HUS-HR, HUS-CR SCREW ANCHOR

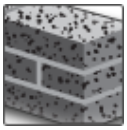
Technical Datasheet

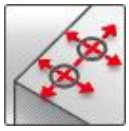
Update: Apr-18

HUS-HR / HUS-CR Screw anchor

Ultimate performance screw anchor

Anchor version		Benefits
	HUS-HR (6-14)	- 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 Nmm^2) for temporary applicationS
	HUS-CR (8-14)	

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

Installation conditions	Other information			
				
Small edge distance and spacing	European Technical Assessment	CE conformity	Corrosion resistance	PROFIS Anchor design software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment	DIBt, Berlin	ETA-08/0307 / 2015-08-27
Fire test report	DIBt, Berlin	ETA-08/0307 / 2015-08-27
Fire test report ZTV – Tunel (EBA)	MFPA, Leipzig	PB III / 08-354 / 2008-11-27

a) All data given in this section according ETA-08/0307 issue 2015-07-27.

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 N/mm²

Effective anchorage depth for static

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

a) Extra reduced embedment (Hilti Technical Data)
b) Reduced embedment depth according to ETA-08/0307.
c) Standard embedment depth according to ETA-08/0307.

Mean ultimate resistance

Anchor size		6	8			10			14		
Type	**HUS-**	**HR**	**HR, CR**			**HR, CR**			**HR**		
Non-cracked concrete											
Tension $N_{Ru,m}$	[kN]	12,0	12,0[a]	16,0	21,3	16,0[a]	21,3	33,3	-	25,2	53,6
Shear $V_{Ru,m}$	[kN]	*22,7*	31,5[a]	*34,7*	*34,7*	41,9[a]	*44,0*	*44,0*	-	50,4	*102,7*
Cracked concrete											
Tension $N_{Ru,m}$	[kN]	6,7	6,7[a]	8,0	16,0	10,0[a]	12,0	21,3	-	16,0	33,3
Shear $V_{Ru,m}$	[kN]	21,7	22,5[a]	30,9	*34,7*	30,0[a]	38,2	*44,0*	-	36,0	76,6

a) Hilti Technical Data

Characteristic resistance

Anchor size		6	8			10			14		
Type	**HUS-**	**HR**	**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**	**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**	**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]	1,8	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 γ = 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 tenstion 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 resisance					
Partial safety factor	$\gamma_{Ms,seis}$	[-]	1,8		

Characteristic resistance for seismic C1[1)]

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 α_{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 embedmenth 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	$M^0_{Rec,s,fi}$	[kN]	4,0	8,2		6,3	19,4	65,6	
	R60	$M^0_{Rec,s,fi}$	[kN]	2,7	5,5		4,6	12,6	42,4	
	R90	$M^0_{Rec,s,fi}$	[kN]	1,4	2,8		2,8	5,7	19,2	
	R120	$M^0_{Rec,s,fi}$	[kN]	0,8	1,5		1,9	2,5	8,5	
Pull-out failure										
Recommended ressitance	R30 R60 R90	$N_{Rec,p,fi}$	[kN]	1,3	1,5	3,0	2,3	4,0	3,0	6,3
	R120	$N_{Rec,p,fi}$	[kN]	1,0	1,2	2,4	1,8	3,2	2,4	5,0
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

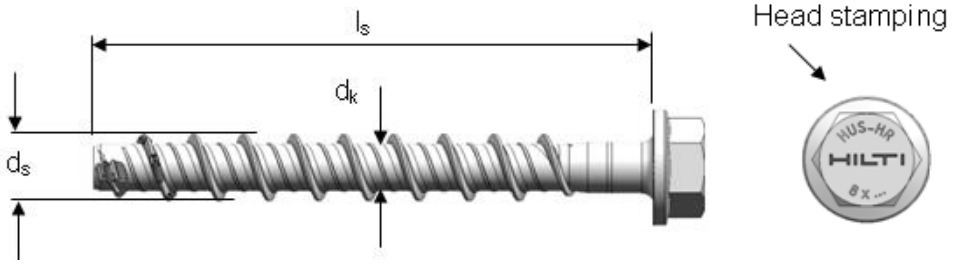
Anchor size		**6**	**8**	**10**	**14**
Type	**HUS-**	**HR**	**HR, CR**	**HR, CR**	**HR**
Nominal tensile strength f_{uk}	[N/mm²]	1050	870	950	690
Yield strength f_{yk}	[N/mm²]	900	745	815	590
Stressed cross-section A_s	[mm²]	22,9	39	55,4	143,1
Moment of resistance W	[mm³]	15	34	58	255
Design bending 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	M12
Type	HUS-	HR	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	
Embedmenth depth	h_{nom1}, [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	-	-	-	-	-	-	-
	135	-	-	-	-	-	65	25
	140	-	-	-	60	40	-	-

Screw length and thickness of fixture for HUS-CR

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

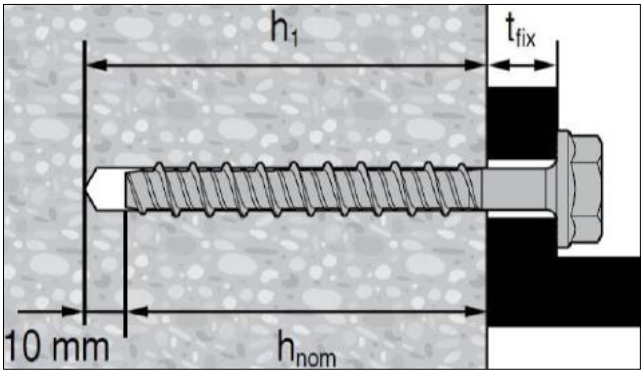
Setting information

Setting details

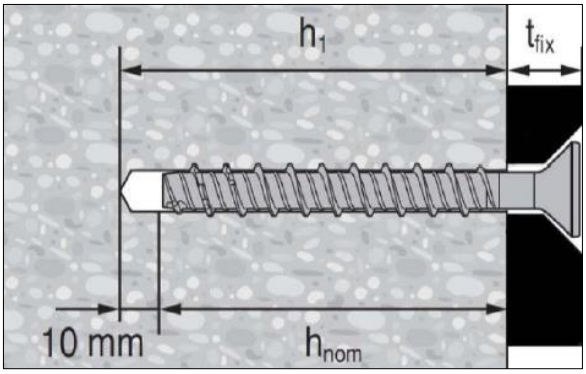
Anchor size				6	8			10			14	
Type			HUS-	HR	HR, CR[a)]			HR, CR[a)]			HR	
Nominal anchorage depth		h_{nom}	[mm]	55	50	60	80	60	70	90	70	110
Efective anchorage depth		h_{ef}	[mm]	45	38	47	64	46	54	71	52	86
Nominal diameter of drill bit		d_0	[mm]	6	8			10			14	
Cutting diameter of drill bit		d_{cut}	[mm]	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	- [b)]	16	16	- [b)]	20	20	- [b)]	- [b)]
	Solid m, KS 12	T_{inst}	[Nm]	10	- [b)]	16	16	- [b)]	20	20	- [b)]	- [b)]
	Aerated	T_{inst}	[Nm]	4	- [b)]	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)
8 and 10



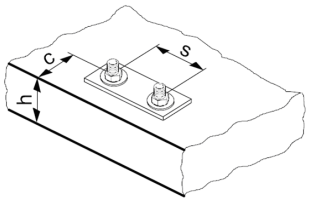
Installation equipment

Anchor size		6	8	10	14
Type	HUS-	HR	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		

Setting parameters

Anchor size			6	8			10			14	
Type		HUS-	HR	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 decidive.

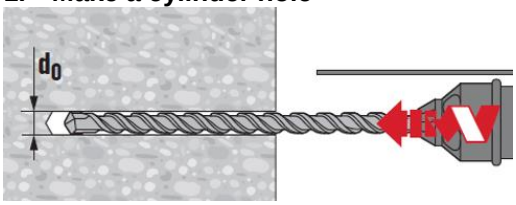


Setting instructions

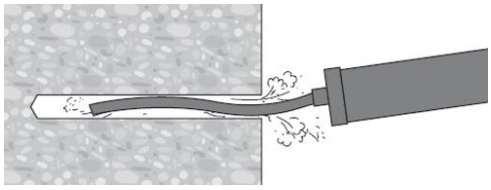
***For detailed information on installation see instruction for use given with the package of the product**

Setting instruction

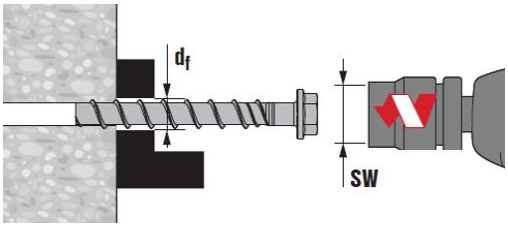
1. Make a cylinder hole



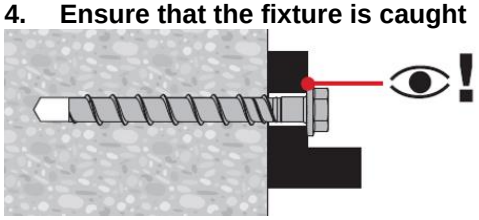
2. Clean the borehole



3. Install the screw anchor by impact screw driver



4. Ensure that the fixture is caught



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 embedmenth depth

Anchor size			6	8	10
Type		HUS-	HR	HR	HR, CR
Nominal embedmenth 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] ≥ 12 N/mm²	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] ≥ 12 N/mm²	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] ≥ 6 N/mm²	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 slid 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 ≥ 170mm
- Distance to free edge free edge to solid masonry (autoclaved aerated gas concrete) units ≥ 170mm
- 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 ≥ 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