




HUS-HR / HUS-CR SCREW ANCHOR


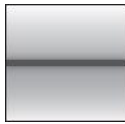


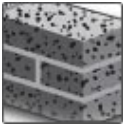

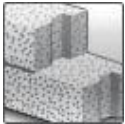
Technical Datasheet

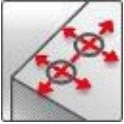




Update: Oct-20

HUS-HR / HUS-CR Screw anchor

Ultimate performance screw anchor for single point fastening

Anchor version	Benefits
 <p>HUS-H (10)</p>	<ul style="list-style-type: none"> - High productivity- less drilling and fewer operations than with conventional anchors - ETA approval for cracked and non-cracked concrete - ETA approval for Seismic C1 - Technical data for reusability in fresh concrete ($f_{ck,cube} = 10/15/20 \text{ Nmm}^2$) for temporary applications
 <p>HUS-HR (6-14)</p>	
 <p>HUS-CR (6-14)</p>	

Base material	Load conditions
 <p>Concrete (non-cracked)</p>	 <p>Static / quasi-static</p>
 <p>Concrete (cracked)</p>	 <p>Seismic ETA-C1</p>
 <p>Solid brick</p>	 <p>Fire resistance</p>
 <p>Autoclaved aerated concrete</p>	

Installation conditions	Other information
 <p>Small edge distance and spacing</p>	 <p>European Technical Assessment</p>
	 <p>CE conformity</p>
	 <p>Corrosion resistance</p>
	 <p>PROFIS design software</p>

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment	DIBt, Berlin	ETA-08/0307 / 2018-08-23
Fire test report	DIBt, Berlin	ETA-08/0307 / 2018-08-23
Fire test report ZTV – Tunnel (EBA)	MFPA, Leipzig	PB III / 08-354 / 2008-11-27

a) All data given in this section according ETA-08/0307 issue 2018-08-23.

Static and quasi-static resistance (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- **Steel** failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube} = 25 \text{ N/mm}^2$

Effective anchorage depth for static

Anchor size		6	8			10			14			
Type	HUS-	HR,CR	HR,CR			HR,CR			H	HR		
Nominal anchorage depth h_{ef} [mm]		55	50 ^{a)}	60	80	60 ^{a)}	70	90	70	85	70	110

a) Hilti Technical Data for embedment depth

Characteristic resistance

Anchor size		6	8			10			14		
Type	HUS-	HR,CR	HR, CR			HR, CR			HR		
Non-cracked concrete											
Tension N_{Rk}	[kN]	9,0	9,0 ^{a)}	12,0	16,0	12,0 ^{a)}	16,0	25,0	-	18,9	40,2
Shear V_{Rk}	[kN]	17,0	23,6 ^{a)}	26,0	26,0	31,4 ^{a)}	33,0	33,0	-	37,8	77,0
Cracked concrete											
Tension N_{Rk}	[kN]	5,0	5,0 ^{a)}	6,0	12,0	7,5 ^{a)}	9,0	16,0	-	12,0	25,0
Shear V_{Rk}	[kN]	16,3	16,9 ^{a)}	23,2	26,0	22,5 ^{a)}	28,6	33,0	-	27,0	57,4

a) Hilti Technical Data

Design resistance

Anchor size		6	8			10			14		
Type	HUS-	HR,CR	HR, CR			HR, CR			HR		
Non-cracked concrete											
Tension N_{Rd}	[kN]	4,3	5,0 ^{a)}	6,7	8,9	6,7 ^{a)}	8,9	13,9	-	10,5	22,3
Shear V_{Rd}	[kN]	11,3	15,7 ^{a)}	17,3	17,3	21,0 ^{a)}	22,0	22,0	-	25,2	51,3
Cracked concrete											
Tension N_{Rd}	[kN]	2,4	2,8 ^{a)}	3,3	6,7	4,2 ^{a)}	5,0	8,9	-	6,7	13,9
Shear V_{Rd}	[kN]	10,9	11,2 ^{a)}	15,5	17,3	15,0 ^{a)}	19,0	22,0	-	18,0	38,3

a) Hilti Technical Data

Recommended loads^{b)}

Anchor size		6	8			10			14		
Type	HUS-	HR,CR	HR, CR			HR, CR			HR		
Non-cracked concrete											
Tension N_{Rec}	[kN]	3,1	3,6 ^{a)}	4,8	6,3	4,8	6,3	9,9	-	7,5	16,0
Shear V_{Rec}	[kN]	8,1	11,2 ^{a)}	12,4	12,4	15,0	15,7	15,7	-	18,0	36,7
Cracked concrete											
Tension N_{Rec}	[kN]	1,7	2,0 ^{a)}	2,4	4,8	3,0	3,6	6,3	-	4,8	9,9
Shear V_{Rec}	[kN]	7,8	8,0 ^{a)}	11,0	12,4	10,7	13,6	15,7	-	12,9	27,3

a) Hilti Technical Data

b) With overall partial safety factor for action $\gamma = 1,4$. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

Seismic resistance

All data in this section applies to:

- Correct setting
- Seismic design according to TR045
- The following data are based on ETA-08/0307 issue 2015-08-27
- Concrete C20/25 to C50/60

Effective anchorage depth for seismic C1

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

Characteristic resistance for seismic C1

Anchor size		8	10	14
Type	HUS-	HR, CR	HR, CR	HR
Characteristic tension to steel failure				
Characteristic resistance	$N_{Rk,s,seis}$ [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				
Characteristic resistance	$N_{Rk,p,seis}$ [kN]	7,7	12,5	17,5
Partial safety factor	$\gamma_{Ms,seis}$ [-]	1,8		
Concrete cone resistance and splitting resistance				
Partial safety factor	$\gamma_{Ms,seis}$ [-]	1,8		

Characteristic resistance for seismic C1¹⁾

Anchor size		8	10	14
Type	HUS-	HR, CR	HR, CR	HR
Characteristic shear resistance to steel failure				
Characteristic resistance	$V_{Rk,s,seis}$ [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 $\alpha_{gap} = 1,0$ when using the Hilti Dynamic Set.

Fire resistance

All data in this section applies to:

- Correct setting
- No edge distance and spacing influence
- Minimum base material thickness
- The following technical data are based on: ETA-08/0307 issue 2015-08-27

Nominal embedment depth for resistance to fire

Anchor size		6	8		10		14	
Type	HUS-	HR	HR		HR		HR	
Nominal anchorage depth	h_{nom} [mm]	55	60	80	70	90	70	110

Recommended resistance to fire

Anchor size		6	8		10		14		
Type	HUS-	HR	HR		HR		HR		
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]	4,9	9,3	5,0	18,5	41,7		
	R60	$F_{Rec,s,fi}$ [kN]	3,3	6,3	3,6	12,0	26,9		
	R90	$F_{Rec,s,fi}$ [kN]	1,8	3,2	2,2	5,4	12,2		
	R120	$F_{Rec,s,fi}$ [kN]	1,0	1,7	1,5	2,4	5,4		
	R30	$M^0_{Rec,s,fi}$ [Nm]	4,0	8,2	6,3	19,4	65,6		
	R60	$M^0_{Rec,s,fi}$ [Nm]	2,7	5,5	4,6	12,6	42,4		
	R90	$M^0_{Rec,s,fi}$ [Nm]	1,4	2,8	2,8	5,7	19,2		
	R120	$M^0_{Rec,s,fi}$ [Nm]	0,8	1,5	1,9	2,5	8,5		
Pull-out failure									
Recommended resistance	R30	$N_{Rec,p,fi}$ [kN]	1,3	1,5	3,0	2,3	4,0	3,0	6,3
	R60								
	R90								
	R120								
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		

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

Materials

Mechanical properties

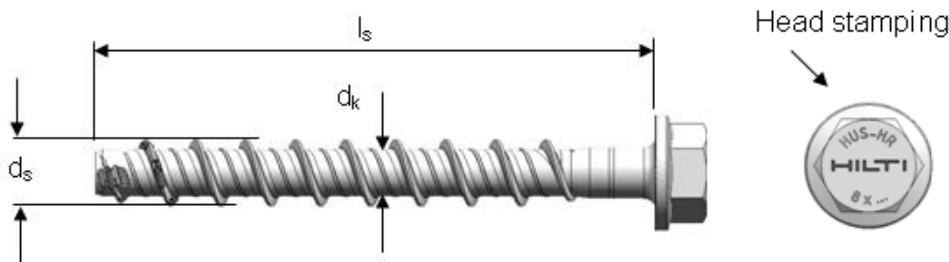
Anchor size		6	8	10	14
Type	HUS-	HR, CR	HR, CR	HR, CR	HR
Nominal tensile strength f_{uk}	[N/mm ²]	1050	870	950	690
Yield strength f_{yk}	[N/mm ²]	900	745	815	590
Stressed cross-section A_s	[mm ²]	22,9	39	55,4	143,1
Moment of resistance W	[mm ³]	15	34	58	255
Design bending resistance $M^{0}_{Rd,s}$	[Nm]	19	36	66	193

Material quality

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

Anchor dimensions

Anchor size		6	8	10	14
Type	HUS-	HR, CR	HR, CR	HR, CR	HR
Core diameter	d_k [mm]	5,4	7,05	8,4	12,6
Shaft diameter	d_s [mm]	7,6	10,1	12,3	16,6
Stressed section	A_s [mm]	22,9	39,0	55,4	143,1



Screw length and thickness of fixture for HUS-HR

Anchor size		6	8		10		14	
Embedment depth	h_{nom1}, h_{nom2} [mm]	55	60	80	70	90	70	110
Thickness of fixture		t_{fix}	t_{fix1}	t_{fix2}	t_{fix1}	t_{fix2}	t_{fix1}	t_{fix2}
Length of screw [mm]	60	5	-	-	-	-	-	-
	65	-	5	-	-	-	-	-
	70	15	-	-	-	-	-	-
	75	-	15	-	5	5	10	-
	80	-	-	-	-	-	-	-
	85	-	25	5	15	-	-	-
	90	-	-	-	-	-	-	-
	95	-	35	15	25	5	-	-
	100	-	-	-	-	-	-	-
	105	-	45	25	35	15	-	-
	110	-	-	-	-	-	-	-
	115	-	-	-	45	25	-	-
	120	-	-	-	-	-	50	10
130	-	-	-	60	40	-	-	
135	-	-	-	-	-	65	25	

Screw length and thickness of fixture for HUS-CR

Anchor size		6	8		10			
Embedment depth		h_{nom1} , h_{nom2}	[mm]	55	60	80	70	90
Thickness of fixture		t_{fix1}	t_{fix1}	t_{fix2}	t_{fix1}	t_{fix2}		
Length of screw [mm]	60	5	-	-	-	-		
	70	15	-	-	-	-		
	75	-	15	-	-	-	5	
	80	-	-	-	-	-		
	85	-	-	-	-	15	-	
	90	-	-	-	-	-	-	
	95	-	35	15	-	-	-	
	100	-	-	-	-	-	-	
	105	-	45	25	35	15		

Setting information

Setting details

Anchor size		6	8			10			14			
Type	HUS-	HR, CR	HR, CR ^{a)}			HR, CR ^{a)}			HR			
Nominal anchorage depth	h_{nom}	[mm]	55	50	60	80	60	70	90	70	110	
Effective anchorage depth	h_{ef}	[mm]	45	38	47	64	46	54	71	52	86	
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			14,5		
Clearance hole diameter	d_f	[mm]	9	12			14			18		
Depth of drill hole	h_1	[mm]	65	60	70	90	70	80	100	80	120	
Wrench size	SW	[mm]	13	13			15			21		
Diameter of countersunk	d_h	[mm]	-	-			21			-		
Installation torque	Concrete	T_{inst}	[Nm]	- ^{a)}	35	- ^{a)}	- ^{a)}	45 ^{c)}			65	
	Solid m, Mz 12	T_{inst}	[Nm]	10	-	16	16	- ^{b)}	20	20	- ^{b)}	- ^{b)}
	Solid m, KS 12	T_{inst}	[Nm]	10	-	16	16	- ^{b)}	20	20	- ^{b)}	- ^{b)}
	Aerated	T_{inst}	[Nm]	4	-	8	8	- ^{b)}	10	10	- ^{b)}	- ^{b)}

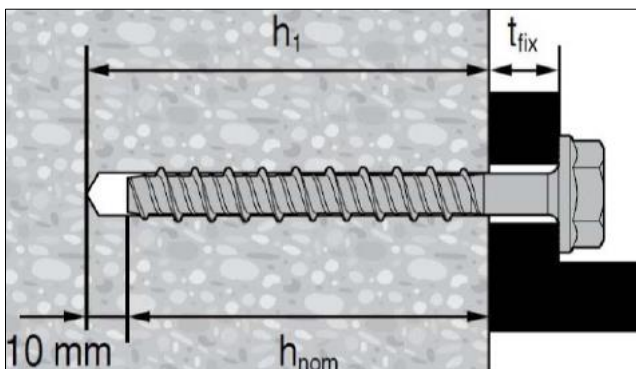
a) Hand setting in concrete base material not allowed (machine setting only)

b) Hilti does not recommend this setting process for this application.

c) Installation torque refer to HUS-HR only

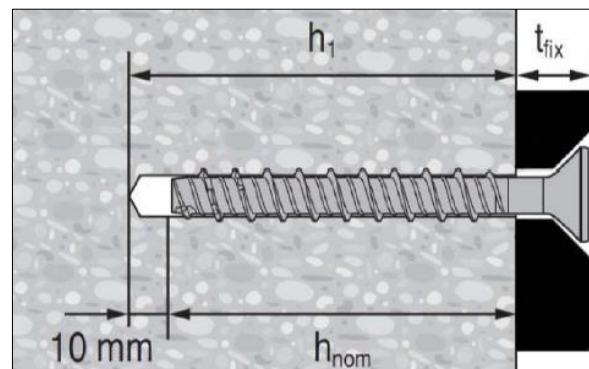
HUS-HR (hexagonal head)

6, 8,10 and 14



HUS-CR (countersunk)

6, 8 and 10



Installation equipment

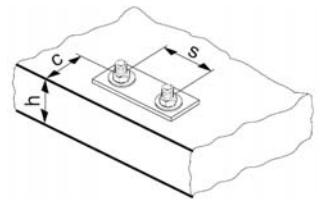
Anchor size		6	8	10	14
Type	HUS-	HR, CR	HR, CR	HR, CR	HR
Rotary hammer		TE 2 – TE 30			
Drill bit		TE-C3X 6/17	TE-C3X 8/17	TE-C3X 10/22	TE-C3X 14/22
Socket wrench insert		S-NSD 13 ½	S-NSD 13 ½	S-NSD 15 ½	S-NSD 21 ½
Torx (CR type only)		-	S-SY TX 45	S-SY TX 50	-
Impact screw driver		Hilti SIW 14-A, 22-A	Hilti SIW 22 T-A		SIW 22 T-A, SIW 9

Setting parameters

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



Setting instructions

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

Setting instruction	
<p>1. Make a cylinder hole</p>	<p>2. Clean the borehole</p>
<p>3. Install the screw anchor by impact screw driver</p>	<p>4. Ensure that the fixture is caught</p>

Basic loading data (for a 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
- All data given in this section according to Hilti Technical Data

Nominal embedment depth

Anchor size		6	8	10
Type	HUS-	HR	HR	HR, CR
Nominal embedment depth	h_{nom} [mm]	55	60	70

Recommended loads for HUS-HR / HUS-CR

Anchor size			6	8	10
	Solid clay brick Mz 12/2,0 DIN 105 / EN 771-1 $f_b^{a)} \geq 12 \text{ N/mm}^2$	Tension N_{Rec} [kN]	0,9	1,0	1,1
		Shear N_{Rec} [kN]	1,4	2,0	2,3
	Solid sand-lime brick Mz 12/2,0 DIN 106/EN 771-2 $f_b^{a)} \geq 12 \text{ N/mm}^2$	Tension N_{Rec} [kN]	0,6	0,6	1,0
		Shear N_{Rec} [kN]	0,9	1,1	1,7
	Aerated concrete PPW 6-0,4 DIN 4165/EN 771-4 $f_b^{a)} \geq 6 \text{ N/mm}^2$	Tension N_{Rec} [kN]	0,2	0,2	0,4
		Shear N_{Rec} [kN]	0,4	0,4	0,9

Permissible anchor location in brick and block walls

Edge distance and spacing influence

- The technical data for 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 $\geq 170\text{mm}$
- Distance to free edge free edge to solid masonry (autoclaved aerated gas concrete) units $\geq 170\text{mm}$
- The minimum distance to horizontal and vertical mortar joint (c_{min}) is started in drawing below
- Minimum anchor spacing (s_{min}) in one brick/block is $\geq 2 \cdot c_{min}$

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

