



# HILTI HSA EXPANSION ANCHOR

**Technical Datasheet**



**Update: Oct-20**

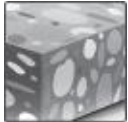
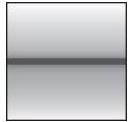

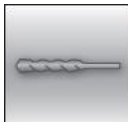

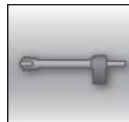
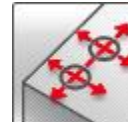
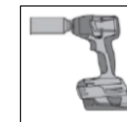








# HSA Expansion anchor

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 the innovative SIW 6AT-A22 and SI-AT-A22 system for automatic torquing</li> <li>- Small edge and spacing distances</li> <li>- High loads</li> <li>- Three embedment depths for maximal design flexibility</li> </ul>
 <p>HSA-BW (M6-M20)</p>	<ul style="list-style-type: none"> <li>- M10, 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>

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>Impact wrench with adaptative torque module</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 <sup>a)</sup>	DIBt, Berlin	ETA-11/0374 / 2020-10-22

a) All data given in this section according to ETA-11/0374, issued 2020-10-22.

## 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

### 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	8,1	12,4	16,0	12,4	17,4	25,0
	HSA-R2, HSA-R		6,0	7,5	9,0	8,1	12,4	16,0	12,4	17,4	25,0
	HSA-F		6,0	7,5	9,0	8,1	12,4	15,9	12,4	17,4	25,0
Shear $V_{Rk}$	HSA, HSA-BW	[kN]	6,0	6,5	6,5	8,1	10,6	10,6	18,9	18,9	18,9
	HSA-R2, HSA-R		6,0	7,2	7,2	8,1	12,3	12,3	22,6	22,6	22,6
	HSA-F		6,0	6,5	6,5	8,1	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]	17,4	25,8	35,0	25,8	35,2	50,0	32,0	49,2	60,7
	HSA-R2, HSA-R		17,4	25,8	35,0	25,8	35,2	50,0	32,0	49,2	60,7
	HSA-F		17,4	25,8	35,0	25,8	35,2	50,0	32,0 <sup>b)</sup>	49,2 <sup>b)</sup>	60,7 <sup>b)</sup>
Shear $V_{Rk}$	HSA, HSA-BW	[kN]	29,5	29,5	29,5	51,0	51,0	51,0	63,9	85,8	85,5
	HSA-R2, HSA-R		29,3	29,3	29,3	56,5	56,5	56,5	63,9	91,9	91,9
	HSA-F		29,5	29,5	29,5	51,0	51,0	51,0	63,9 <sup>b)</sup>	68,6 <sup>b)</sup>	68,6 <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	5,4	8,3	10,7	8,3	11,6	16,7
	HSA-R2, HSA-R		4,0	5,0	6,0	5,4	8,3	10,7	8,3	11,6	16,7
	HSA-F		4,0	5,0	6,0	5,4	8,3	10,7	8,3	11,6	16,7
Shear $V_{Rd}$	HSA, HSA-BW	[kN]	4,0	5,2	5,2	5,4	8,5	8,5	15,1	15,1	15,1
	HSA-R2, HSA-R		4,0	5,8	5,8	5,4	9,8	9,8	18,1	18,1	18,1
	HSA-F		4,0	5,2	5,2	5,4	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]	11,6	17,2	23,3	17,2	23,5	33,3	21,3	32,8	40,4
	HSA-R2, HSA-R		11,6	17,2	23,3	17,2	23,5	33,3	21,3	32,8	40,4
	HSA-F		11,6	17,2	23,3	17,2	23,5	33,3	21,3 <sup>b)</sup>	32,8 <sup>b)</sup>	40,4 <sup>b)</sup>
Shear $V_{Rd}$	HSA, HSA-BW	[kN]	23,2	23,6	23,6	40,8	40,8	40,8	42,6	68,6	68,4
	HSA-R2, HSA-R		23,2	23,4	23,4	45,2	45,2	45,2	42,6	73,5	73,5
	HSA-F		23,2	23,6	23,6	40,8	40,8	40,8	42,6 <sup>b)</sup>	54,9 <sup>b)</sup>	54,9 <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	3,8	5,9	7,6	5,9	8,3	11,9
	HSA-R2, HSA-R		2,9	3,6	4,3	3,8	5,9	7,6	5,9	8,3	11,9
	HSA-F		2,9	3,6	4,3	3,8	5,9	7,6	5,9	8,3	11,9
Shear $V_{rec}$	HSA, HSA-BW	[kN]	2,9	3,7	3,7	3,8	6,1	6,1	10,8	10,8	10,8
	HSA-R2, HSA-R		2,9	4,1	4,1	3,8	7,0	7,0	12,9	12,9	12,9
	HSA-F		2,9	3,7	3,7	3,8	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]	8,3	12,3	16,7	12,3	16,8	23,8	15,2	23,4	28,9
	HSA-R2, HSA-R		8,3	12,3	16,7	12,3	16,8	23,8	15,2	23,4	28,9
	HSA-F		8,3	12,3	16,7	12,3	16,8	23,8	15,2 <sup>b)</sup>	23,4 <sup>b)</sup>	28,9 <sup>b)</sup>
Shear $V_{rec}$	HSA, HSA-BW	[kN]	16,6	16,9	16,9	29,1	29,1	29,1	30,4	49,0	48,9
	HSA-R2, HSA-R		16,6	16,7	16,7	32,3	32,3	32,3	30,4	52,5	52,5
	HSA-F		16,6	16,9	16,9	29,1	29,1	29,1	30,4 <sup>b)</sup>	39,2 <sup>b)</sup>	39,2 <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**

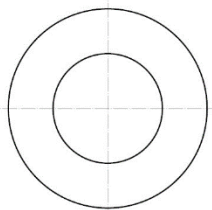
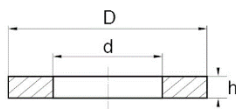
Anchor size		M6	M8	M10	M12	M16	M20	
Nominal tensile strength $f_{uk,thread}$	HSA, HSA-BW, HSA-F	[N/mm <sup>2</sup> ]	650	580	650	700	650	700
	HSA-R2, HSA-R		650	560	650	580	600	625
Yield strength $f_{yk,thread}$	HSA, HSA-BW, HSA-F	[N/mm <sup>2</sup> ]	520	464	520	560	520	560
	HSA-R2, HSA-R		520	448	520	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	Bolt	Carbon steel, 18MnV5 or 1.0511 or 1.0501 / Galvanized ( $\geq 5 \mu\text{m}$ )
	Sleeve	Carbon steel, 1.0347 / Galvanized ( $\geq 5 \mu\text{m}$ )
	Washer	Carbon steel, DIN 125 strength class 140HV / Galvanized ( $\geq 5 \mu\text{m}$ )
	Hexagon nut	Carbon steel, DIN 934 strength class 8 / Galvanized ( $\geq 5 \mu\text{m}$ )
HSA-R2	Bolt	Stainless steel A2, 1.4301
	Sleeve	Stainless steel A2, 1.4301
	Washer	Stainless steel A2, DIN 125 strength class 140HV
	Hexagon nut	Stainless steel A2, DIN 934 strength class 8
HSA-R	Bolt	Stainless steel A4, 1.4401 or Duplex steel, 1.4362
	Sleeve	Stainless steel A2, 1.4301
	Washer	Stainless steel A4, DIN 125 strength class 140HV
	Hexagon nut	Stainless steel A4, DIN 934 strength class 8
HSA-F	Bolt	Carbon steel, 18MnV5 or 1.0501 or 1.1172 / Hot-dip galvanized ( $\geq 42 \mu\text{m}$ )
	Sleeve	Stainless steel A2, 1.4301
	Washer	Carbon steel, DIN 125 strength class 140HV / Hot-dip galvanized ( $\geq 42 \mu\text{m}$ )
	Hexagon nut	Carbon steel, DIN 934 strength class 8 / Hot-dip galvanized ( $\geq 42 \mu\text{m}$ )

### Washer dimensions

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



### Nut dimensions – according to DIN 934

Anchor size			M6	M8	M10	M12	M16	M20
Dimension	s	[mm]	10	13	17	19	24	30
Dimension	e	[mm]	11.05	14.38	18.90	21.10	26.75	32.95
Thickness	m	[mm]	5	6.5	8	10	13	16



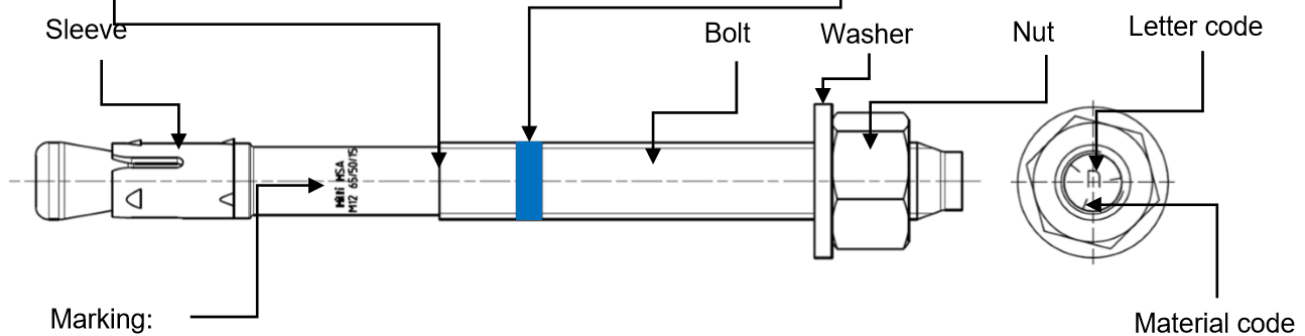
### Product marking and identification of anchor:

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

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

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

$h_{nom,2}$  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.  $t_{fix,1}/t_{fix,2}/t_{fix,3}$  for the corresponding  $h_{nom,1}/h_{nom,2}/h_{nom,3}$

### 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	$t_{fix}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$
<b>z</b>	<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>	<b>5/-/-</b>
<b>y</b>	10/-/-	10/-/-	10/-/-	10/-/-	10/-/-	<b>10/-/-</b>
<b>x</b>	15/5/-	15/5/-	15/5/-	15/-/-	15/-/-	15/-/-
<b>w</b>	<b>20/10/-</b>	<b>20/10/-</b>	<b>20/10/-</b>	<b>20/5/-</b>	<b>20/5/-</b>	20/-/-
<b>v</b>	25/15/-	25/15/-	25/15	25/10/-	25/10/-	25/-/-
<b>u</b>	30/20/-	30/20/-	30/20/-	30/15/-	30/15/-	30/5/-
<b>t</b>	35/25/5	<b>35/25/-</b>	<b>35/25/-</b>	<b>35/20/-</b>	35/20/-	35/10/-
<b>s</b>	<b>40/30/10</b>	40/30/-	40/30/-	40/25/-	<b>40/25/-</b>	40/15/-
<b>r</b>	45/35/15	45/35/5	45/35/5	45/30/-	45/30/-	45/20/5
<b>q</b>	50/40/20	50/40/10	<b>50/40/10</b>	50/35/-	50/35/-	50/25/10
<b>p</b>	<b>55/45/25</b>	<b>55/45/15</b>	55/45/15	55/40/5	55/40/-	<b>55/30/15</b>
<b>o</b>	60/50/30	60/50/20	60/50/20	60/45/10	60/45/5	60/35/20
<b>n</b>	65/55/35	65/55/25	65/55/25	<b>65/50/15</b>	65/50/10	65/40/25
<b>m</b>	70/60/40	70/60/30	<b>70/60/30</b>	70/55/20	70/55/15	70/45/30
<b>l</b>	75/65/45	75/65/35	75/65/35	75/60/25	75/60/20	75/50/35
<b>k</b>	80/70/50	<b>80/70/40</b>	80/70/40	80/65/30	80/65/25	80/55/40
<b>j</b>	85/75/55	85/75/45	85/75/45	85/70/35	<b>85/70/30</b>	85/60/45
<b>i</b>	90/80/60	90/80/50	<b>90/80/50</b>	90/75/40	90/75/35	90/65/50
<b>h</b>	95/85/65	95/85/55	95/85/55	<b>95/80/45</b>	95/80/40	95/70/55
<b>g</b>	100/90/70	100/90/60	100/90/60	100/85/50	100/85/45	100/75/60
<b>f</b>	105/95/75	105/95/65	<b>105/95/65</b>	105/90/55	105/90/50	105/80/65
<b>e</b>	110/100/80	110/100/70	110/100/70	110/95/60	110/95/55	110/85/70
<b>d</b>	115/105/85	115/105/75	115/105/75	115/100/65	115/100/60	115/90/75
<b>c</b>	120/110/90	120/110/80	120/110/80	<b>125/110/75</b>	120/105/65	120/95/80
<b>b</b>	125/115/95	125/115/85	125/115/85	135/120/85	125/110/70	125/100/85
<b>a</b>	130/120/100	130/120/90	130/120/90	<b>145/130/95</b>	<b>135/120/80</b>	130/105/90
<b>aa</b>	-	-	-	155/140/105	145/130/90	-
<b>ab</b>	-	-	-	165/150/115	155/140/100	-
<b>ac</b>	-	-	-	175/160/125	165/150/110	-
<b>ad</b>	-	-	-	180/165/130	190/175/135	-
<b>ae</b>	-	-	-	230/215/180	240/225/185	-
<b>af</b>	-	-	-	280/265/230	290/275/235	-
<b>ag</b>	-	-	-	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.

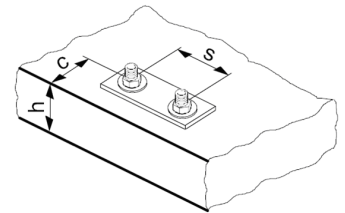
**Setting information**

**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		
<b>Anchor size</b>			<b>M12</b>			<b>M16</b>			<b>M20</b>		
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
<b>Drilling</b>						
Rotary hammer	TE2 – TE30					TE40 – TE80
- With hammer drilling (HD)	✓	✓	✓	✓	✓	✓
- With Hilti hollow drill bits (HDB) TE-CD, TE-YD		-		✓	✓	✓
Diamond coring (DD) with DD-30W and C+...SPX-T (abrasive) core bits		-	✓	✓	✓	✓
<b>Borehole cleaning</b>						
Manual cleaning: hand blow out pump	✓	✓	✓	✓	✓	✓
Automatic cleaning: rotary hammer with Hilti TE-CD and TE-YD drilling system including Hilti Vacuum Cleaner (VC)	-	-	-	✓	✓	✓
<b>Anchor setting</b>						
Manual setting: hammer	✓	✓	✓	✓	✓	✓
Machine setting: rotary hammer with setting tool HS-SC	-	✓	✓	✓	✓	-
<b>Application of the torque moment</b>						
Manual: calibrated torque wrench	✓	✓	✓	✓	✓	✓
Automatic: impact wrench with S-TB HSA torque bar	-	Hilti SIW 14-A Hilti SIW 22-A / Hilti SIW 6AT-A22			Hilti SIW 22T-A / Hilti SIW 6AT-A22	-



Speed setting of impact wrench	HSA, HSA-BW, HSA-F	-	1	3	- <sup>1)</sup>	-	
	HSA-R2, HSA-R	-	3	3	- <sup>1)</sup>	-	
Setting time	t <sub>set</sub> [sec]	-	4			-	
Automatic: impact wrench with SIW 6AT-A22 and SI-AT-A22 adaptive torque module	HSA, HSA-R, HSA-R2	-	✓	✓	✓	✓	-

1) The impact wrench operates with a fixed speed.

### Setting parameters

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

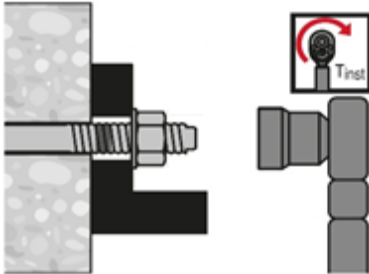
### Setting instructions

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

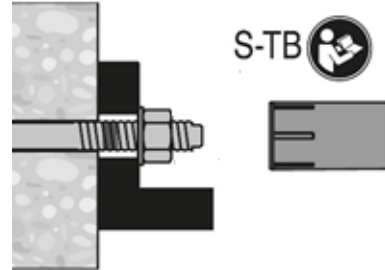
1. Hole drilling		
<p><b>Hammer drilling (HD): M6-M20</b></p>	<p><b>Hammer drilling with Hilti hollow drill bit (HDB): M12-M20</b></p>	<p><b>Diamond drilling (DD): M10-M20</b></p>
2. Cleaning		
<p><b>Manual cleaning (MC): M6-M20</b></p>	<p><b>Automatic cleaning (AC): M12-M20</b></p>	
3. Anchor setting		
<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 torqueing

Torque wrench: M6-M20



Impact screw driver with setting tool (only for HSA-F)



Impact wrench with adaptative torque module

