HUS-H Screw anchor

Ultimate performance screw anchor with hex-head

Anchor version

HUS-H
(10)

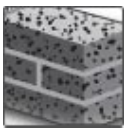
Benefits

- Quick and easy setting
- Low expansion forces in base materials
- Through fastening
- Removable
- Forged-on washer and hexagon head with no protruding head

Base material

Concrete (non-cracked)

Concrete (cracked)



Solid brick

Autoclaved aerated concrete

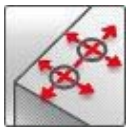
Load conditions

Static / quasi-static

Seismic ETA-C1

Fire resistance

Installation conditions



Small edge distance and spacing

Other information

European Technical Assessment

CE conformity

PROFIS Anchor design software

DIBt Approval Reusability

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment	DIBt, Berlin	ETA-08/0307 / 2015-08-27
Fire test report	IBMB, Brunswick	UB3574/5146 / 2006-05-20
Fire Assessment report	Exova Warringtonfire	WF 166402 / 2007-10-26

a) All data given in this section according ETA-08/0307 issue 2015-08-27.

Static and quasi-static loading data (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²

Anchorage depth

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H 10**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85

Mean ultimate resistance

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H 10**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Non-cracked concrete				
Tension $N_{Ru,m}$	[kN]	16,0	16,0	26,7
Shear $V_{Ru,m}$	[kN]	25,1	25,1	25,1
Cracked concrete				
Tension $N_{Ru,m}$	[kN]	8,5	10,0	21,3
Shear $V_{Ru,m}$	[kN]	25,1	25,1	25,1

Characteristic resistance

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H 10**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Non-cracked concrete				
Tension N_{Rk}	[kN]	12,0	12,0	20,0
Shear V_{Rk}	[kN]	23,8	23,8	23,8
Cracked concrete				
Tension N_{Rk}	[kN]	6,4	7,5	16,0
Shear V_{Rk}	[kN]	21,0	23,8	23,8

Design resistance

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H 10**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Non-cracked concrete				
Tension N_{Rd}	[kN]	6,7	6,7	9,5
Shear V_{Rd}	[kN]	15,9	15,9	15,9
Cracked concrete				
Tension N_{Rd}	[kN]	3,6	4,2	7,6
Shear V_{Rd}	[kN]	14,0	15,9	15,9

Recommended loads

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H 10**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Non-cracked concrete				
Tension N_{Rec}	[kN]	4,8	4,8	6,8
Shear V_{Rec}	[kN]	11,3	11,3	11,3
Cracked concrete				
Tension N_{Rec}	[kN]	2,5	3,0	5,4
Shear V_{Rec}	[kN]	10,0	11,3	11,3

a) With overall partial safety factor for action γ = 1,4, The partial safety factors for action depend on the type of loading and shall be taken from national regulations,

Seismic loading data (for single anchor)

All data in this section applies to:
- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- α_{gap} = 0,5

Anchorage depth

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Effective anchorage depth	h_{ef} [mm]	44	54	67

Characteristic resistance in case of seismic performance category C1

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Tension $N_{Rk,seis}$	[kN]	-	-	12,5
Shear $V_{Rk,seis}$		-	-	9,0

Design resistance in case of seismic performance category C1

Anchor size		Hilti Technical Data	ETA 08/0307	
Type	**HUS-H**	**10**	**10**	
Nominal embedmenth depth	h_{nom} [mm]	60	70	85
Tension $N_{Rd,seis}$	[kN]	-	-	6,0
Shear $V_{Rd,seis}$		-	-	6,0

Materials

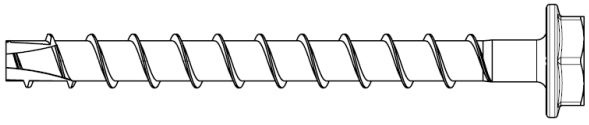
Mechanical properties

Anchor size	HUS-H	10
Nominal tensile strength f_{uk}	[N/mm²]	1000
Yield strength f_{yk}	[N/mm²]	900
Stressed cross-section A_s	[mm²]	55,4
Moment of resistance W	[mm³]	58,2
Design bending resistance $M^0_{Rd,s}$	[Nm]	46,5

Material quality

Type	Material
HUS - H	Carbon steel, galvanized (≥ 5 µm)

Head configuration

Type	Part		
HUS-H	Hexagonal head		

Anchor dimensions

Anchor size		HUS-H	10
Nominal length	l_S	[mm]	75..280
Outer diameter of thread	d_S	[mm]	12,3
Core diameter	d_k	[mm]	8,4

Setting information

Setting details

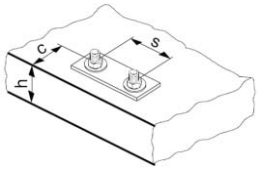
Anchor size		HUS-H	10		
		h_{nom}	60	70	85
Nominal diameter of drill bit	d_0	[mm]	10		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10,45		
Clearance hole diameter	d_f	[mm]	14		
Depth of drill hole in floor/wall position	$h_1 \geq$	[mm]	h_{nom}+10 mm		
Depth of drill hole in ceiling position	$h_1 \geq$	[mm]			
Thickness of fixture	t_{fix}	[mm]	l_s - h_{nom}		
Max. installation torque for hand setting	$T_{inst, max}$	[Nm]	45	45	55
Impact screw driver for machine setting			SIW 22T-A ; SI 100		

a) For concrete < 28 days old and $f_{ck,cube} \geq 15$ N/mm²
b) For concrete < 28 days old and $f_{ck,cube} \geq 15$ N/mm² only hand setting is recommended

Setting parameters

Anchor size		HUS-H	10		
		h_{nom}	60	70	85
Minimum base material thickness	h_{min}	[mm]	110	130	130
Non-cracked concrete					
Minimum spacing	s_{min}	[mm]	65		
Minimum edge distance	c_{min}	[mm]	65		
Cracked concrete					
Minimum spacing	s_{min}	[mm]	65	50	50
Minimum edge distance	c_{min}	[mm]	65	50	50
Effective anchorage depth	h_{ef}	[mm]	44	54	67
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	3 h_{ef}		
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]			
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	1,5 h_{ef}		
Critical edge distance for splitting failure	$c_{cr,sp}$	[mm]			

For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced (see system design resistance),
Critical spacing and critical edge distance for splitting failure apply only for non-cracked concrete, For cracked concrete only the critical spacing and critical edge distance for concrete cone failure are decisive.
a) Only hand setting is recommended



Installation equipment

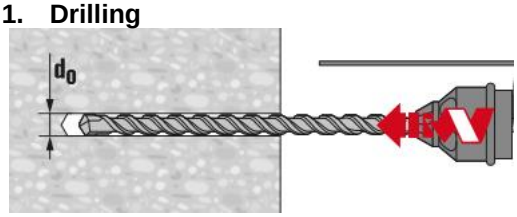
Anchor size HUS-H	10
Rotary hammer	TE 2 - TE 30
Drill bit for concrete, solid clay brick solid sand-lime brick	TE -CX 10
Drill bit for aerated concrete	TE -CX 8
Socket wrench insert	S-NSD 15 1/2
Setting tool	SIW 22T-A ; SI 100

Setting instructions

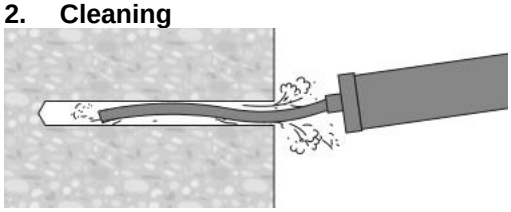
***For detailed information on installation see instruction for use given with the package of the product**

Setting instruction without adjustment

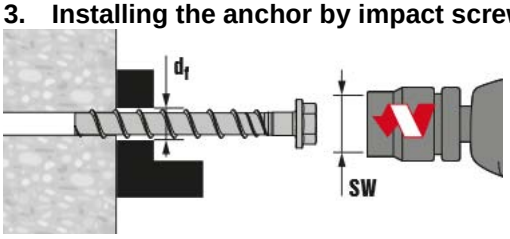
1. Drilling



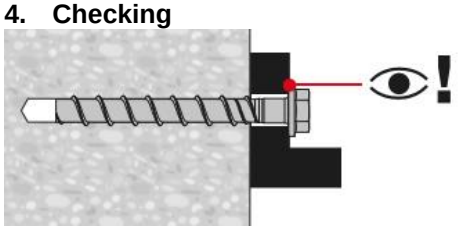
2. Cleaning



3. Installing the anchor by impact screw driver



4. Checking



Basic loading data for single anchor in solid masonry units

Solid bricks: a reduction of the cross section area by a vertical perforation perpendicular to the bed joint area must not be greater than 15%

Drilling:

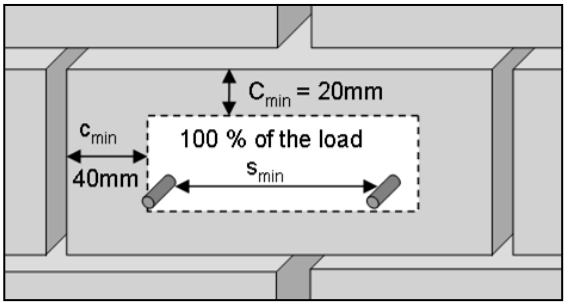
- Holes in Mz and KS drilled with TE rotary hammers drilled with hammering mode
- Holes in PPW drilled with TE rotary hammers drilled without hammering mode

Installation:

- The anchor is correct mounted, if there is neither a turn-through or spinning of the screw in the drill hole nor that an easy turning of the screw is possible after the installation procedure when the head of the screw has touched the fixture

Edge distance and spacing influences:

- Distance to free edge free edge to solid masonry (Mz and KS) units $c_{min,free} \geq 200$ mm
- Distance to free edge free edge to solid masonry (autoclaved aerated gas concrete) units $c_{min,free} \geq 170$ mm
- The minimum distance to horizontal and vertical mortar joint $c_{min,h}$ and $c_{min,v}$ is stated in drawing below
- Minimum anchor spacing in one brick/block is $s_{min} = 80$ mm



Recommended loads

Anchor size			Hilti Technical Data
Base material		Type HUS-H	10
		h_{nom} [mm]	60
		Compressive strength class [N/mm²]	F_{rec} a) [kN] Tensile and Shear
	**Solid clay brick Mz 2,0-2DF** DIN V 105-100 / EN 771-1 LxWxH [mm]: 240x115x113 h_{min} [mm]: 115	≥ 8	1,0
		≥ 10	1,2
		≥ 12	1,3
		≥ 16	1,5
		≥ 20	1,7
	**Solid sand-lime brick KS 2,0-2DF** DIN V 106-100 / EN 771-2 LxWxH [mm]: 240x115x113 h_{min} [mm]: 115	≥ 8	1,1
		≥ 10	1,2
		≥ 12	1,3
		≥ 16	1,5
		≥ 20	1,7
	**Aerated concrete PPW -0,65** DIN 4165/ EN 771-4 LxWxH [mm]: 499x240x249 h_{min} [mm]: 240	≥ 6	1,3

a) Characteristic resistance for tension, shear or combined tension and shear loading.
The characteristic resistance is valid for single anchor or for a group of two or four anchors with a spacing equal or larger than the minimum spacing smin according to specification.

Load values:

- The technical data for the HUS-H anchors are reference loads for MZ 12 2,0-2DF, KS 12 2,0-2DF and PPW 6-0,65.
- The load Values are valid for non-structural applications.
- Due to the natural variation of stone solid bricks, on site anchor testing is recommended to validate technical data.
- The HUS-H anchor was installed and tested in the centre area of solid bricks as shown considering minimal edge and space distances.
- The HUS-H anchor was not tested in the mortar joint between solid bricks or in hollow bricks; however a load reduction is expected.
- For brick walls where anchor position in brick can not be determined, 100% anchor testing is recommended.

Limitations of loads:

- All data is for redundant fastening for non structural applications
- Plaster, graveling, lining or leveling courses are regarded as non-bearing and may not be taken into account for the calculation of embedment depth.
- The decisive resistance to tension loads is the lower value of N_{rec} (brick breakout, pull out) and $N_{max,pb}$ (pull out of one brick).

Pull out of one brick:

The allowable load of an anchor or a group of anchors in case of single brick pull out, $N_{max,pb}$ [kN], is given in the following tables:

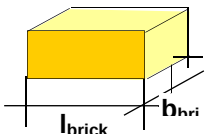
Clay bricks:

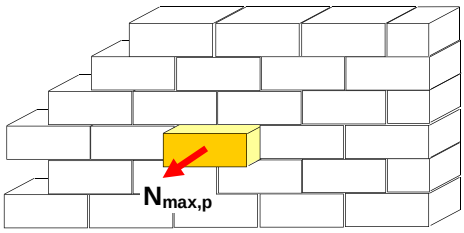
$N_{max,pb}$ [kN]		brick breadth b_{brick} [mm]					
		80	120	200	240	300	360
brick length l_{brick} [mm]	240	1,1	1,6	2,7	3,3	4,1	4,9
	300	1,4	2,1	3,4	4,1	5,1	6,2
	500	2,3	3,4	5,7	6,9	8,6	10,3

All other brick types:

$N_{max,pb}$ [kN]		brick breadth b_{brick} [mm]					
		80	120	200	240	300	360
brick length l_{brick} [mm]	240	0,8	1,2	2,1	2,5	3,1	3,7
	300	1,0	1,5	2,6	3,1	3,9	4,6
	500	1,7	2,6	4,3	5,1	6,4	7,7

$N_{max,pb}$ = resistance for pull out of one brick
l_{brick} = length of the brick
b_{brick} = breadth of the brick





Setting details in masonry

Anchor size		**HUS-H**	**10**
		h_{nom}	**70**
Nominal diameter of drill bit diameter for solid clay (Mz) and sand-lime brick (KS)	d_0	[mm]	10
Nominal diameter of drill bit Aerated concrete (PPW)	d_0	[mm]	8
Clearance hole diameter	d_f	[mm]	14
Depth of drill hole	$h_1 \geq$	[mm]	h_{nom}+10 mm
Thickness of fixture	t_{fix}	[mm]	
Max. installation torque for hand setting [a]			
Solid clay brick (MZ)	$T_{inst,\,max}$	[Nm]	8
Solid sand-lime brick (KS)	$T_{inst,\,max}$	[Nm]	16
Aerated concrete (PPW)	$T_{inst,\,max}$	[Nm]	8