero galvanizado*	160.000	-
31	Window sill / *Vierteaguas*	-	-
32	PVC piece / *Pieza PVC*	0.113	-

Window top connection ***Instalación superior ventana***	09 EW1_OH1_2a *09 WITO*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

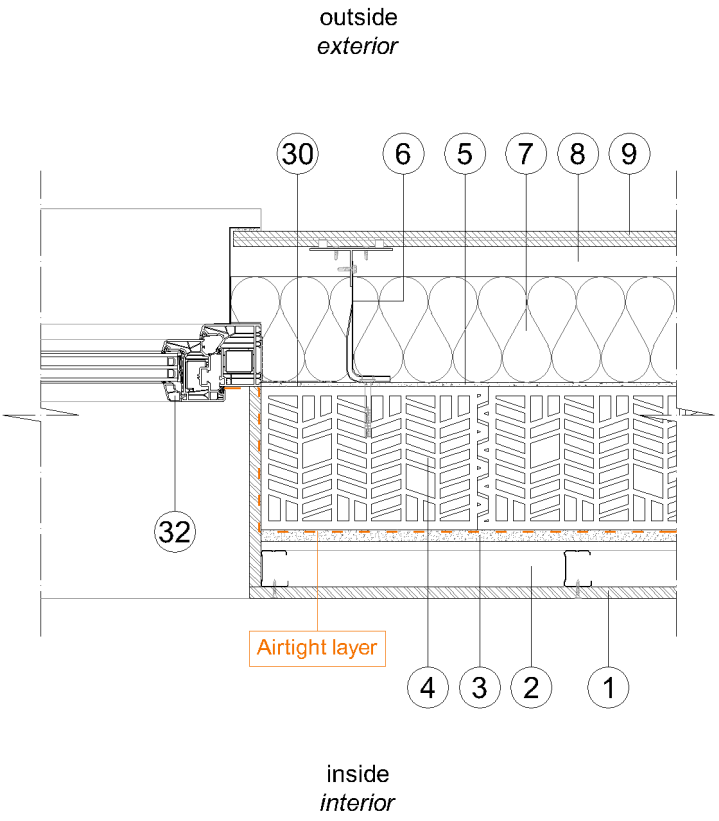
La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Other materials (materials not in the standard components)		
30	Steel piece / *Pieza acero galvanizado*	-	-
32	PVC piece / *Pieza PVC*	0.113	-

Window side connection ***Instalación lateral ventana***	10 EW1_OJ1_1a *10 WISI*	CONSORCIO TERMOARCILLA

Design drawing – **Horizontal cross-section** / *Detalle constructivo* – ***Sección horizontal***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied. Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

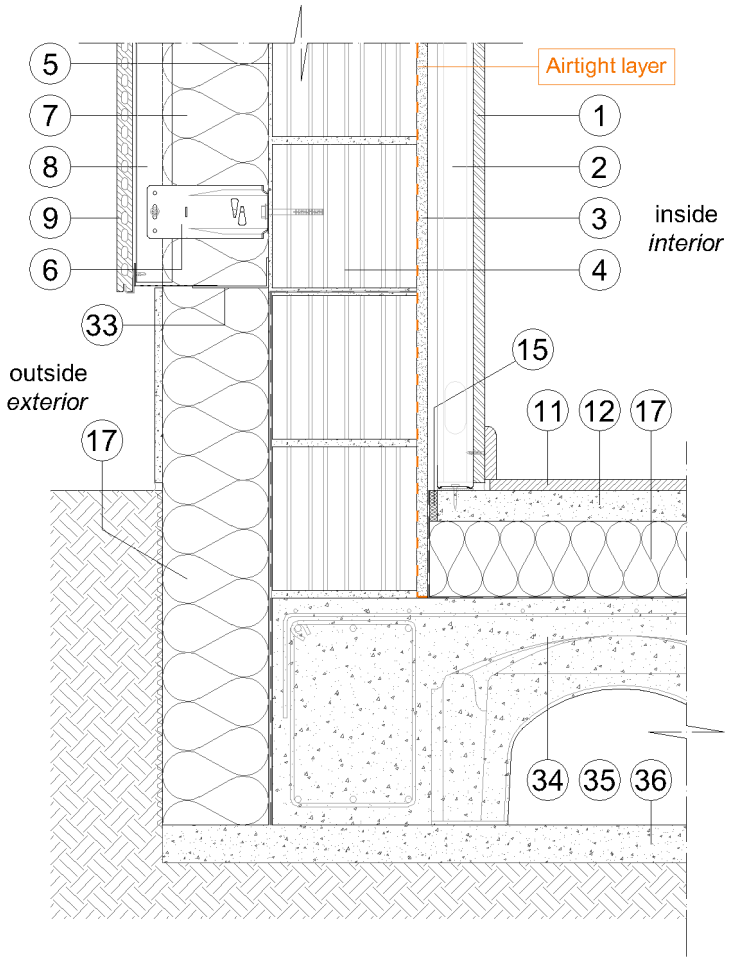
Capa hermética

La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]		From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
Standard component : Exterior wall							
1	Gypsum board / *Placa yeso laminado*	0.250	1.5				
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6				
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5				
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19				
5	Cement mortar / *Mortero de cemento*	1.000	0.5				
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-				
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14				
8	Air cavity / *Cámara de aire ventilada*	-	-				
9	Ceramic tile / *Placa cerámica*	-	-				
				Other materials (materials not in the standard components)			
				30	Steel piece / *Pieza acero galvanizado*	-	-
				32	PVC piece / *Pieza PVC*	0.113	-

Floor slab edge ***Muro exterior – forjado sanitario***	11 FS1_EW1 *11 FSEW*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied.
Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

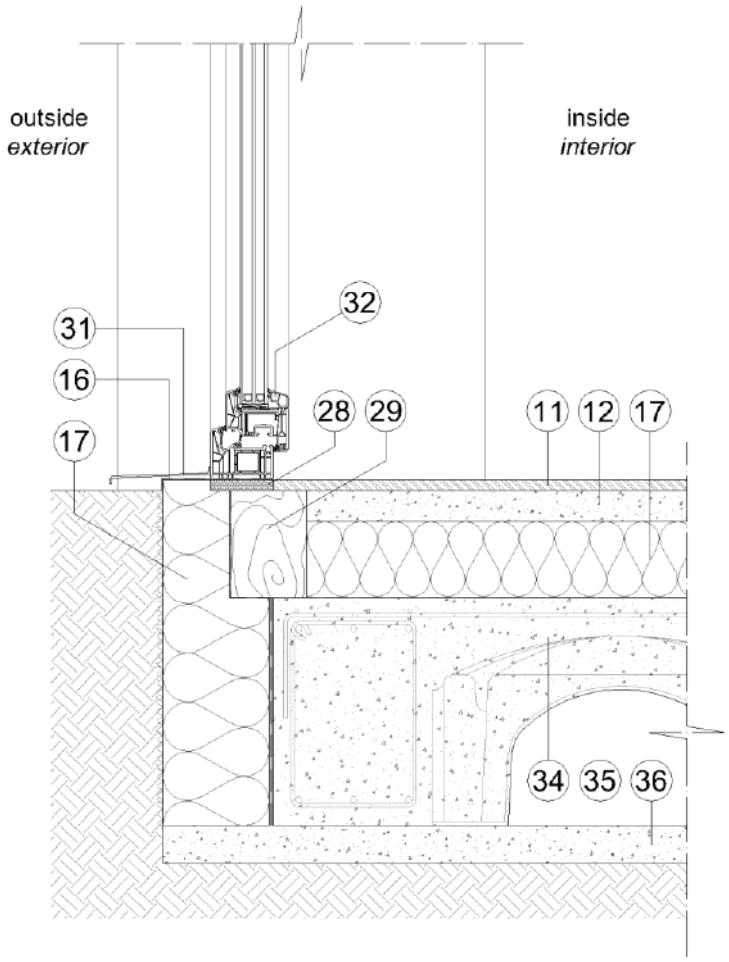
La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Exterior wall		
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

	From the inside towards the outside	λ [W/(mK)]	Thickness [cm]
	Standard component : Floor slab		
11	Ceramic finishing / *Baldosa cerámica*	-	-
12	Cement screed / Mortero de cemento	1.400	4
17	Thermal insulation XPS / *Aislamiento térmico XPS*	0.037	10
34	Concrete slab / *Forjado de hormigón*	2.300	10
35	Ventilated crawl space / *Cámara ventilada*	2.300	20
36	Concrete / Hormigón de limpieza	-	-
	Other materials (materials not in the standard components)		
15	Joint / *Junta*	-	-
33	PVC-U piece / *Perfil PVC-U*	0.170	-

Window bottom – floor slab ***Umbral terreno balconera***	12 FS1_OT1_1 *12 WITH*	CONSORCIO TERMOARCILLA

Design drawing – **Vertical cross-section** / *Detalle constructivo* – ***Sección vertical***



Airtight layer

To achieve airtightness in the walls, a layer of gypsum plaster is applied. Sealing with windows, concrete slab etc by tapes.
Surfaces must be clean, without dust and treated if necessary.

Capa hermética

La capa hermética en los muros se consigue mediante guarnecido de yeso.
Uniones con ventanas, hormigón etc con cintas.
Las superficies deben estar limpias, sin polvo y con tratamiento previo si es necesario.

From the inside towards the outside		λ [W/(mK)]	Thickness [cm]
Standard component : Exterior wall			
1	Gypsum board / *Placa yeso laminado*	0.250	1.5
2	Air layer + steel studs / *Cámara de aire + perfiles de acero galvanizado*	0.361	6
3	Gypsum plaster / *Guarnecido de yeso*	0.570	1.5
4	Termoarcilla 19 / *Termoarcilla 19*	0.325	19
5	Cement mortar / *Mortero de cemento*	1.000	0.5
6	Stainless steel bracket / *Ménsula de acero inoxidable*	-	-
7	Thermal insulation mineral wool / *Aislamiento térmico lana mineral*	0.040	14
8	Air cavity / *Cámara de aire ventilada*	-	-
9	Ceramic tile / *Placa cerámica*	-	-

From the inside towards the outside		λ [W/(mK)]	Thickness [cm]
Standard component : Floor slab			
11	Ceramic finishing / *Baldosa cerámica*	-	-
12	Cement screed / Mortero de cemento	1.400	4
17	Thermal insulation XPS / *Aislamiento térmico XPS*	0.037	10
34	Concrete slab / *Forjado de hormigón*	2.300	10
35	Ventilated crawl space / *Cámara ventilada*	2.300	20
36	Concrete / Hormigón de limpieza	-	-
Other materials (materials not in the standard components)			
14	Waterproofing / *Impermeabilización*	0.250	-
28	PU in-situ foam / *Espuma de poliuretano*	0.040	1.5
29	Wooden subframe / *Precerco de madera*	0.130	-
31	Door sill / *Vierteaguas*	160.000	-
32	PVC piece / *Pieza PVC*	0.113	-