

HTH Insulation fastener



Approvals/Certificates

wall only

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment ^{a)}	DIBt, Berlin	ETA-15/0464 / 2018-01-11
Application in External Thermal Insulation Composite Systems with Rendering ^{a)}	DIBt, Berlin	Z-21.2-2047 / 2018-04-13

a) Unless otherwise stated, all data given in this section are according to named documents

Basic loading data (for a single anchor)

Assessment

All data in this section applies to:

- Correct setting (see setting instruction)
- No edge distance and spacing influence
- Base material as specified in table
- Minimum base material thickness
- Transmission of wind suction loads only



Characteristic resistance

Base material	Use cat.d)			НТН
Concrete ≥ C12/15	А	N _{Rk} [k	(N]	1,2
Thin concrete members (e.g. weather resistant skins of external wall panels) C16/20 – C 50/60	A	N _{Rk} [k	(N]	1,2
Solid clay brick Mz 20/2,0	В	N _{Rk} [k	kN]	1,2
Solid sand-lime brick KS 20/2,0	В	N _{Rk} [k	kN]	1,2
Vertically perforated clay brick Hlz 12/1,2	С	N _{Rk} [k	kN]	1,2 ^{a)}
Vertically perforated clay brick Hlz 12/0,8	С	N _{Rk} [k	kN]	0,6 ^{b)}
Vertically perforated sand-lime brick KSL 12/1,4	С	N _{Rk} [k	kN]	1,2 ^{c)}
Lighweight Aggregate Concrete ≥ LAC2 (raw density ≥ 0,9 kg/dm³)	D	N _{Rk} [k	kN]	0,6
Lighweight Aggregate Concrete ≥ LAC4 (raw density ≥ 0,9 kg/dm³)	D	N _{Rk} [k	(N]	1,2
Autoclaved aerated concrete ≥ PP4 (raw density ≥ 0,5 kg/dm³)	E	N _{Rk} [k	(N]	0,9

a) The value applies only for outer web thickness ≥ 12 mm, rotary drilling only

b) The value applies only for outer web thickness \geq 9 mm, rotary drilling only

c) The value applies only for outer web thickness ≥ 23 mm, rotary drilling only

d) Different installation parameters for use categories A, B, C and use categories D, E and thin concrete members to be considered

Design resistance

Design resistance was calculated according to equation:

$N_{Rd} = \frac{N_{Rk}}{\gamma_M}$	with $\gamma_M = 2,0$	(safety factor	for base	material)
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Base material	Use cat.d)		НТН
Concrete ≥ C12/15	A	N _{Rd} [kN]	0,6
Thin concrete members (e.g. weather resistant skins of external wall panels) C16/20 – C 50/60	A	N _{Rd} [kN]	0,6
Solid clay brick Mz 20/2,0	В	N _{Rd} [kN]	0,6
Solid sand-lime brick KS 20/2,0	В	N _{Rd} [kN]	0,6
Vertically perforated clay brick Hlz 12/1,2	С	N _{Rd} [kN]	0,6 ^{a)}
Vertically perforated clay brick Hlz 12/0,8	С	N _{Rk} [kN]	0,3 ^{b)}
Vertically perforated sand-lime brick KSL 12/1,4	С	N _{Rd} [kN]	0,6 ^{c)}
Lighweight Aggregate Concrete ≥ LAC2 (raw density ≥ 0,9 kg/dm³)	D	N _{Rd} [kN]	0,3
Lighweight Aggregate Concrete ≥ LAC4 (raw density ≥ 0,9 kg/dm³)	D	N _{Rd} [kN]	0,6
Autoclaved aerated concrete \geq PP4 (raw density \geq 0,5 kg/dm ³)	E	N _{Rd} [kN]	0,45

a) The value applies only for outer web thickness ≥ 12 mm, rotary drilling only

b) The value applies only for outer web thickness ≥ 9 mm, rotary drilling only

c) The value applies only for outer web thickness \ge 23 mm, rotary drilling only

d) Different installation parameters for use categories A, B, C and use categories D, E and thin concrete members to be considered



Recommended loads

Recommended load was calculated according to equation:

$$N_{Rd} = \frac{N_{Rd}}{\gamma_F}$$
 with $\gamma_F =$ 1,5 (safety factor for wind)

Base material	Use cat.d)		нтн
Concrete ≥ C12/15	А	N _{Rd} [kN]	0,4
Thin concrete members (e.g. weather resistant skins of external wall panels) C16/20 – C 50/60	A	N _{Rd} [kN]	0,4
Solid clay brick Mz 20/2,0	В	N _{Rd} [kN]	0,4
Solid sand-lime brick KS 20/2,0	В	N _{Rd} [kN]	0,4
Vertically perforated clay brick Hlz 12/1,2	С	N _{Rd} [kN]	0,4 ^{a)}
Vertically perforated clay brick Hlz 12/0,8	С	N _{Rk} [kN]	0,2 ^{b)}
Vertically perforated sand-lime brick KSL 12/1,4	С	N _{Rd} [kN]	0,4 ^{c)}
Lighweight Aggregate Concrete ≥ LAC2 (raw density ≥ 0,9 kg/dm³)	D	N _{Rd} [kN]	0,2
Lighweight Aggregate Concrete ≥ LAC4 (raw density ≥ 0,9 kg/dm³)	D	N _{Rd} [kN]	0,4
Autoclaved aerated concrete \geq PP4 (raw density \geq 0,5 kg/dm ³)	E	N _{Rd} [kN]	0,3

a) The value applies only for outer web thickness ≥ 12 mm, rotary drilling only

b) The value applies only for outer web thickness ≥ 9 mm, rotary drilling only
c) The value applies only for outer web thickness ≥ 23 mm, rotary drilling only

d) Different installation parameters for use categories A, B, C and use categories D, E and thin concrete members to be considered



Insulation Materials

Insulation material and provider	Specifying document	Referenced document for anchor design	Design provisions ^{a)}	Anchor design
EPS with designation key T2 L2 W2 S2 P4 BS50 DS(70)5-DS(N)2 a) TR80 raw density 15-20 kg/m ³ ; b) TR100 raw density 15- 30 kg/m ³	DIN EN 13163	Z-21.2-2047	ETICS fixed with anchor and supplementary adhesive Panels 100mm to 360mm thick	see next
Coverrock, Coverrock II and Coverrock 036 by Deutsche Rockwool Mineralwoll GmbH	Z-33.4-1571, October 14 th 2016, DIBt	April 13 th 2018, DIBt		pages ^{b)}
Sillatherm WVP 1-035 by SAINT-GOBAIN ISOVER G+H AG	Z-33.4-1081, Oct. 14 th 2016, DIBt		ETICS fixed with	
Mineral wool FKD-MAX C1/C2 by Knauf Insulation GmbH	Anwendungs- dokument ^{b)}	Anwendungs- dokument ^{c)}	anchor and supplementary adhesive	see next pages
Mineral wool FKD-S C2 by Knauf Insulation GmbH Mineral wool PAROC FAS 3cc by PAROC GmbH Mineral wool ROCKWOOL PT A 036 by ROCKWOOL Handelsgesellschaft m.b.H.	ÖNorm B6000:2017	B6400-1, September 2017	200mm thick	Systemklasse 3

a) Design provisions of this table refer to the referenced documents for anchor design. National provisions of other countries might be different and must be considered.

b) In Germany: Design provisions of German ETICS-approval Z-33.43-xxxx must considered, too. The less unfavourable design of Z-21.2-2047 and Z-33.43-xxxx is applicable.

c) Anwendungsdokument Mineralwolle-Dämmstoff nach EN 16262 f
ür die Verwendung in Wärmedämmverbundsystemen (WDVS), Knauf Insulation Putztr
ägerplatte FKD-MAX C1, Knauf Insulation Putztr
ägerplatte FKD-MAX C2, Knauf Insulation GmbH, November 2017

In absence of national provisions, HTH can be used for ETICS with mineral wool if the following provision are kept:

- minimum 4 anchors/m²
- only ETICS fixed with anchors and supplementary adhesive
- only ETICS that hold an ETA or National approval
- Mineral wool of TR5 or greater
- Mineral wool of 100mm to 300mm thickness
- Rendering weight ≤ 48 kg/m²
- Characteristic pull-through resistance of the mineral wool in combination with HTH has to be determined by tests
- Design of anchor number/m² must be done based on characteristic pull-through resistance and pull-out resistance by an engineer experienced in anchor design



Number of anchors based on <u>design wind resistance</u> $w_{ed}=w_e\bullet_{VF}$ for different insulation panels and base material categories A, B, C, D, E^{a) b) c)}

Design load of wind w _{ed} [kN/m ²] ^{e)}					
EPS TR80	EPS TR100	Coverrock, Coverrock II and Coverrock 036 Sillatherm WVP 1-035		of	Anchor pattern ^{f)}
Panel 1000mm	l size: x 500mm	Pane 800mm :	l size: x 625mm	per m ²	
≤ 1,2	≤ 1,3	≤ 0,6	≤ 0,3	4	
≤ 1,7	≤ 1,9	≤ 0,8	≤ 0,4	6	
≤ 2,2	≤ 2,4	≤ 1,1	≤ 0,6	8	
≤ 2,6	≤ 2,9	≤ 1,2	≤ 0,7	10	
≤ 3,0	≤ 3,3	≤ 1,4	-	12	
-	-	≤ 1,5	-	14	

a) The design of anchorages must be carried out in accordance to ETAG 014 and ETAG 004 under the responsibility of an engineer experienced in anchorages.

b) The table considers a safety factor for the base material of $\gamma_{M,BM}$ =2,0, for EPS $\gamma_{M,EPS}$ =1,5, and for mineral wool $\gamma_{M,MW}$ =2.0.

c) All base materials given in tables before are covered. In case that the characteristic resistance is determined by job site tests, the number of anchors is determined by the greater number in the table and $n = w_{ed}/(N_{rk,jobsite}/\gamma_{M,BM})$, where $N_{rk,jobsite}$ =characteristic resistance determined by job site tests and $\gamma_{M,BM}$ =2.0 (in absence of national safety factors). The number n shall be rounded upwards to an integer number.

d) DIBt letter November 13th, 2017 lays out that ETICS anchor approvals do cover wind resistances only. Effects caused by ETICS' weight and hygrothermal influences are not considered. In every case the ETICS approval must be considered.

e) w_{ed}=w_e x γ_F where w_e=characteristic external wind suction according EN 1991-1-4:2005-04 and national appendixes. Safety factor for wind γ_F=1.5.

f) The application of the indicated anchor pattern pre-assumes that the anchors are set with a distance ≥ 150mm to the edge of the panels



Number of anchors based on design wind loads w_e for different insulation panels and base material categories A, B, C, D, E^{a) b) c) d)}

		Numbor			
EPS TR80	EPS TR100	Coverrock, Coverrock II and Coverrock 036	Sillatherm WVP 1-035	Of	Anchor pattern ^{f)}
Pane 1000mm	l size: x 500mm	Panel 800mm x	l size: x 625mm	per m ²	
≤ 0,80	≤ 0,87	≤ 0,40	≤ 0,20	4	
≤ 1,13	≤ 1,27	≤ 0,53	≤ 0,27	6	
≤ 1,47	≤ 1,60	≤ 0,73	≤ 0,40	8	
≤ 1,73	≤ 1,93	≤ 0,80	≤ 0,47	10	
≤ 2,00	≤ 2,20	≤ 0,93	-	12	
-	-	≤ 1,00	-	14	

a) The design of anchorages must be carried out in accordance to ETAG 014 and ETAG 004 under the responsibility of an engineer experienced in anchorages.

b) The table considers a safety factor for the base material of γ_{M,BM}=2,0, for EPS γ_{M,EPS}=1,5, for mineral wool γ_{M,MW}=2,0 and for wind action γ_F=1,5
 c) All base materials given in tables before are covered. In case that the characteristic resistance is determined by job site tests, the number of anchors is determined by the greater number in the table and n = w_e/(N_{rk,jobsite}/(γ_{M,BM} x γ_F), where N_{rk,jobsite}=characteristic resistance determined

by job site tests, γ_{M,BM}=2,0 and γ_F=1,50 (in absence of national safety factors). The number n shall be rounded upwards to an integer number.
 d) DIBt letter November 13th, 2017 lays out that ETICS anchor approvals do cover wind resistances only. Effects caused by ETICS' weight and hygrothermal influences are not considered. In every case the ETICS approval must be considered.

e) we=characteristic external wind suction according EN 1991-1-4:2005-04 and national appendixes

f) The application of the indicated anchor pattern pre-assumes that the anchors are set with a distance ≥ 150mm to the edge of the panels



Number of anchors based on wind loads w_e for FKD-MAX panels, size 1200mm x 400mm and base material categories A, B, C, D, E^{a) b) c) d)}

wind load w _e [kN/m ²] ^{e)} FKD-MAX Panel size: 1200mm x 400mm	Number of anchors per m ²	Anchor pattern ^{f)}
≤ 0,50	6	
≤ 0,60	7	
≤ 0,70	8	
≤ 0,80	9	
≤ 0,90	10	
≤ 1,0	11	
≤ 1,12	12	

a) The design of anchorages must be carried out in accordance to ETAG 014 and ETAG 004 under the responsibility of an engineer experienced in anchorages.

b) The table considers a safety factor for the base material of $\gamma_{M,BM}=2,0$, for EPS $\gamma_{M,EPS}=1,5$, for mineral wool $\gamma_{M,MW}=2,0$ and for wind action $\gamma_F=1,5$

c) All base materials given in tables before are covered. In case that the characteristic resistance is determined by job site tests, the number of anchors is determined by the greater number in the table and n = w_e/(N_{rk,jobsite}/(γ_{M,BM} x γ_F), where N_{rk,jobsite}=characteristic resistance determined by job site tests, γ_{M,BM}=2,0 and γ_F=1,50 (in absence of national safety factors). The number n shall be rounded upwards to an integer number.
 d) DIBt letter November 13th, 2017 lays out that ETICS anchor approvals do cover wind resistances only. Effects caused by ETICS' weight and

hygrothermal influences are not considered. In every case the ETICS approval must be considered.

e) we=characteristic external wind suction according EN 1991-1-4:2005-04 and national appendixes

f) The application of the indicated anchor pattern pre-assumes that the anchors are set with a distance ≥ 150mm to the edge of the panels

Point Thermal Transmittance

Anchor size		HTH 8x125	HTH 8x155
Point thermal transmittance χ	[W/K]	0,001 (t _{fix} = 80mm, 0,000 (t _{fix} = 80mm,	100mm ≤ h _D ≤ 150mm) 150mm < h _D ≤ 360mm)

Plate stiffness and plate capacity ^{a) b)}

Anchor size		HTH 8x125	HTH 8x155
Capacity of plate	[kN]	1,8	30
Plate stiffness	[kN/mm]	0,7	70

a) Test report DET 15-008, HILTI corporation, Schaan (LI), 13.04.2015, testing in accordance with EOTA-TR026, 06.2007

b) The data are related to the performance of the helix-shaped insulation holder of HTH. The naming plate stiffness and plate capacity were kept because that is the common nomenclature.



Hilti HTH ETICS anchors may be applied in the temperature range given below.

Service temperature range

	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range	0 °C to +40 °C	+24 °C	+40 °C

Maximum short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Maximum long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time.

Materials

Material quality

Part	Material
Anchor sleeve	Polypropylene, black
Expansion screw	Steel, galvanized
Plug	EPS
PU-Foam	Polyurethane, thermal conductivity ≤ 0,045 W/(mK)







HTH screw and plug



Anchor size

			HTH 8x125	HTH 8x155		
Diameter of sleeve	dnom	[mm]	8			
Length of sleeve	la	[mm]	125	125		
Diameter of helix center	dhs	[mm]	17			
Diameter of helix	dh	[mm]	75			
Screw diameter	d₅	[mm]	5,35			
Length of screw	ls	[mm]	94	94		



Anchor designations

		нтн
Anchor sleeve	Top of helix	Producer: HILTI Anchor type: HTH Size and length [mm]: e.g. 8x155 Use categories (base materials): A-B-C-D-E Overall embedment depth in use categories A, B and C: $h_{nom,1}$ (A-B-C) \geq 25mm Overall embedment depth in use categories D and E: $h_{nom,2}$ (D-E) \geq 55mm
	Sleeve	Embedment depth h _{nom,1} =end of corrugated part of sleeve (25mm) Embedment depth h _{nom,2} =circumferential line at sleeve (55mm)

Setting information



The anchor shall not be exposed to UV-radiation for more than 6 weeks.

Concrete and solid masonry (use category A, B)

			HTH 8x125	HTH 8x155		
Nominal diameter of drill bit	d₀	[mm]	8			
Cutting diameter of drill bit	d _{cut}	[mm]	8,4	45		
Minimum depth of drilled hole to the deepest point	h₁	[mm]	45			
Overall plastic anchor embedment depth in the base material	h _{nom,1}	[mm]	25			
Thickness of fixture	t _{fix}	[mm]	80	80		
Thickness of equalizing layer for	t _{tol,min}	[mm]	0	0		
loadbearing layer	t _{tol,max}	- []	20	20		
Total length of borehole	h₃	[mm]	h _D +65	h _D +95		



Thin concrete members (e.g. weather resistant skins or external wall panels) and hollow masonry (use category C)

			HTH 8x125	HTH 8x155		
Nominal diameter of drill bit	do	[mm]	8			
Cutting diameter of drill bit	d_{cut}	[mm]	8,4	45		
Minimum depth of drilled hole to the deepest point	h₁	[mm]	45			
Overall plastic anchor embedment depth in the base material	h _{nom,1}	[mm]	25			
Thickness of fixture	t _{fix}	[mm]	80	80		
Thickness of equalizing layer for	t _{tol,min}	[mm]	0	0		
loadbearing layer	t _{tol,max}	- []	20	20		
Total length of borehole	h₃	[mm]	h₀+65	h₀+95		

a) t_{tol, min} may be lower if the anchor performance is tested on site.

Thin concrete members (e.g. weather resistant skins or external wall panels) and hollow masonry (use category C)

			HTH 8x125	HTH 8x155
Nominal diameter of drill bit	do	[mm]	-	8
Cutting diameter of drill bit	d _{cut}	[mm]	-	8,45
Minimum depth of drilled hole to the deepest point	h₁	[mm]	-	75
Overall plastic anchor embedment depth in the base material	h _{nom,1}	[mm]	-	55
Thickness of fixture	t _{fix}	[mm]	-	80
Thickness of equalizing layer for	t _{tol,min}	[mm]	-	0
loadbearing layer	ttol,max	- [mm]	-	20
Total length of borehole	h₃	[mm]	-	h₀+95

Installation equipment

Anchor	нтн
Rotary hammer	TE 2 – TE 7
Installation	Screw driver SFH 22-A or SF 10W or similar (n=370-600 rpm) Setting tool HTH-SW 1 (h _D =100-200mm), HTH-SW 2 (h _D =200-360mm) Setting tool D8-SW 1 (h _D =100-200mm), D8-SW 2 (h _D =200-360mm)

HTH Setting tools





Setting tool HTH-SW 1 and HTH-SW 2

Setting tool			HTH-SW 1	HTH-SW 2
Diameter of disk	d⊤	[mm]	10	00
Length of the tool	ℓт	[mm]	310	477
	h D,min	[mm]	100	200
Applicable insulation thickness	increment	[mm]	1	0
	h _{D,max}	[mm]	200	360

Setting tool D8-SW 1 and D8-SW 2

Setting tool			D8-SW 1	D8-SW 2	
Diameter of disk	d⊤	[mm]	100		
Length of the tool	ℓ_{T}	[mm]	310	477	
Length of distance sleeves (insulation thickness increment)	ℓн	[mm]	10		
Applicable insulation thickness	$\mathbf{h}_{D,min}$	[mm]	100	200	
	h _{D,max}	[mm]	200	360	

Minimum edge distance, minimum spacing and minimum base material thickness

						нтн
Concrete, masonry, lightweight aggregateMinimum baseconcrete and autoclaved aerated concrete			- b :	[mm]	100	
material thickness	Thin concrete resistant skin	e members (e.g. w s of external wall	eather panels)	- I Imin	[11111]	40
Minimum spacing				Smin	[mm]	100
Minimum edge distance				Cmin	[mm]	100
		S _{min} C _{min} C _{min} S _{min}	¢-	h _{min}		



Setting instruction*

*For detailed information on installation see instruction for use given with the package of the product.

