



# Hilti HSA EXPANSION ANCHOR

**Technical Datasheet**



**Update: Oct-18**

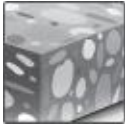
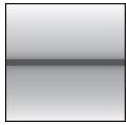

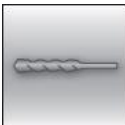

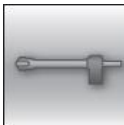
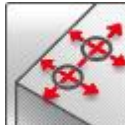








# HSA Expansion anchor

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"> <li>- Fast &amp; convenient setting behaviour</li> <li>- Reliable ETA approved torquing using impact wrench with torque bar for torque control</li> <li>- Small edge and spacing distances</li> <li>- High loads</li> <li>- Three embedment depths for maximal design flexibility</li> <li>- M12, M16 and M20 ETA approved for diamond cored holes using DD 30-W and matching diamond core bit</li> <li>- Suitable for pre- and through fastening</li> <li>- Long lengths available suitable for wood structures fastening applications</li> </ul>
 <p>HSA-BW (M6-M20)</p>	

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>A4 316 Corrosion resistance</p>

## Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment <sup>a)</sup>	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 <sup>b)</sup>	50,5 <sup>b)</sup>	62,3 <sup>b)</sup>
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 <sup>b)</sup>	85,8 <sup>b)</sup>	85,8 <sup>b)</sup>

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 <sup>b)</sup>	33,7 <sup>b)</sup>	41,5 <sup>b)</sup>
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 <sup>b)</sup>	68,6 <sup>b)</sup>	68,6 <sup>b)</sup>

b) Data covered by Hilti Technical Data.

### Recommended loads <sup>a)</sup>

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 <sup>b)</sup>	24,0 <sup>b)</sup>	29,7 <sup>b)</sup>
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 <sup>b)</sup>	49,0 <sup>b)</sup>	49,0 <sup>b)</sup>

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 <sup>2</sup> ]	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 <sup>2</sup> ]	520	464	520	560	520	560
	HSA-R2, HSA-R		520	448	520	464	480	500
Stressed cross-section $A_s$		[mm <sup>2</sup> ]	20,1	36,6	58	84,3	157	245
Moment of resistance $W$		[mm <sup>3</sup> ]	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
<b>Inner diameter <math>d_1</math></b>								
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
<b>Outer diameter <math>d_2</math></b>								
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
<b>Thickness h</b>								
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

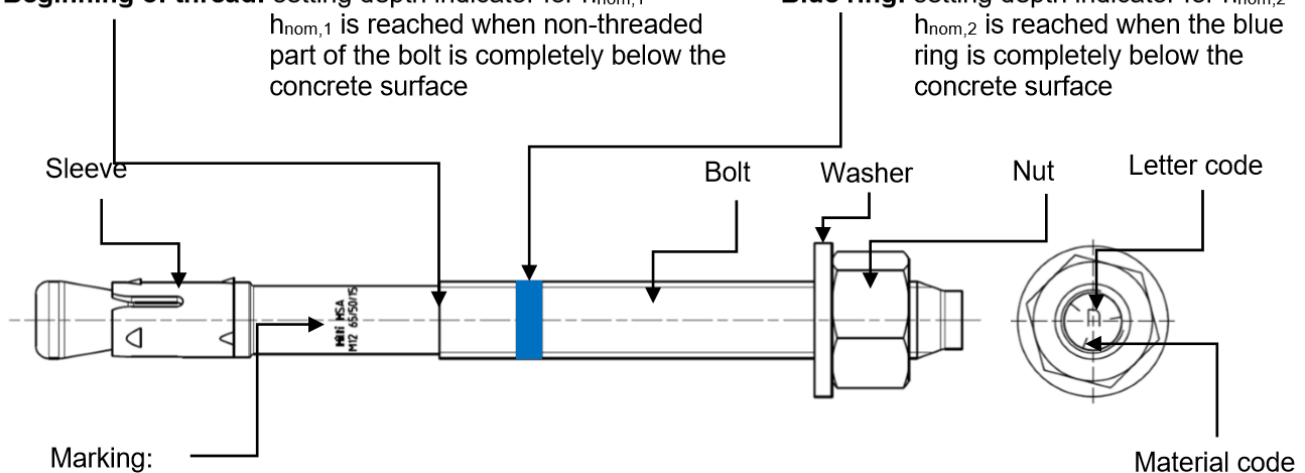
### Product marking and identification of anchor:

**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		<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>	5/-/-
y		10/-/-	10/-/-	10/-/-	10/-/-	10/-/-	<b>10/-/-</b>
x		15/5/-	15/5/-	15/5/-	15/-/-	15/-/-	15/-/-
w		<b>20/10/-</b>	<b>20/10/-</b>	<b>20/10/-</b>	<b>20/5/-</b>	<b>20/5/-</b>	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	<b>35/25/-</b>	<b>35/25/-</b>	<b>35/20/-</b>	35/20/-	35/10/-
s		<b>40/30/10</b>	40/30/-	40/30/-	40/25/-	<b>40/25/-</b>	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	<b>50/40/10</b>	50/35/-	50/35/-	50/25/10
p		<b>55/45/25</b>	<b>55/45/15</b>	55/45/15	55/40/5	55/40/-	<b>55/30/15</b>
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	<b>65/50/15</b>	65/50/10	65/40/25
m		70/60/40	70/60/30	<b>70/60/30</b>	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	<b>80/70/40</b>	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	<b>85/70/30</b>	85/60/45
i		90/80/60	90/80/50	<b>90/80/50</b>	90/75/40	90/75/35	90/65/50
h		95/85/65	95/85/55	95/85/55	<b>95/80/45</b>	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	<b>105/95/65</b>	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	<b>125/110/75</b>	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	<b>145/130/95</b>	<b>135/120/80</b>	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	-

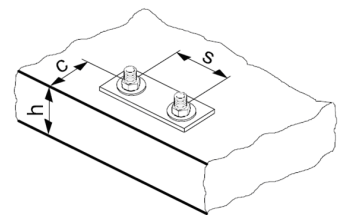
Anchor length in bolt type and grey shaded are standard items. For selection of other anchor length, check availability of the items.

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