



HILTI HSA EXPANSION ANCHOR

Technical Datasheet

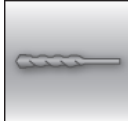
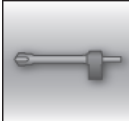
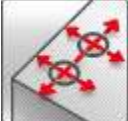
Update: Nov-23



HSA Expansion anchor

Everyday standard expansion anchor for uncracked concrete

Anchor version	Benefits
 HSA HSA-F HSA-R HSA-R2 (M6-M20)	- Fast & convenient setting behaviour - Reliable ETA approved torquing using impact wrench with the innovative SIW and SI-AT system for automatic torquing - Small edge and spacing distances - High loads - Three embedment depths for maximal design flexibility
 HSA-BW (M6-M20)	- M10, 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
 Concrete (non-cracked)	 Static/ quasi- static  Fire resistance
Installation conditions	Other information
 Hammer drilled holes  Diamond drilled holes  Hollow drill- bit drilling  Small edge distance and spacing  Impact wrench with adaptative torque module	 European Technical Assessment  CE conformity  PROFIS Engineering design software  Corrosion resistance

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment ^{a)}	DIBt, Berlin	ETA-11/0374 / 2023-10-27

a) All data given in this section according to ETA-11/0374, issued 2023-10-27.

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		
Effective anchorage depth	h_{ef}	[mm]	30	40	60	30	40	70	40	50	80
Anchor size			M12			M16			M20		
Effective anchorage depth	h_{ef}	[mm]	50	65	100	65	80	120	75	100	115

Characteristic resistance

Anchor size				M6			M8			M10			
Effective anchorage depth		h_{ef}	[mm]	30	40	60	30	40	70	40	50	80	
Tension	HSA, HSA-BW		N_{Rk}	[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	HSA, HSA-BW		V_{Rk}	[kN]	6,5	6,5	6,5	8,1	10,6	10,6	18,9	18,9	18,9
	HSA-R2, HSA-R				7,2	7,2	7,2	8,1	12,3	12,3	22,6	22,6	22,6
	HSA-F				6,5	6,5	6,5	8,1	10,6	10,6	18,9	18,9	18,9
Anchor size				M12			M16			M20			
Effective anchorage depth		h_{ef}	[mm]	50	65	100	65	80	120	75	100	115	
Tension	HSA, HSA-BW		N_{Rk}	[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 ^{a)}	49,2 ^{a)}	60,7 ^{a)}
Shear	HSA, HSA-BW		V_{Rk}	[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 ^{a)}	68,6 ^{a)}	68,6 ^{a)}

a) Data covered by Hilti Technical Data.

Design resistance

Anchor size				M6			M8			M10			
Effective anchorage depth		h_{ef}	[mm]	30	40	60	30	40	70	40	50	80	
Tension	HSA, HSA-BW		N_{Rd}	[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	HSA, HSA-BW		V_{Rd}	[kN]	5,2	5,2	5,2	5,4	8,5	8,5	15,1	15,1	15,1
	HSA-R2, HSA-R				5,8	5,8	5,8	5,4	9,8	9,8	18,1	18,1	18,1
	HSA-F				5,2	5,2	5,2	5,4	8,5	8,5	15,1	15,1	15,1
Anchor size				M12			M16			M20			
Effective anchorage depth		h_{ef}	[mm]	50	65	100	65	80	120	75	100	115	
Tension	HSA, HSA-BW		N_{Rd}	[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 ^{a)}	32,8 ^{a)}	40,4 ^{a)}
Shear	HSA, HSA-BW		V_{Rd}	[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 ^{a)}	54,9 ^{a)}	54,9 ^{a)}

a) Data covered by Hilti Technical Data.

Recommended loads ^{a)}

Anchor size				M6			M8			M10			
Effective anchorage depth		h_{ef}	[mm]	30	40	60	30	40	70	40	50	80	
Tension	HSA, HSA-BW		N_{rec}	[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	HSA, HSA-BW		V_{rec}	[kN]	3,7	3,7	3,7	3,8	6,1	6,1	10,8	10,8	10,8
	HSA-R2, HSA-R				4,1	4,1	4,1	3,8	7,0	7,0	12,9	12,9	12,9
	HSA-F				3,7	3,7	3,7	3,8	6,1	6,1	10,8	10,8	10,8
Anchor size				M12			M16			M20			
Effective anchorage depth		h_{ef}	[mm]	50	65	100	65	80	120	75	100	115	
Tension	HSA, HSA-BW		N_{rec}	[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 ^{b)}	23,4 ^{b)}	28,9 ^{b)}
Shear	HSA, HSA-BW		V_{rec}	[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 ^{b)}	39,2 ^{b)}	39,2 ^{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

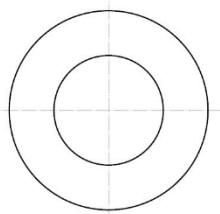
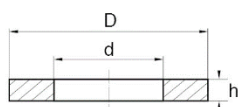
Anchor size				M6	M8	M10	M12	M16	M20
Nominal tensile strength	HSA, HSA-BW, HSA-F	$f_{uk,thread}$	[N/mm ²]	650	580	650	700	650	700
	HSA-R2, HSA-R			650	560	650	580	600	625
Yield strength	HSA, HSA-BW, HSA-F	$f_{yk,thread}$	[N/mm ²]	520	464	520	560	520	560
	HSA-R2, HSA-R			520	448	520	464	480	500
Stressed 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
Characteristic bending resistance	HSA, HSA-BW, HSA-F	$M^0_{Rk,s}$	[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 ($\geq 42 \mu\text{m}$)

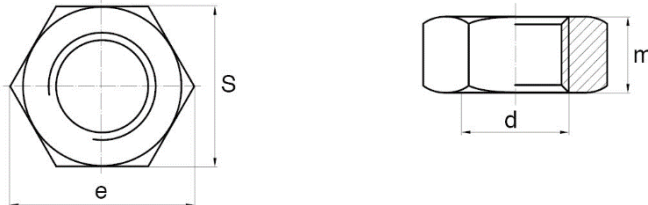
Washer dimensions

Anchor size		M6	M8	M10	M12	M16	M20
Inner diameter d							
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
Outer diameter D							
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
Thickness h							
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



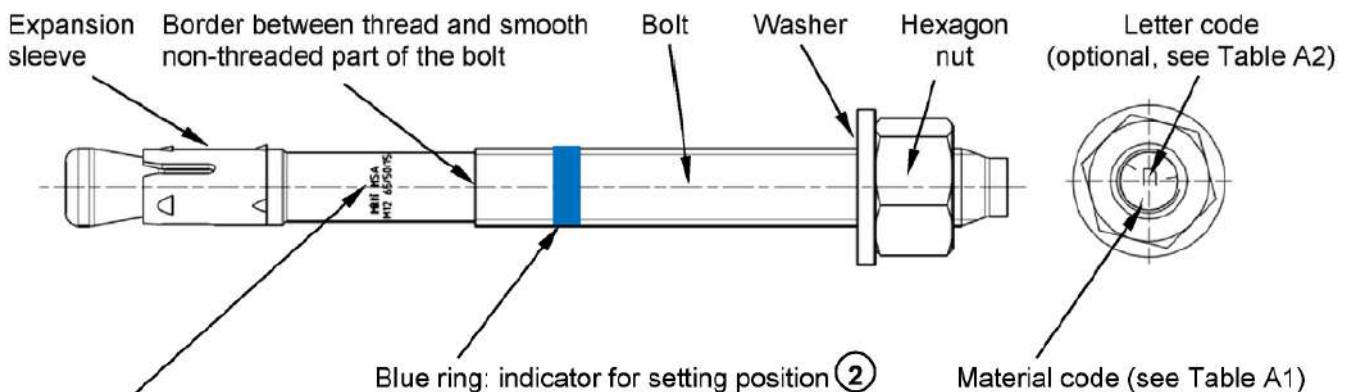
Nut dimensions – according to DIN 934

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:

Product description: Hilti metal expansion anchor HSA, HSA-BW, HSA-F, HSA-R2 and HSA-R



Marking:

Hilti HSA M... $t_{fix,1}/t_{fix,2}/t_{fix,3}$

Brand and metal expansion anchor type as well as metal expansion anchor size and max. fixture thicknesses $t_{fix,1}/t_{fix,2}/t_{fix,3}$

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 (optional) 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	-

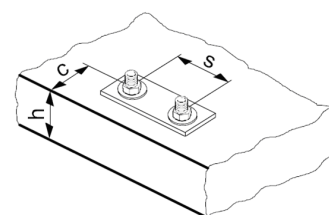
Anchor length in bolt type and grey shaded are standard items. For selection of other anchor length, check availability of the items.

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 flats	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 flats	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
Drilling							
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		-		✓	✓	✓	✓
Borehole cleaning							
Manual cleaning: hand blow out pump		✓	✓	✓	✓	✓	✓
Automatic cleaning: rotary hammer with Hilti TE-CD and TE-YD drilling system including Hilti Vacuum Cleaner (VC)		-	-	-	✓	✓	✓
Anchor setting							
Manual setting: hammer		✓	✓	✓	✓	✓	✓
Machine setting: rotary hammer with setting tool HS-SC		-	✓	✓	✓	✓	-
Application of the torque moment							
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	- ¹⁾	-
	HSA-R2, HSA-R	-	3		3	- ¹⁾	-
Setting time t _{set} [sec]		-	4				-
Automatic: impact wrench SIW and SI-AT adaptive torque module							
SIW 4AT-22 with SI-AT-22 ²⁾	HSA, HSA-BW, HSA-R, HSA-R2	-	✓	✓	✓	✓	-
SIW 6AT-22 with SI-AT-22 ²⁾		-	-	✓	✓	✓	✓

1) The impact wrench operates with a fixed speed;

2) Equivalent combination of Hilti SIW + SI-AT tool, compatible to this anchor type, may be used.

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

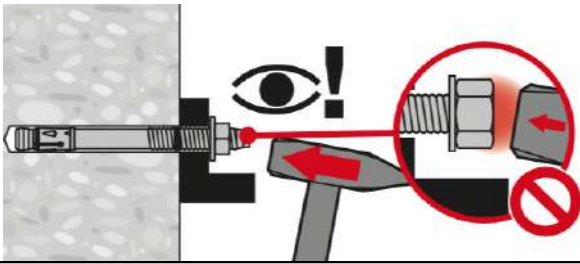
Setting instructions

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

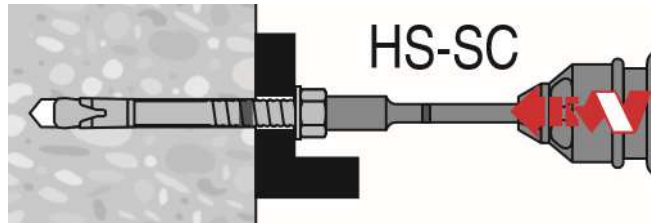
1. Hole drilling		
Hammer drilling (HD): M6-M20 	Hammer drilling with Hilti hollow drill bit (HDB): M12-M20 	Diamond drilling (DD): M10-M20
2. Cleaning		
Manual cleaning (MC): M6-M20 	Automatic cleaning (AC): M12-M20 	

3. Anchor setting

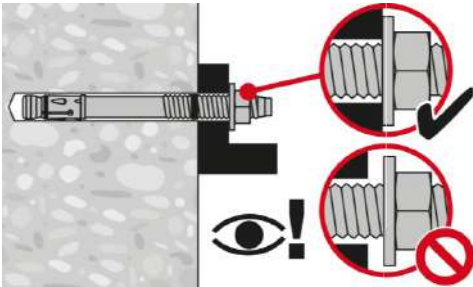
Hammer setting: M6-M20



Machine setting (impact screw driver with setting tool): M8-M16

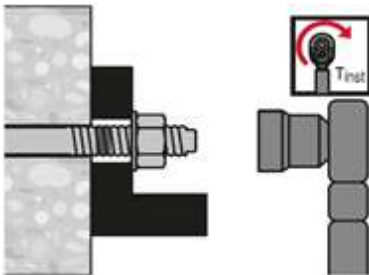


4. Check setting

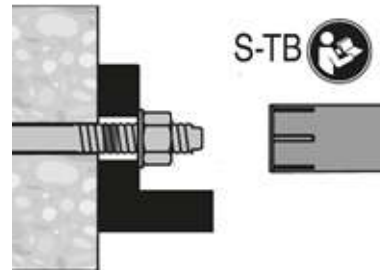


5. Anchor torqueing

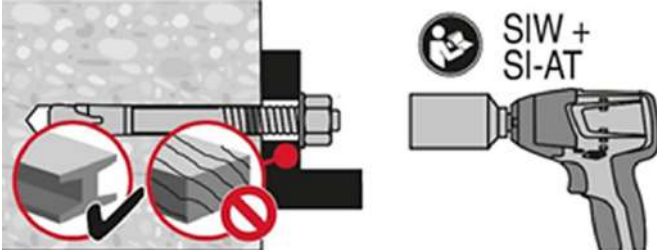
Torque wrench: M6-M20



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



Impact wrench with adaptative torque module ^{a)}



- a) Equivalent combination of Hilti SIW + SI-AT tool, compatible to this anchor type, may be used (e.g. SIW 6AT-22 with SI-AT-22 for sizes M10-M20 or SIW 4AT-22 with SI-AT-22 for sizes M8-M16)