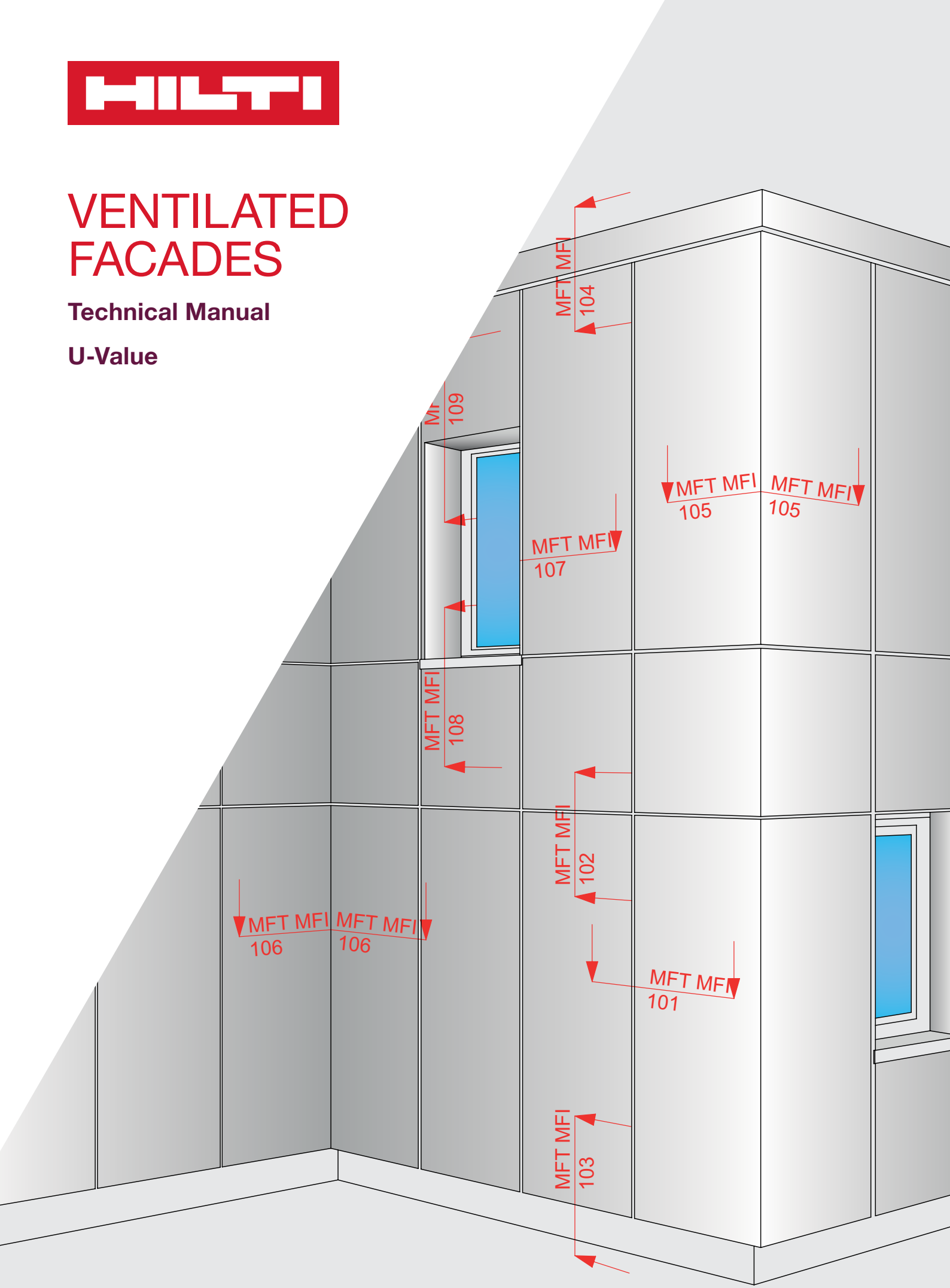
VENTILATED FACADES

Technical Manual

U-Value

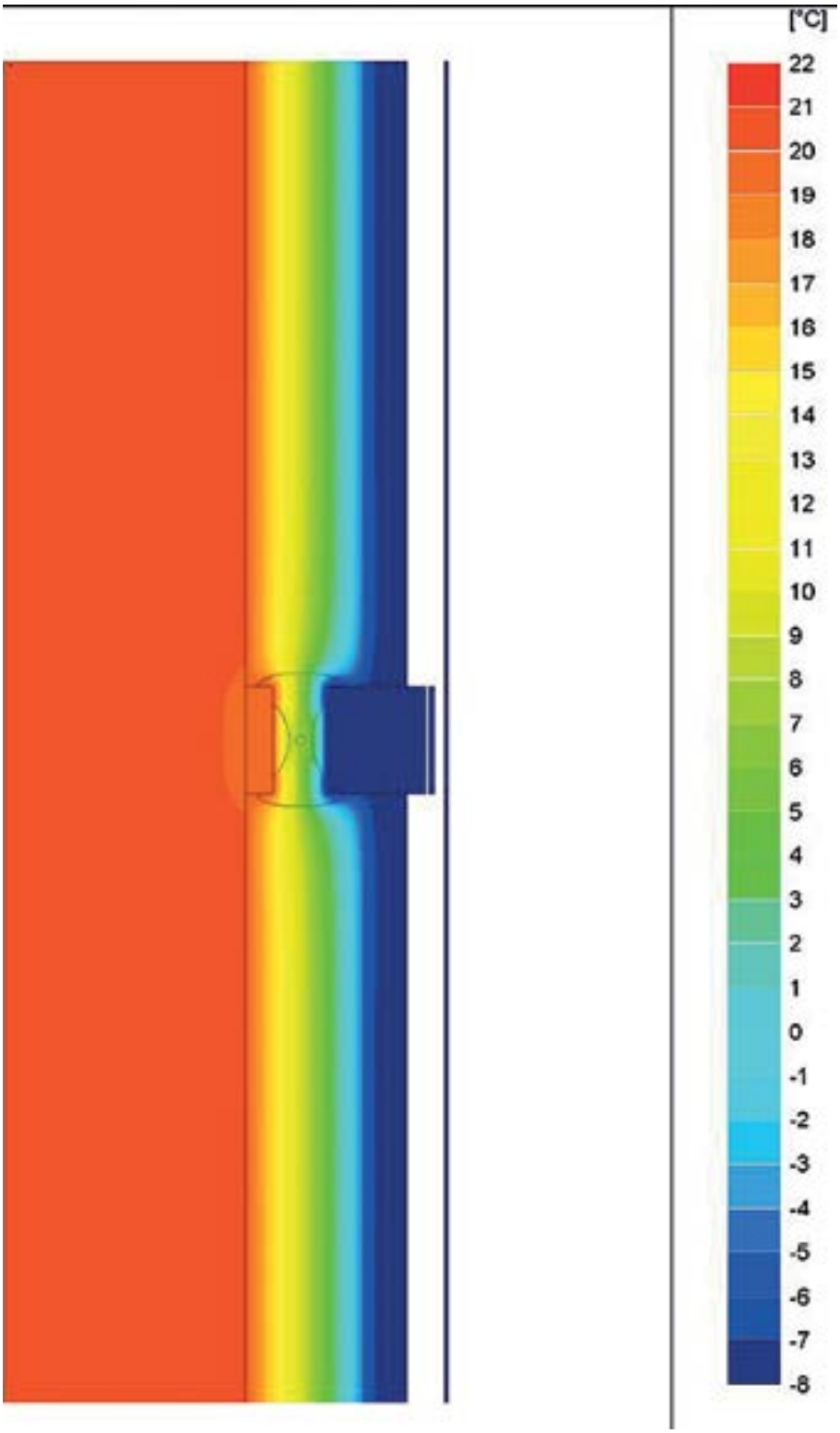


CONTENTS AND OVERVIEW OF U-VALUE

DESCRIPTION

The U-factor or U-value is the overall heat transfer coefficient that describes how well a building element conducts heat or the rate of heat transfer (in watts) through one square metre of a structure divided by the difference in temperature across the structure.

The elements are commonly assemblies of many layers of components such as those that make up walls/floors/roofs etc. These values measure the rate of heat transfer through a building element over a given area under standardised conditions. The usual standard is at a temperature gradient of 24° C (75° F) at 50% humidity with no wind. It is expressed in watts per meter squared kelvin (W/m^2K).
A lower U-factor/value indicates a greater reduction of heat transfer.



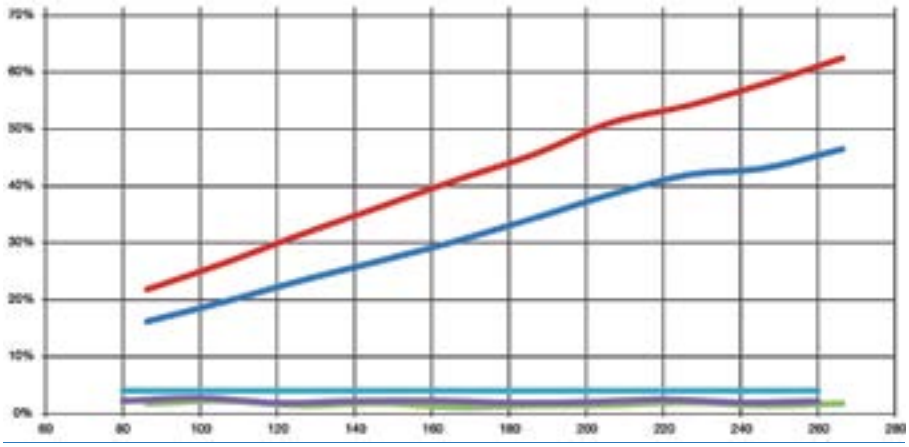
IMPACT DUE TO THE SUBSTRUCTURE

Today's targets, requirements and standards relating to the efficiency and sustainability of buildings inevitably demand new, innovative solutions, also for facades.

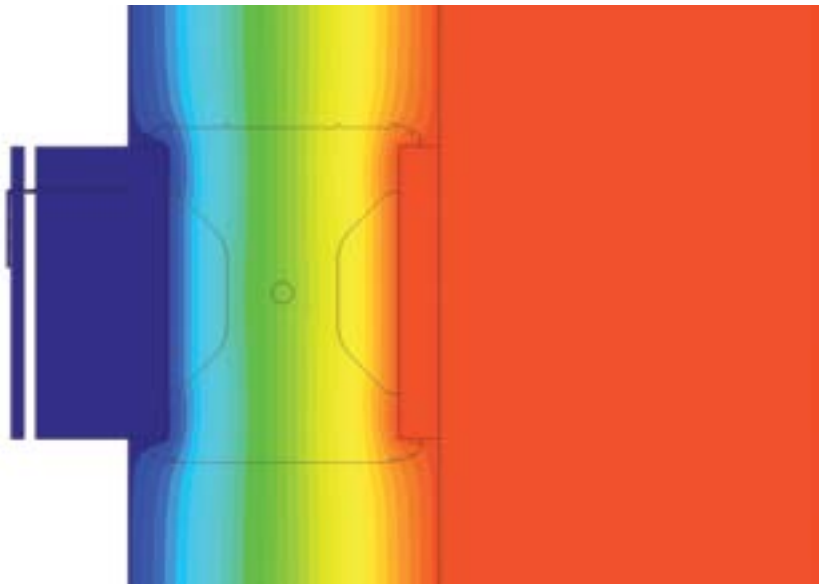
Various studies, including tests carried out by the Swiss Federal Laboratories for Materials Science and Technology (EMPA – Eidgenössische Materialprüfanstalt) have shown, for example, that the requirements of the "Passivhaus" standards can no longer be met by facade substructures constructed only from aluminum.

Through use of brackets such as the Hilti MFT-FOX VT/HT, designed to eliminate thermal bridging, not only can the thickness of the insulating layer be reduced, but an up to 40% better U-value can be achieved compared to metal structures.

The diagram compares standard aluminum substructures to substructures designed to reduce thermal bridging.



The isothermal image clearly shows the uniform heat distribution. The result is a facade with virtually no losses due to thermal bridging.

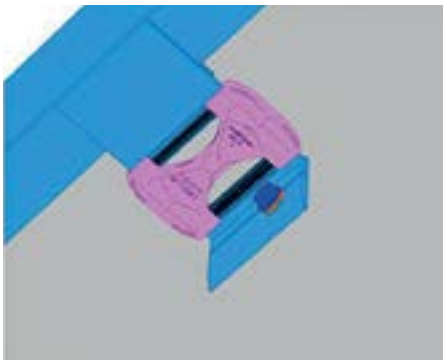


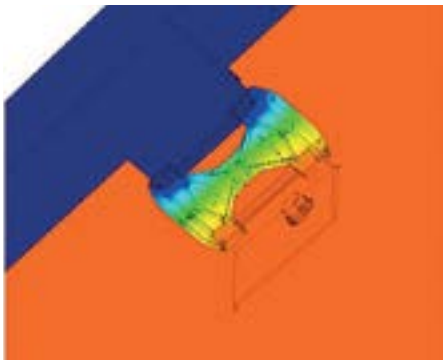
CALCULATION METHOD

The numerical calculations were performed in accordance with EN ISO 10211.

Simplified models
The test object is a wall (made of concrete, sand-lime block or standard brickwork in two thicknesses) on which a framework for supporting a ventilated facade is mounted using anchor bolts. The following simplifications were made in order to model the inputs for the calculation program:
The bolt is shown as a solid cylinder; the frame anchor is shown as a hollow cylinder.

The modeling method and the definition of grid points conform to the requirements of the EN ISO 10211-1 standard. A detailed listing of the input data for the calculated cases is given in the appendix.





Calculations
Thermal conduction was evaluated for a one square meter section of the wall clad with various thicknesses of insulation. A single bracket was mounted in the center of the test wall area, anchored to the base material.

CALCULATION METHOD

Standard for thermal bridge calculation as per EN ISO 10211-1

Thermal bridges present in the facade were taken into account as follows:

$$U = \frac{U_o \cdot A + \sum \psi \cdot l + \sum \chi}{A} = U_o + \Delta U$$

with:

Area-dependent additional term for the total thermal bridge:

$$\Delta U = \frac{L^{3D}}{A} - U_0$$

Linear thermal transmittance:

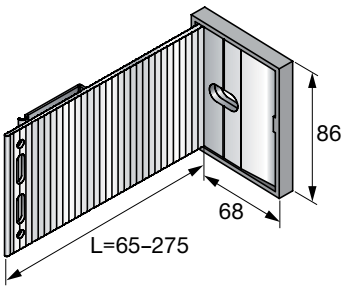
$$\Psi = L^{2D} - U_0 \cdot l$$

Point thermal transmittance:

$$\chi = L^{3D} - \psi \cdot l - U_0 \cdot A$$

$$U_0 = \frac{1}{(\frac{1}{h_i} + \frac{d_v}{\lambda_v} + \frac{d_D}{\lambda_D} + \frac{1}{he})} = \frac{1}{(\frac{1}{h_i} + R_v + R_D + \frac{1}{he})}$$

U_o	Heat transmittance of the unmodified wall in W/(m²K)
ΔU	Additional term due to thermal bridges W/(m²K)
A	Wall area in m²
l	Length of the linear thermal bridge in m
L^{2D}	Thermal coupling coefficient for a 2D-calculation in W/(m²K)
L^{3D}	Thermal coupling coefficient for a 3D-calculation in W/K
h_i	Heat transfer coefficient on warm side 8 W/(m²K)
h_e	Heat transfer coefficient on cold side 8 W/(m²K)
d_v	Thickness of underlying wall structure m
d_D	Thickness of insulation layer m
λ_w	Thermal conductivity of underlying wall structure W/(m²K)
λ_D	Thermal conductivity of insulation layer 0.035 W/(m²K)
R_v	Thermal resistance of underlying wall structure (m²K)/W
R_D	Thermal resistence of insulation layer (m²K)/W



MFT-MFI MEDIUM – CONCRETE 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_v	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	100-280 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-MFI Medium Brackets			**MFI 125 M**	**MFI 125 M**	**MFI 155 M**	**MFI 185 M**	**MFI 215 M**	**MFI 245 M**	**MFI 275 M**	**MFI 275 M**	**MFI 275 M**	**MFI 275 M**
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.3118	0.2647	0.2299	0.2032	0.1821	0.1649	0.1507	0.1388	0.1286	0.1198
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0638	0.0639*	0.0641*	0.0642	0.0638*	0.0634*	0.0630*	0.0627*	0.0623*	0.0620*

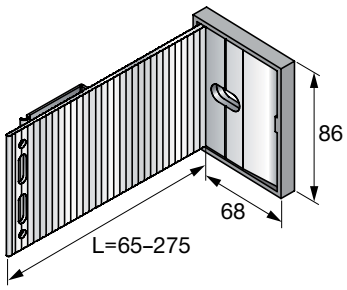
*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.3756	0.3286	0.2940	0.2674	0.2495	0.2283	0.2137	0.2015	0.1909	0.1818
Number of brackets	2	0.4394	0.3925	0.3581	0.3316	0.3097	0.2917	0.2767	0.2642	0.2532	0.2438
Number of brackets	3	0.5032	0.4564	0.4222	0.3958	0.3775	0.3551	0.3397	0.3269	0.3155	0.3058
Number of brackets	4	0.567	0.5203	0.4863	0.4600	0.4373	0.4185	0.4027	0.3898	0.3778	0.3678
Number of brackets	5	0.6308	0.5842	0.5504	0.5242	0.5011	0.4819	0.4657	0.4523	0.4401	0.4298

**MFT-MFI M and profile T 120 x 60 x 1.8 30 inside the insulation

MFT-MFI MEDIUM – THICK STANDARD BRICK 300 MM



Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Thick standard brick
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	100-280 mm
Thermal conductivity λ_D	0.035 W/mK

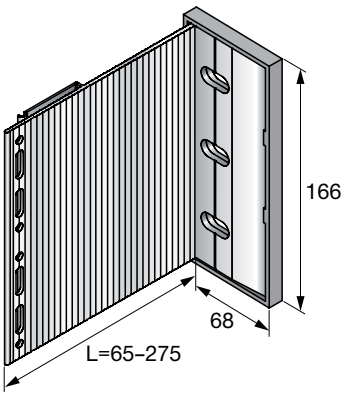
MFT-MFI Medium Brackets			MFI 125 M	MFI 125 M	MFI 155 M	MFI 185 M	MFI 215 M	MFI 245 M	MFI 275 M	MFI 275 M	MFI 275 M	MFI 275 M
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2639	0.2293	0.2028	0.1817	0.1646	0.1505	0.1335	0.1284	0.1196	0.1120
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0296	0.0312*	0.0328*	0.0344	0.0350*	0.0357*	0.0364*	0.0370*	0.0377*	0.0384*

*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.2935	0.2605	0.2356	0.2161	0.1996	0.1862	0.1749	0.1654	0.1573	0.1504
Number of brackets	2	0.3231	0.2917	0.2684	0.2505	0.2346	0.2219	0.2131	0.2024	0.195	0.1888
Number of brackets	3	0.3527	0.3229	0.3012	0.2849	0.2696	0.2576	0.2477	0.2394	0.2327	0.2272
Number of brackets	4	0.3823	0.3541	0.334	0.3193	0.3046	0.2933	0.2841	0.2764	0.2704	0.2656
Number of brackets	5	0.4119	0.3853	0.3668	0.3537	0.3396	0.3290	0.3205	0.3134	0.3081	0.3040

**MFT-MFI M and profile T 120 x 60 x 1.8 30 inside the insulation



MFT-MFI LARGE – CONCRETE 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_v	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	100-280 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-MFI Large Brackets			MFI 125 L	MFI 125 L	MFI 155 L	MFI 185 L	MFI 215 L	MFI 245 L	MFI 275 L	MFI 275 L	MFI 275 L	MFI 275 L
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.3118	0.2647	0.2299	0.2032	0.1821	0.1649	0.1507	0.1388	0.1286	0.1198
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.1082	0.1087*	0.1092*	0.1097	0.1092*	0.1086*	0.1081*	0.1076*	0.1070*	0.1065*

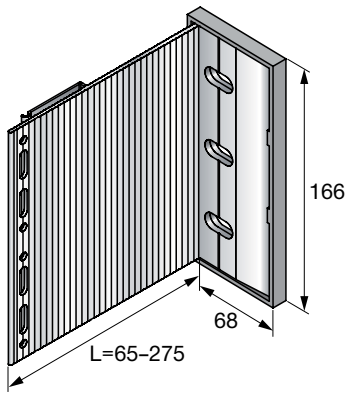
*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.42	0.3734	0.3391	0.3129	0.2913	0.2735	0.2588	0.2464	0.2356	0.2263
Number of brackets	2	0.5282	0.4821	0.4483	0.4226	0.4005	0.3821	0.3669	0.3540	0.3426	0.3328
Number of brackets	3	0.6364	0.5908	0.5575	0.5323	0.5097	0.4907	0.475	0.4616	0.4496	0.4393
Number of brackets	4	0.7446	0.6995	0.6667	0.642	0.6189	0.5993	0.5831	0.5692	0.5566	0.5458
Number of brackets	5	0.8528	0.8082	0.7759	0.7517	0.7281	0.6912	0.6912	0.6768	0.6636	0.6523

**MFT-MFI L and profile T 120 x 60 x 1.8 30 inside the insulation

MFT-MFI LARGE - THICK STANDARD BRICK 300 MM



Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Thick standard brick
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	100-280 mm
Thermal conductivity λ_D	0.035 W/mK

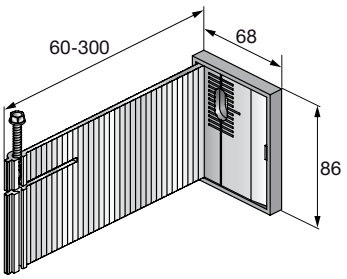
MFT-MFI Large Brackets			MFI 125 L	MFI 125 L	MFI 155 L	MFI 185 L	MFI 215 L	MFI 245 L	MFI 275 L	MFI 275 L	MFI 275 L	MFI 275 L
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2639	0.2293	0.2028	0.1817	0.1646	0.1529	0.1386	0.1284	0.1196	0.1120
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0478	0.0503*	0.0529*	0.0554	0.0564*	0.0575*	0.0586*	0.0597*	0.0607*	0.0618*

*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.3117	0.2796	0.2557	0.2371	0.2210	0.2104	0.1972	0.1863	0.1803	0.1738
Number of brackets	2	0.3595	0.3299	0.3086	0.2925	0.2774	0.2679	0.2558	0.2442	0.241	0.2356
Number of brackets	3	0.4073	0.3802	0.3615	0.3479	0.3338	0.3254	0.3144	0.3021	0.3017	0.2974
Number of brackets	4	0.4551	0.4305	0.4144	0.4033	0.3902	0.3829	0.373	0.3600	0.3624	0.3592
Number of brackets	5	0.5029	0.4808	0.4673	0.4587	0.4466	0.4404	0.4316	0.4179	0.4231	0.4210

**MFT-MFI L and profile T 120 x 60 x 1.8 30 inside the insulation



MFT-FOX HI - CONCRETE 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_V	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	100-280 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-FOX HI Brackets			FOX HI 140	FOX HI 160	FOX HI 180	FOX HI 200	FOX HI 220	FOX HI 240	FOX HI 260	FOX HI 280
Insulation thickness	d_D	[mm]	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2299	0.2032	0.1821	0.1649	0.1507	0.1388	0.1286	0.1198
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0532	0.0528*	0.0523*	0.0519	0.0517*	0.0514*	0.0512*	0.051

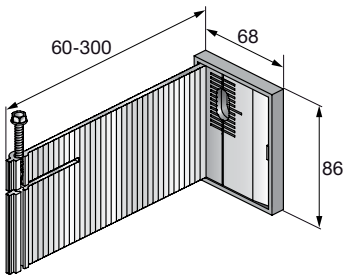
*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 40 mm air side)

Number of brackets	1	0.2831	0.2560	0.2344	0.2168	0.2024	0.1902	0.1798	0.1708
Number of brackets	2	0.3363	0.3088	0.2867	0.2687	0.2541	0.2416	0.2310	0.2218
Number of brackets	3	0.3895	0.3616	0.3390	0.3206	0.3058	0.2930	0.2822	0.2728
Number of brackets	4	0.4427	0.4144	0.3913	0.3725	0.3575	0.3444	0.3334	0.3238
Number of brackets	5	0.4959	0.4672	0.4436	0.4244	0.4092	0.3958	0.3846	0.3748

**MFT-FOX HI and profile L 60 x 40 x 1.8 20 inside the insulation

MFT-FOX HI - THICK STANDARD BRICK 300 MM



Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Thick standard brickwork
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_V	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	140-280 mm
Thermal conductivity λ_D	0.035 W/mK

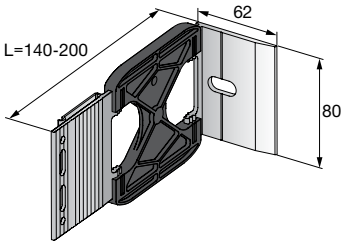
MFT-FOX HI Brackets			FOX HI 140	FOX HI 160	FOX HI 180	FOX HI 200	FOX HI 220	FOX HI 240	FOX HI 260	FOX HI 280
Insulation thickness	d_D	[mm]	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2028	0.1817	0.1646	0.1505	0.1385	0.1284	0.1196	0.1120
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0291	0.0295*	0.0299*	0.0304	0.0308*	0.0312*	0.321*	0.0329

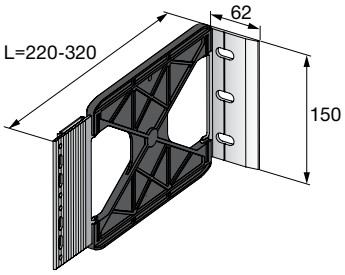
*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 40 mm air side)

Number of brackets	1	0.2319	0.2112	0.1945	0.1809	0.1693	0.1596	0.4406	0.1449
Number of brackets	2	0.2610	0.2407	0.2244	0.2113	0.2001	0.1908	0.7616	0.1778
Number of brackets	3	0.2901	0.2702	0.2543	0.2417	0.2309	0.2220	1.0826	0.2107
Number of brackets	4	0.3192	0.2997	0.2842	0.2721	0.2617	0.2532	1.4036	0.2436
Number of brackets	5	0.3483	0.3292	0.3141	0.3025	0.2925	0.2844	1.7246	0.2765

**MFT-FOX HI and profile L 60 x 40 x 1.8 20 inside the insulation





MFT-FOX VT – CONCRETE 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Material (polyamide part)	Ultramid A3WG10
Thermal conductivity polyamide	0.37 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_V	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	120-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-FOX VT Brackets			FOX VT 140	FOX VT 160	FOX VT 180	FOX VT 200	FOX VT 220	FOX VT 240	FOX VT 260	FOX VT 280	FOX VT 300	FOX VT 320
Insulation thickness	d_D	[mm]	120	140	160	180	200	220	240	260	280	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2647	0.2299	0.2032	0.1821	0.1649	0.1507	0.1388	0.1286	0.1198	0.1121
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0034	0.0035	0.0018	0.0018*	0.002*	0.0019	0.0019*	0.0019	0.0018	0.0018

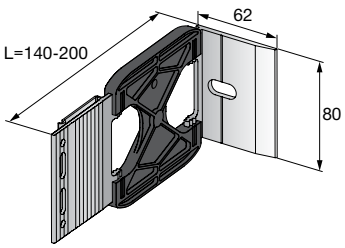
*value interpolated

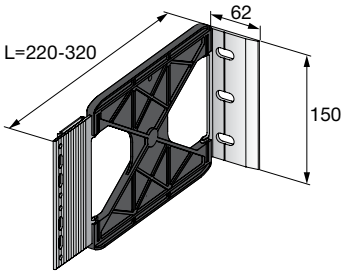
U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.2681	0.2334	0.205	0.1839	0.1669	0.1526	0.1407	0.1305	0.1216	0.1139
Number of brackets	2	0.2715	0.2369	0.2068	0.1857	0.1689	0.1545	0.1426	0.1324	0.1234	0.1157
Number of brackets	3	0.2749	0.2404	0.2086	0.1875	0.1709	0.1564	0.1445	0.1343	0.1252	0.1175
Number of brackets	4	0.2783	0.2439	0.2104	0.1893	0.1729	0.1583	0.1464	0.1362	0.1270	0.1193
Number of brackets	5	0.2817	0.2474	0.2122	0.1911	0.1749	0.1602	0.1483	0.1381	0.1288	0.1121

**MFT-FOX VT and profile T 120 x 60 x 1.8 30 inside the insulation

MFT-FOX VT – THICK STANDARD BRICK 300 MM





Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Material (polyamide part)	Ultramid A3WG10
Thermal conductivity polyamide	0.37 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Thick standard brick
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_V	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	120-300 mm
Thermal conductivity λ_D	0.035 W/mK

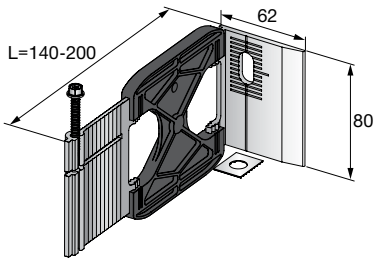
MFT-FOX VT Brackets			FOX VT 140	FOX VT 160	FOX VT 180	FOX VT 200	FOX VT 220	FOX VT 240	FOX VT 260	FOX VT 280	FOX VT 300	FOX VT 320
Insulation thickness	d_D	[mm]	120	140	160	180	200	220	240	260	280	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2293	0.2028	0.1817	0.146	0.1505	0.1386	0.1284	0.1196	0.1120	0.1052
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0025	0.0026	0.0014	0.0015*	0.0012*	0.0011	0.001*	0.001	0.001	0.001

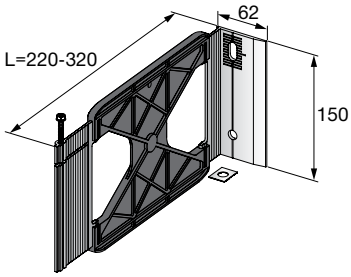
*value interpolated

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.2318	0.2054	0.1831	0.1661	0.1517	0.1397	0.1295	0.1207	0.1130	0.162
Number of brackets	2	0.2343	0.2080	0.1845	0.1676	0.1529	0.1408	0.1306	0.1218	0.1140	0.1072
Number of brackets	3	0.2368	0.2106	0.1859	0.1691	0.1541	0.1419	0.1317	0.1229	0.1150	0.1082
Number of brackets	4	0.2393	0.2132	0.1873	0.1706	0.1553	0.1430	0.1328	0.1240	0.1160	0.1092
Number of brackets	5	0.2418	0.2158	0.1887	0.1721	0.1565	0.1441	0.1339	0.1251	0.1170	0.1102

**MFT-FOX VT and profile T 120 x 60 x 1.8 30 inside the insulation





MFT-FOX HT – CONCRETE 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Material (polyamide part)	Ultramid A3WG10
Thermal conductivity polyamide	0.37 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_v	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	120-300 mm
Thermal conductivity λ_D	0.035 W/mK

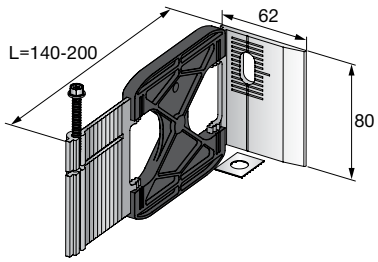
MFT-FOX HT Brackets			FOX HT 140	FOX HT 160	FOX HT 180	FOX HT 200	FOX HT 220	FOX HT 240	FOX HT 260	FOX HT 280	FOX HT 300	FOX HT 320
Insulation thickness	d_D	[mm]	80	100	120	140	160	180	200	220	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.3794	0.3118	0.2647	0.2299	0.2032	0.1821	0.1649	0.1507	0.1388	0.1286
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0027	0.0032	0.0014	0.0017	0.0014	0.0018	0.001	0.0012	0.0008	0.0009

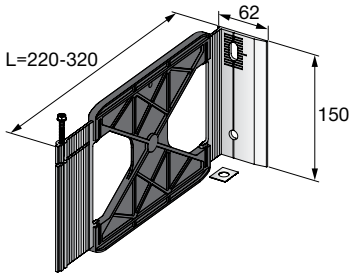
U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.3821	0.315	0.2661	0.2316	0.2048	0.1839	0.1704	0.1519	0.1396	0.1295
Number of brackets	2	0.3848	0.3182	0.2675	0.2333	0.2064	0.1857	0.1714	0.1531	0.1404	0.1304
Number of brackets	3	0.3875	0.3214	0.2689	0.235	0.208	0.1875	0.1724	0.1543	0.1412	0.1313
Number of brackets	4	0.3902	0.3246	0.2703	0.2367	0.2096	0.1893	0.1734	0.1555	0.142	0.1322
Number of brackets	5	0.3929	0.3278	0.2717	0.2384	0.2112	0.1911	0.1744	0.1567	0.1428	0.1331

**MFT-FOX HT and profile T 120 x 60 x 1.8 30 inside the insulation

MFT-FOX HT – STANDARD BRICK 180 MM





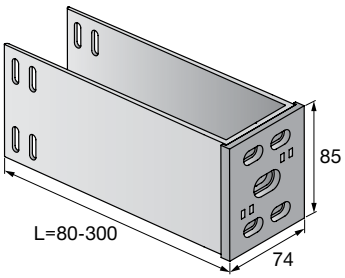
Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Material (polyamide part)	Ultramid A3WG10
Thermal conductivity polyamide	0.37 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Thick standard brick
Thickness d_v	180 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.409 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	80-260 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-FOX HT Brackets			**FOX HT 140**	**FOX HT 160**	**FOX HT 180**	**FOX HT 200**	**FOX HT 220**	**FOX HT 240**	**FOX HT 260**	**FOX HT 280**	**FOX HT 300**	**FOX HT 320**
Insulation thickness	d_D	[mm]	80	100	120	140	160	180	200	220	240	260
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.3396	0.2844	0.2446	0.2146	0.1912	0.1724	0.1569	0.1440	0.1330	0.1236
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0021	0.0026	0.0012	0.0014	0.0013	0.0015	0.0009	0.0011	0.0007	0.0009

U-Value**
(surface A=1.0 m², profile length 1.0 m, profile 30 mm air side)

Number of brackets	1	0.3417	0.287	0.2458	0.2160	0.1925	0.1739	0.1575	0.1451	0.1337	0.1245
Number of brackets	2	0.3438	0.2896	0.247	0.2174	0.1938	0.1754	0.1581	0.1462	0.1344	0.1254
Number of brackets	3	0.3459	0.2922	0.2482	0.2188	0.1951	0.1769	0.1587	0.1473	0.1351	0.1263
Number of brackets	4	0.348	0.2948	0.2494	0.2202	0.1964	0.1784	0.1593	0.1484	0.1358	0.1272
Number of brackets	5	0.3501	0.2974	0.2506	0.2216	0.1977	0.1799	0.1614	0.1495	0.1365	0.1281

**MFT-MFI L and profile T 120 x 60 x 1.8 30 inside the insulation



MFT-S2S UI M – REINFORCED CONCRETE WALL 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Reinforced concrete wall
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_v	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

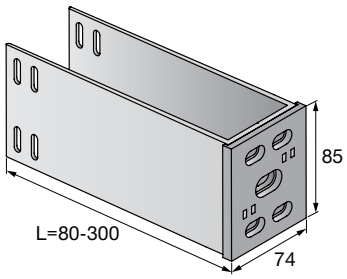
MFT-S2S UI M Brackets			S2S UI 080 M	S2S UI 100 M	S2S UI 120 M	S2S UI 140 M	S2S UI 160 M	S2S UI 180 M	S2S UI 200 M	S2S UI 220 M	S2S UI 240 M	S2S UI 260 M	S2S UI 280 M	S2S UI 300 M
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.5591	0.3780	0.3108	0.2640	0.2028	0.2028	0.1817	0.1646	0.1505	0.1333	0.1284	0.1196
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0585	0.0680*	0.0744	0.0757*	0.0769*	0.0782	0.0780*	0.0780*	0.0775*	0.0772	0.0769*	0.0755

*value interpolated

U-Value
(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.6176	0.4460	0.1488	0.1514	0.1538	0.1564	0.1560	0.1560	0.1550	0.1544	0.2053	0.1875
Number of brackets	2	0.6761	0.5140	0.4596	0.4154	0.3832	0.3592	0.3377	0.3206	0.3055	0.2877	0.2822	0.2630

MFT-S2S UI M – BRICK WALL 300 MM WITH REINFORCED CONCRETE FLOOR 200 MM



Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Brick wall with reinforced concrete floor
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

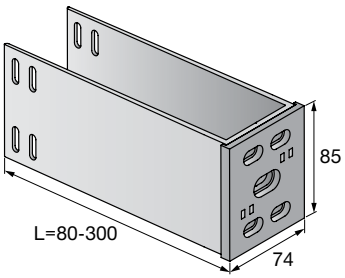
MFT-S2S UI M Brackets			S2S UI 080 M	S2S UI 100 M	S2S UI 120 M	S2S UI 140 M	S2S UI 160 M	S2S UI 180 M	S2S UI 200 M	S2S UI 220 M	S2S UI 240 M	S2S UI 260 M	S2S UI 280 M	S2S UI 300 M
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.4345	0.3177	0.2679	0.2332	0.2064	0.1836	0.1664	0.1521	0.1401	0.1252	0.1209	0.1058
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0524	0.0598*	0.0648	0.0664*	0.0681*	0.0697	0.0698*	0.0699*	0.07*	0.0702	0.07*	0.0692
Punctual thermal bridge loss coefficient of the separating floor	Ψ	[W/K]	0.0227	0.0142*	0.0085	0.0054*	0.0039*	0.0039	0.0035*	0.0030*	0.0026*	0.0019	0.0018*	0.0013

*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.4869	0.3775	0.3327	0.2996	0.2745	0.2533	0.2362	0.2220	0.2101	0.1954	0.1909	0.1750
Number of brackets	2	0.5393	0.4373	0.3975	0.3660	0.3426	0.3230	0.3060	0.2919	0.2801	0.2656	0.2609	0.2442



MFT-S2S UI M – BRICK WALL 300 MM WITH STEEL BEAM SEPARATING FLOOR

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Brick wall with steel beam sep. floor
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-S2S UI M Brackets			**S2S UI 080 M**	**S2S UI 100 M**	**S2S UI 120 M**	**S2S UI 140 M**	**S2S UI 160 M**	**S2S UI 180 M**	**S2S UI 200 M**	**S2S UI 220 M**	**S2S UI 240 M**	**S2S UI 260 M**	**S2S UI 280 M**	**S2S UI 300 M**
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.4336	0.3172	0.2676	0.2327	0.2058	0.1845	0.1669	0.1523	0.14	0.1246	0.1203	0.1058
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0637	0.0844*	0.0984	0.0965*	0.0946*	0.0927	0.0914*	0.0902*	0.0889*	0.0870	0.0864*	0.0838
Punctual thermal bridge loss coefficient of the separating floor	Ψ	[W/K]	0.0211	0.0341*	0.0079	0.0153*	0.0119*	0.0036	0.0075*	0.0065*	0.0054*	0.0017	0.0032*	0.0012

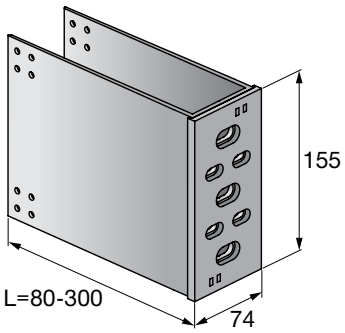
*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.4973	0.4016	0.3660	0.3292	0.3004	0.2772	0.2583	0.2425	0.2289	0.2116	0.2067	0.1896
Number of brackets	2	0.5610	0.4859	0.4644	0.4257	0.3950	0.3699	0.3497	0.3327	0.3178	0.2986	0.2931	0.2734

MFT-S2S UI L – REINFORCED CONCRETE WALL 180 MM



Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Reinforced concrete wall
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_v	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

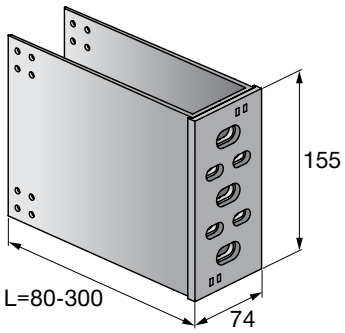
MFT-S2S UI L Brackets			S2S UI 080 L	S2S UI 100 L	S2S UI 120 L	S2S UI 140 L	S2S UI 160 L	S2S UI 180 L	S2S UI 200 L	S2S UI 220 L	S2S UI 240 L	S2S UI 260 L	MS2S UI 280 L	S2S UI 300 L
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.5591	0.3780	0.3108	0.2640	0.2028	0.2028	0.1817	0.1646	0.1505	0.1333	0.1284	0.1196
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0960	0.1076*	0.1193	0.1212*	0.1231*	0.125	0.1246*	0.1243*	0.1239*	0.1234	0.1218*	0.1208

*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.6551	0.4856	0.2386	0.2424	0.2462	0.2500	0.2492	0.2486	0.2478	0.2468	0.2502	0.2328
Number of brackets	2	0.7511	0.5932	0.5494	0.5064	0.4756	0.4528	0.4309	0.4132	0.3983	0.3801	0.3720	0.3536



MFT-S2S UI L – BRICK WALL 300 MM WITH REINFORCED CONCRETE FLOOR 200 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Brick wall with reinforced concrete floor
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-S2S UI L Brackets			**S2S UI 080 L**	**S2S UI 100 L**	**S2S UI 120 L**	**S2S UI 140 L**	**S2S UI 160 L**	**S2S UI 180 L**	**S2S UI 200 L**	**S2S UI 220 L**	**S2S UI 240 L**	**S2S UI 260 L**	**S2S UI 280 L**	**S2S UI 300 L**
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.7821	0.6022	0.4823	0.4317	0.3810	0.3304	0.3069	0.2833	0.2598	0.2245	0.2177	0.1905
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0792	0.0913*	0.0993	0.1019*	0.1045*	0.1071	0.1074*	0.1077*	0.1080*	0.1084	0.1082*	0.1072
Punctual thermal bridge loss coefficient of the separating floor	Ψ	[W/K]	0.0227	0.0142*	0.0085	0.0054*	0.0039*	0.0039	0.0035*	0.0030*	0.0026*	0.0019	0.0018*	0.0013

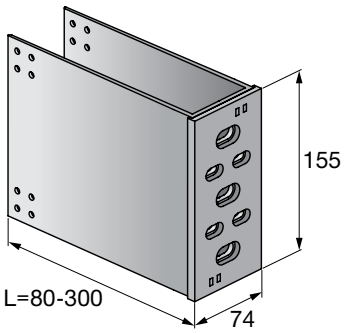
*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.5137	0.4090	0.3672	0.3351	0.3109	0.2907	0.2738	0.2598	0.2481	0.2336	0.2291	0.2130
Number of brackets	2	0.5929	0.5003	0.4665	0.4370	0.4154	0.3978	0.3812	0.3675	0.3561	0.3420	0.3373	0.3202

MFT-S2S UI L – BRICK WALL 300 MM WITH STEEL BEAM SEPARATING FLOOR



Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Brick wall with steel beam sep. floor
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

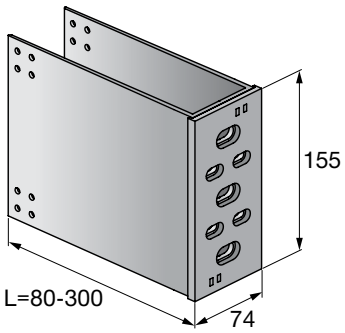
MFT-S2S UI L Brackets			S2S UI 080 M	S2S UI 100 M	S2S UI 120 M	S2S UI 140 M	S2S UI 160 M	S2S UI 180 M	S2S UI 200 M	S2S UI 220 M	S2S UI 240 M	S2S UI 260 M	S2S UI 280 M	S2S UI 300 M
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.4336	0.3172	0.2676	0.2327	0.2058	0.1845	0.1669	0.1523	0.14	0.1246	0.1203	0.1058
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.4973	0.4016*	0.3660	0.3292*	0.3004*	0.2772	0.2583*	0.2425*	0.2289*	0.2116	0.2067*	0.1896
Punctual thermal bridge loss coefficient of the separating floor	Ψ	[W/K]	0.0211	0.0341*	0.0079	0.0153*	0.0119*	0.0036	0.0075*	0.0065*	0.0054*	0.0017	0.0032*	0.0012

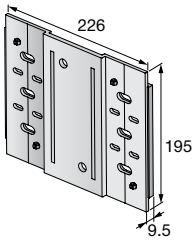
*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.5322	0.4306	0.3908	0.3584	0.3341	0.3153	0.2970	0.2823	0.2700	0.2546	0.2497	0.2329
Number of brackets	2	0.6308	0.5440	0.5140	0.4841	0.4624	0.4461	0.4271	0.4123	0.4000	0.3846	0.3791	0.3600





MFT-S2S UI L INCL. MFT-S2S AP – REINFORCED CONCRETE WALL 180 MM

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Reinforced concrete wall
Thickness d_v	180 mm
Thermal conductivity λ_W	1.8 W/mK
Thermal resistance R_v	0.1 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-S2S UI L incl. MFT-S2S AP Brackets			**S2S UI 080 L incl. MFT-S2S UI AP L**	**S2S UI 100 L incl. MFT-S2S UI AP L**	**S2S UI 120 L incl. MFT-S2S UI AP L**	**S2S UI 140 L incl. MFT-S2S UI AP L**	**S2S UI 160 L incl. MFT-S2S UI AP L**	**S2S UI 180 L incl. MFT-S2S UI AP L**	**S2S UI 200 L incl. MFT-S2S UI AP L**	**S2S UI 220 L incl. MFT-S2S UI AP L**	**S2S UI 240 L incl. MFT-S2S UI AP L**	**S2S UI 260 L incl. MFT-S2S UI AP L**	**S2S UI 280 L incl. MFT-S2S UI AP L**	**S2S UI 300 L incl. MFT-S2S UI AP L**
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.5591	0.3780	0.3108	0.2640	0.2028	0.2028	0.1817	0.1646	0.1505	0.1333	0.1284	0.1196
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.1766	0.2023*	0.2195	0.2188*	0.2181*	0.2174	0.2139*	0.2104*	0.2069*	0.2016	0.1996*	0.1917

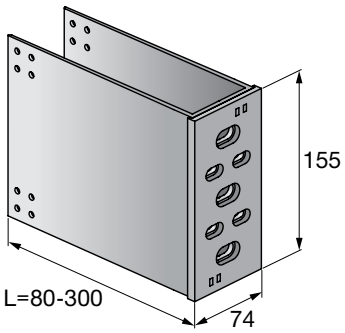
*value interpolated

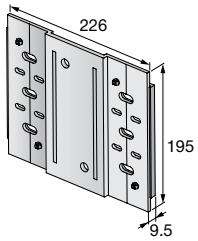
U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.7357	0.5803	0.4390	0.4376	0.4362	0.4348	0.4278	0.4208	0.4138	0.4032	0.3280	0.3037
Number of brackets	2	0.9123	0.7826	0.7498	0.7016	0.6656	0.6376	0.6095	0.5854	0.5643	0.5365	0.5276	0.4954

MFT-S2S UI L INCL. MFT-S2S AP – BRICK WALL 300 MM WITH REINFORCED CONCRETE FLOOR 200 MM





Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Brick wall with reinforced concrete floor
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

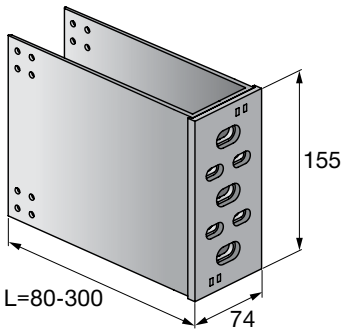
MFT-S2S UI L incl. MFT-S2S AP Brackets			S2S UI 080 L incl. MFT-S2S UI AP L	S2S UI 100 L incl. MFT-S2S UI AP L	S2S UI 120 L incl. MFT-S2S UI AP L	S2S UI 140 L incl. MFT-S2S UI AP L	S2S UI 160 L incl. MFT-S2S UI AP L	S2S UI 180 L incl. MFT-S2S UI AP L	S2S UI 200 L incl. MFT-S2S UI AP L	S2S UI 220 L incl. MFT-S2S UI AP L	S2S UI 240 L incl. MFT-S2S UI AP L	S2S UI 260 L incl. MFT-S2S UI AP L	S2S UI 280 L incl. MFT-S2S UI AP L	S2S UI 300 L incl. MFT-S2S UI AP L
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.4345	0.3177	0.2679	0.2332	0.2064	0.1836	0.1664	0.1521	0.1401	0.1252	0.1209	0.1058
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.1455	0.1602*	0.1700	0.1719*	0.1737*	0.1756	0.1734*	0.1712*	0.1691*	0.1685	0.1651*	0.1625
Punctual thermal bridge loss coefficient of the separating floor	Ψ	[W/K]	0.0227	0.0142*	0.0085	0.0054*	0.0039*	0.0039	0.0035*	0.0030*	0.0026*	0.0019	0.0018*	0.0013

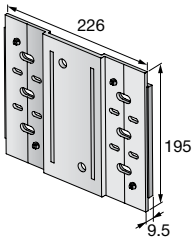
*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.5800	0.4779	0.4379	0.4051	0.3801	0.3592	0.3398	0.3233	0.3092	0.2937	0.2860	0.2683
Number of brackets	2	0.7255	0.6381	0.6079	0.5770	0.5538	0.5348	0.5132	0.4945	0.4783	0.4622	0.4511	0.4308





MFT-S2S UI L INCL. MFT-S2S AP – BRICK WALL 300 MM WITH STEEL BEAM SEPARATING FLOOR

Technical data:	
Bracket	
Material	EN-AW-6063 T66
Yield strength	200 N/mm²
Modulus of elasticity	70.000 N/mm²
Isolator material	Polypropylene
Thermal conductivity polypropylene	0.117 W/mK
Thermal conductivity aluminum	160 W/mK
Substrate	
Material	Brick wall with steel beam sep. floor
Thickness d_v	300 mm
Thermal conductivity λ_W	0.44 W/mK
Thermal resistance R_v	0.682 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-S2S UI L incl. MFT-S2S AP Brackets			**S2S UI 080 M**	**S2S UI 100 M**	**S2S UI 120 M**	**S2S UI 140 M**	**S2S UI 160 M**	**S2S UI 180 M**	**S2S UI 200 M**	**S2S UI 220 M**	**S2S UI 240 M**	**S2S UI 260 M**	**S2S UI 280 M**	**S2S UI 300 M**
Insulation thickness	d_D	[mm]	50	80	100	120	140	160	180	200	220	250	260	300
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.4336	0.3172	0.2676	0.2327	0.2058	0.1845	0.1669	0.1523	0.14	0.1246	0.1203	0.1058
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.1317	0.1699*	0.1953	0.1966*	0.1979*	0.1992	0.1969*	0.1945*	0.1922*	0.1887	0.1871*	0.1808
Punctual thermal bridge loss coefficient of the separating floor	Ψ	[W/K]	0.0211	0.0341*	0.0079	0.0153*	0.0119*	0.0036	0.0075*	0.0065*	0.0054*	0.0017	0.0032*	0.0012

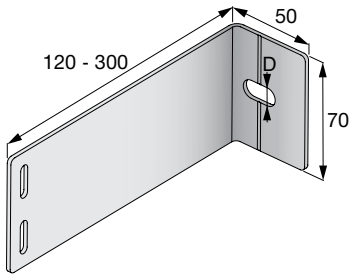
*value interpolated

U-Value

(surface A=1.0 m², profile TT100x100x2.0 mm, profile 30 mm into the insulation)

Number of brackets	1	0.5653	0.4871	0.4629	0.4293	0.4037	0.3837	0.3638	0.3468	0.3322	0.3133	0.3074	0.2866
Number of brackets	2	0.6970	0.6570	0.6582	0.6259	0.6016	0.5829	0.5607	0.5413	0.5244	0.5020	0.4945	0.4674

VTR M INCL. ISOLATOR – CONCRETE 180 MM



Technical data:	
Bracket	
Material	A4 1.4401/1.4404
Yield strength	240 N/mm²
Modulus of elasticity	81.000 N/mm²
Isolator material:	Polypropylene
Mac FOX Isolator	0,087 W/mK
Thermal conductivity Stainless steel	15 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1,8 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

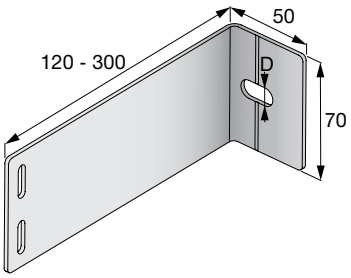
MFT-VTR M incl. isolator Brackets			MFT-FOX VTR SP 120 M 11	MFT-FOX VTR SP 140 M 11	MFT-FOX VTR SP 160 M 11	MFT-FOX VTR SP 180 M 11	MFT-FOX VTR SP 200 M 11	MFT-FOX VTR SP 220 M 11	MFT-FOX VTR SP 240 M 11	MFT-FOX VTR SP 260 M 11	MFT-FOX VTR SP 280 M 11	MFT-FOX VTR SP 300 M 11
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.3108	0.2647	0.2299	0.2032	0.1821	0.1649	0.1507	0.1388	0.1286	0.1198
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.017	0.0157	0.0144	0.0132	0.0119	0.0106	0.01	0.0094	0.0089	0.0083

U-Value

(surface A=1.0 m², profile T120x60x1.8 mm, profile 30 mm into the insulation)

Number of brackets	1	0.3278	0.2804	0.2443	0.2164	0.194	0.1755	0.1607	0.1482	0.1375	0.1281
Number of brackets	2	0.3448	0.2961	0.2587	0.2296	0.2059	0.1861	0.1707	0.1576	0.1464	0.1364
Number of brackets	3	0.3618	0.3118	0.2731	0.2428	0.2178	0.1967	0.1807	0.167	0.1553	0.1447
Number of brackets	4	0.3788	0.3275	0.2875	0.256	0.2297	0.2073	0.1907	0.1764	0.1642	0.153
Number of brackets	5	0.3958	0.3432	0.3019	0.2692	0.2416	0.2179	0.2007	0.1858	0.1731	0.1613

**VTR M and profile T120x60x1.8 mm, profile 30mm into the insulation



VTR M INCL. ISOLATOR – BRICK 300 MM

Technical data:	
Bracket	
Material	A4 1.4401/1.4404
Yield strength	20 N/mm²
Modulus of elasticity	81.000 N/mm²
Isolator material:	Polypropylene
Mac FOX Isolator	0,087 W/mK
Thermal conductivity Stainless steel	15 W/mK
Substrate	
Material	Brick
Thickness d_v	300 mm
Thermal conductivity λ_W	0,44 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

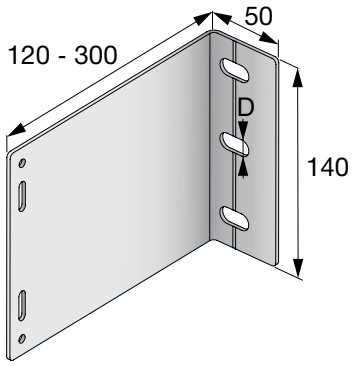
MFT-VTR M incl. isolator Brackets			**MFT-FOX VTR SP 120 M 11**	**MFT-FOX VTR SP 140 M 11**	**MFT-FOX VTR SP 160 M 11**	**MFT-FOX VTR SP 180 M 11**	**MFT-FOX VTR SP 200 M 11**	**MFT-FOX VTR SP 220 M 11**	**MFT-FOX VTR SP 240 M 11**	**MFT-FOX VTR SP 260 M 11**	**MFT-FOX VTR SP 280 M 11**	**MFT-FOX VTR SP 300 M 11**
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2632	0.2293	0.2028	0.1817	0.1646	0.1502	0.1386	0.1284	0.1196	0.112
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0104	0.0099	0.0095	0.009	0.0086	0.0081	0.0078	0.0074	0.0071	0.0067

U-Value**
(surface A=1.0 m², profile T120x60x1.8 mm, profile 30 mm into the insulation)

Number of brackets	1	0.2736	0.2392	0.2123	0.1907	0.1732	0.1583	0.1464	0.1358	0.1267	0.1187
Number of brackets	2	0.284	0.2491	0.2218	0.1997	0.1818	0.1664	0.1542	0.1432	0.1338	0.1254
Number of brackets	3	0.2944	0.259	0.2313	0.2087	0.1904	0.1745	0.162	0.1506	0.1409	0.1321
Number of brackets	4	0.3048	0.2689	0.2408	0.2177	0.199	0.1826	0.1698	0.158	0.148	0.1388
Number of brackets	5	0.3152	0.2788	0.2503	0.2267	0.2076	0.1907	0.1776	0.1654	0.1551	0.1455

**VTR M and profile T120x60x1.8 mm, profile 30mm into the insulation

VTR L INCL. ISOLATOR – CONCRETE 180 MM



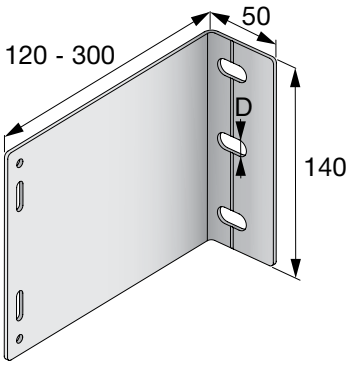
Technical data:	
Bracket	
Material	A4 1.4401/1.4404
Yield strength	240 N/mm²
Modulus of elasticity	81.000 N/mm²
Isolator material:	Polypropylene
Mac FOX Isolator	0,087 W/mK
Thermal conductivity Stainless steel	15 W/mK
Substrate	
Material	Concrete
Thickness d_v	180 mm
Thermal conductivity λ_W	1,8 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-VTR L incl. isolator Brackets			MFT-FOX VTR SP 120 L 11	MFT-FOX VTR SP 140 L 11	MFT-FOX VTR SP 160 L 11	MFT-FOX VTR SP 180 L 11	MFT-FOX VTR SP 200 L 11	MFT-FOX VTR SP 220 L 11	MFT-FOX VTR SP 240 L 11	MFT-FOX VTR SP 260 L 11	MFT-FOX VTR SP 280 L 11	MFT-FOX VTR SP 300 L 11
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.3108	0.2647	0.2299	0.2032	0.1821	0.1646	0.1507	0.1388	0.1286	0.1198
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0317	0.0294	0.0271	0.0249	0.0226	0.0203	0.0192	0.0181	0.017	0.0159

U-Value**
(surface A=1.0 m², profile T120x60x1.8 mm, profile 30 mm into the insulation)

Number of brackets	1	0.3425	0.2941	0.257	0.2281	0.2047	0.1849	0.1699	0.1569	0.1456	0.1357
Number of brackets	2	0.3742	0.3235	0.2841	0.253	0.2273	0.2052	0.1891	0.175	0.1626	0.1516
Number of brackets	3	0.4059	0.3529	0.3112	0.2779	0.2499	0.2255	0.2083	0.1931	0.1796	0.1675
Number of brackets	4	0.4376	0.3823	0.3383	0.3028	0.2725	0.2458	0.2275	0.2112	0.1966	0.1834
Number of brackets	5	0.4693	0.4117	0.3654	0.3277	0.2951	0.2661	0.2467	0.2293	0.2136	0.1993

**VTR L and profile T120x60x1.8 mm, profile 30mm into the insulation



VTR L INCL. ISOLATOR – BRICK 300 MM

Technical data:	
Bracket	
Material	A4 1.4401/1.4404
Yield strength	20 N/mm²
Modulus of elasticity	81.000 N/mm²
Isolator material:	Polypropylene
Mac FOX Isolator	0,087 W/mK
Thermal conductivity Stainless steel	15 W/mK
Substrate	
Material	Brick
Thickness d_v	300 mm
Thermal conductivity λ_W	0,44 W/mK
Insulation	
Material	Mineral wool
Thickness d_D	50-300 mm
Thermal conductivity λ_D	0.035 W/mK

MFT-VTR L incl. isolator Brackets			**MFT-FOX VTR SP 120 L 11**	**MFT-FOX VTR SP 140 L 11**	**MFT-FOX VTR SP 160 L 11**	**MFT-FOX VTR SP 180 L 11**	**MFT-FOX VTR SP 200 L 11**	**MFT-FOX VTR SP 220 L 11**	**MFT-FOX VTR SP 240 L 11**	**MFT-FOX VTR SP 260 L 11**	**MFT-FOX VTR SP 280 L 11**	**MFT-FOX VTR SP 300 L 11**
Insulation thickness	d_D	[mm]	100	120	140	160	180	200	220	240	260	280
Thermal transmission coefficient of the undisturbed wall	U_0	[W/m²K]	0.2632	0.2293	0.2028	0.1817	0.1646	0.1502	0.1386	0.1284	0.1196	0.112
Punctual thermal bridge loss coefficient of the bracket	χ	[W/K]	0.0188	0.0181	0.0174	0.0166	0.0159	0.0152	0.0146	0.014	0.0133	0.0127

U-Value**
(surface A=1.0 m², profile T120x60x1.8 mm, profile 30 mm into the insulation)

Number of brackets	1	0.282	0.2474	0.2202	0.1983	0.1805	0.1654	0.1532	0.1424	0.1329	0.1247
Number of brackets	2	0.3008	0.2655	0.2376	0.2149	0.1964	0.1806	0.1678	0.1564	0.1462	0.1374
Number of brackets	3	0.3196	0.2836	0.255	0.2315	0.2123	0.1958	0.1824	0.1704	0.1595	0.1501
Number of brackets	4	0.3384	0.3017	0.2724	0.2481	0.2282	0.211	0.197	0.1844	0.1728	0.1628
Number of brackets	5	0.3572	0.3198	0.2898	0.2647	0.2441	0.2262	0.2116	0.1984	0.1861	0.1755

**VTR L and profile T120x60x1.8 mm, profile 30mm into the insulation

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