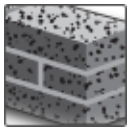
HTH Insulation fastener

Anchor version		Benefits
	HTH	- Fastening in all base materials of category A, B, C, D and E - Setting tool for fast and safe application - Lowest heat transmission (chi-value up to 0.000 W/K) - One anchor size fits all insulation thickness

Base material


Concrete (non-cracked)

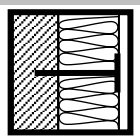

Solid brick


Hollow brick


Lightweight Aggregate concrete


Autoclavated Aerated concrete

Other information


Fastening of insulation at the wall only


European Technical Assessment


CE conformity

Approvals/Certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment [a)]	DIBt, Berlin	ETA-15/0464 / 2017-06-08
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)

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

$$N_{Rd} = \frac{N_{Rk}}{\gamma_M} \text{ with } \gamma_M = 2{,}0 \text{ (safety factor for base material)}$$

Base material	Use cat.[d]		HTH
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	B	N_{Rd} [kN]	0,6
Solid sand-lime brick KS 20/2,0	B	N_{Rd} [kN]	0,6
Vertically perforated clay brick Hlz 12/1,2	C	N_{Rd} [kN]	0,6[a]
Vertically perforated clay brick Hlz 12/0,8	C	N_{Rk} [kN]	0,3[b]
Vertically perforated sand-lime brick KSL 12/1,4	C	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 ≥ PP4 (raw density ≥ 0,5 kg/dm³)	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 ≥ 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:

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

Base material	Use cat.[d]		HTH
Concrete ≥ C12/15	A	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	B	N_{Rd} [kN]	0,4
Solid sand-lime brick KS 20/2,0	B	N_{Rd} [kN]	0,4
Vertically perforated clay brick Hlz 12/1,2	C	N_{Rd} [kN]	0,4[a]
Vertically perforated clay brick Hlz 12/0,8	C	N_{Rk} [kN]	0,2[b]
Vertically perforated sand-lime brick KSL 12/1,4	C	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 ≥ PP4 (raw density ≥ 0,5 kg/dm³)	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

<table>
<tr><th>Insulation material and provider</th><th>Specifying document</th><th>Referenced document for anchor design</th><th>Design provisions[a)]</th><th>Anchor design</th></tr>
<tr><td>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</td><td>DIN EN 13163</td><td rowspan="3">Z-21.2-2047
April 13th 2018, DIBt</td><td>ETICS fixed with anchor and supplementary adhesive
Panels 100mm to 360mm thick</td><td rowspan="3">see next pages[b)]</td></tr>
<tr><td>Coverrock, Coverrock II and Coverrock 036 by Deutsche Rockwool Mineralwoll GmbH</td><td>Z-33.4-1571, October 14th 2016, DIBt</td><td rowspan="4">ETICS fixed with anchor and supplementary adhesive
Panels 100mm to 200mm thick</td></tr>
<tr><td>Sillatherm WVP 1-035 by SAINT-GOBAIN ISOVER G+H AG</td><td>Z-33.4-1081, Oct. 14th 2016, DIBt</td></tr>
<tr><td>Mineral wool FKD-MAX C1/C2 by Knauf Insulation GmbH</td><td>Anwendungs-dokument[b)]</td><td>Anwendungs-dokument[c)]</td><td>see next pages</td></tr>
<tr><td>Mineral wool FKD-S C2 by Knauf Insulation GmbH</td><td rowspan="3">ÖNorm B6000:2017</td><td rowspan="3">B6400-1, September 2017</td><td rowspan="3">Systemklasse 3</td></tr>
<tr><td>Mineral wool PAROC FAS 3cc by PAROC GmbH</td></tr>
<tr><td>Mineral wool ROCKWOOL PT A 036 by ROCKWOOL Handelsgesellschaft m.b.H.</td></tr>
</table>

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.

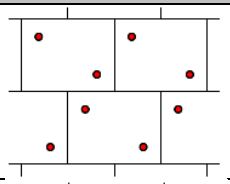
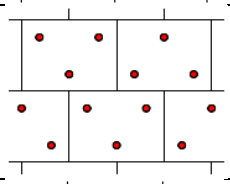
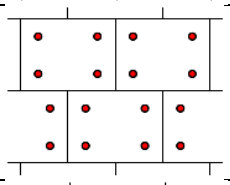
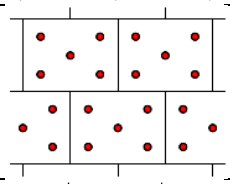
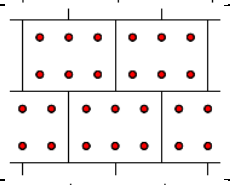
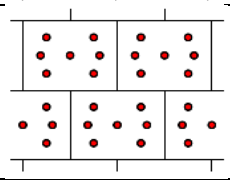
b) In Germany: Design provisions of German ETICS-approval Z-33.43-xxxx must considered, too. The less unfavourable design of Z-21.2-2047 and Z-33.43-xxxx is applicable.

c) Anwendungsdokument Mineralwolle-Dämmstoff nach EN 16262 für die Verwendung in Wärmedämmverbundsystemen (WDVS), Knauf Insulation Putzträgerplatte FKD-MAX C1, Knauf Insulation Putzträgerplatte 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/m^2
- 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/m^2
- Characteristic pull-through resistance of the mineral wool in combination with HTH has to be determined by tests
- Design of anchor number/m^2 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> $w_{ed}=w_e \bullet \gamma_F$ for different insulation panels and base material categories A, B, C, D, E [a) b) c)]

Design load of wind w_{ed} [kN/m²] [e)]				Number of anchors per m²	Anchor pattern [f)]
EPS TR80	EPS TR100	Coverrock, Coverrock II and Coverrock 036	Sillatherm WVP 1-035		
Panel size: 1000mm x 500mm		Panel size: 800mm x 625mm			
≤ 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.

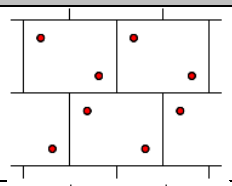
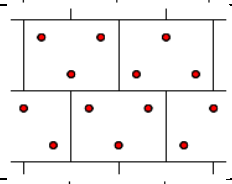
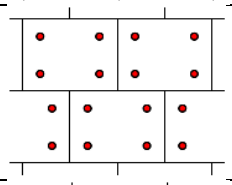
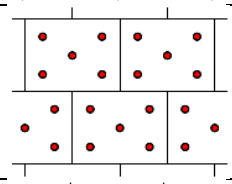
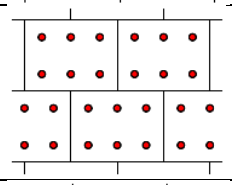
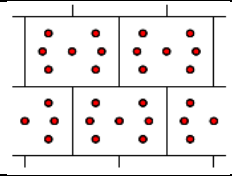
c) All base materials given in tables before are covered. In case that the characteristic resistance is determined by job site tests, the number of anchors is determined by the greater number in the table and $n = w_{ed}/(N_{rk,jobsite}/\gamma_{M,BM})$, where $N_{rk,jobsite}$=characteristic resistance 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) $w_{ed}=w_e \times \gamma_F$ 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 <u>wind loads w_e</u> for different insulation panels and base material categories A, B, C, D, E [a) b) c) d)]

wind load w_{ed} [kN/m²] [e)]				Number of anchors per m²	Anchor pattern [f)]
EPS TR80	EPS TR100	Coverrock, Coverrock II and Coverrock 036	Sillatherm WVP 1-035		
Panel size: 1000mm x 500mm		Panel size: 800mm x 625mm			
≤ 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 $\gamma_{M,BM}$=2,0, for EPS $\gamma_{M,EPS}$=1,5, for mineral wool $\gamma_{M,MW}$=2,0 and for wind action γ_F=1,5

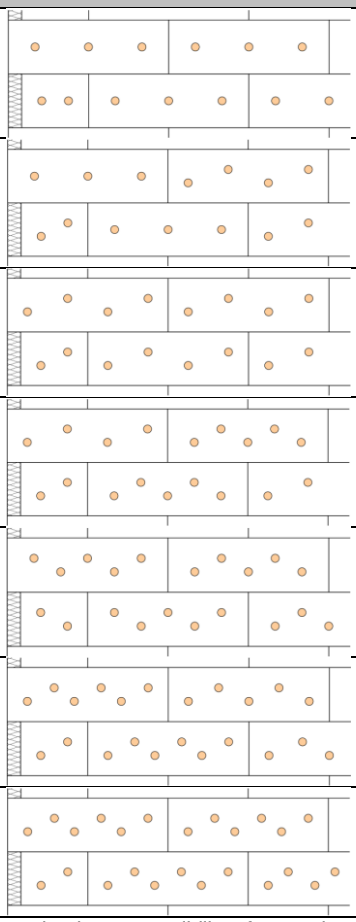
c) All base materials given in tables before are covered. In case that the characteristic resistance is determined by job site tests, the number of anchors is determined by the greater number in the table and $n = w_e/(N_{rk,jobsite}/(\gamma_{M,BM} \times \gamma_F)$, where $N_{rk,jobsite}$=characteristic resistance determined by job site tests, $\gamma_{M,BM}$=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) w_e=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 <u>wind loads</u> 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/m²] [e)] FKD-MAX Panel size: 1200mm x 400mm	Number of anchors per m²	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 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 $n = w_e/(N_{rk,jobsite}/(\gamma_{M,BM} \times \gamma_F)$, where $N_{rk,jobsite}$=characteristic resistance determined by job site tests, $\gamma_{M,BM}$=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) w_e=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, 100mm ≤ h_D ≤ 150mm) 0,000 (t_{fix}= 80mm, 150mm < h_D ≤ 360mm)	

Plate stiffness and plate capacity [a) b)]

Anchor size		HTH 8x125	HTH 8x155
Capacity of plate	[kN]	1,80	
Plate stiffness	[kN/mm]	0,70	

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

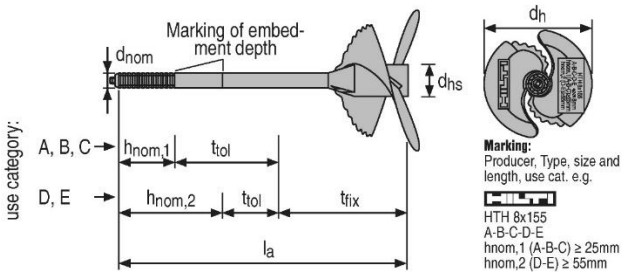
Long-term elevated base material temperatures are roughly constant over significant periods of time.

Materials

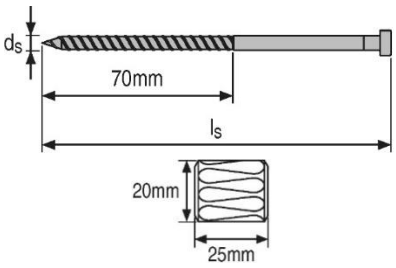
Material quality

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

HTH anchor body



HTH screw and plug



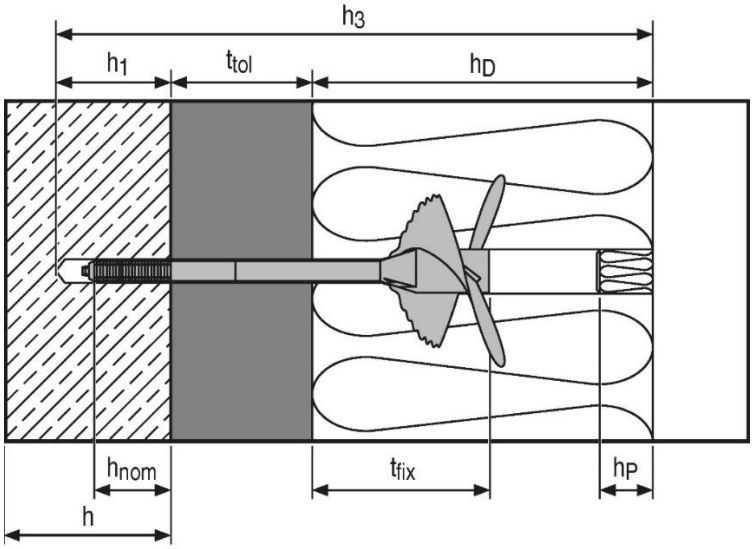
Anchor size

			HTH 8x125	HTH 8x155
Diameter of sleeve	d_{nom}	[mm]	8	
Length of sleeve	l_a	[mm]	125	125
Diameter of helix center	d_{hs}	[mm]	17	
Diameter of helix	d_h	[mm]	75	
Screw diameter	d_s	[mm]	5,35	
Length of screw	l_s	[mm]	94	94

Anchor designations

		HTH
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) ≥ 25mm Overall embedment depth in use categories D and E: $h_{nom,2}$ (D-E) ≥ 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	d_o	[mm]	8	
Cutting diameter of drill bit	d_{cut}	[mm]	8,45	
Minimum depth of drilled hole to the deepest point	h_1	[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 compensation of tolerances or non-loadbearing layer	$t_{tol,min}$	[mm]	0	0
	$t_{tol,max}$		20	20
Total length of borehole	h_3	[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	d_o	[mm]	8	
Cutting diameter of drill bit	d_{cut}	[mm]	8,45	
Minimum depth of drilled hole to the deepest point	h_1	[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 compensation of tolerances or non-loadbearing layer	$t_{tol,min}$	[mm]	0	0
	$t_{tol,max}$		20	20
Total length of borehole	h_3	[mm]	h_D+65	h_D+95

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

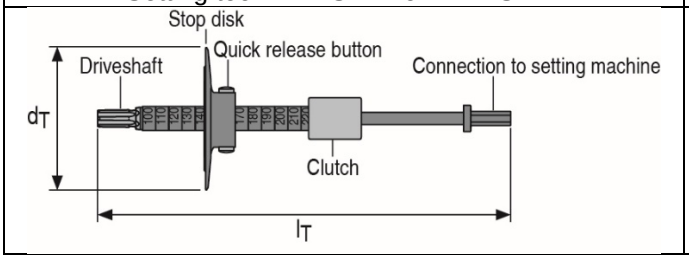
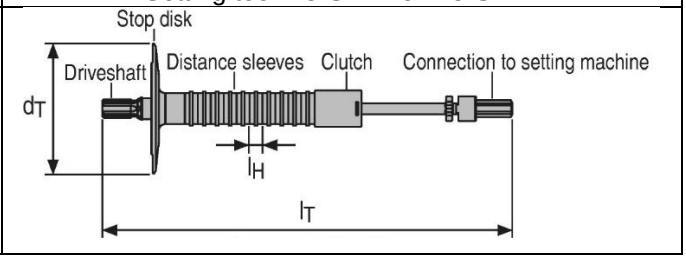
Thin concrete members (e.g. weather resistant skins or external wall panels) and hollow masonry (use category C)

			HTH 8x125	HTH 8x155
Nominal diameter of drill bit	d_o	[mm]	-	8
Cutting diameter of drill bit	d_{cut}	[mm]	-	8,45
Minimum depth of drilled hole to the deepest point	h_1	[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 compensation of tolerances or non-loadbearing layer	$t_{tol,min}$	[mm]	-	0
	$t_{tol,max}$		-	20
Total length of borehole	h_3	[mm]	-	h_D+95

Installation equipment

Anchor	HTH
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 or HTH-SW 2	Setting tool D8-SW 1 or D8-SW 2
	

Setting tool HTH-SW 1 and HTH-SW 2

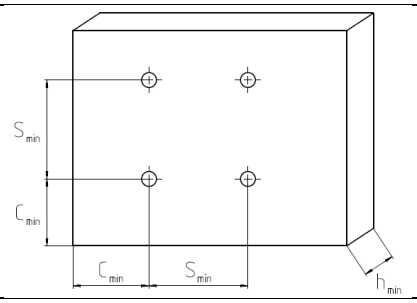
Setting tool			HTH-SW 1	HTH-SW 2
Diameter of disk	d_T	[mm]	100	
Length of the tool	ℓ_T	[mm]	310	477
Applicable insulation thickness	$h_{D,min}$	[mm]	100	200
	increment	[mm]	10	
	$h_{D,max}$	[mm]	200	360

Setting tool D8-SW 1 and D8-SW 2

Setting tool			D8-SW 1	D8-SW 2
Diameter of disk	d_T	[mm]	100	
Length of the tool	ℓ_T	[mm]	310	477
Length of distance sleeves (insulation thickness increment)	ℓ_H	[mm]	10	
Applicable insulation thickness	$h_{D,min}$	[mm]	100	200
	$h_{D,max}$	[mm]	200	360

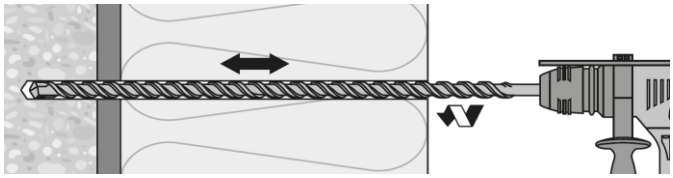
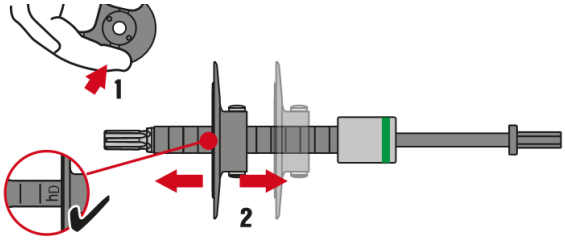
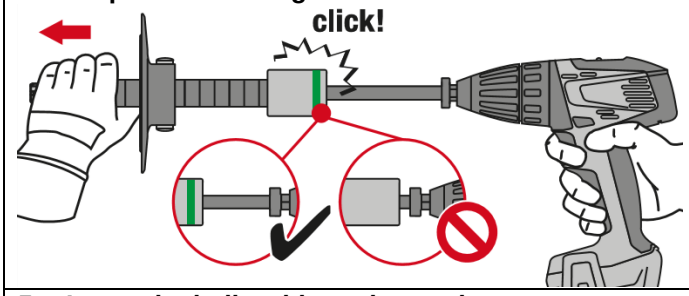
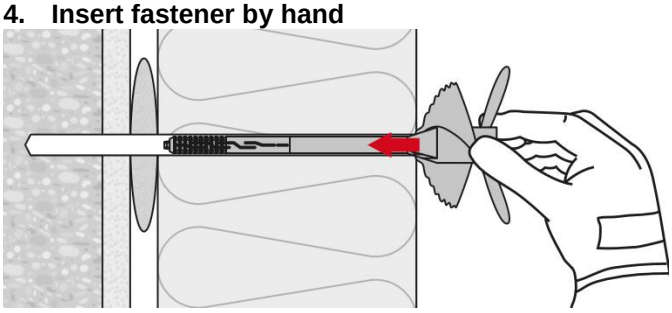
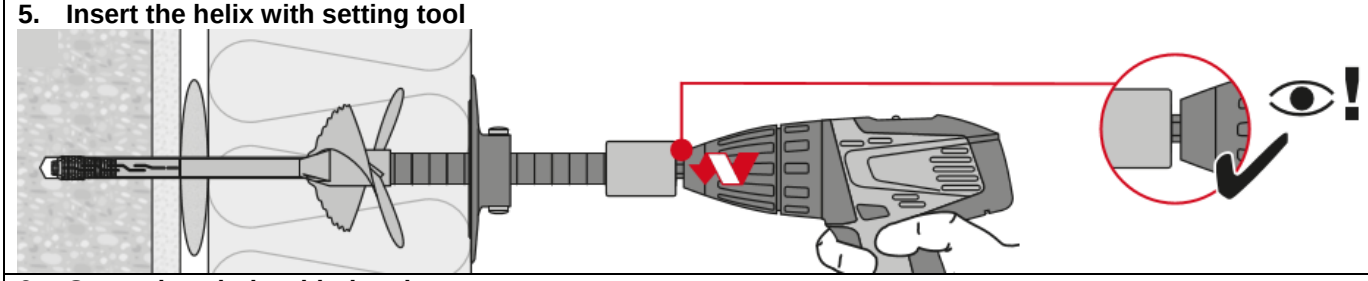
Minimum edge distance, minimum spacing and minimum base material thickness

				HTH
Minimum base material thickness	Concrete, masonry, lightweight aggregate concrete and autoclaved aerated concrete	h_{min}	[mm]	100
	Thin concrete members (e.g. weather resistant skins of external wall panels)			40
Minimum spacing		s_{min}	[mm]	100
Minimum edge distance		c_{min}	[mm]	100



Setting instruction*

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

Setting instructions	
1. Drill hole with drill bit 	**2. Set insulation thickness** 
3. Prepare the setting tool 	**4. Insert fastener by hand** 
5. Insert the helix with setting tool 	
6. Cover the whole with the plug or mortar