



Hilti HSA EXPANSION ANCHOR

Technical Datasheet



Update: Oct-18

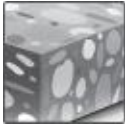
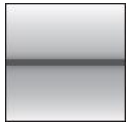

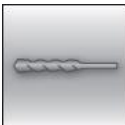

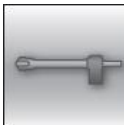
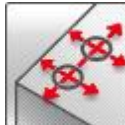



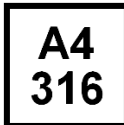




HSA Expansion anchor

Everyday standard expansion anchor for uncracked concrete

Anchor version	Benefits
 <p>HSA HSA-F HSA-R HSA-R2 (M6-M20)</p>	<ul style="list-style-type: none"> - Fast & convenient setting behaviour - Reliable ETA approved torquing using impact wrench with torque bar for torque control - Small edge and spacing distances - High loads - Three embedment depths for maximal design flexibility
 <p>HSA-BW (M6-M20)</p>	<ul style="list-style-type: none"> - M12, M16 and M20 ETA approved for diamond cored holes using DD 30-W and matching diamond core bit - Suitable for pre- and through fastening - Long lengths available suitable for wood structures fastening applications

Base material	Load conditions
 <p>Concrete (non-cracked)</p>	  <p>Static/ quasi-static</p> <p>Fire resistance</p>
Installation conditions	Other information
    <p>Hammer drilled holes</p> <p>Diamond drilled holes</p> <p>Hollow drill- bit drilling</p> <p>Small edge distance and spacing</p>	    <p>European Technical Assessment</p> <p>CE conformity</p> <p>PROFIS Anchor design Software</p> <p>Corrosion resistance</p>

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment ^{a)}	DIBt, Berlin	ETA-11/0374 / 2016-08-08

a) All data given in this section according to ETA-11/0374, issue 2016-08-08.

Static and quasi-static loading (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

Anchor size			M6			M8			M10		
Eff. Anchorage depth	h_{ef}	[mm]	30	40	60	30	40	70	40	50	80
Anchor size			M12			M16			M20		
Eff. Anchorage depth	h_{ef}	[mm]	50	65	100	65	80	120	75	100	115

Characteristic resistance

Anchor size			M6			M8			M10		
Eff. Anchorage depth	h_{ef}	[mm]	30	40	60	30	40	70	40	50	80
Tension N_{Rk}	HSA, HSA-BW	[kN]	6,0	7,5	9,0	8,3	12,8	16,0	12,8	17,9	25,0
	HSA-R2, HSA-R		6,0	7,5	9,0	8,3	12,8	16,0	12,8	17,9	25,0
	HSA-F		6,0	7,5	9,0	8,3	12,8	15,9	12,8	17,9	25,0
Shear V_{Rk}	HSA, HSA-BW	[kN]	6,5	6,5	6,5	8,3	10,6	10,6	18,9	18,9	18,9
	HSA-R2, HSA-R		7,2	7,2	7,2	8,3	12,3	12,3	22,6	22,6	22,6
	HSA-F		6,5	6,5	6,5	8,3	10,6	10,6	18,9	18,9	18,9
Anchor size			M12			M16			M20		
Eff. Anchorage depth	h_{ef}	[mm]	50	65	100	65	80	120	75	100	115
Tension N_{Rk}	HSA, HSA-BW	[kN]	17,9	26,5	35,0	26,5	36,1	50,0	32,8	50,5	62,3
	HSA-R2, HSA-R		17,9	26,5	35,0	26,5	36,1	50,0	32,8	50,5	62,3
	HSA-F		17,9	26,5	35,0	26,5	36,1	50,0	32,8 ^{b)}	50,5 ^{b)}	62,3 ^{b)}
Shear V_{Rk}	HSA, HSA-BW	[kN]	29,5	29,5	29,5	51,0	51,0	51,0	65,6	85,8	85,8
	HSA-R2, HSA-R		29,3	29,3	29,3	56,5	56,5	56,5	65,6	91,9	91,9
	HSA-F		29,5	29,5	29,5	51,0	51,0	51,0	65,6 ^{b)}	85,8 ^{b)}	85,8 ^{b)}

b) Data covered by Hilti Technical Data.

Design resistance

Anchor size			M6			M8			M10		
Eff. Anchorage depth	h_{ef}	[mm]	30	40	60	30	40	70	40	50	80
Tension N_{Rd}	HSA, HSA-BW	[kN]	4,0	5,0	6,0	5,5	8,5	10,7	8,5	11,9	16,7
	HSA-R2, HSA-R		4,0	5,0	6,0	5,5	8,5	10,7	8,5	11,9	16,7
	HSA-F		4,0	5,0	6,0	5,5	8,5	10,7	8,5	11,9	16,7
Shear V_{Rd}	HSA, HSA-BW	[kN]	5,2	5,2	5,2	5,5	8,5	8,5	15,1	15,1	15,1
	HSA-R2, HSA-R		5,5	5,8	5,8	5,5	9,8	9,8	18,1	18,1	18,1
	HSA-F		5,2	5,2	5,2	5,5	8,5	8,5	15,1	15,1	15,1
Anchor size			M12			M16			M20		
Eff. Anchorage depth	h_{ef}	[mm]	50	65	100	65	80	120	75	100	115
Tension N_{Rd}	HSA, HSA-BW	[kN]	11,9	17,6	23,3	17,6	24,1	33,3	21,9	33,7	41,5
	HSA-R2, HSA-R		11,9	17,6	23,3	17,6	24,1	33,3	21,9	33,7	41,5
	HSA-F		11,9	17,6	23,3	17,6	24,1	33,3	21,9 ^{b)}	33,7 ^{b)}	41,5 ^{b)}
Shear V_{Rd}	HSA, HSA-BW	[kN]	23,6	23,6	23,6	40,8	40,8	40,8	43,7	68,6	68,6
	HSA-R2, HSA-R		23,4	23,4	23,4	45,2	45,2	45,2	43,7	73,5	73,5
	HSA-F		23,6	23,6	23,6	40,8	40,8	40,8	43,7 ^{b)}	68,6 ^{b)}	68,6 ^{b)}

b) Data covered by Hilti Technical Data.

Recommended loads ^{a)}

Anchor size		M6			M8			M10			
Eff. Anchorage depth h_{ef} [mm]		30	40	60	30	40	70	40	50	80	
Tension N_{rec}	HSA, HSA-BW	[kN]	2,9	3,6	4,3	4,0	6,1	7,6	6,1	8,5	11,9
	HSA-R2, HSA-R		2,9	3,6	4,3	4,0	6,1	7,6	6,1	8,5	11,9
	HSA-F		2,9	3,6	4,3	4,0	6,1	7,6	6,1	8,5	11,9
Shear V_{rec}	HSA, HSA-BW	[kN]	3,7	3,7	3,7	4,0	6,1	6,1	10,8	10,8	10,8
	HSA-R2, HSA-R		4,0	4,1	4,1	4,0	7,0	7,0	12,9	12,9	12,9
	HSA-F		3,7	3,7	3,7	4,0	6,1	6,1	10,8	10,8	10,8
Anchor size		M12			M16			M20			
Eff. Anchorage depth h_{ef} [mm]		50	65	100	65	80	120	75	100	115	
Tension N_{rec}	HSA, HSA-BW	[kN]	8,5	12,6	16,7	12,6	17,2	23,8	15,6	24,0	29,7
	HSA-R2, HSA-R		8,5	12,6	16,7	12,6	17,2	23,8	15,6	24,0	29,7
	HSA-F		8,5	12,6	16,7	12,6	17,2	23,8	15,6 ^{b)}	24,0 ^{b)}	29,7 ^{b)}
Shear V_{rec}	HSA, HSA-BW	[kN]	16,9	16,9	16,9	29,1	29,1	29,1	31,2	49,0	49,0
	HSA-R2, HSA-R		16,7	16,7	16,7	32,3	32,3	32,3	31,2	52,5	52,5
	HSA-F		16,9	16,9	16,9	29,1	29,1	29,1	31,2 ^{b)}	49,0 ^{b)}	49,0 ^{b)}

a) 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.

b) Data covered by Hilti Technical data

Materials

Mechanical properties

Anchor size		M6	M8	M10	M12	M16	M20	
Nominal tensile strength $f_{uk,thread}$	HSA, HSA-BW, HSA-F	[N/mm ²]	650	580	650	700	650	700
	HSA-R2, HSA-R		650	560	650	580	600	625
Yield strength $f_{yk,thread}$	HSA, HSA-BW, HSA-F	[N/mm ²]	520	464	520	560	520	560
	HSA-R2, HSA-R		520	448	520	464	480	500
Stressed cross-section A_s		[mm ²]	20,1	36,6	58	84,3	157	245
Moment of resistance W		[mm ³]	12,7	31,2	62,3	109,2	277,5	540,9
Char. bending resistance	HSA, HSA-BW, HSA-F	[Nm]	9,9	21,7	48,6	91,7	216,4	454,4
	HSA-R2, HSA-R		9,9	21	48,6	76	199,8	405,7

Material quality

Part		Material
HSA HSA-BW (Carbon steel)	Bolt	Galvanized ($\geq 5 \mu\text{m}$)
	Sleeve	Galvanized ($\geq 5 \mu\text{m}$)
	Washer	Galvanized ($\geq 5 \mu\text{m}$)
	Hexagon nut	Strength class 8 / Galvanized ($\geq 5 \mu\text{m}$)
HSA-R2 (Stainless steel)	Bolt	Stainless steel A2, 1.4301; M6-M20 coated
	Sleeve	Stainless steel A2
	Washer	Stainless steel A2
	Hexagon nut	Stainless steel A2; / M6-M20 coated
HSA-R (Stainless steel)	Bolt	Stainless steel A4, 1.4401 or 1.4362 / M6-M20 coated
	Sleeve	Stainless steel A2
	Washer	Stainless steel A4
	Hexagon nut	Stainless steel A4; / M6-M20 coated
HSA-F (Carbon steel)	Bolt	Stainless steel A2 Hot-dip galvanized ($\geq 42 \mu\text{m}$)
	Sleeve	Stainless steel A2
	Washer	Hot-dip galvanized ($\geq 42 \mu\text{m}$)
	Hexagon nut	Strength class 8 / Hot-dip galvanized ($\geq 42 \mu\text{m}$)

Geometry washer

Anchor size		M6	M8	M10	M12	M16	M20
Inner diameter d_1							
HSA, HSA-R2, HSA-R, HSA-F	d_1 [mm]	6,4	8,4	10,5	13,0	17,0	21
HSA-BW	d_1 [mm]	6,4	8,4	10,5	13,0	17,0	22
Outer diameter d_2							
HSA, HSA-R2, HSA-R, HSA-F	d_2 [mm]	12,0	16,0	20,0	24,0	30,0	37,0
HSA-BW	d_2 [mm]	18,0	24,0	30,0	37,0	50,0	60,0
Thickness h							
HSA, HSA-R2, HSA-R, HSA-F	h [mm]	1,6	1,6	2,0	2,5	3,0	3,0
HSA-BW	h [mm]	1,8	2,0	2,5	3,0	3,0	4,0

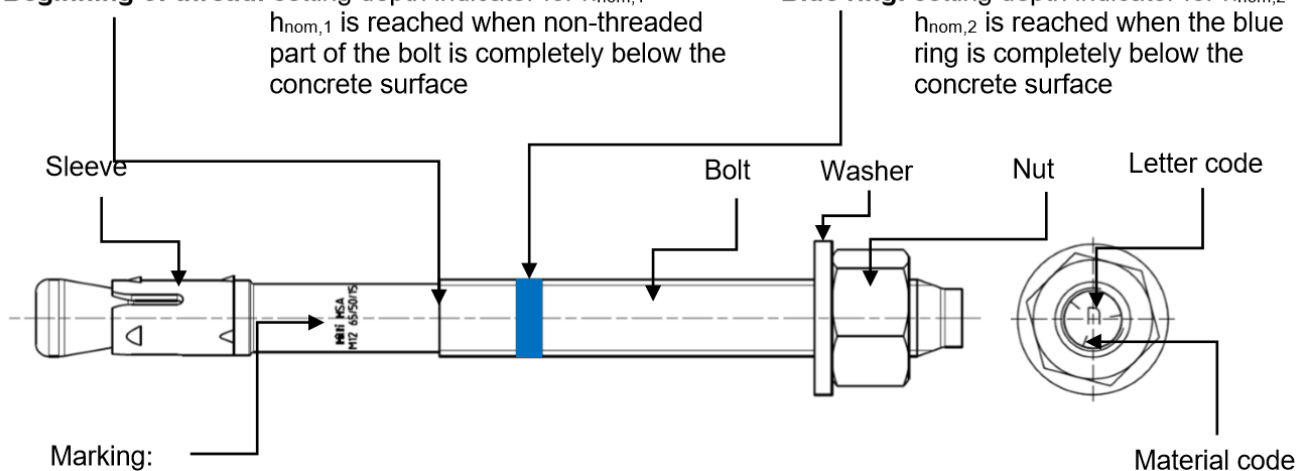
Product marking and identification of anchor:

Beginning of thread: setting depth indicator for $h_{\text{nom},1}$

$h_{\text{nom},1}$ is reached when non-threaded part of the bolt is completely below the concrete surface

Blue ring: setting depth indicator for $h_{\text{nom},2}$

$h_{\text{nom},2}$ is reached when the blue ring is completely below the concrete surface



e.g.
 Hilti HSA ... Brand and Anchor type
 M12 65/50/15 ... Anchor Size and the max. $t_{\text{fix},1}$ / $t_{\text{fix},2}$ / $t_{\text{fix},3}$ for the corresponding $h_{\text{nom},1}$ / $h_{\text{nom},2}$ / $h_{\text{nom},3}$

Material code for identification of different materials

Type	HSA, HSA-BW, HSA-F (carbon steel)	HSA-R2 (Stainless steel grade A2)	HSA-R (stainless steel grade A4)
Material code			
	Letter code without mark	Letter code with two marks	Letter code with three marks

Letter code for anchor length and maximum thickness of the fixture t_{fix}

Type	HSA, HSA-BW, HSA-R2, HSA-R, HSA-F						
	Size	M6	M8	M10	M12	M16	M20
h_{nom} [mm]		37 / 47 / 67	39 / 49 / 79	50 / 60 / 90	64 / 79 / 114	77 / 92 / 132	90 / 115 / 130
Letter	t_{fix}	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$
z		5/-/-	5/-/-	5/-/-	5/-/-	5/-/-	5/-/-
y		10/-/-	10/-/-	10/-/-	10/-/-	10/-/-	10/-/-
x		15/5/-	15/5/-	15/5/-	15/-/-	15/-/-	15/-/-
w		20/10/-	20/10/-	20/10/-	20/5/-	20/5/-	20/-/-
v		25/15/-	25/15/-	25/15	25/10/-	25/10/-	25/-/-
u		30/20/-	30/20/-	30/20/-	30/15/-	30/15/-	30/5/-
t		35/25/5	35/25/-	35/25/-	35/20/-	35/20/-	35/10/-
s		40/30/10	40/30/-	40/30/-	40/25/-	40/25/-	40/15/-
r		45/35/15	45/35/5	45/35/5	45/30/-	45/30/-	45/20/5
q		50/40/20	50/40/10	50/40/10	50/35/-	50/35/-	50/25/10
p		55/45/25	55/45/15	55/45/15	55/40/5	55/40/-	55/30/15
o		60/50/30	60/50/20	60/50/20	60/45/10	60/45/5	60/35/20
n		65/55/35	65/55/25	65/55/25	65/50/15	65/50/10	65/40/25
m		70/60/40	70/60/30	70/60/30	70/55/20	70/55/15	70/45/30
l		75/65/45	75/65/35	75/65/35	75/60/25	75/60/20	75/50/35
k		80/70/50	80/70/40	80/70/40	80/65/30	80/65/25	80/55/40
j		85/75/55	85/75/45	85/75/45	85/70/35	85/70/30	85/60/45
i		90/80/60	90/80/50	90/80/50	90/75/40	90/75/35	90/65/50
h		95/85/65	95/85/55	95/85/55	95/80/45	95/80/40	95/70/55
g		100/90/70	100/90/60	100/90/60	100/85/50	100/85/45	100/75/60
f		105/95/75	105/95/65	105/95/65	105/90/55	105/90/50	105/80/65
e		110/100/80	110/100/70	110/100/70	110/95/60	110/95/55	110/85/70
d		115/105/85	115/105/75	115/105/75	115/100/65	115/100/60	115/90/75
c		120/110/90	120/110/80	120/110/80	125/110/75	120/105/65	120/95/80
b		125/115/95	125/115/85	125/115/85	135/120/85	125/110/70	125/100/85
a		130/120/100	130/120/90	130/120/90	145/130/95	135/120/80	130/105/90
aa		-	-	-	155/140/105	145/130/90	-
ab		-	-	-	165/150/115	155/140/100	-
ac		-	-	-	175/160/125	165/150/110	-
ad		-	-	-	180/165/130	190/175/135	-
ae		-	-	-	230/215/180	240/225/185	-
af		-	-	-	280/265/230	290/275/235	-
ag		-	-	-	330/315/280	340/325/285	-

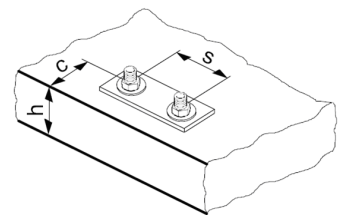
Anchor length in bolt type and grey shaded are standard items. For selection of other anchor length, check availability of the items.

Setting information

Setting details

Anchor size			M6			M8			M10		
Nominal anchorage depth	h_{nom}	[mm]	37	47	67	39	49	79	50	60	90
Minimum base material thickness	h_{min}	[mm]	100	100	120	100	100	120	100	120	160
Minimum spacing	s_{min}	[mm]	35	35	35	35	35	35	50	50	50
Minimum edge distance	c_{min}	[mm]	35	35	35	40	35	35	50	40	40
Nominal diameter of drill bit	d_0	[mm]	6			8			10		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,4			8,45			10,45		
Depth of drill hole	$h_1 \geq$	[mm]	42	52	72	44	54	84	55	65	95
Diameter of clearance hole in the fixture	$d_r \leq$	[mm]	7			9			12		
Torque moment	T_{inst}	[Nm]	5			15			25		
Width across	SW	[mm]	10			13			17		
Anchor size			M12			M16			M20		
Nominal anchorage depth	h_{nom}	[mm]	64	79	114	77	92	132	90	115	130
Minimum base material thickness	h_{min}	[mm]	100	140	180	140	160	180	160	220	220
Minimum spacing	s_{min}	[mm]	70	70	70	90	90	90	195	175	175
Minimum edge distance	c_{min}	[mm]	70	65	55	80	75	70	130	120	120
Nominal diameter of drill bit	d_0	[mm]	12			16			20		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12,5			16,5			20,55		
Depth of drill hole	$h_1 \geq$	[mm]	72	87	122	85	100	140	98	123	138
Diameter of clearance hole in the fixture	$d_r \leq$	[mm]	14			18			22		
Torque moment	T_{inst}	[Nm]	50			80			200		
Width across	SW	[mm]	19			24			30		

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



Installation equipment

Anchor size		M6	M8	M10	M12	M16	M20	
Rotary hammer		TE2 – TE16					TE40 – TE80	
Other tools		hammer, torque wrench, blow out pump						
Machine tightening								
Setting tool		-	S-TB HSA				-	
Impact screw driver		-	Hilti S/W 14-A Hilti S/W 22-A			Hilti S/W 22T-A		-
Speed	HAS, HAS-BW, HAS-F	-	1		3	-1)		-
	HAS-R2, HAS-R	-	3					-
Setting time t_{set} [sec]		-	4				-	

1) The impact screw driver operates with a fixed speed.

Setting parameters

Anchor size			M6			M8			M10		
Nominal anchorage depth	h_{nom}	[mm]	37	47	67	39	49	79	50	60	90
Effective anchorage depth	h_{ef}	[mm]	30	40	60	30	40	70	40	50	80
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	100	120	130	130	180	200	190	210	290
Critical edge distance for splitting failure	$c_{cr,sp}$	[mm]	50	60	65	65	90	100	95	105	145
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	90	120	180	90	120	210	120	150	240
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	45	60	90	45	60	105	60	75	120
Anchor size			M12			M16			M20		
Nominal anchorage depth	h_{nom}	[mm]	64	79	114	77	92	132	90	115	130
Effective anchorage depth	h_{ef}	[mm]	50	65	100	65	80	120	75	100	115
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	200	250	310	230	280	380	260	370	400
Critical edge distance for splitting failure	$c_{cr,sp}$	[mm]	100	125	155	115	140	190	130	185	200
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	150	195	300	195	240	360	225	300	345
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	75	97,5	150	97,5	120	180	112,5	150	172,5

Setting instructions

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

1. Hole drilling		
<p>Hammer drilling (HD): M6-M20</p>	<p>Hammer drilling with Hilti hollow drill bit (HDB): M12-M20</p>	<p>Diamond drilling (DD): M10-M20</p>
2. Cleaning		
<p>Manual cleaning (MC): M6-M20</p>	<p>Automatic cleaning (AC): M12-M20</p>	
3. Anchor setting		
<p>Hammer setting: M6-M20</p>	<p>Machine setting (impact screw driver with setting tool): M8-M16</p>	
4. Check setting		
5. Anchor torquing		
<p>Torque wrench: M6-M20</p> <p>$T_{inst} = 20 \text{ Nm}$ 13 mm</p>	<p>Impact screw driver with setting tool: M8-M16</p> <p>S-TB</p>	