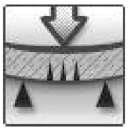
HUS-HR, CR Screw anchor, stainless steel

Anchor version		Benefits
	HUS-HR 6 / 8 / 10 / 14 Stainless steel concrete Screw with hexagonal head	- High productivity – less drilling and fewer operations than with conventional anchors - ETA approval for cracked and non-cracked concrete - Seismic approval ETA C1 - Small edge and spacing distances
	HUS-CR 10 Stainless steel concrete screw with countersunk head	

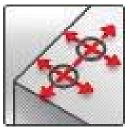

Concrete


Tensile zone


Solid brick

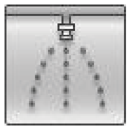

Autoclaved aerated concrete


Seismic ETA-C1

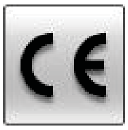

Small edge distance and spacing


Fire resistance

Corrosion Resistance


Sprinkler approved


European Technical Approval


CE conformity


PROFIS Anchor design software

Approvals / certificates

Description	Authority / Laboratory	No, / date of issue
European technical approval a)	DIBt, Berlin	ETA-08/0307 / 2014-04-29
Fire test report	DIBt, Berlin	ETA-08/0307 / 2014-04-29
Fire test report ZTV – Tunnel (EBA)	MFPA, Leipzig	PB III / 08-354 / 2008-11-27

a) Data for HUS-HR with standard and reduced embedment depth is given in this section according ETA-08/0307 issue 2014-04-29,

Basic loading data

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

For details see Simplified design method

Mean ultimate resistance

		Non-cracked concrete				Cracked concrete			
Anchor size		**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type	**HUS**	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Tensile $N_{Ru,m}$	[kN]	- [a)]	12,0	16,0	-	- [a)]	6,7	10,0	-
Shear $V_{Ru,m}$	[kN]	- [a)]	31,5	41,9	-	- [a)]	22,5	30,0	-
Reduced embedment (ETA-08/0307)									
h_{nom}	[mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Tensile $N_{Ru,m}$	[kN]	-	16,0	21,3	25,2	-	8,0	12,0	16,0
Shear $V_{Ru,m}$	[kN]	-	34,7	44,0	50,4	-	30,9	38,1	36,0
Standard embedment (ETA-08/0307)									
h_{nom}	[mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Tensile $N_{Ru,m}$	[kN]	12,0	21,3	33,3	53,6	6,7	16,0	21,3	33,3
Shear $V_{Ru,m}$	[kN]	22,7	34,7	44,0	102,7	21,7	34,7	44,0	76,6

a) Please refer to resistance table in all load directions for multiple use fastenings in section HUS 6 screw anchor for redundant fastening,

Characteristic resistance

		Non-cracked concrete				Cracked concrete			
Anchor size		**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type	**HUS**	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Tensile N_{Rk}	[kN]	- [a)]	9,0	12,0	-	- [a)]	5,0	7,5	-
Shear V_{Rk}	[kN]	- [a)]	23,6	31,4	-	- [a)]	16,9	22,5	-
Reduced embedment (ETA-08/0307)									
h_{nom}	[mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Tensile N_{Rk}	[kN]	-	12,0	16,0	18,9	-	6,0	9,0	12,0
Shear V_{Rk}	[kN]	-	26,0	33,0	37,8	-	23,2	28,6	27,0
Standard embedment (ETA-08/0307)									
h_{nom}	[mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Tensile N_{Rk}	[kN]	9,0	16,0	25,0	40,2	5,0	12,0	16,0	25,0
Shear V_{Rk}	[kN]	17,0	26,0	33,0	77,0	16,3	26,0	33,0	57,4

a) Please refer to resistance table in all load directions for multiple use fastenings in section HUS 6 screw anchor for redundant fastening,

Design resistance

		Non-cracked concrete				Cracked concrete			
Anchor size		**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type	**HUS**	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Tensile N_{Rd}	[kN]	- a)	5,0	6,7	-	- a)	2,8	4,2	-
Shear V_{Rd}	[kN]	- a)	15,7	21,0	-	- a)	11,2	15,0	-
Reduced embedment (ETA-08/0307)									
h_{nom}	[mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Tensile N_{Rd}	[kN]	-	6,7	8,9	10,5	-	3,3	5,0	6,7
Shear V_{Rd}	[kN]	-	17,3	22,0	25,2	-	15,5	19,0	18,0
Standard embedment (ETA-08/0307)									
h_{nom}	[mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Tensile N_{Rd}	[kN]	4,3	8,9	13,9	22,3	2,4	6,7	8,9	13,9
Shear V_{Rd}	[kN]	11,3	17,3	22,0	51,3	10,9	17,3	22,0	38,3

a) Please refer to resistance table in all load directions for multiple use fastenings in section HUS 6 screw anchor for redundant fastening,

Recommended loads

		Non-cracked concrete				Cracked concrete			
Anchor size		**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type	**HUS**	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Tensile N_{rec} a)	[kN]	- b)	3,6	4,8	-	- b)	2,0	3,0	-
Shear V_{rec} a)	[kN]	- b)	11,2	15,0	-	- b)	8,0	10,7	-
Reduced embedment (ETA-08/0307)									
h_{nom}	[mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Tensile N_{rec} a)	[kN]	-	4,8	6,3	7,5	-	2,4	3,6	4,8
Shear V_{rec} a)	[kN]	-	12,4	15,7	18,0	-	11,0	13,6	12,9
Standard embedment (ETA-08/0307)									
h_{nom}	[mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Tensile N_{rec} a)	[kN]	3,1	6,3	9,9	16,0	1,7	4,8	6,3	9,9
Shear V_{rec} a)	[kN]	8,1	12,4	15,7	36,7	7,8	12,4	15,7	27,3

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,

b) Please refer to resistance table in all load directions for multiple use fastenings in section HUS 6 screw anchor for redundant fastening,

Materials

Mechanical properties

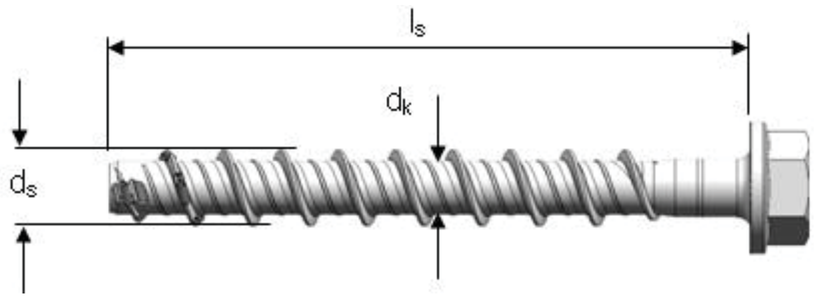
Anchor size		6	8	10	14
Type		**HUS-HR**	**HUS-HR**	**HUS-HR,CR**	**HUS-HR**
Nominal tensile strength f_{uk}	[N/mm²]	1050	870	950	690
Nominal yield strength f_{yk}	[N/mm²]	900	745	815	590
Stressed cross-section A_s	[mm²]	22,9	39,0	55,4	143,1
Moment of resistance W	[mm³]	15	34	58	255
Design bending resistance $M_{Rd,s}$	[Nm]	19	36	66	193

Part	Material
Stainless steel hexagonal head concrete screw	Stainless steel (grade A4)

Anchor dimensions

Dimensions

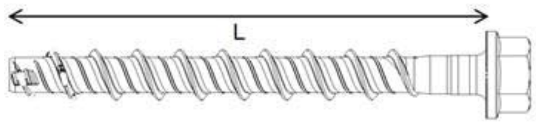
Anchor version	d_s [mm]	d_k [mm]	A_s [mm²]
HUS-HR 6	7,6	5,4	22,9
HUS-HR 8	10,1	7,05	39,0
HUS-HR 10	12,3	8,40	55,4
HUS-CR 10	12,3	8,40	55,4
HUS-HR 14	16,6	12,6	143,1



Head stamping

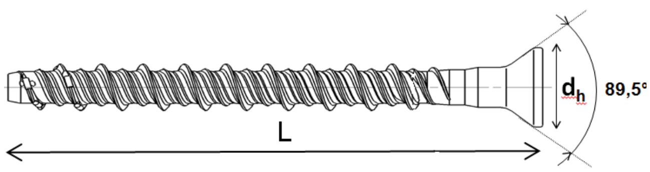
Screw length and thickness of fixture for HUS-HR (hex head)

Anchor size HUS HR	6		8			10			14	
Nominal anchorage depth [mm]	h_{nom} 30	h_{nom} 55	h_{nom} 50	h_{nom} 60	h_{nom} 80	h_{nom} 60	h_{nom} 70	h_{nom} 90	h_{nom} 70	h_{nom} 110
	Thickness of fixture [mm]									
Length of anchor [mm]	t_{fix1}	t_{fix2}	t_{fix1}	t_{fix2}	t_{fix3}	t_{fix1}	t_{fix2}	t_{fix3}	t_{fix1}	t_{fix2}
35	5	-	-	-	-	-	-	-	-	-
45	15	-	-	-	-	-	-	-	-	-
60	30	5	-	-	-	-	-	-	-	-
65	-	-	15	5	-	5	-	-	-	-
70	40	15	-	-	-	-	-	-	-	-
75	-	-	25	15	-	15	5	-	-	-
80	-	-	-	-	-	-	-	-	10	-
85	-	-	35	25	5	25	15	-	-	-
95	-	-	45	35	15	35	25	5	-	-
105	-	-	55	45	25	45	35	15	-	-
115	-	-	-	-	-	55	45	25	-	-
120	-	-	-	-	-	-	-	-	50	10
130	-	-	-	-	-	70	60	40	-	-
135	-	-	-	-	-	-	-	-	65	25



Screw length and thickness of fixture for HUS-CR (countersunk head)

Anchor size HUS HR	10		
Nominal anchorage depth [mm]	h_{nom} 60	h_{nom} 70	h_{nom} 90
	Thickness of fixture [mm]		
Length of anchor [mm]	t_{fix1}	t_{fix2}	t_{fix3}
75	15	-	-
85	25	15	-
105	45	35	15

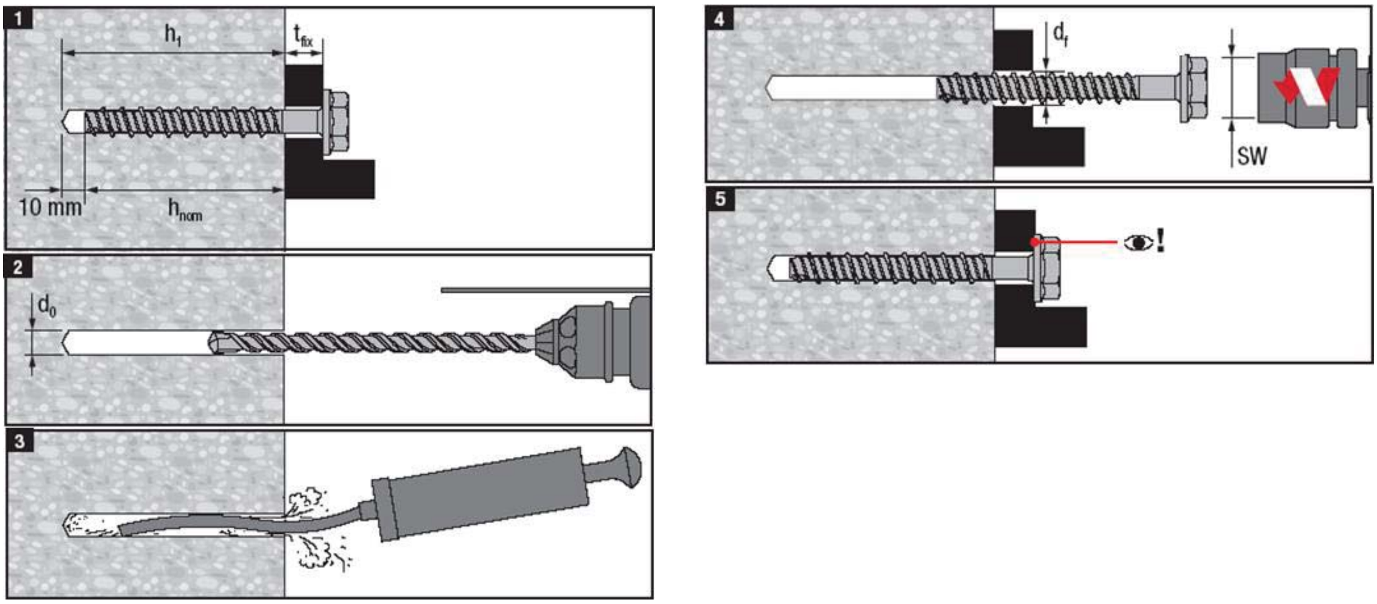


Setting

Recommended installation equipment

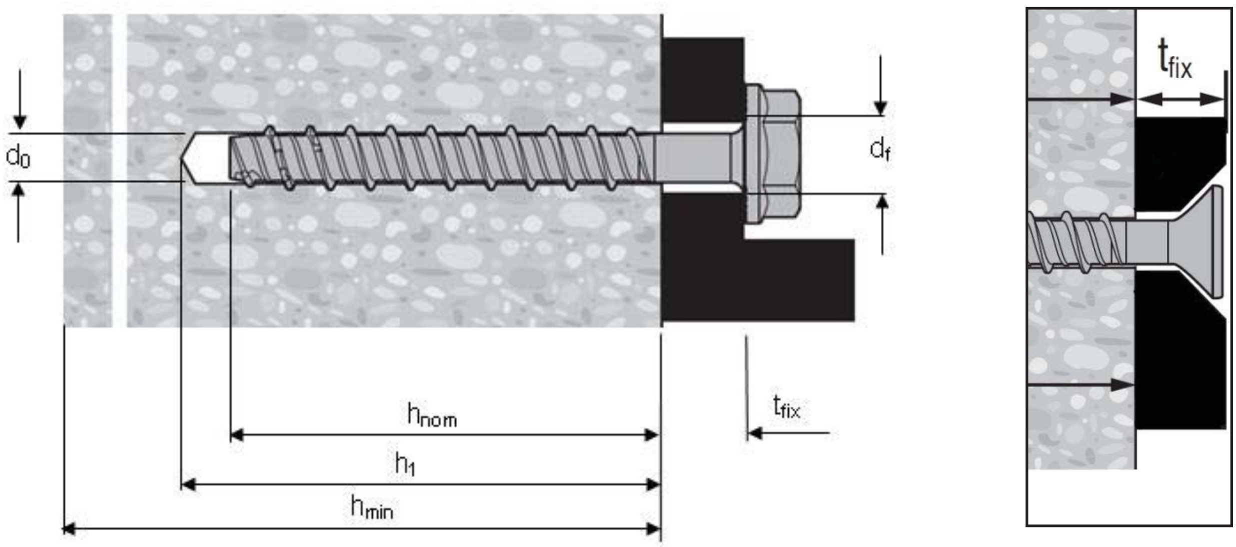
Anchor size	HUS	6	8	10	14
Rotary hammer		Hilti TE 2 – TE 30	Hilti TE 2 – TE 30	Hilti TE 2 – TE 30	Hilti TE 2 – TE 30
drill bit		TE-C3X 6/17	TE-C3X 8/17	TE-C3X 10/22	TE-C3X 14/22
Socket wrench insert		S-NSD 13 ½ (L)	S-NSD 13 ½ (L)	S-NSD 15 ½ (L)	S-NSD 21 ½
Torx (CR type only)		-	-	S-SY TX50	-
Impact screw driver		Hilti SIW 14-A, 22-A	Hilti SIW 22 T-A		

Setting instruction



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

Setting details: depth of drill hole h_1 and effective anchorage depth h_{ef}



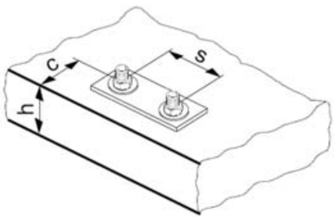
Setting details

Anchor version				6		8			10			14	
Type			HUS	HR		HR			HR, CR [a)]			HR	
Nominal embedment depth		h_{nom}	[mm]	30	55	50	60	80	60	70	90	70	110
Nominal diameter of drill bit		d_o	[mm]	6		8			10			14	
Cutting diameter of drill bit		$d_{cut} \leq$	[mm]	6,4		8,45			10,45			14,5	
Depth of drill hole		$h_1 \geq$	[mm]	40	65	60	70	90	70	80	100	80	120
Diameter of countersunk head		d_h	[mm]	-		-			21			-	
Diameter of clearance hole in the fixture		$d_f \leq$	[mm]	9		12			14			18	
Effective anchorage depth		h_{ef}	[mm]	23	45	38	47	64	46	54	71	52	86
Max, installation torque	Concrete	T_{inst}	[Nm]	20	- [a)]	35	- [a)]	- [a)]	45 [c)]			65	
	Solid m, Mz 12	T_{inst}	[Nm]	- [b)]	10	- [b)]	16	16	-	20	20	- [b)]	- [b)]
	Solid m, KS 12	T_{inst}	[Nm]	- [b)]	10	- [b)]	16	16	-	20	20	- [b)]	- [b)]
	Aerated conc,	T_{inst}	[Nm]	- [b)]	4	- [b)]	8	8	-	10	10	- [b)]	- [b)]

a) Hilti recommends machine setting only in concrete
b) Hilti does not recommend this setting process for this application,
c) Intallation torque refer to HUS-HR only

Base material thickness, anchor spacing and edge distance

Anchor size			6		8			10			14	
Type			HUS-HR		HUS-HR			HUS-HR, CR			HUS-HR	
Nominal embedment depth	h_{nom}	[mm]	30	55	50	60	80	60	70	90	70	110
Minimum base material thickness non-cracked concrete	h_{min}	[mm]	100	100	100	100	120	120	120	140	140	160
Minimum spacing	s_{min}	[mm]	35	35	45	45	50	50	50	50	50	60
Minimum edge distance	c_{min}	[mm]	35	35	45	45	50	50	50	50	50	60
Critical spacing for concrete cone and splitting failure	$s_{cr,N} =$ $s_{cr,sp}$	[mm]	69	135	114	141	192	166	194	256	187	310
Critical edge distance for concrete cone and splitting failure	$c_{cr,N} =$ $c_{cr,sp}$	[mm]	35	68	57	71	96	83	97	128	94	155



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,

Simplified design method

Simplified version of the design method according ETAG 001, Annex C, Design resistance according data given in ETA-08/0307 issue 2011,01,21,

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing
- Valid for a group of two anchors, (The method may also be applied for anchor groups with more than two anchors or more than one edge, The influencing factors must then be considered for each edge distance and spacing, The calculated design loads are then on the save side: They will be lower than the exact values according ETAG 001, Annex C, To avoid this, it is recommended to use the anchor design software PROFIS anchor)

The design method is based on the following simplification:

- No different loads are acting on individual anchors (no eccentricity)

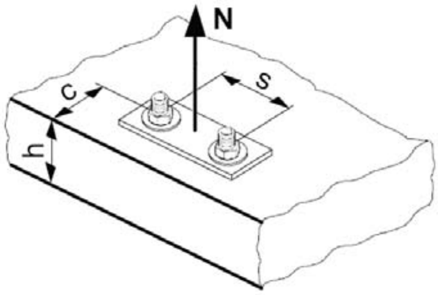
The values are valid for one anchor (single point fastening), multiple use applications are not part of this design method,

For more complex fastening applications please use the anchor design software PROFIS Anchor,

Tension loading

The design tensile resistance is the lower value of

- Steel resistance: $N_{Rd,s}$
- Concrete pull-out resistance: $N_{Rd,p} = N^0_{Rd,p} \cdot f_B$
- Concrete cone resistance: $N_{Rd,c} = N^0_{Rd,c} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$
- Concrete splitting resistance (only non-cracked concrete): $N_{Rd,sp} = N^0_{Rd,c} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{re,N}$



Basic design tensile resistance

Design steel resistance $N_{Rd,s}$

Anchor size		6	8	10	14
Type		HUS-HR	HUS-HR	HUS-HR, CR	HUS-HR
$N_{Rd,s}$	[kN]	17,0	24,3	37,6	73,0

Design pull-out resistance $N_{Rd,p} = N^0_{Rd,p} \cdot f_B$

	Non-cracked concrete				Cracked concrete			
Anchor size	**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Extra reduced embedment (Hilti Tech Data)								
h_{nom} [mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Tensile N_{Rd} [kN]	-	5,0	6,7	-	-	2,8	4,2	-
Reduced embedment								
h_{nom} [mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Tensile N_{Rd} [kN]	-	6,7	8,9	10,5	-	3,3	5,0	6,7
Standard embedment								
h_{nom} [mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Tensile N_{Rd} [kN]	4,3	8,9	13,9	22,3	2,4	6,7	8,9	13,9

Design concrete cone $N_{Rd,c} = N^0_{Rd,c} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$
Design splitting resistance* $N_{Rd,sp} = N^0_{Rd,c} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{re,N}$

	Non-cracked concrete				Cracked concrete			
Anchor size	**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type HUS	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)								
h_{nom} [mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
$N^0_{Rd,c}$ [kN]	-	6,6	8,7	-	-	4,7	6,2	-
Reduced embedment								
h_{nom} [mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
$N^0_{Rd,c}$ [kN]	-	9,0	11,1	10,5	-	6,4	7,9	7,5
Standard embedment								
h_{nom} [mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
$N^0_{Rd,c}$ [kN]	7,2	14,3	16,8	22,3	5,2	10,2	12,0	16,0

a) Splitting resistance must only be considered for non-cracked concrete

ETA: Data according ETA-08/0307 issue 2008-12-12 Hilti: Additional Hilti technical data

Influencing factors

Influence of concrete strength

Concrete strength designation (ENV 206)	C 20/25	C 25/30	C 30/37	C 35/45	C 40/50	C 45/55	C 50/60
$f_B = (f_{ck,cube}/25N/mm^2)^{0,5}$ a)	1	1,1	1,22	1,34	1,41	1,48	1,55

a) $f_{ck,cube}$ = concrete compressive strength, measured on cubes with 150 mm side length

Influence of edge distance a)

$c/c_{cr,N}$ / $c/c_{cr,sp}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_{1,N} = 0{,}7 + 0{,}3 \cdot c/c_{cr,N} \leq 1$ / $f_{1,sp} = 0{,}7 + 0{,}3 \cdot c/c_{cr,sp} \leq 1$	0,73	0,76	0,79	0,82	0,85	0,88	0,91	0,94	0,97	1
$f_{2,N} = 0{,}5 \cdot (1 + c/c_{cr,N}) \leq 1$ / $f_{2,sp} = 0{,}5 \cdot (1 + c/c_{cr,sp}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The edge distance shall not be smaller than the minimum edge distance c_{min} given in the table with the setting details, These influencing factors must be considered for every edge distance,

Influence of anchor spacing a)

$s/s_{cr,N}$ / $s/s_{cr,sp}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_{3,N} = 0{,}5 \cdot (1 + s/s_{cr,N}) \leq 1$ / $f_{3,sp} = 0{,}5 \cdot (1 + s/s_{cr,sp}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The anchor spacing shall not be smaller than the minimum anchor spacing s_{min} given in the table with the setting details, This influencing factor must be considered for every anchor spacing,

Influence of base material thickness

h/h_{ef}	2,0	2,2	2,4	2,6	2,8	3,0	3,2	3,4	3,6	≥ 3,68
$f_{h,sp} = [h/(2 \cdot h_{ef})]^{2/3}$	1	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,5

Influence of reinforcement

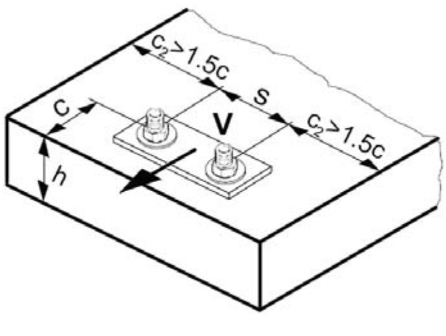
Anchor size		6		8			10			14	
Type	HUS	HR		HR			HR, CR			HR	
h_{nom}	[mm]	30	55	50	60	80	60	70	90	70	110
h_{ef}	[mm]	23	45	38	47	64	46	54	71	52	86
$f_{re,N} = 0{,}5 + h_{ef}/200mm \leq 1$		0,62	0,73	0,69	0,74	0,82	0,73	0,77	0,86	0,76	0,93

a) This factor applies only for dense reinforcement, If in the area of anchorage there is reinforcement with a spacing ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a spacing ≥ 100 mm, then a factor $f_{re,N} = 1$ may be applied,

Shear loading

The design shear resistance is the lower value of

- Steel resistance: $V_{Rd,s}$
- Concrete pryout resistance: $V_{Rd,cp} = k \cdot N_{Rd,c}$
- Concrete edge resistance: $V_{Rd,c} = V^0_{Rd,c} \cdot f_B \cdot f_ß \cdot f_h \cdot f_4 \cdot f_{hef} \cdot f_c$



Basic design shear resistance

Design steel resistance $V_{Rd,s}$

Anchor size			6	8	10	14
Type		HUS	HR	HR	HR, CR	HR
Extra reduced embedment	$V_{Rd,s}$	[kN]	11,3	17,3	22,0	-
Reduced embedment	$V_{Rd,s}$	[kN]	-	17,3	22,0	36,7
Standard embedment	$V_{Rd,s}$	[kN]	11,3	17,3	22,0	51,3

Design concrete pryout resistance $V_{Rd,cp} = k \cdot N_{Rd,c}$ a)

Anchor size		6		8			10			14	
Type	HUS	HR		HR			HR, CR			HR	
h_{nom}	[mm]	30	55	50	60	80	60	70	90	70	110
k		1,0	1,5	2,0							

a) $N_{Rd,c}$: Design concrete cone resistance

Design concrete edge resistance $V_{Rd,c} = V^0_{Rd,c} \cdot f_B \cdot f_ß \cdot f_h \cdot f_4 \cdot f_{hef} \cdot f_c$

		Non-cracked concrete				Cracked concrete			
Anchor size		6	8	10	14	6	8	10	14
Type	HUS	HR	HR	HR,CR	HR	HR	HR	HR,CR	HR
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	30	50	60	-	30	50	60	-
$V^0_{Rd,c}$	[kN]	-	5,9	8,6	-	-	4,2	6,1	-
Reduced embedment									
h_{nom}	[mm]	-	60	70	70	-	60	70	70
$V^0_{Rd,c}$	[kN]	-	5,9	8,6	15	-	4,2	6,1	10,6
Standard embedment									
h_{nom}	[mm]	55	80	90	110	55	80	90	110
$V^0_{Rd,c}$	[kN]	3,6	5,9	8,6	15,1	2,6	4,2	6,1	10,7

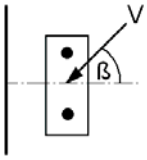
Influencing factors

Influence of concrete strength

Concrete strength designation (ENV 206)	C 20/25	C 25/30	C 30/37	C 35/45	C 40/50	C 45/55	C 50/60
$f_B = (f_{ck,cube}/25N/mm^2)^{0,5}$ a)	1	1,1	1,22	1,34	1,41	1,48	1,55

a) $f_{ck,cube}$ = concrete compressive strength, measured on cubes with 150 mm side length

Influence of angle between load applied and the direction perpendicular to the free edge

Angle ß		0°	10°	20°	30°	40°	50°	60°	70°	80°	≥ 90°
$f_\beta = \frac{1}{\sqrt{(\cos\alpha_V)^2 + \left(\frac{\sin\alpha_V}{2,5}\right)^2}}$		1	1,01	1,05	1,13	1,24	1,40	1,64	1,97	2,32	2,50

Influence of base material thickness

h/c	0,15	0,3	0,45	0,6	0,75	0,9	1,05	1,2	1,35	≥ 1,5
$f_h = \{h/(1,5 \cdot c)\}^{1/2} \leq 1$	0,32	0,45	0,55	0,63	0,71	0,77	0,84	0,89	0,95	1,00

Influence of anchor spacing and edge distance [a)] for concrete edge resistance: f_4

c/h_{ef}	Single anchor	Group of two anchors s/h_{ef}														
		0,75	1,50	2,25	3,00	3,75	4,50	5,25	6,00	6,75	7,50	8,25	9,00	9,75	10,50	11,25
0,50	0,35	0,27	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35
0,75	0,65	0,43	0,54	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65
1,00	1,00	0,63	0,75	0,88	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
1,25	1,40	0,84	0,98	1,12	1,26	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40
1,50	1,84	1,07	1,22	1,38	1,53	1,68	1,84	1,84	1,84	1,84	1,84	1,84	1,84	1,84	1,84	1,84
1,75	2,32	1,32	1,49	1,65	1,82	1,98	2,15	2,32	2,32	2,32	2,32	2,32	2,32	2,32	2,32	2,32
2,00	2,83	1,59	1,77	1,94	2,12	2,30	2,47	2,65	2,83	2,83	2,83	2,83	2,83	2,83	2,83	2,83
2,25	3,38	1,88	2,06	2,25	2,44	2,63	2,81	3,00	3,19	3,38	3,38	3,38	3,38	3,38	3,38	3,38
2,50	3,95	2,17	2,37	2,57	2,77	2,96	3,16	3,36	3,56	3,76	3,95	3,95	3,95	3,95	3,95	3,95
2,75	4,56	2,49	2,69	2,90	3,11	3,32	3,52	3,73	3,94	4,15	4,35	4,56	4,56	4,56	4,56	4,56
3,00	5,20	2,81	3,03	3,25	3,46	3,68	3,90	4,11	4,33	4,55	4,76	4,98	5,20	5,20	5,20	5,20
3,25	5,86	3,15	3,38	3,61	3,83	4,06	4,28	4,51	4,73	4,96	5,18	5,41	5,63	5,86	5,86	5,86
3,50	6,55	3,51	3,74	3,98	4,21	4,44	4,68	4,91	5,14	5,38	5,61	5,85	6,08	6,31	6,55	6,55
3,75	7,26	3,87	4,12	4,36	4,60	4,84	5,08	5,33	5,57	5,81	6,05	6,29	6,54	6,78	7,02	7,26
4,00	8,00	4,25	4,50	4,75	5,00	5,25	5,50	5,75	6,00	6,25	6,50	6,75	7,00	7,25	7,50	7,75
4,25	8,76	4,64	4,90	5,15	5,41	5,67	5,93	6,18	6,44	6,70	6,96	7,22	7,47	7,73	7,99	8,25
4,50	9,55	5,04	5,30	5,57	5,83	6,10	6,36	6,63	6,89	7,16	7,42	7,69	7,95	8,22	8,49	8,75
4,75	10,35	5,45	5,72	5,99	6,27	6,54	6,81	7,08	7,36	7,63	7,90	8,17	8,45	8,72	8,99	9,26
5,00	11,18	5,87	6,15	6,43	6,71	6,99	7,27	7,55	7,83	8,11	8,39	8,66	8,94	9,22	9,50	9,78
5,25	12,03	6,30	6,59	6,87	7,16	7,45	7,73	8,02	8,31	8,59	8,88	9,17	9,45	9,74	10,02	10,31
5,50	12,90	6,74	7,04	7,33	7,62	7,92	8,21	8,50	8,79	9,09	9,38	9,67	9,97	10,26	10,55	10,85

a) The anchor spacing and the edge distance shall not be smaller than the minimum anchor spacing s_{min} and the minimum edge distance c_{min},

Influence of embedment depth

Anchor size		6		8			10			14	
Type	HUS	HR		HR			HR, CR			HR	
h_{nom}	[mm]	30	55	50	60	80	60	70	90	70	110
$f_{hef} = 0,05 \cdot (h_{ef} / d)^{1,68}$		-	1,48	0,69	0,98	1,64	0,65	0,85	1,35	0,45	1,06

Influence of edge distance [a)]

c/d	4	6	8	10	15	20	30	40
$f_c = (d / c)^{0,19}$	0,77	0,71	0,67	0,65	0,60	0,57	0,52	0,50

a) The edge distance shall not be smaller than the minimum edge distance c_{min},

Combined tension and shear loading

For combined tension and shear loading see section “Anchor Design”,

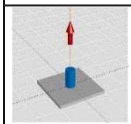
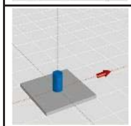
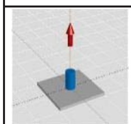
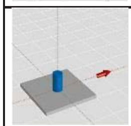
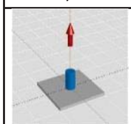
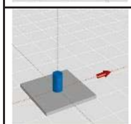
Precalculated values

Design resistance calculated according ETAG 001, Annex C and data given in ETA-08/0307, issue 2011,01,21, All data applies to concrete C 20/25 – $f_{ck,cube}$ =25 N/mm², Hilti technical data for the extra reduced embedment depth is not part of the approval,

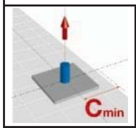
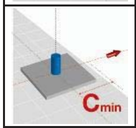
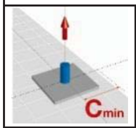
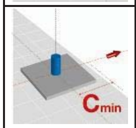
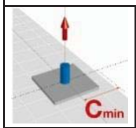
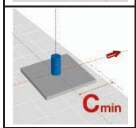
Recommended loads can be calculated by dividing the design resistance by an overall partial safety factor for action γ = 1,4, The partial safety factors for action depend on the type of loading and shall be taken from national regulations,

Design resistance

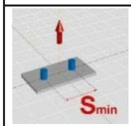
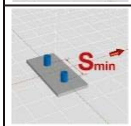
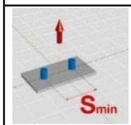
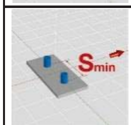
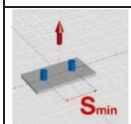
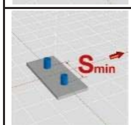
Single anchor, no edge effects (c ≥ c_{cr}), shear without lever arm

		Non-cracked concrete				Cracked concrete			
Anchor size		6	8	10	14	6	8	10	14
Type	HUS	HR	HR	HR,CR	HR	HR	HR	HR,CR	HR
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	30	50	60	-	30	50	60	-
Min, base material thickness h_{min}	[mm]	80	100	120	-	80	100	120	-
 Tensile N_{Rd}	[kN]	-	5,0	6,7	-	-	2,8	4,2	-
 Shear V_{Rd}	[kN]	-	15,7	21,0	-	-	11,2	15,0	-
Reduced embedment									
h_{nom}	[mm]	-	60	70	70	-	60	70	70
Min, base material thickness h_{min}	[mm]	-	100	120	140	-	100	120	140
 Tensile N_{Rd}	[kN]	-	6,7	8,9	10,5	-	3,3	5,0	6,7
 Shear V_{Rd}	[kN]	-	17,3	22,0	25,2	-	15,5	19,0	18,0
Standard embedment									
h_{nom}	[mm]	55	80	90	110	55	80	90	110
Min, base material thickness h_{min}	[mm]	100	120	140	160	100	120	140	160
 Tensile N_{Rd}	[kN]	4,3	8,9	13,9	22,3	2,4	6,7	8,9	13,9
 Shear V_{Rd}	[kN]	11,3	17,3	22,0	51,3	10,9	17,3	22,0	38,3

Single anchor, min, edge distance ($c = c_{min}$), shear without lever arm

			Non-cracked concrete				Cracked concrete			
Anchor size			**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type		**HUS**	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)										
h_{nom}		[mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Min, base material thickness h_{min} [mm]			80	100	120	-	80	100	120	-
Min, edge distance c_{min} [mm]			40	45	50	-	40	45	50	-
	**Tensile N_{Rd}**	[kN]	-	5,0	6,7	-	-	2,8	4,2	-
	**Shear V_{Rd}**	[kN]	-	3,8	4,7	-	-	2,7	3,3	-
Reduced embedment										
h_{nom}		[mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Min, base material thickness h_{min} [mm]			-	100	120	140	-	100	120	140
Min, edge distance c_{min} [mm]			-	45	50	50	-	45	50	50
	**Tensile N_{Rd}**	[kN]	-	6,6	8,0	7,7	-	3,3	5,0	4,9
	**Shear V_{Rd}**	[kN]	-	3,9	4,8	5,0	-	2,8	3,4	3,6
Standard embedment										
h_{nom}		[mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Min, base material thickness h_{min} [mm]			100	120	140	160	100	120	140	160
Min, edge distance c_{min} [mm]			40	50	50	60	40	50	50	60
	**Tensile N_{Rd}**	[kN]	4,3	8,9	10,4	13,8	2,4	6,7	6,8	9,0
	**Shear V_{Rd}**	[kN]	3,2	4,8	5,1	7,1	2,2	3,4	3,6	5,0

Double anchor, no edge effects ($c \geq c_{cr}$), min, spacing ($s = s_{min}$), shear without lever arm (load values are valid for one anchor)

		Non-cracked concrete				Cracked concrete			
Anchor size		**6**	**8**	**10**	**14**	**6**	**8**	**10**	**14**
Type	**HUS**	**HR**	**HR**	**HR,CR**	**HR**	**HR**	**HR**	**HR,CR**	**HR**
Extra reduced embedment (Hilti Tech Data)									
h_{nom}	[mm]	**30**	**50**	**60**	**-**	**30**	**50**	**60**	**-**
Min, base material thickness h_{min}	**[mm]**	80	100	120	-	80	100	120	-
Min, spacing s_{min}	**[mm]**	40	45	50	-	40	45	50	-
 **Tensile N_{Rd}**	[kN]	-	4,6	6,0	-	-	3,3	4,3	-
 **Shear V_{Rd}**	[kN]	-	11,0	14,3	-	-	7,8	10,2	-
Reduced embedment									
h_{nom}	[mm]	**-**	**60**	**70**	**70**	**-**	**60**	**70**	**70**
Min, base material thickness h_{min}	**[mm]**	-	100	120	140	-	100	120	140
Min, spacing s_{min}	**[mm]**	-	45	50	50	-	45	50	50
 **Tensile N_{Rd}**	[kN]	-	6,0	7,3	6,9	-	4,3	5,2	5,0
 **Shear V_{Rd}**	[kN]	-	14,3	17,5	16,7	-	10,2	12,5	11,9
Standard embedment									
h_{nom}	[mm]	**55**	**80**	**90**	**110**	**55**	**80**	**90**	**110**
Min, base material thickness h_{min}	**[mm]**	100	120	140	160	100	120	140	160
Min, spacing s_{min}	**[mm]**	40	50	50	60	40	50	50	60
 **Tensile N_{Rd}**	[kN]	4,7	9,1	10,4	13,8	3,4	6,5	7,4	9,8
 **Shear V_{Rd}**	[kN]	9,9	17,3	22,0	33,1	7,0	15,5	17,7	23,6

Fire resistance

Basic loading data for concrete C20/25 – C50/60

All data in this section applies to:
- Correct setting (see setting instruction)
- No edge distance and spacing influence
- Minimum base material thickness

The following technical data are based on: ETA-08/0307 issue 2014-04-29

Characteristic loads under fire exposure

Anchor Size				6	8		10		14	
Type			**HUS**	**HR**	**HR**		**HR, CR**		**HR, CR**	
				h_{nom}	h_{nom}	h_{nom}	h_{nom}	h_{nom}	h_{nom}	h_{nom}
Nominal embedment depth		h_{nom}	[mm]	50	60	80	70	90	70	110
Steel failure for tension and shear load ($F_{Rec,s,fi} = N_{Rec,s,fi} = V_{Rec,s,fi}$)										
Recommended tensile and shear load	R30	$F_{Rec,s,fi}$	[kN]	2,3	4,4		8,8		19,9	
	R60	$F_{Rec,s,fi}$	[kN]	1,6	3,0		5,7		12,8	
	R90	$F_{Rec,s,fi}$	[kN]	0,9	1,5		2,6		5,8	
	R120	$F_{Rec,s,fi}$	[kN]	0,5	0,8		1,1		2,6	
	R30	$M^0_{Rec,s,fi}$	[Nm]	1,9	3,9		9,2		31,2	
	R60	$M^0_{Rec,s,fi}$	[Nm]	1,3	2,6		6,0		20,2	
	R90	$M^0_{Rec,s,fi}$	[Nm]	0,7	1,3		2,7		9,1	
	R120	$M^0_{Rec,s,fi}$	[Nm]	0,4	0,7		1,2		4,0	
Pull out failure										
Recommended resistance	R30 R60 R90	$N_{Rec,p,fi}$	[kN]	0,6	0,7	1,4	1,1	1,9	1,4	3,0
	R120	$N_{Rec,p,fi}$	[kN]	0,5	0,6	1,1	0,9	1,5	1,1	2,4
Concrete cone failure										
Edge distance										
	R30 to R120	$c_{cr,N}$	[mm]	$2h_{ef}$						
Spacing										
	R30 to R120	$s_{cr,N}$	[mm]	$4h_{ef}$						
Concrete pry-out failure										
	R30 to R120	k	[-]	1,5	2,0		2,0		2,0	

b) gThe recommended loads under fire exposure include a safety factor for resistance under fire exposure $\gamma_{M,fi}$ = 1,0 and the partial safety factor for action $\gamma_{F,fi}$ = 1,0, The partial safety factors for action shall be taken from national regulations,

Seismic design

Basic loading data for concrete C20/25 – C50/60

All data in this section applies to:
- Seismic design according to TR045

The following technical data are based on: ETA-08/0307 issue 2014-04-30

Anchorage depth range

Anchor size			8	10	14
Type		**HUS**	**HR**	**HR, CR**	**HR**
Nominal anchorage depth range	h_{nom}	[mm]	80	90	110

Tension resistance in case of seismic performance category C1

Anchor size			8	10	14
Type		**HUS**	**HR**	**HR, CR**	**HR**
Characteristic tension resistance to steel failure					
	$N_{Rk,s,seis}$	[kN]	34,0	52,6	102,2
Partial safety factor	$\gamma_{Ms,seis}$	[-]	1,4		
Characteristic pull-out resistance in cracked concrete C20/25 to C50/60					
	$N_{Rk,p,seis}$	[kN]	7,7	12,5	17,5
Partial safety factor	$\gamma_{Mp,seis}$	[-]	1,8		
Concrete cone resistance and splitting resistance					
Partial safety factor	$\gamma_{Mc,seis} = \gamma_{Msp,seis}$	[-]	1,8		

Displacement under tension load in case of seismic performance category C1 1)

Anchor size			8	10	14
Type		**HUS**	**HR**	**HR, CR**	**HR**
Displacement	$\delta_{N,seis}$	[mm]	1,2	1,2	0,4

1) Maximum displacement during cycling (seismic event),

Shear resistance in case of seismic performance category C1 1)

Anchor size			8	10	14
Type		**HUS**	**HR**	**HR, CR**	**HR**
Characteristic shear resistance to steel failure					
	$V_{Rk,s,seis}$	[kN]	11,1	17,9	53,9
Partial safety factor	$\gamma_{Ms,seis}$	[-]	1,5		
Concrete pryout resistance and concrete edge resistance					
Partial safety factor	$\gamma_{Mc,seis}$	[-]	1,5		

1) Reduction factor α_{gap} = 1,0 when using the Hilti Dynamic Set

Displacement under tension load in case of seismic performance category C1 1)

Anchor size			8	10	14
Type		**HUS**	**HR**	**HR, CR**	**HR**
Displacement	$\delta_{V,seis}$	[mm]	4,8	5,3	7,6

1) Maximum displacement during cycling (seismic event)

Basic loading data for single anchor in solid masonry units

All data in this section applies to

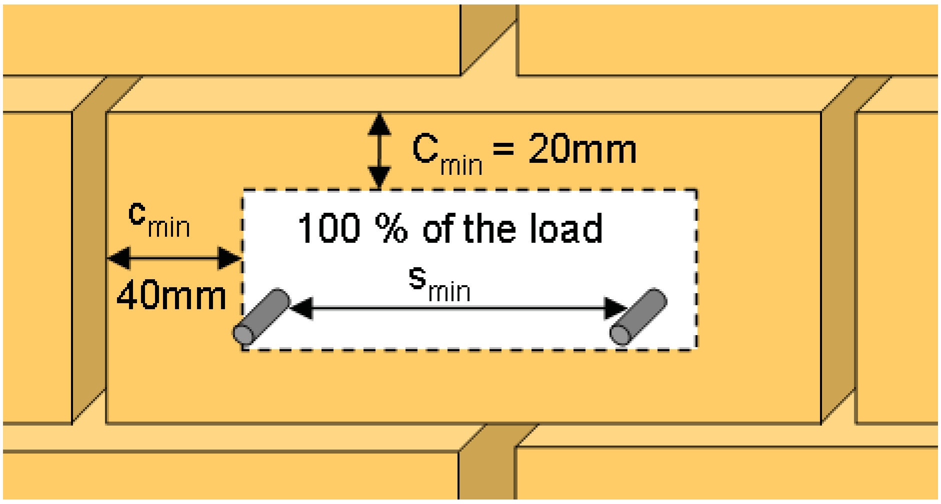
- Load values valid for holes drilled with TE rotary hammers in hammering mod
- Correct anchor setting (see instruction for use, setting details)
- The core / material ratio may not exceed 15% of a bed joint area,
- The brim area around holes must be at least 70mm
- Edge distances, spacing and other influences, see below

Recommended loads

				Hilti		
Base material		**Anchor size** **Type**		**6** **HUS-HR**	**8** **HUS-HR**	**10** **HUS-HR, CR**
Germany, Austria, Switzerland		h_{nom}	[mm]	**55**	**60**	**70**
Solid clay brick Mz12/2,0 	DIN 105/ EN 771-1 f_b a) ≥ 12 N/mm²	Tensile N_{rec}	[kN]	0,9	1,0	1,1
		Shear V_{rec}	[kN]	1,4	2,0	2,3
Solid sand-lime brick KS 12/2,0 	DIN 106/ EN 771-2 f_b a) ≥12 N/mm²	Tensile N_{rec}	[kN]	0,6	0,6	1,0
		Shear V_{rec}	[kN]	0,9	1,1	1,7
Aerated concrete PPW 6-0,4 	DIN 4165/ EN 771-4 f_b a) ≥ 6 N/mm²	Tensile N_{rec}	[kN]	0,2	0,2	0,4
		Shear V_{rec}	[kN]	0,4	0,4	0,9

a) f_b = brick strength

Permissible anchor location in brick and block walls



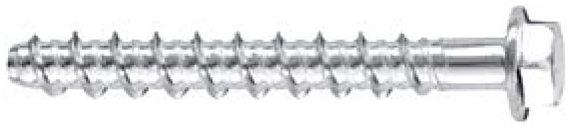
Edge distance and spacing influences

- The technical data for the HUS-HR anchors are reference loads for MZ 12 and KS 12, Due to the large variation of natural stone solid bricks, on site anchor testing is recommended to validate technical data,
- The HUS-HR anchor was installed and tested in center of solid bricks as shown, The HUS-HR 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,
- Distance to free edge free edge to solid masonry (Mz and KS) units ≥ 200 mm
- Distance to free edge free edge to solid masonry (autoclaved aerated gas concrete) units ≥ 170 mm
- The minimum distance to horizontal and vertical mortar joint (c_{min}) is stated in drawing above,
- Minimum anchor spacing (s_{min}) in one brick/block is ≥ $2*c_{min}$

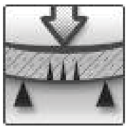
Limits

- Applied load to individual bricks may not exceed 1,0 kN without compression or 1,4 kN with compression
- All data is for multiple use for non structural applications
- Plaster, graveling, lining or levelling courses are regarded as non-bearing and may not be taken into account for the calculation of embedment depth,

HUS Screw anchor, carbon steel

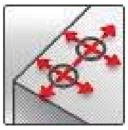
	Anchor version	Benefits
	HUS-A 6 Carbon steel Concrete Screw with hex head	- Quick and easy setting - Low expansion forces in base materials - Through fastening - Removable - Forged-on washer and hexagon head with no protruding thread
	HUS-H 6 Carbon steel Concrete Screw with hex head	
	HUS-H 8 HUS-H 10 HUS-H 14 Carbon steel Concrete Screw with hex head	
	HUS-I 6 Carbon steel Concrete Screw with hex head	
	HUS-P 6 Carbon steel Concrete Screw with pan head	


Concrete


Tensile zone

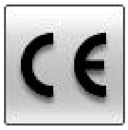

Solid brick


Autoclaved aerated concrete


Small edge distance and spacing


Fire resistance


European Technical Approval


CE conformity


PROFIS Anchor design software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)] with fire assessment according TR020	DIBt, Berlin	ETA-08/0307/ 2014-04-29
Fire test report	IBMB, Brunswick	UB3574/5146/ 2006-05-20
Fire Assessment report	Exova Warringtonfire	WF 166402/ 2007-10-26

a) Does not include HUS-H 14

Basic loading data for concrete C20/25

All data in this section applies to

For details see simplified design method

- 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

The following technical data are based on: **ETA:** Data according ETA-08/0307 issue 2014-04-29
Hilti: Additional Hilti technical data

Mean ultimate resistance

		ETA-08/0307						Hilti				
Anchor size		6		8		10		8	10	14		
Type	**HUS-**	A, H, I	P	H		H		H	H	H		
h_{nom}	**[mm]**	55	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete												
Tensile $N_{Ru,m}$	[kN]	12,0	10,0	16,0	21,3	16,0	26,7	11,2	16,0	23,8	36,9	56,0
Shear $V_{Ru,m}$	[kN]	13,2	13,2	16,7	16,7	25,1	25,1	16,7	25,1	47,6	53,8	53,8
Cracked concrete												
Tensile $N_{Ru,m}$	[kN]	8,0		8,0	12,0	10,0	21,3	5,2	8,5	-	19.1	-
Shear $V_{Ru,m}$	[kN]	13,2		16,7	16,7	25,1	25,1	16,7	25,1	-	53,8	-

Characteristic resistance

		ETA-08/0307						Hilti				
Anchor size		6		8		10		8	10	14		
Type	**HUS-**	A, H, I	P	H		H		H	H	H		
h_{nom}	**[mm]**	55	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete												
Tensile N_{Rk}	[kN]	9,0	7,5	12,0	16,0	12,0	20,0	8,4	12,0	17,8	27,6	42
Shear V_{Rk}	[kN]	12,5	12,5	15,9	15,9	23,8	23,8	15,9	23,8	35,6	51,2	51,2
Cracked concrete												
Tensile N_{Rk}	[kN]	6,0		6,0	9,0	7,5	16,0	3,9	6,4	-	14,3	-
Shear V_{Rk}	[kN]	12,5		15,9	15,9	23,8	23,8	15,6	21,0	-	39,5	-

Design resistance

		ETA-08/0307						Hilti				
Anchor size		6		8		10		8	10	14		
Type	**HUS-**	A, H, I	P	H		H		H	H	H		
h_{nom}	**[mm]**	55	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete												
Tensile N_{Rd}	[kN]	5,0	4,2	6,7	8,9	6,7	9,5	4,7	6,7	9,9	15,4	24,0
Shear V_{Rd}	[kN]	8,3	8,3	10,6	10,6	15,9	15,9	10,6	15,9	23,8	34,1	34,1
Cracked concrete												
Tensile N_{Rd}	[kN]	3,3		3,3	5,0	4,2	7,6	2,2	3,6	-	9,5	-
Shear V_{Rd}	[kN]	8,3		10,6	10,6	15,9	15,9	10,4	14,0	-	26,3	-

Recommended loads

		ETA-08/0307						Hilti				
Anchor size		6		8		10		8	10	14		
Type	**HUS-**	A, H, I	P	H		H		H	H	H		
h_{nom}	**[mm]**	55	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete												
Tensile N_{rec}	[kN]	3,6	3,0	4,8	6,3	4,8	6,8	3,3	4,8	7,1	11,0	17,1
Shear V_{rec}	[kN]	6,0	6,0	7,6	7,6	11,3	11,3	7,6	11,3	17,0	24,4	24,4
Cracked concrete												
Tensile N_{rec}	[kN]	2,4		2,4	3,6	3,0	5,4	1,5	2,5	-	6,8	-
Shear V_{rec}	[kN]	6,0		7,6	7,6	11,3	11,3	7,4	10,0	-	18,8	-

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.

Basic loading data for concrete < 28 days old and $f_{ck,cube}$ ≥ 15 N/mm²:

All data in this section applies to the following conditions:

Concrete:
- Strength class C 20/25, $f_{ck,cube}$ ≥ 15 N/mm²

Installation:
- For hand installation $T_{inst,rec}$ = 40 Nm

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.

Loads:
- No edge distance and spacing influence
- Minimum base material thickness

Recommended loads in non-cracked concrete

		Hilti		
Anchor size		**14**	**14**	**14**
Type	**HUS-**	**H**	**H**	**H**
h_{nom}	**[mm]**	**70**	**90**	**110**
Non-cracked concrete				
Tensile N_{rec} a)	[kN]	3,5	5,5	7,5
Shear V_{rec} a)	[kN]	6,6	14,0	16,5

a) Values serve as a reference, onsite testing is recommended to determine actual loading potential of the anchors

Basic loading data for single anchor in solid masonry units:

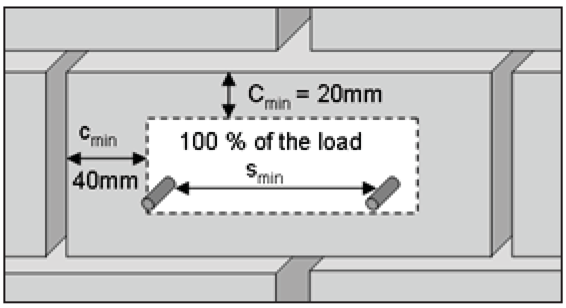
All data in this section applies to the following conditions:

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%

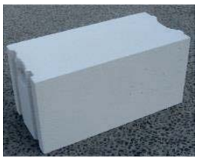
Drilling:
- Holes in Mz and KS drilled with TE rotary hammers drilled with hammering mode
- Holes in PPW drilled with TE rotary hammers drilled without hammering mode

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 $c_{min,free}$ ≥ 200 mm
- Distance to free edge free edge to solid masonry (autoclaved aerated gas concrete) units $c_{min,free}$ ≥ 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

	Base material		Hilti		
		Anchor size	**6**	**8**	**10**
		Type HUS-	**A, H, I, P**	**H**	**H**
		h_{nom} [mm]	**55**	**60**	**70**
		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	0,6	0,8	1,0
		≥ 10	0,7	0,9	1,2
		≥ 12	0,8	1,0	1,3
		≥ 16	0,9	1,2	1,5
		≥ 20	0,9	1,3	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	0,8	1,0	1,1
		≥ 10	0,9	1,1	1,2
		≥ 12	1,0	1,2	1,3
		≥ 16	1,1	1,3	1,5
		≥ 20	1,2	1,5	1,7
	**Aerated concrete** **PPW -0,65** DIN 4165/ EN 771-4 LxWxH [mm]: 499x240x249 h_{min} [mm]: 240	≥ 6	0,4	0,5	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 s_{min} 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:

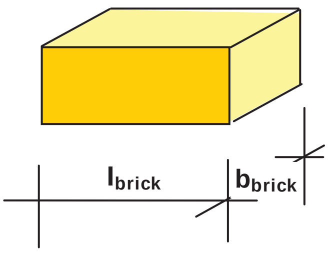
Clay bricks:

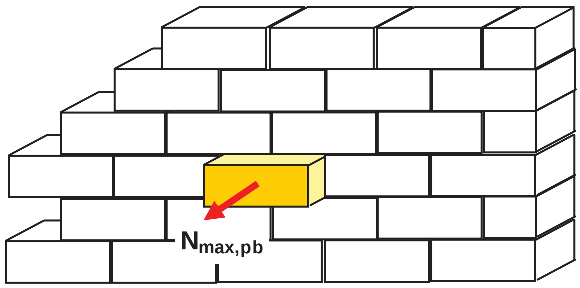
$N_{max,pb}$ [kN]		brick breadth b_{brick} [mm]					
		80	120	200	240	300	360
brick length l_{brick} [mm]	240	1,1	1,6	2,7	3,3	4,1	4,9
	300	1,4	2,1	3,4	4,1	5,1	6,2
	500	2,3	3,4	5,7	6,9	8,6	10,3

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





Materials

Mechanical properties

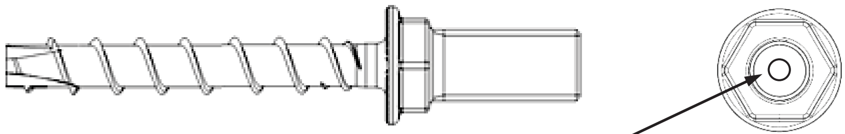
Anchor size		6	8	10	14
Type	**HUS-**	**A, H, I, P**	**H**	**H**	**H**
Nominal tensile strength f_{uk}	[N/mm²]	930	950	1000	770
Yield strength f_{yk}	[N/mm²]	750	855	900	700
Stressed cross-section A_s	[mm²]	26,9	39,0	55,4	143,1
Moment of resistance W	[mm³]	19,6	34,4	58,2	191,7
Design bending resistance $M_{Rd,s}$	[Nm]	21,9	26,1	46,5	118

Material quality

Part	Designation	Material
Screw anchor	HUS-A 6 HUS-H 6 HUS-I 6 HUS-P 6 HUS-H 8 HUS-H 10 HUS-H 14	Carbon Steel, galvanized (≥ 5 µm)

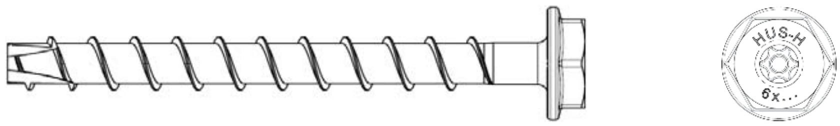
Head configuration

HUS-A 6
External thread
M8 or M10

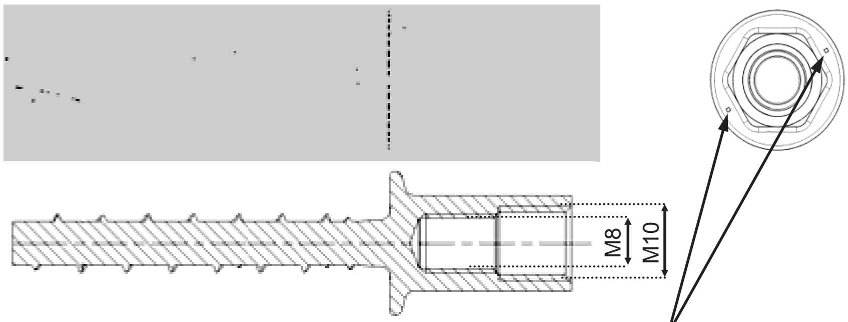


Circle mark with d = 2,5 mm for h_{nom} = 55 mm

HUS-H 6
Hex head

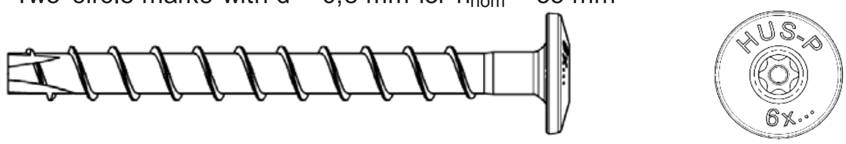


HUS-I 6
Internal threads
M8 and M10



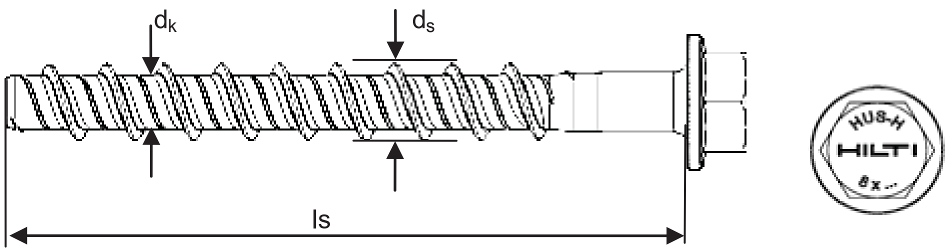
Two circle marks with d = 0,8 mm for h_{nom} = 55 mm

HUS-P 6
Pan head



HUS-H 8
HUS-H 10
HUS-H 14

Hex head



Anchor dimensions:

Dimensions

Anchor size			6				8	10	14
Type		HUS-	A	H	I	P	H	H	H
Nominal length	l_S	[mm]	55	60..120	55	60..80	65..150	75..280	80..160
Outer diameter of thread	d_S	[mm]	7,85				10,1	12,3	16,55
Core diameter	d_k	[mm]	5,85				7,1	8,4	12,6

Setting:

Recommended installation equipment

Anchor Size		6				8			10			14		
Type	HUS-	A	I	H	P	H			H			H		
h_{nom}	[mm]	55				50	60	70	60	70	85	70	90	110
Rotary hammer		TE 2 - TE 7				TE 2 - TE 30								
drill bit for concrete, solid clay brick solid sand-lime brick		TE -CX 6				TE -CX 8			TE -CX 10			TE -CX 14		
drill bit for aerated concrete		TE -CX 5				TE -CX 6			TE -CX 8			-		
Socket wrench insert		S-NSD 13 1/2 L			-	S-NSD 13 1/2 L			S-NSD 15 1/2			S-NSD 21 1/2		
TORX		-		TXI 30		-			-			-		
Setting tool		SIW/ SID 121 SIW/ SID 144 TKI 2500				SIW 22T-A SI 100								

Setting details for concrete from C20/25 to C50/60

Anchor size			6				8			10			14		
Type		HUS-	A	I	H	P	H			H			H		
h_{nom}		[mm]	55				50	60	70	60	70	85	70	90	110
Nominal diameter of drill bit	d_0	[mm]	6				8			10			14		
Cutting diameter of drill bit	d_{cut} ≤	[mm]	6,4				8,45			10,45			14,50		
Clearance hole diameter	d_f	[mm]	9				12			14			18		
Depth of drill hole in floor/ wall position	h_1 ≥	[mm]	h_{nom}+10 mm				h_{nom} +10 mm			h_{nom} +10 mm			h_{nom} +10 mm		
Depth of drill hole in ceiling position	h_1 ≥	[mm]	h_{nom}+3 mm												
Thickness of fixture	t_{fix}	[mm]	l_s - h_{nom}												
Max. installation torque for hand setting	max. T_{inst}	[Nm]	25				35	35	45	45	45	55	65 (40)[a]		
Impact screw driver for machine setting			SIW/SID 121,144 TKI 2500				SIW 22T-A SI 100						SIW 22T-A SI 100 [b]		

[a] For concrete < 28 days old and $f_{ck,cube}$ ≥ 15 N/mm²

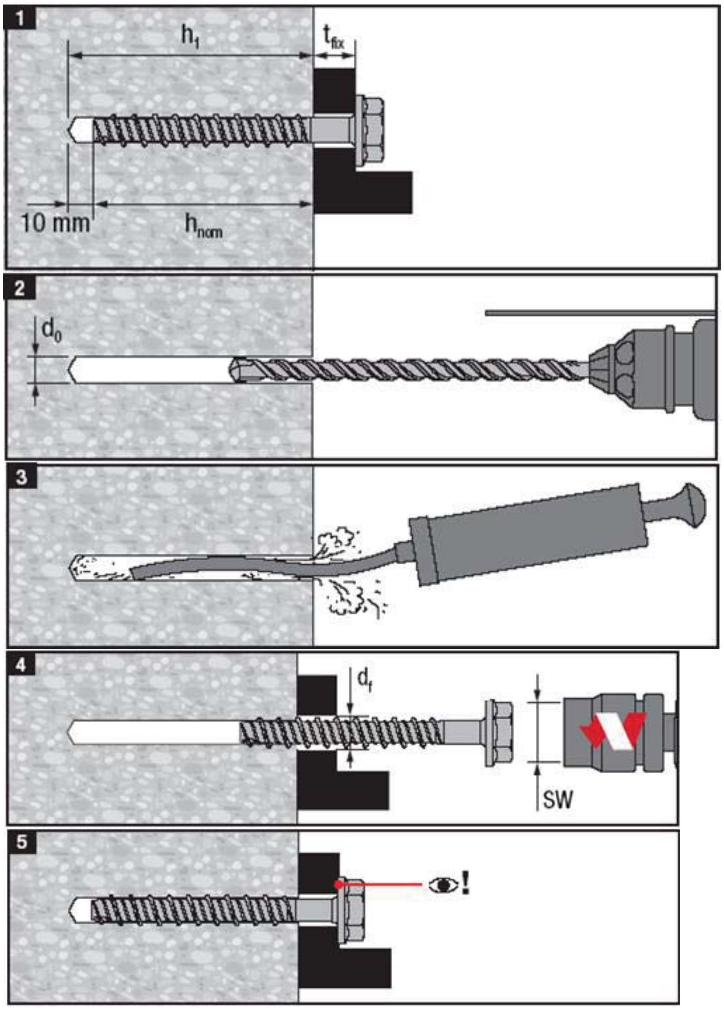
[b] For concrete < 28 days old and $f_{ck,cube}$ ≥ 15 N/mm² only hand setting is recommended

Setting details for masonry

Anchor size			6				8	10
Type		**HUS-**	**A**	**I**	**H**	**P**	**H**	**H**
h_{nom}		**[mm]**	**55**				**60**	**70**
Nominal diameter of drill bit diameter for solid clay (Mz) and sand-lime brick (KS)	d_0	[mm]	6				8	10
Nominal diameter of drill bit Aerated concrete (PPW)	d_0	[mm]	5				6	8
Clearance hole diameter	d_f	[mm]	9				12	14
Depth of drill hole	h_1 ≥	[mm]	h_{nom}+10 mm					
Thickness of fixture	t_{fix}	[mm]	l_s - h_{nom}					
Max. installation torque for hand setting [a]								
Solid clay brick (MZ)	max. T_{inst}	[Nm]	8				8	8
Solid sand-lime brick (KS)	max. T_{inst}	[Nm]	12				16	16
Aerated concrete (PPW)	max. T_{inst}	[Nm]	5				5	8

[a] Only hand setting is recommended

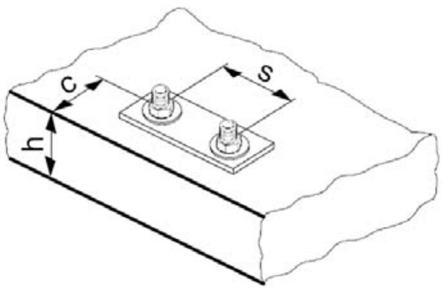
Setting instruction



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

Base material thickness, anchor spacing and edge distance for concrete from C20/25 to C50/60

Anchor size				6	8			10			14		
Type			**HUS-**	**A, I, H, P**	**H**			**H**			**H**		
h_{nom}			**[mm]**	**55**	**50**	**60**	**75**	**60**	**70**	**85**	**70**	**90**	**110**
Minimum base material thickness		h_{min}	[mm]	100	100	110	120	110	130	130	130	170	210
non-cracked concrete	Minimum spacing	s_{min}	[mm]	35	55			65			80		
	Minimum edge distance	c_{min}	[mm]	35	55			65			60		
cracked concrete	Minimum spacing	s_{min}	[mm]	35	55	40	40	65	50	50	-	80	-
	Minimum edge distance	c_{min}	[mm]	35	55	50	50	65	50	50	-	60	-
Effective anchorage depth		h_{ef}	[mm]	42	36	47	60	44	54	67	50	69	90
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 and/ or edge distance smaller than critical spacing and/ or critical edge distance the design loads have to be reduced.

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.

Simplified design method

Simplified version of the design method according ETAG 001, Annex C. Design resistance according data given in ETA-08/0307 issue 2014-04-29.

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing

- Valid for a group of two anchors. (The method may also be applied for anchor groups with more than two anchors or more than one edge. The influencing factors must then be considered for each edge distance and spacing. The calculated design loads are then on the save side: They will be lower than the exact values according ETAG 001, Annex C. To avoid this, it is recommended to use the anchor design software PROFIS anchor)

The design method is based on the following simplification:
- No different loads are acting on individual anchors (no eccentricity)

The values are valid for one anchor.

For more complex fastening applications please use the anchor design software PROFIS Anchor.

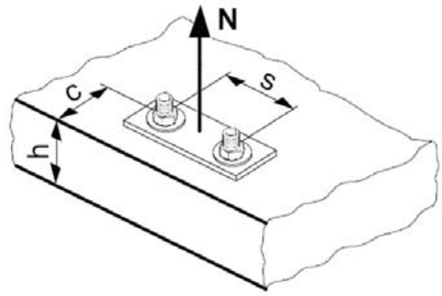
Tension loading

The design tensile resistance is the lower value of

- Steel resistance: $N_{Rd,s}$
- Concrete pull-out resistance: $N_{Rd,p} = N^0_{Rd,p} \cdot f_B$
- Concrete cone resistance: $N_{Rd,c} = N^0_{Rd,c} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$
- Concrete splitting resistance (only non-cracked concrete):

For HUS-A, H, I, P $N_{Rd,sp} = N^0_{Rd,p} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{h,sp} \cdot f_{re,N}$

For all the other HUS $N_{Rd,sp} = N^0_{Rd,c} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{h,sp} \cdot f_{re,N}$



Basic design tensile resistance

Design steel resistance $N_{Rd,s}$

	ETA-08/0307			Hilti
Anchor size	HUS-A, H, I, P	HUS-H 8	HUS-H 10	HUS-H 14
$N_{Rd,s}$ [kN]	16,7	26,5	39,6	67,5

ETA: Data according ETA-08/0307 issue 2014-04-29 Hilti: Additional Hilti technical data

Design pull-out resistance $N_{Rd,p} = N^0_{Rd,p} \cdot f_B$

	ETA-08/0307						Hilti				
Anchor size	6		8		10		8	10	14		
Type HUS-	A, H, I	P	H		H		H		H		
h_{nom}	55	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete											
Tensile $N^0_{Rd,p}$ [kN]	5	4,2	6,7	8,9	6,7	9,5	4,7	6,7	14,7	22,7	28,0
Cracked concrete											
Tensile $N^0_{Rd,p}$ [kN]	3,3	3,3	3,3	5,0	4,2	7,6	2,2	3,6	-	9,5	-

ETA: Data according ETA-08/0307 issue 2014-04-29 Hilti: Additional Hilti technical data

Design concrete cone resistance $N_{Rd,c} = N^0_{Rd,c} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$
Design splitting resistance a) $N_{Rd,sp} = N^0_{Rd,c} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{h,sp} \cdot f_{re,N}$
b) $N_{Rd,sp} = N^0_{Rd,p} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{h,sp} \cdot f_{re,N}$

	ETA-08/0307					Hilti				
Anchor size	6	8	8	10	10	8	10	14	14	14
h_{nom}	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete										
Tensile $N^0_{Rd,c}$ [kN]	7,6	9,0	13,0	11,1	13,2	6,0	8,2	11,9	18,4	28,7
Cracked concrete										
Tensile $N^0_{Rd,c}$ [kN]	5,4	6,4	9,3	7,9	9,4	4,3	5,8	-	13,2	-

a) Splitting resistance must only be considered for non-cracked concrete
b) Equation valid for HUS-A, H, I, P 6

ETA: Data according ETA-08/0307 issue 2014-04-29 Hilti: Additional Hilti technical data

Influencing factors

Influence of concrete strength

Concrete strength designation (ENV 206)	HUS	h_{nom}	C 20/25	C 25/30	C 30/37	C 35/45	C 40/50	C 45/55	C 50/60
$f_B = (f_{ck,cube}/25N/mm^2)^{0,5}$ a)	6	55	1	1,10	1,22	1,34	1,41	1,48	1,55
	8	50...75							
	10	85							
	14	70...110							
$f_B = (f_{ck,cube}/25N/mm^2)^{0,4}$ a)	10	60...70	1	1,08	1,17	1,27	1,32	1,37	1,42

a) $f_{ck,cube}$ = concrete compressive strength, measured on cubes with 150 mm side length

Influence of edge distance a)

$c/c_{cr,N}$ / $c/c_{cr,sp}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_{1,N} = 0,7 + 0,3 \cdot c/c_{cr,N} \leq 1$ / $f_{1,sp} = 0,7 + 0,3 \cdot c/c_{cr,sp} \leq 1$	0,73	0,76	0,79	0,82	0,85	0,88	0,91	0,94	0,97	1
$f_{2,N} = 0,5 \cdot (1 + c/c_{cr,N}) \leq 1$ / $f_{2,sp} = 0,5 \cdot (1 + c/c_{cr,sp}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The edge distance shall not be smaller than the minimum edge distance c_{min} given in the table with the setting details. These influencing factors must be considered for every edge distance.

Influence of anchor spacing a)

$s/s_{cr,N}$ / $s/s_{cr,sp}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_{3,N} = 0,5 \cdot (1 + s/s_{cr,N}) \leq 1$ / $f_{3,sp} = 0,5 \cdot (1 + s/s_{cr,sp}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The anchor spacing shall not be smaller than the minimum anchor spacing s_{min} given in the table with the setting details. This influencing factor must be considered for every anchor spacing.

Influence of base material thickness

h/h_{ef}	2,0	2,2	2,4	2,6	2,8	3,0	3,2	3,4	3,6	≥ 3,68
$f_{h,sp} = [h/(2 \cdot h_{ef})]^{2/3}$	1	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,5

Influence of reinforcement

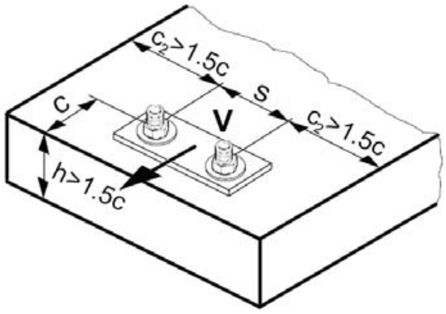
Anchor size	6	8			10			14		
Type HUS-	A, H, I, P	H			H			H		
h_{nom} [mm]	55	50	60	75	60	70	85	70	90	110
h_{ef} [mm]	42	36	46,9	59,6	44	52,7	66,8	50	67	90
$f_{re,N}$ a) $= 0,5 + h_{ef}/200mm \leq 1$	0,71	0,68	0,73	0,8	0,72	0,76	0,83	0,7	0,84	0,95

a) This factor applies only for dense reinforcement. If in the area of anchorage there is reinforcement with a spacing ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a spacing ≥ 100 mm, then a factor $f_{re,N}$ = 1 may be applied.

Shear loading

The design shear resistance is the lower value of

- Steel resistance: $V_{Rd,s}$
- Concrete pryout resistance: $V_{Rd,cp} = V^0_{Rd,cp} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$
- Concrete edge resistance: $V_{Rd,c} = V^0_{Rd,c} \cdot f_B \cdot f_ß \cdot f_h \cdot f_4$



Basic design shear resistance

Design steel resistance $V_{Rd,s}$

	ETA-08/0307			Hilti
Anchor size	HUS-A, H, I, P 6	HUS-H 8	HUS-H 10	HUS-H 14
$V_{Rd,s}$ [kN]	8,3	10,6	15,9	34,1

Design concrete pryout resistance $V_{Rd,cp} = V^0_{Rd,cp} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$

	ETA-08/0307					Hilti				
Anchor size	6	8	8	10	10	8	10	14	14	14
h_{nom}	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete										
$V^0_{Rd,cp}$ [kN]	13,7	21,7	31,2	26,7	36,9	14,5	19,6	23,8	36,9	57,4
Cracked concrete										
$V^0_{Rd,cp}$ [kN]	9,8	15,5	22,3	19,0	26,3	10,4	14,0	-	26,3	-

Design concrete edge resistance $V_{Rd,c} = V^0_{Rd,c} \cdot f_B \cdot f_ß \cdot f_4$

	ETA-08/0307					Hilti				
Anchor size	6	8	8	10	10	8	10	14	14	14
h_{nom}	55	60	75	70	85	50	60	70	90	110
Non-cracked concrete										
$V^0_{Rd,c}$ [kN]	2,1	2,7	4,1	3,7	5,3	1,7	2,6	3,6	5,9	9,7
Cracked concrete										
$V^0_{Rd,c}$ [kN]	1,5	1,9	3,0	2,6	3,8	1,2	1,9	-	4,2	-

Influencing factors

Influence of concrete strength

Concrete strength designation (ENV 206)	HUS	h_{nom}	C 20/25	C 25/30	C 30/37	C 35/45	C 40/50	C 45/55	C 50/60
$f_B = (f_{ck,cube}/25N/mm^2)^{0,5}$ a)	6	55	1	1,10	1,22	1,34	1,41	1,48	1,55
	8	50…75							
	10	85							
	14	70…110							
$f_B = (f_{ck,cube}/25N/mm^2)^{0,4}$ a)	10	60…70	1	1,08	1,17	1,27	1,32	1,37	1,42

a) $f_{ck,cube}$ = concrete compressive strength, measured on cubes with 150 mm side length

Influence of edge distance a)

$c/c_{cr,N}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_{1,N} = 0,7 + 0,3 \cdot c/c_{cr,N} \leq 1$	0,73	0,76	0,79	0,82	0,85	0,88	0,91	0,94	0,97	1
$f_{2,N} = 0,5 \cdot (1 + c/c_{cr,N}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The edge distance shall not be smaller than the minimum edge distance c_{min} given in the table with the setting details. These influencing factors must be considered for every edge distance.

Influence of anchor spacing a)

$s/s_{cr,N}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_{3,N} = 0,5 \cdot (1 + s/s_{cr,N}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

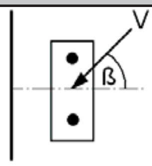
a) The anchor spacing shall not be smaller than the minimum anchor spacing s_{min} given in the table with the setting details. This influence factor must be considered for every anchor spacing.

Influence of reinforcement

Anchor size		6	8			10			14		
Type	HUS-	A, H, I, P	H			H			H		
h_{nom}	[mm]	55	50	60	75	60	70	85	70	90	110
h_{ef}	[mm]	42	36	46,9	59,6	44	52,7	66,8	50	67	90
$f_{re,N}$ a) $= 0,5 + h_{ef}/200mm \leq 1$		0,71	0,68	0,73	0,8	0,72	0,76	0,83	0,7	0,84	0,95

a) This factor applies only for dense reinforcement. If in the area of anchorage there is reinforcement with a spacing ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a spacing ≥ 100 mm, then a factor $f_{re,N}$ = 1 may be applied.

Influence of angle between load applied and the direction perpendicular to the free edge

Angle ß		0° - 55°	60°	65°	70°	75°	80°	85°	90° - 180°
$f_ß$		1,00	1,07	1,14	1,23	1,35	1,50	1,71	2,00

Influence of base material thickness

h/c	0,15	0,3	0,45	0,6	0,75	0,9	1,05	1,2	1,35	≥ 1,5
$f_h = \{h/(1,5 \cdot c)\}^{2/3} \leq 1$	0,22	0,34	0,45	0,54	0,63	0,71	0,79	0,86	0,93	1,00

Influence of anchor spacing and edge distance [a)] for concrete edge resistance: f_4

$f_4 = (c/h_{ef})^{1,5} \cdot (1 + s / [3 \cdot c]) \cdot 0,5$

c/h_{ef}	Single anchor	Group of two anchors s/h_{ef}														
		0,75	1,50	2,25	3,00	3,75	4,50	5,25	6,00	6,75	7,50	8,25	9,00	9,75	10,50	11,25
0,50	0,35	0,27	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35
0,75	0,65	0,43	0,54	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65
1,00	1,00	0,63	0,75	0,88	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
1,25	1,40	0,84	0,98	1,12	1,26	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40	1,40
1,50	1,84	1,07	1,22	1,38	1,53	1,68	1,84	1,84	1,84	1,84	1,84	1,84	1,84	1,84	1,84	1,84
1,75	2,32	1,32	1,49	1,65	1,82	1,98	2,15	2,32	2,32	2,32	2,32	2,32	2,32	2,32	2,32	2,32
2,00	2,83	1,59	1,77	1,94	2,12	2,30	2,47	2,65	2,83	2,83	2,83	2,83	2,83	2,83	2,83	2,83
2,25	3,38	1,88	2,06	2,25	2,44	2,63	2,81	3,00	3,19	3,38	3,38	3,38	3,38	3,38	3,38	3,38
2,50	3,95	2,17	2,37	2,57	2,77	2,96	3,16	3,36	3,56	3,76	3,95	3,95	3,95	3,95	3,95	3,95
2,75	4,56	2,49	2,69	2,90	3,11	3,32	3,52	3,73	3,94	4,15	4,35	4,56	4,56	4,56	4,56	4,56
3,00	5,20	2,81	3,03	3,25	3,46	3,68	3,90	4,11	4,33	4,55	4,76	4,98	5,20	5,20	5,20	5,20
3,25	5,86	3,15	3,38	3,61	3,83	4,06	4,28	4,51	4,73	4,96	5,18	5,41	5,63	5,86	5,86	5,86
3,50	6,55	3,51	3,74	3,98	4,21	4,44	4,68	4,91	5,14	5,38	5,61	5,85	6,08	6,31	6,55	6,55
3,75	7,26	3,87	4,12	4,36	4,60	4,84	5,08	5,33	5,57	5,81	6,05	6,29	6,54	6,78	7,02	7,26
4,00	8,00	4,25	4,50	4,75	5,00	5,25	5,50	5,75	6,00	6,25	6,50	6,75	7,00	7,25	7,50	7,75
4,25	8,76	4,64	4,90	5,15	5,41	5,67	5,93	6,18	6,44	6,70	6,96	7,22	7,47	7,73	7,99	8,25
4,50	9,55	5,04	5,30	5,57	5,83	6,10	6,36	6,63	6,89	7,16	7,42	7,69	7,95	8,22	8,49	8,75
4,75	10,35	5,45	5,72	5,99	6,27	6,54	6,81	7,08	7,36	7,63	7,90	8,17	8,45	8,72	8,99	9,26
5,00	11,18	5,87	6,15	6,43	6,71	6,99	7,27	7,55	7,83	8,11	8,39	8,66	8,94	9,22	9,50	9,78
5,25	12,03	6,30	6,59	6,87	7,16	7,45	7,73	8,02	8,31	8,59	8,88	9,17	9,45	9,74	10,02	10,31
5,50	12,90	6,74	7,04	7,33	7,62	7,92	8,21	8,50	8,79	9,09	9,38	9,67	9,97	10,26	10,55	10,85

a) The anchor spacing and the edge distance shall not be smaller than the minimum anchor spacing s_{min} and the minimum edge distance c_{min}.

Combined tension and shear loading

For combined tension and shear loading see section “Anchor Design”.

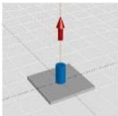
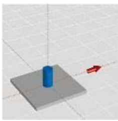
Precalculated values

Design resistance calculated according ETAG 001, Annex C and data given in ETA-08/0307 issue 2014-04-29.
All data applies to concrete C 20/25 – $f_{ck,cube}$ =25 N/mm².

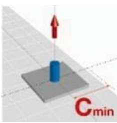
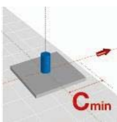
Recommended loads can be calculated by dividing the design resistance by an overall partial safety factor for action γ = 1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

Design resistance

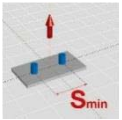
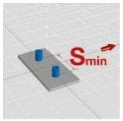
Single anchor, no edge effects

		ETA-08/0307					Hilti				
Anchor size		**6**	**8**	**8**	**10**	**10**	**8**	**10**	**14**	**14**	**14**
h_{nom}	**[mm]**	**55**	**60**	**75**	**70**	**85**	**50**	**60**	**70**	**90**	**110**
Base material thickness h_{min}=	[mm]	100	110	120	130	130	100	110	130	170	210
	**Tensile N_{Rd} [kN]**										
	Non cracked concrete										
	HUS-H [kN]	4,2	6,7	8,9	6,7	9,5	4,7	6,7	9,9	15,4	24,0
	Cracked concrete										
	HUS-H [kN]	3,3	3,3	5,0	4,2	7,6	2,2	3,6	-	9,5	-
	**Shear V_{Rd}, without lever arm [kN]**										
	Non cracked concrete										
	HUS-H [kN]	8,3	10,6	10,6	15,9	15,9	10,6	15,9	23,8	34,1	34,1
	Cracked concrete										
	HUS-H [kN]	8,3	10,6	10,6	15,9	15,9	10,6	15,9	-	26,3	-

Single anchor, min. edge distance ($c = c_{min}$)

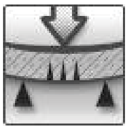
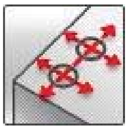
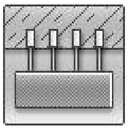
		ETA-08/0307					Hilti				
Anchor size		**6**	**8**	**8**	**10**	**10**	**8**	**10**	**14**	**14**	**14**
h_{nom}	**[mm]**	**55**	**60**	**75**	**70**	**85**	**50**	**60**	**70**	**90**	**110**
Base material thickness h_{min}=	[mm]	100	110	120	130	130	100	110	130	170	210
	**Tensile N_{Rd} [kN]**										
	Non cracked concrete										
	Edge distance c_{min} [mm]	35	55	55	65	65	55	65	60	60	60
	HUS-H [kN]	5,1	7,5	9,3	9,4	9,7	6,1	8,1	8,4	10,8	14,4
	Cracked concrete										
	Edge distance c_{min} [mm]	35	50	50	50	50	55	65	-	60	-
	HUS-H [kN]	3,7	5,0	6,3	5,7	6,0	4,3	5,8	-	7,7	-
	**Shear V_{Rd}, without lever arm [kN]**										
	Non cracked concrete										
	Edge distance c_{min} [mm]	35	55	55	65	65	55	65	60	60	60
	HUS-H [kN]	2,6	5,1	5,4	6,8	7,1	4,9	6,6	6,3	6,7	7,2
	Cracked concrete										
	Edge distance c_{min} [mm]	35	50	50	50	50	55	65	-	60	-
	HUS-H [kN]	1,9	3,2	3,3	3,4	3,5	3,5	4,7	-	4,8	-

Double anchor, no edge effects, min. spacing ($s = s_{min}$),
(load values are valid for one anchor)

		ETA-08/0307					Hilti				
Anchor size		**6**	**8**	**8**	**10**	**10**	**8**	**10**	**14**	**14**	**14**
h_{nom}	**[mm]**	**55**	**60**	**75**	**70**	**85**	**50**	**60**	**70**	**90**	**110**
Base material thickness h_{min}=	[mm]	100	110	120	130	130	100	110	130	170	210
Tensile N_{Rd} [kN]											
Non cracked concrete											
Spacing s_{min}	[mm]	35	55	55	65	65	55	65	80	80	80
HUS-H	[kN]	4,9	6,3	8,5	7,8	8,7	4,6	6,1	7,6	10,8	15,5
 Cracked concrete											
Spacing s_{min}	[mm]	35	40	40	50	50	55	65	-	80	-
HUS-H	[kN]	3,5	4,1	5,7	5,2	5,9	3,3	4,4	-	7,7	-
Shear V_{Rd}, without lever arm [kN]											
Non cracked concrete											
Spacing s_{min}	[mm]	35	55	55	65	65	55	65	80	80	80
HUS-H	[kN]	8,3	10,6	10,6	15,9	15,9	10,6	14,7	18,3	25,8	34,1
 Cracked concrete											
Spacing s_{min}	[mm]	35	40	40	50	50	55	65	-	80	-
HUS-H	[kN]	6,3	9,9	10,6	12,5	15,9	7,8	10,5	-	18,4	-

HUS 6 Screw anchor, Redundant fastening

	Anchor version	Benefits
	HUS-A 6 Carbon steel Concrete Screw with hex head	- Quick and easy setting - Low expansion forces in base materials - Through fastening - Removable - Forged-on washer and hexagon head with no protruding thread
	HUS-H 6 Carbon steel Concrete Screw with hex head	
	HUS-I 6 Carbon steel Concrete Screw with hex head	
	HUS-P 6 Carbon steel Concrete Screw with pan head	
	HUS-HR 6 Stainless steel Concrete Screw	

					A4 316		CE
Concrete	Tensile zone	Small edge distance and spacing	Redundant fastening	Fire resistance	Corrosion Resistance	European Technical Approval	CE conformity

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)]	DIBt, Berlin	ETA-10/0005 / 2013-06-26
Fire test report	DIBt, Berlin	ETA-10/0005 / 2013-06-26

a) Data for HUS-HR 6 with nominal embedment depth = 30 mm for multiple use for non-structural applications (= redundant fastening) are not part of ETA-10/0005 issue 2013-06-26

Basic loading data

All data in this section applies to
- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²

For details see Simplified design method

The following technical data are based on:
ETA: Data according ETA-05/0005 issue 2013-06-26 **Hilti:** Additional Hilti technical data

Characteristic resistance

				Hilti tech. data	Data according ETA-10/0005, issue 2013-06-26	
Anchor version				**HUS-HR 6**		**HUS-A, -H, -I, -P 6**
Nominal embedment depth		h_{nom}	[mm]	30	35	35
All load directions	35 ≤ c < 80 mm	F^0_{Rk}	[kN]	2,0	3,0	2,0
	c ≥ 80 mm	F^0_{Rk}	[kN]		5,0	3,0

Design resistance

				Hilti tech. data	Data according ETA-10/0005, issue 2013-06-26	
Anchor version				**HUS-HR 6**		**HUS-A, -H, -I, -P 6**
Nominal embedment depth		h_{nom}	[mm]	30	35	35
All load directions	35 ≤ c < 80 mm	F^0_{Rd}	[kN]	1,0	1,4	1,3
	c ≥ 80 mm	F^0_{Rd}	[kN]		2,4	2,0

Recommended loads

				Hilti tech. data	Data according ETA-10/0005, issue 2013-06-26	
Anchor version				**HUS-HR 6**		**HUS-A, -H, -I, -P 6**
Nominal embedment depth		h_{nom}	[mm]	30	35	35
All load directions a)	35 ≤ c < 80 mm	F^0_{Rec}	[kN]	0,7	1,0	0,9
	c ≥ 80 mm	F^0_{Rec}	[kN]		1,7	1,4

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.

Requirements for redundant fastening

The definition of redundant fastening according to Member States is given in the ETAG 001 Part six, Annex 1. In Absence of a definition by a Member State the following default values may be taken

Minimum number of fixing points	Minimum number of anchors per fixing point	Maximum design load of action N_{Sd} per fixing point a)
3	1	2 kN
4	1	3 kN

b) The value for maximum design load of actions per fastening point N_{Sd} is valid in general that means all fastening points are considered in the design of the redundant structural system. The value N_{Sd} may be increased if the failure of one (= most unfavourable) fixing point is taken into account in the design (serviceability and ultimate limit state) of the structural system e.g. suspended ceiling.

Materials

Mechanical properties

Anchor version			HUS-HR 6	HUS-A, -H, -I, -P 6
Nominal tensile strength	f_{uk}	[N/mm²]	1040	930
Stressed cross-section	A_s	[mm²]	23	26,9
Moment of resistance	W	[mm³]	15,5	19,7
Design bending resistance	$M_{Rd,s}$	[Nm]	12,9	14,6

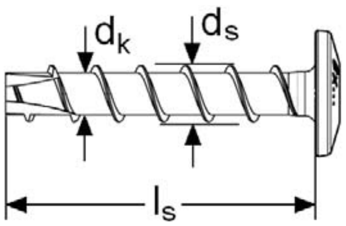
Material quality

Anchor version	HUS-HR 6	HUS-A, -H, -I, -P 6
Material	Stainless steel (grade A4)	Steel, Galvanised ≥ 5 µm

Anchor dimensions

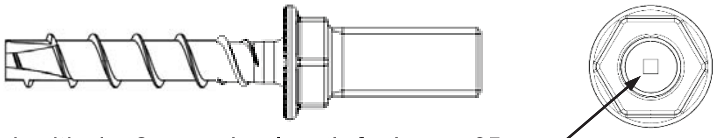
Dimensions

Anchor version			HUS-HR 6	HUS-A 6	HUS-H 6	HUS-I 6	HUS-P 6
Nominal length	l_S	[mm]	35 … 70	35	40..120	35	40..80
Outer diameter of thread	d_S	[mm]	7,6	7,85			
Core diameter	d_k	[mm]	5,4	5,85			



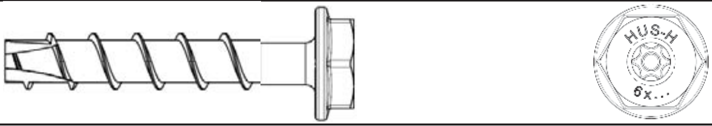
Head configuration

HUS-A 6 — External thread M8 or M10

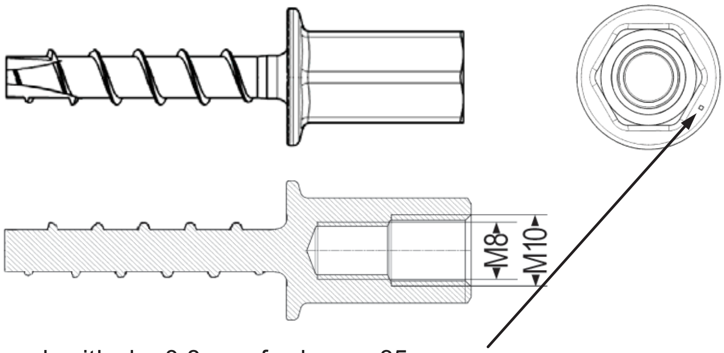


Square mark with d = 2 mm edge length for h_{nom} = 35 mm

HUS-H 6 — Hex head and Torx T30

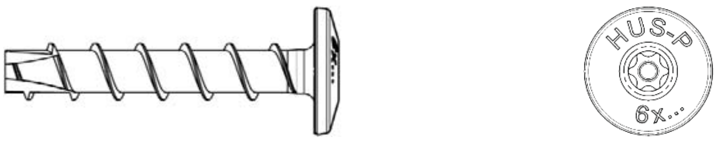


HUS-I 6 — Internal threads M8 and M10

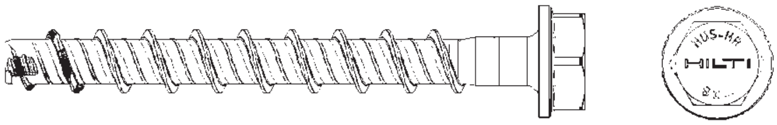


One circle mark with d = 0.8 mm for h_{nom} = 35 mm

HUS-P 6 — Pan head with



HUS-HR 6 — Hexagon head SW = 13 mm



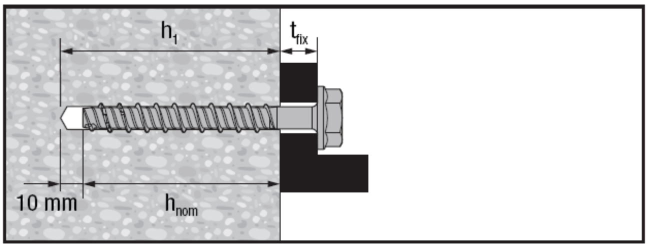
Setting

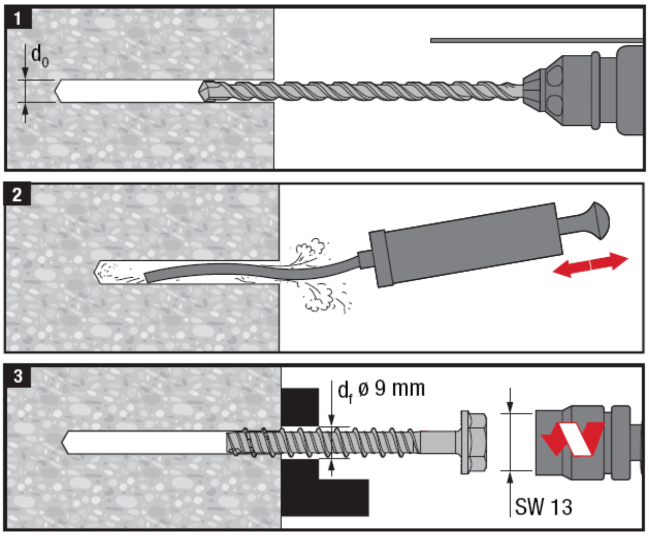
Recommended installation equipment

Anchor size	HUS-HR 6	HUS-A 6	HUS-I 6	HUS-H 6	HUS-P 6
Rotary hammer	Hilti TE 6 / TE 7				
drill bit	TE-CX 6				
Socket wrench insert	S-NSD 13 ½ (L)	S-NSD 13 ½ L	S-NSD 13 ½ (L)		-
Torx	-			T30	
Impact screw driver	See setting instruction				

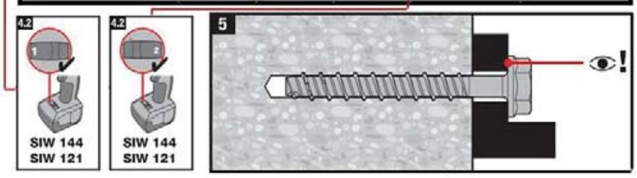
Setting instruction

HUS-HR 6

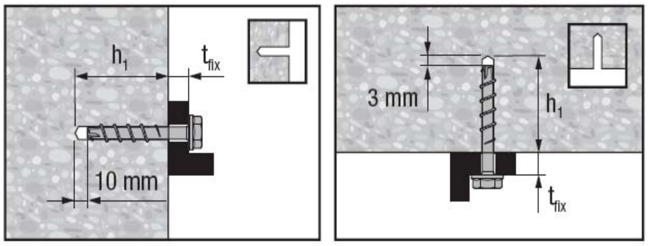




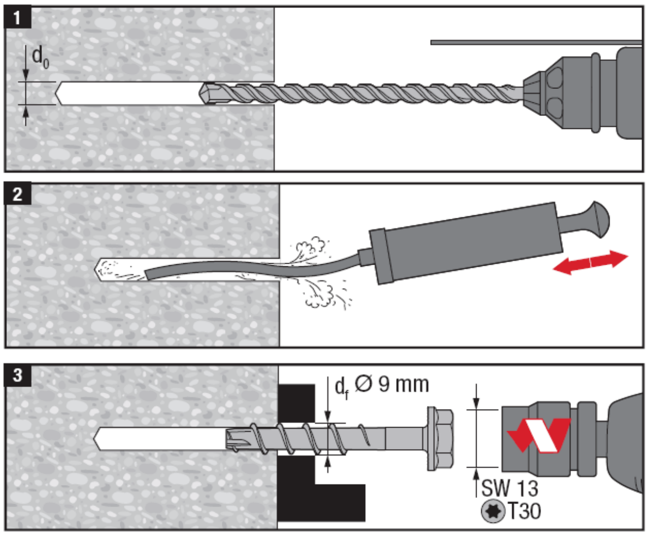
3.1 hnom	30 mm	35 mm	55 mm	55 mm	55 mm
SIW/SID 121	✔	✔	✔	⊘	⊘
SIW/SID 144	✔	✔	✔	⊘	⊘
SIW 22T-A	⊘	⊘	⊘	⊘	⊘
SI 100	⊘	⊘	⊘	⊘	⊘
TKI 2500	✔	✔	✔	⊘	⊘
Torque wrench	⊘	⊘	⊘	12 Nm	6 Nm



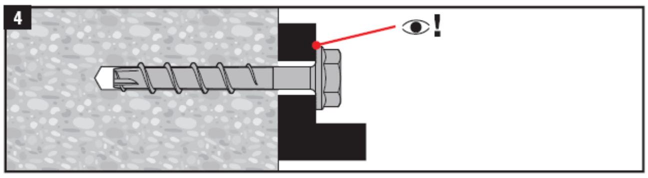
HUS-P 6, HUS-I 6



reduced drilling depth
for overhead installation



3.1	
SIW/SID 121	✔
SIW/SID 144	✔
TKI 2500	✔
Torque wrench	18 Nm

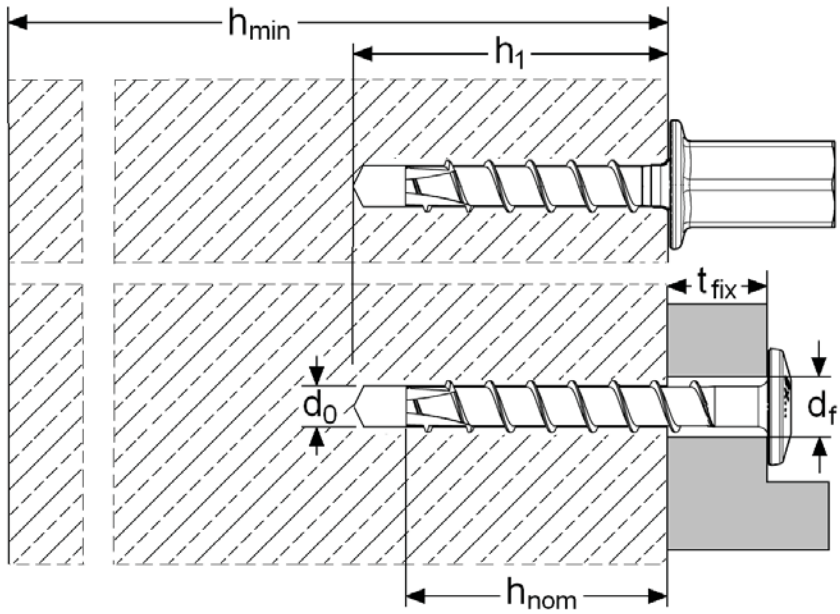


For detailed information on installation see instruction for use given with the package of the product.

Setting details

Anchor version			HUS-HR 6		HUS-A 6	HUS-H 6	HUS-I 6	HUS-P 6
Nominal embedment depth	$h_{nom} \geq$	[mm]	30	35	35			
Nominal diameter of drill bit	d_o	[mm]	6					
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,4					
Depth of drill hole	$h_1 \geq$	[mm]	40	45	45			
Depth of drill hole for overhead installation	$h_1 \geq$	[mm]	40	45	38			
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9		-	9	-	9
Effective anchorage depth	h_{ef}	[mm]	23	27	25			
Nominal length of screw	l_s	[mm]	35 … 70	60 … 70	35	40 … 120	35	40 … 80
Max. fastening thickness	t_{fix}	[mm]	$l_s - h_{nom}$		-	$l_s - h_{nom}$	-	$l_s - h_{nom}$
Max. installation torque	T_{inst}	[Nm]	- a)	- a)	18			

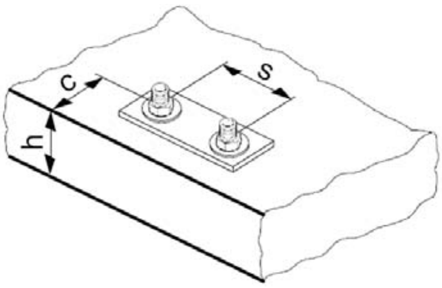
a) Hilti recommends machine setting only



Base material thickness, anchor spacing and edge distance

Anchor version			HUS-HR 6		HUS-A, -H, -I, -P 6
Nominal embedment depth	h_{nom}	[mm]	30	35	35
Effective anchorage depth	h_{ef}	[mm]	23	27	25
Minimum base material thickness	h_{min}	[mm]	80	80	80
Minimum spacing	s_{min}	[mm]	35	35	35
Minimum edge distance	c_{min}	[mm]	35	35 (80)[1)]	35 (80)[1)]
Critical spacing	s_{cr}	[mm]	3 h_{ef}		
Critical edge distance	c_{cr}	[mm]	1,5 h_{ef}		

1) see basic loading data



For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced (see system design resistance).

Simplified design method for multiple use for non-structural applications (= redundant fastening)

Simplified version of the design method according ETAG 001, Annex C. Design resistance according data given in ETA-10/0005 issue 2013-06-26.

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing
- Valid for a group of two anchors. (The method may also be applied for anchor groups with more than two anchors or more than one edge. The influencing factors must then be considered for each edge distance and spacing. The calculated design loads are then on the save side: They will be lower than the exact values according ETAG 001, Annex C.

The design method is based on the following simplification:

- No different loads are acting on individual anchors (no eccentricity)

The values are valid for one anchor.

Design load – all load directions

Design resistance $F_{Rd} = F^0_{Rd} \cdot f_B \cdot f_1 \cdot f_2 \cdot f_3 \cdot f_{re}$

Basic design resistance

				Hilti tech. data	Data according ETA-10/0005, issue 2013-06-26	
Anchor version				HUS-HR 6		HUS-A, -H, -I, -P 6
Nominal embedment depth		h_{nom}	[mm]	30	35	35
Basic design resistance in all load directions	35 ≤ c < 80 mm	F^0_{Rd}	[kN]	1,0	1,4	1,3
	c ≥ 80 mm	F^0_{Rd}	[kN]		2,4	2,0

Influencing factors

Influence of concrete strength

Concrete strength designation (ENV 206)	C 20/25	C 25/30	C 30/37	C 35/45	C 40/50	C 45/55	C 50/60
$f_B = (f_{ck,cube}/25N/mm^2)^{0,5}$ a)	1	1,1	1,22	1,34	1,41	1,48	1,55

a) $f_{ck,cube}$ = concrete compressive strength, measured on cubes with 150 mm side length

Influence of edge distance a)

c/c_{cr},	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_1 = 0,7 + 0,3 \cdot c/c_{cr} \leq 1$	0,73	0,76	0,79	0,82	0,85	0,88	0,91	0,94	0,97	1
$f_2 = 0,5 \cdot (1 + c/c_{cr}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The edge distance shall not be smaller than the minimum edge distance c_{min} given in the table with the setting details. The influencing factors must be considered for every edge distance.

Influence of anchor spacing a)

s/s_{cr}	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
$f_3 = 0,5 \cdot (1 + s/s_{cr}) \leq 1$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1

a) The anchor spacing shall not be smaller than the minimum anchor spacing s_{min} given in the table with the setting details. This influencing factor must be considered for every anchor spacing.

Influence of reinforcement

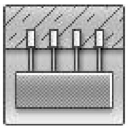
	Dense reinforcement		Standard reinforcement a)	
h_{nom} [mm]	30	35	30	35
$f_{re} = 0,5 + h_{ef}/200mm \leq 1$	0,62	0,63	1	

a) If in the area of anchorage there is reinforcement with a spacing ≥ 150 mm (any diameter) or with a diameter
≤ 10 mm and a spacing ≥ 100 mm, then a factor $f_{re,N}$ = 1 may be applied.

HUS-A 6 / HUS-H 6 / HUS-I 6 / HUS-P 6 Screw anchor in precast prestressed hollow core slabs

	Anchor version	Benefits
	HUS-A 6 Carbon steel Concrete Screw with hex head	- Quick and easy setting - Low expansion forces in base materials - Through fastening - Removable - Forged-on washer and hexagon head with no protruding thread
	HUS-H 6 Carbon steel Concrete Screw with hex head	
	HUS-I 6 Carbon steel Concrete Screw with hex head	
	HUS-P 6 Carbon steel Concrete Screw with pan head	


Prestressed hollow core slabs


Redundant fastening

European Technical Approval

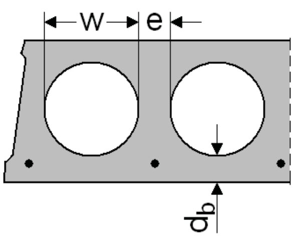
CE conformity

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)]	DIBt, Berlin	ETA-10/0005 / 2013-06-26

a) All data given in this section according ETA-10/0005 issue 2013-06-26.

Basic loading data



All data in this section applies to
- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Ratio core width / web thickness w/e ≤ 4,2
- Concrete C 30/37 to C 50/60

Characteristic resistance

Anchor version			HUS-A, -H, -I, -P 6		
Bottom flange thickness	d_b	[mm]	25	30	35
All load directions	F_{Rk}	[kN]	1,0	2,0	3,0

Design resistance

Anchor version			HUS-A, -H, -I, -P 6		
Bottom flange thickness	d_b	[mm]	25	30	35
All load directions	F_{Rd}	[kN]	0,7	1,3	2,0

Recommended loads

Anchor version			HUS-A, -H, -I, -P 6		
Bottom flange thickness	d_b	[mm]	25	30	35
All load directions [a)]	F_{rec}	[kN]	0,5	1,0	1,4

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.

Requirements for redundant fastening

The definition of redundant fastening according to Member States is given in the ETAG 001 Part six, Annex 1. In Absence of a definition by a Member State the following default values may be taken

Minimum number of fixing points	Minimum number of anchors per fixing point	Maximum design load of action N_{Sd} per fixing point [a)]
3	1	2 kN
4	1	3 kN

c) The value for maximum design load of actions per fastening point N_{Sd} is valid in general that means all fastening points are considered in the design of the redundant structural system. The value N_{Sd} may be increased if the failure of one (= most unfavourable) fixing point is taken into account in the design (serviceability and ultimate limit state) of the structural system e.g. suspended ceiling.

Materials

Mechanical properties

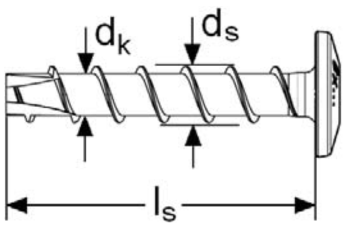
Anchor version		HUS-A, -H, -I, -P 6
Nominal tensile strength f_{uk}	[N/mm²]	930
Stressed cross-section A_s	[mm²]	26,9
Moment of resistance W	[mm³]	19,7
Design bending resistance $M_{Rd,s}$	[Nm]	14,6

Material quality

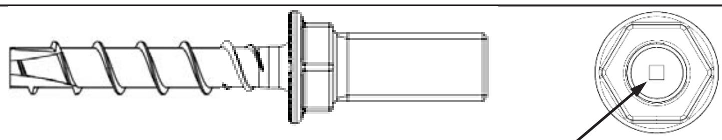
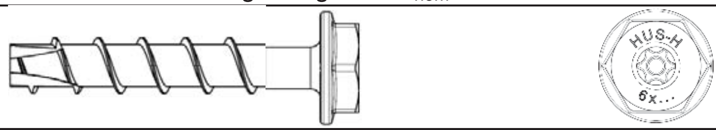
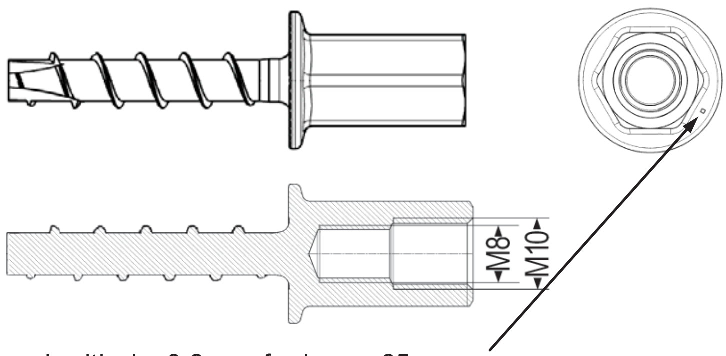
Anchor version	HUS-A, -H, -I, -P 6
Material	Carbon steel, galvanised to min. 5 µm

Anchor dimensions

Anchor version			HUS-A 6	HUS-H 6	HUS-I 6	HUS-P 6
Nominal length	l_S	[mm]	35	40..120	35	60..80
Outer diameter of thread	d_S	[mm]	7,85			
Core diameter	d_k	[mm]	5,85			



Head configuration

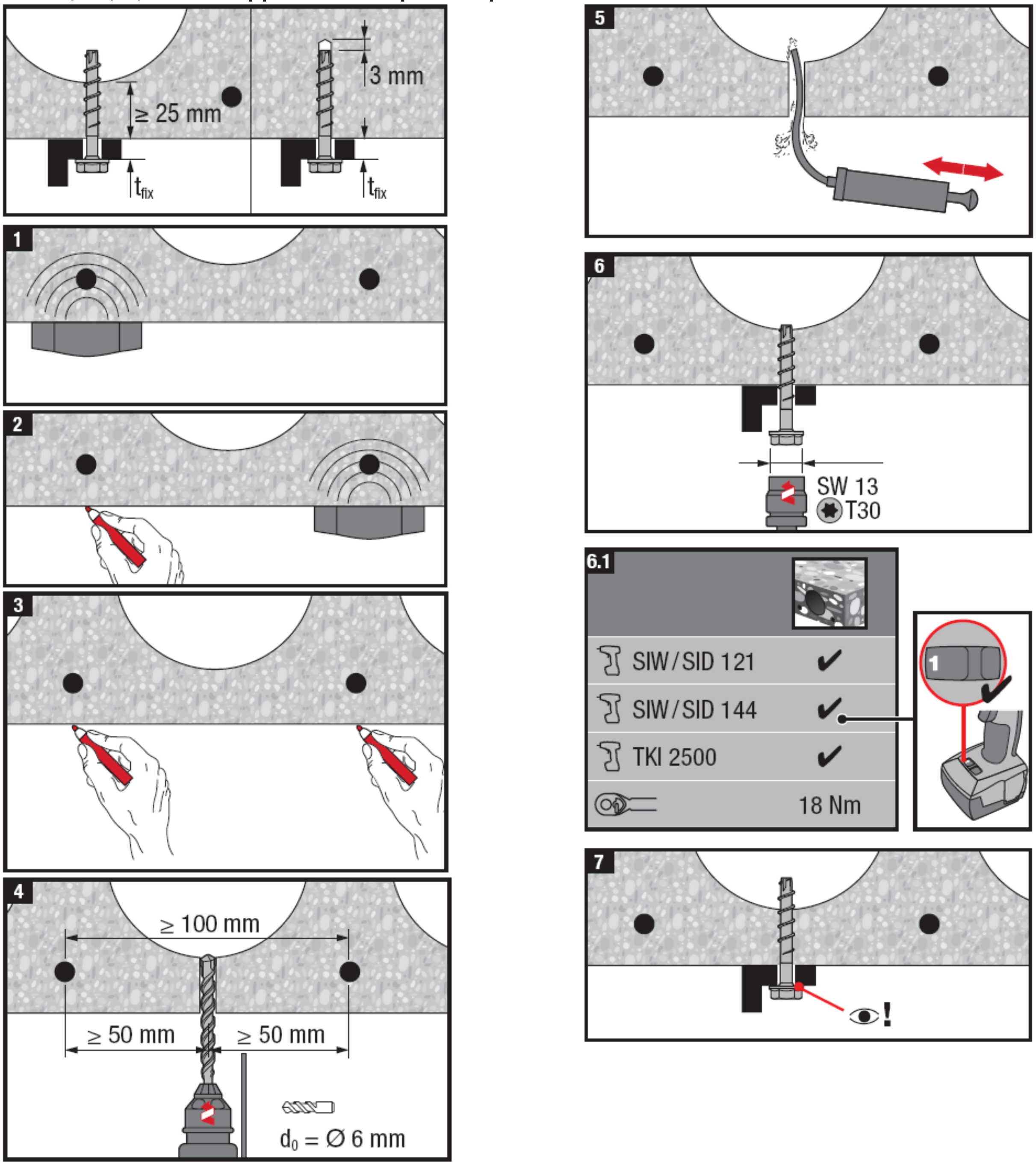
HUS-A 6	External thread M8 or M10	 Square mark with d = 2 mm edge length for h_{nom} = 35 mm
HUS-H 6	Hex head and Torx T30	
HUS-I 6	Internal threads M8 and M10	 One circle mark with d = 0,8 mm for h_{nom} = 35 mm
HUS-P 6	Pan head with	

Setting

Anchor size	HUS-A 6	HUS-I 6	HUS-H 6	HUS-P 6
Rotary hammer	Hilti TE 6 / TE 7			
drill bit	TE-CX 6			
Socket wrench insert	S-NSD 13 ½ L	S-NSD 13 ½ (L)		-
Torx	-		T30	
Impact screw driver	See setting instruction			

Setting instruction

HUS-A, -H, -I, -P 6 for applications in precast prestressed hollow core slabs

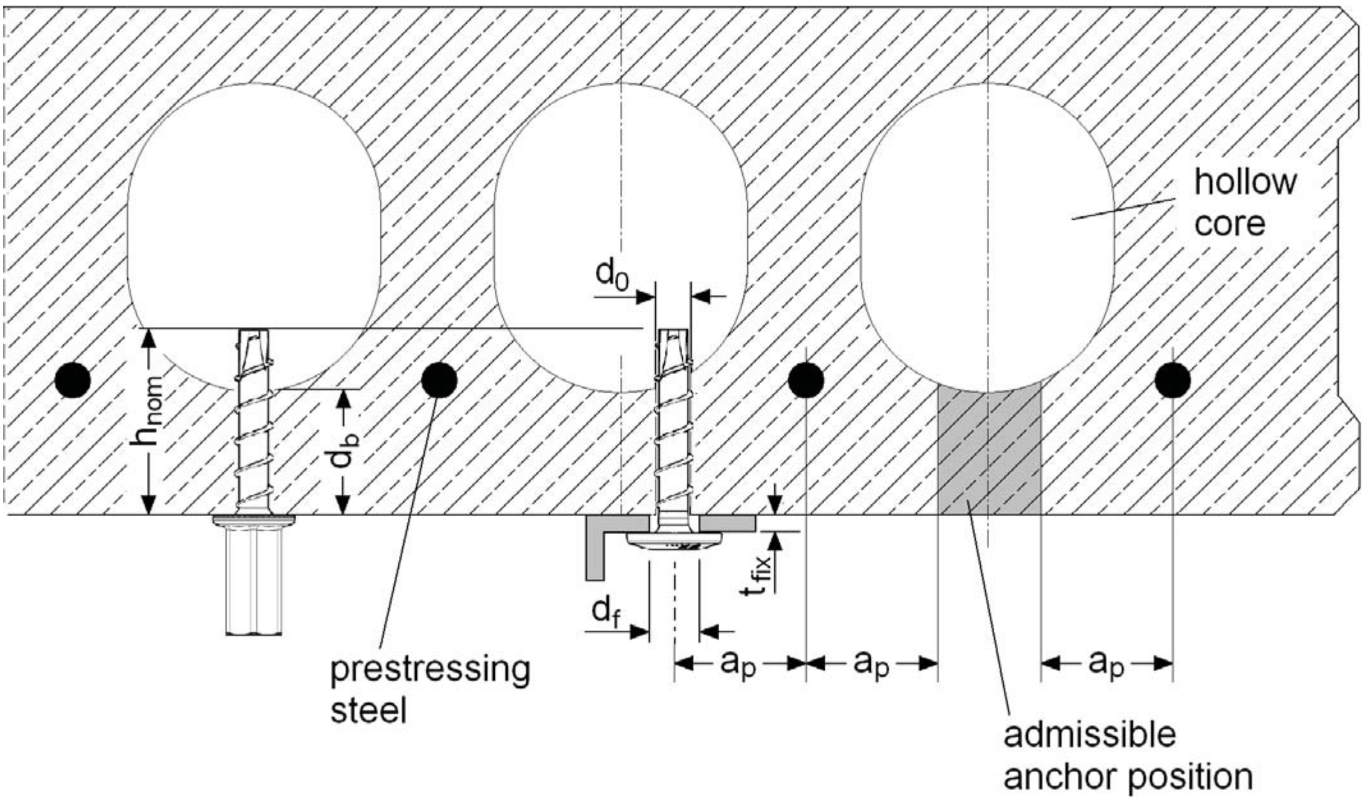


For detailed information on installation see instruction for use given with the package of the product.

Setting details

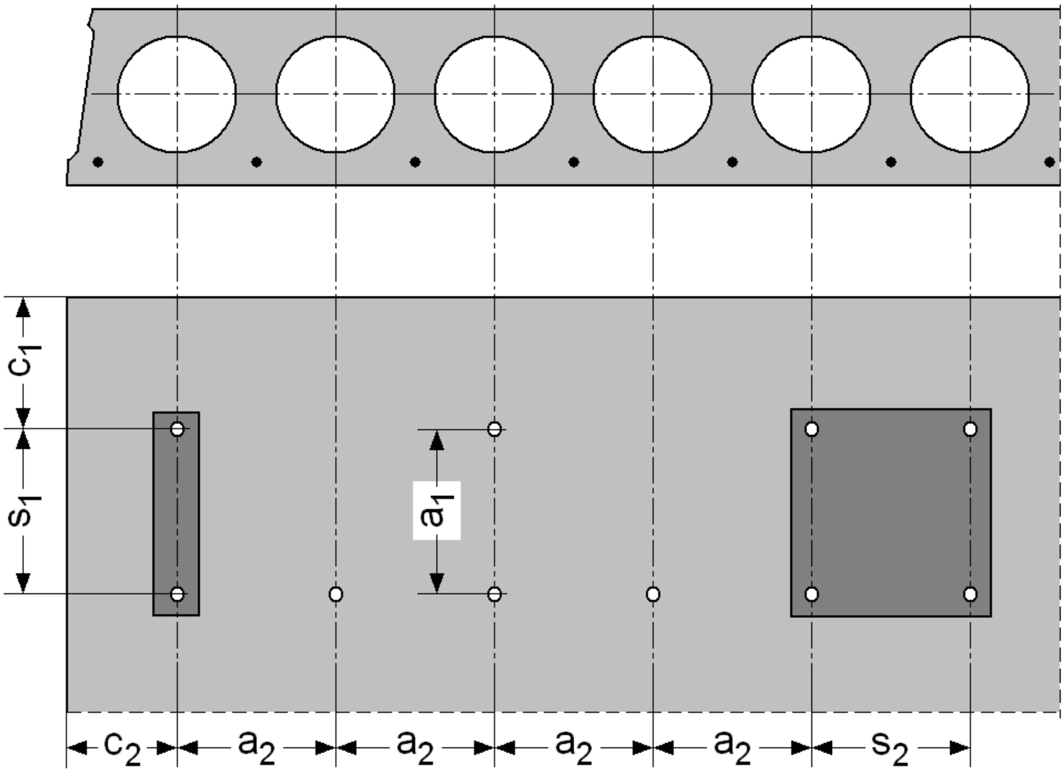
Anchor version			HUS-A, -H, -P 6					HUS-A, -I 6
Nominal embedment depth	h_{nom}	[mm]	35					
Bottom flange thickness	$d_b \geq$	[mm9	25					
Nominal diameter of drill bit	d_o	[mm]	6					
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,4					
Nominal depth of drill hole [a)]	$h_1 \geq$	[mm]	38					
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9					-
Nominal effective anchorage depth	h_{ef}	[mm]	25					
Distance between anchor position and prestressing steel	$a_p \geq$	[mm]	50					
Nominal length of screw	l_s	[mm]	40	60	80	100	120	35
Thickness of fixture	$t_{fix} \geq$	[mm]	0	2	5	25	45	-
	$t_{fix} \leq$	[mm]	5	25	45	65	85	-
Max. installation torque	T_{inst}	[Nm]	18					

a) Nominal depth of drill hole may be deeper than bottom flange thickness



Anchor spacing and edge distance

Anchor version			HUS-A, -H, -I, -P 6
Minimum edge distance	$c_{min} \geq$	[mm]	100
Minimum anchor spacing	$s_{min} \geq$	[mm]	100
Minimum distance between anchor groups	$a_{min} \geq$	[mm]	100



HUS 6 / HUS-S 6 Screw anchor

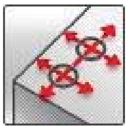
	Anchor version		Benefits
	HUS 6	Carbon steel Concrete Screw	- Quick and easy setting - Low expansion forces in base materials - Through fastening - Removable
	HUS-S 6		

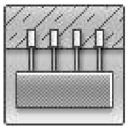

Concrete


Solid brick


Hollow brick


Autoclaved aerated concrete


Small edge distance and spacing


Redundant fastening


Fire resistance

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
Fire test report	IBMB, Braunschweig DIBt, Berlin	UB 3574/5146 / 2006-05-20
Assessment report (fire)	warringtonfire	WF 327804/A / 2013-07-10

Basic loading data

All data in this section applies to
- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Concrete as specified in the table
- *Steel* failure
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²

Note:
When tightening the screw anchor in soft base materials and in hollow brick, care must be taken not to apply too much torque. If the screw anchor is over-tightened the fastening point is unusable for the HUS 6.

- Solid masonry units:
  - Mz 12 ➔ solid brick, compressive strength 12N/mm^2, bulk density 1,8N/mm^2, format ≥ 240/175/113 mm (length/width/height)
  - KS 12 ➔ solid lime block, compressive strength 12N/mm^2, bulk density 2,0N/mm^2, format ≥ 240/175/113 mm (length/width/height)
    The core/material ratio in bricks and solid sand lime blocks may not exceed 15% of a bed joint area.
- Autoclaved aerated concrete:
  - PB6 ➔ block, compressive strength 6 N/mm2, bulk density 0,6 N/mm2
  - PB2 ➔ block, compressive strength 2 N/mm2, bulk density 0,2 N/mm2

- Other Limits:
  - Applied loads to individual bricks/blocks without compression may not exceed 1,0 kN
  - Applied loads to individual bricks/blocks with compression may not exceed 1,4 kN
  - Data applies only to bricks/blocks, there is no test data available for loads in mortar joints. Hilti recommends at least a 50% load reduction or on site testing, if the location of the anchor in relation to the joint (see drawing) can not be specified because of wall plaster or insulation.
  - Plaster, gravelling, lining or levelling courses are regarded as non-bearing and may not be taken into account for calculation of embedment depth.
  - All data is for redundant fastening for non structural applications.

Recommended loads

	concrete C20/25			MZ 20 solid brick b)		KS sand Lime Block b)		Hlz 0.8/12 Hollow Brick b)		Aerated concrete			
	Non-cracked		Cracked a)							PB2 / PB4 c)		PB6	
Anchor size	HUS 6		HUS 6	HUS 6		HUS 6		HUS 6		HUS 6		HUS 6	
h_{nom} [mm]	34		44	44		44		64		64		64	
Edge distance c ≥ [mm]	60	30	100	60	30	60	30	60	30	60	30	60	30
Tensile N_{rec} d) [kN]	1,0	1,0	0,5	0,2	0,2	1,0	1,0	0,1	0,1	0,2	0,2	0,2	0,2
Shear V_{rec} d) [kN]	1,6	0,5	0,5	0,4	0,3	1,1	0,4	0,4	0,2	0,3	0,1	0,6	0,2

a) Redundant fastening
b) Holes must be drilled using rotary action only (no hammering action)
c) No anchor hole drilling required in PB2/PB4 gas aerated concrete
d) 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.

Materials

Mechanical properties

Anchor size		HUS 6 / HUS-S 6
Nominal tensile strength f_{uk}	[N/mm²]	1000
Yield strength f_{yk}	[N/mm²]	900
Stressed cross-section A_s	[mm²]	5,2
Moment of resistance W	[mm³]	13,8
Design bending resistance $M_{Rd,s}$	[Nm]	11

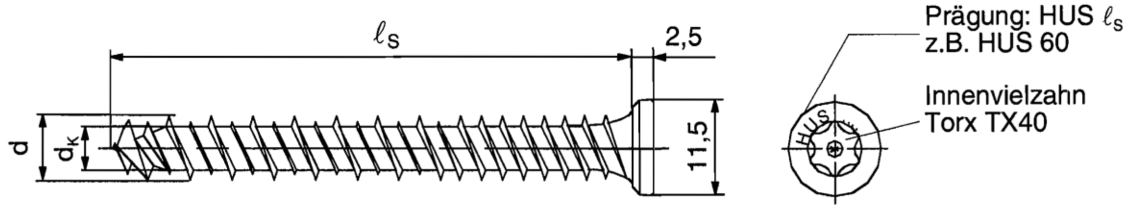
Material quality

Part	Material
Screw anchor	Carbon Steel, galvanised to min. 5 µm

Anchor dimensions

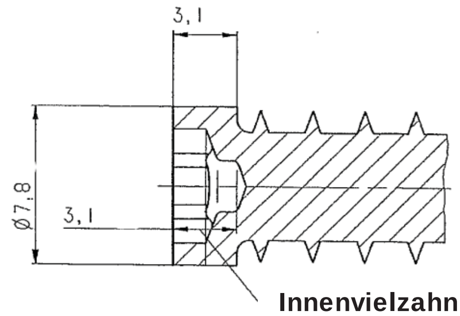
Dimensions

Anchor version	l_s [mm]	d_k [mm]	d [mm]
HUS 6	35..220	5,3	7,5
HUS-S 6	100..220		7,5



HUS 6

Head configuration HUS-S



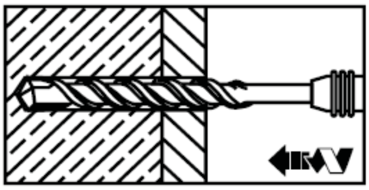
Setting

Recommended installation equipment

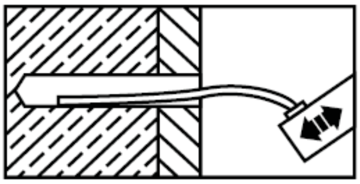
Anchor size	HUS 6			HUS-S 6
Rotary hammer	TE 6 / TE 7			
Drill bit	TE-C3X 6/17			
Recommended Setting Tool	SID/SIW 121, SID/SIW 144, TKI 2500			
Accessories	S-B TXI 40 bit			S-B TXI 30 bit

Setting instruction

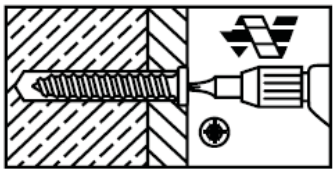
HUS:



Drill hole with drill bit.

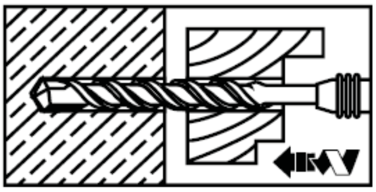


Blow out dust and fragments.

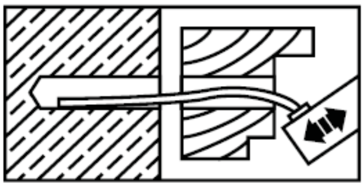


Install anchor with an electric screwdriver.

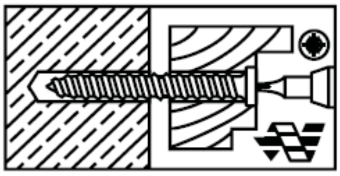
HUS-S:



Drill hole with drill bit.



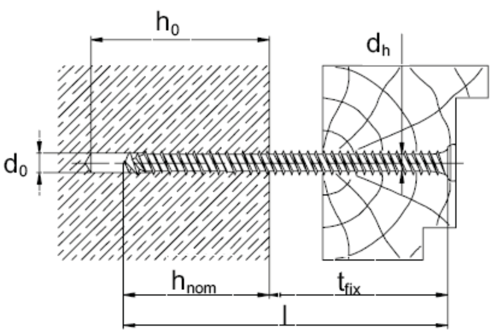
Blow out dust and fragments.



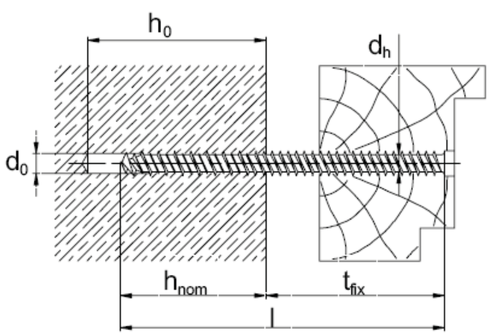
Install anchor with an electric screwdriver.

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

Setting details: depth of drill hole h_1 and effective anchorage depth h_{ef}



HUS



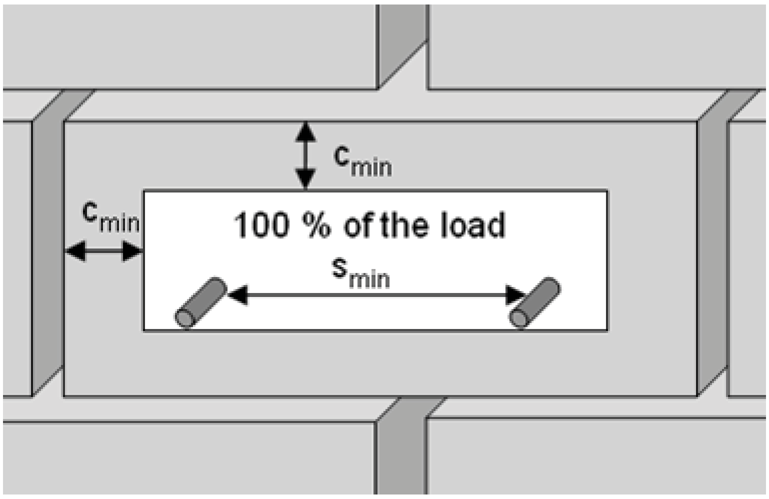
HUS-S

Setting details

			C20/25 Concrete	MZ 20 Brick/ KS 12 Block	Hollow Brick	Aerated Concrete	
						PB2/PB4	PB6
Nominal embedment depth	h_{nom}	[mm]	34	44	64	64	64
Nominal diameter of drill bit	d_o	[mm]	6	6	6	-	6
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,4	6,4	6,4	-	6,4
Minimum depth of drill hole	$h_1 \geq$	[mm]	50	54 [b)]	64 [a)]	- [b)]	70
Diameter of clearance hole in the fixture to clamp a fixture	$d_f \leq$	[mm]	8,5				
Diameter of clearance hole in the fixture for stand-off applications	$d_f \leq$	[mm]	6,2				
Max. fastening thickness	t_{fix}	[mm]	$l_s - h_{nom}$				
Max. installation torque	T_{inst}	[Nm]	10	4	2	2	2

a) Holes must be drilled using rotary action only (no hammering action)
b) No anchor hole drilling required in PB2/PB4 gas aerated concrete

Permissible anchor location in brick and block walls



- Distance to free edge free edge to solid masonry (Mz and KS) units ≥ 200 mm
- Distance to free edge free edge to solid masonry (HLz and autoclaved aerated gas concrete) units ≥ 170 mm
- The minimum distance to horizontal and vertical mortar joint (c_{min}) is stated in the recommended load table.
- Data applies only to bricks/blocks, there is no test data available for loads in mortar joints. Hilti recommends at least a 50% load reduction or on site testing, if the location of the anchor in relation to the joint (see drawing) can not be specified because of wall plaster or insulation.
- Minimum anchor spacing (s_{min}) in one brick/block is ≥ $2*c_{min}$