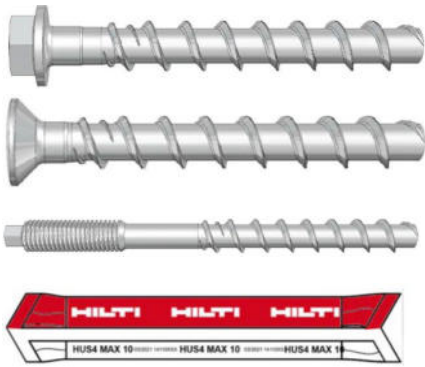




# Hilti HUS4 BONDED SCREW ANCHOR

## Technical Datasheet







Update: Jan-23

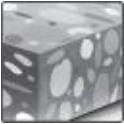
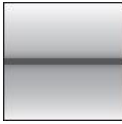



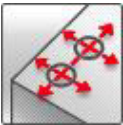







# HUS4 Bonded screw anchor

Ultimate performance screw anchor for single point fastening

Anchor version		Benefits
	HUS4-H(F) (10-16)*	- High productivity - less drilling and fewer operations than with conventional anchors
	HUS4-C (10)	- ETA approval for cracked and non-cracked concrete - ETA approval for Seismic C1 and C2**
	HUS4-A(F) (10 and 14)	- ETA approval for adjustability (unscrew-rescrew)** - Smaller edge and spacing distance
	HUS4-HR (10 and 14)	- One embedment at the level of h.nom3 of HUS4 for maximum performance - No cleaning allowed size 10 to 16
	HUS4-CR (10)	- HUS4-HF and HUS4-AF with multilayer coatings for additional corrosion protection - Through fastening with H, A and C head
	HUS4-MAX capsule	- Pre-fastening with A head

Base material		Load conditions					
	Concrete (non-cracked)		Static / quasi-static		Seismic ETA-C1/C2		Fire resistance
	Concrete (cracked)						
Installation conditions		Other information					
	Small edge distance and spacing		European Technical Assessment		CE conformity		PROFIS Engineering design software

## Approvals / certificates

Description	Authority	No. / date of issue
European Technical Assessment	DIBt	ETA-18/1160 / 27-07-2022
Fire test report	DIBt	ETA-18/1160 / 27-07-2022

\*HUS4-HF not available in size 12

\*\*Not available for HUS4-HR and HUS4-CR

## Static and quasi-static loading data (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,  $f_{ck,cube} = 25 \text{ N/mm}^2$

### Anchorage depth

Anchor size		10		12	14		16
Type	HUS4-	H(F), C, A(F)	HR, CR	H	H(F), A(F)	HR	H
Nominal embedment depth	$h_{nom}$ [mm]	$h_{nom3}$		$h_{nom3}$	$h_{nom3}$		$h_{nom3}$
		85	90	100	115	110	130

### Characteristic resistance

Anchor size		10		12	14		16
Type	HUS4	H(F), C, A(F)	HR, CR	H	H(F), A(F)	HR	H
		$h_{nom3}$		$h_{nom3}$	$h_{nom3}$		$h_{nom3}$
<b>Non-cracked concrete</b>							
Tension	$N_{Rk}$ [kN]	38,0	40,0	49,2	60,7	56,8	72,9
Shear	$V_{Rk}$ [kN]	32,0	33,0	44,9	62,0	77,0	73,1
<b>Cracked concrete</b>							
Tension	$N_{Rk}$ [kN]	24,0	24,0	34,4	42,0	39,7	51,0
Shear	$V_{Rk}$ [kN]	32,0	33,0	44,9	62,0	77,0	73,1

### Design resistance

Anchor size		10		12	14		16
Type	HUS4	H(F), C, A(F)	HR, CR	H	H(F), A(F)	HR	H
		$h_{nom3}$		$h_{nom3}$	$h_{nom3}$		$h_{nom3}$
<b>Non-cracked concrete</b>							
Tension	$N_{Rd}$ [kN]	25,3	26,7	32,8	40,4	37,8	48,6
Shear	$V_{Rd}$ [kN]	25,6	22,0	35,9	49,6	51,3	58,5
<b>Cracked concrete</b>							
Tension	$N_{Rd}$ [kN]	16,0	16,0	23,0	28,0	26,5	34,0
Shear	$V_{Rd}$ [kN]	25,6	22,0	35,9	49,6	51,3	58,5

### Recommended loads

Anchor size		10		12	14		16
Type	HUS4	H(F), C, A(F)	HR, CR	H	H(F), A(F)	HR	H
		$h_{nom3}$		$h_{nom3}$	$h_{nom3}$		$h_{nom3}$
<b>Non-cracked concrete</b>							
Tension	$N_{Rec}$ [kN]	18,1	19,0	23,4	28,9	27,0	34,7
Shear	$V_{Rec}$ [kN]	18,3	15,7	25,7	35,4	36,7	41,8
<b>Cracked concrete</b>							
Tension	$N_{Rec}$ [kN]	11,4	11,4	16,4	20,0	18,9	24,3
Shear	$V_{Rec}$ [kN]	18,3	15,7	25,7	35,4	36,7	41,8

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.



## Seismic loading data (for 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,  $f_{ck,cube} = 25 \text{ N/mm}^2$
- $\alpha_{gap} = 1,0$  (using Hilti seismic filling set) or  $\alpha_{gap} = 0,5$  (without using Hilti seismic filling set) accordingly

### Anchorage depth

Anchor size	10	12	14
Nominal embedment depth $h_{nom}$ [mm]	$h_{nom3}$	$h_{nom3}$	$h_{nom3}$
	85	100	115

### Characteristic resistance in case of seismic performance category C2

Anchor size	10	12	14	
<b>with Hilti filling set</b>				
Type	HUS4 -	H(F), A(F)	H	H(F), A(F)
Tension	$N_{Rk,seis}$ [kN]	10,7	17,2	18,2
Shear	$V_{Rk,seis}$	21,5	27,2	46,5
<b>without Hilti filling set</b>				
Type	HUS4 -	H(F), C, A(F)	H	H(F), A(F)
Tension	$N_{Rk,seis}$ [kN]	10,7	17,2	18,2
Shear	$V_{Rk,seis}$	6,9	11,3	17,2

### Design resistance in case of seismic performance category C2

Anchor size	10	12	14	
<b>with Hilti filling set</b>				
Type	HUS4 -	H(F), A(F)	H	H(F), A(F)
Tension	$N_{Rd,seis}$ [kN]	7,1	11,5	12,1
Shear	$V_{Rd,seis}$	17,2	21,8	37,2
<b>without Hilti filling set</b>				
Type	HUS4 -	H, HF, C, A, AF	H	H, HF, A, AF
Tension	$N_{Rd,seis}$ [kN]	7,1	11,5	12,1
Shear	$V_{Rd,seis}$	5,5	9,0	13,8

**Characteristic resistance in case of seismic performance category C1**

Anchor size		10	12	14
Type		H(F), C, A(F)	H	H(F), A(F)
<b>with Hilti filling set (HUS4-H and HUS4-A)</b>				
Tension	$N_{Rk,seis}$ [kN]	22,9	29,3	36,1
Shear	$V_{Rk,seis}$	26,7	38,9	34,5
<b>without Hilti filling set</b>				
Tension	$N_{Rk,seis}$ [kN]	22,9	29,3	36,1
Shear	$V_{Rk,seis}$	13,4	19,5	17,3

**Design resistance in case of seismic performance category C1**

Anchor size		10	12	14
Type		H(F), C, A(F)	H	H(F), A(F)
<b>with Hilti filling set (HUS4-H and HUS4-A)</b>				
Tension	$N_{Rd,seis}$ [kN]	15,3	19,5	24,1
Shear	$V_{Rd,seis}$	21,4	31,1	27,6
<b>without Hilti filling set</b>				
Tension	$N_{Rd,seis}$ [kN]	15,3	19,5	24,1
Shear	$V_{Rd,seis}$	10,7	15,6	13,8



## Fire resistance

### 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,  $f_{ck,cube} = 25 \text{ N/mm}^2$
- Partial safety factor for resistance under fire exposure  $\gamma_{M,fi}=1,0$  (in absence of other national regulations)

### Characteristic resistance

Anchor size		10				12	14			16
Type	HUS4	H(F)	C	A(F)	HR <sup>a)</sup>	H	H(F)	A(F)	HR <sup>a)</sup>	H(F)
		$h_{nom3}$				$h_{nom3}$	$h_{nom3}$			$h_{nom3}$
<b>Fire Exposure R30</b>										
Tension	$N_{Rk}$ [kN]	4,2	1,0	4,2	4,0	6,1	7,5	7,5	6,3	8,7
Shear	$V_{Rk}$ [kN]	4,2	1,0	4,2	18,5	7,7	10,5	8,4	41,7	10,7
<b>Fire Exposure R120</b>										
Tension	$N_{Rk}$ [kN]	1,7	0,6	2,1	2,4	3,1	4,4	4,3	5,0	4,5
Shear	$V_{Rk}$ [kN]	1,7	0,6	2,1	2,4	3,1	4,4	4,3	5,4	4,5

<sup>a)</sup> Values for this head configuration are based on Hilti technical data

### Design resistance

Anchor size		10				12	14			16
Type	HUS4	H(F)	C	A(F)	HR <sup>a)</sup>	H	H(F)	A(F)	HR <sup>a)</sup>	H(F)
		$h_{nom3}$				$h_{nom3}$	$h_{nom3}$			$h_{nom3}$
<b>Fire Exposure R30</b>										
Tension	$N_{Rd}$ [kN]	4,2	1,0	4,2	4,0	6,1	7,5	7,5	6,3	8,7
Shear	$V_{Rd}$ [kN]	4,2	1,0	4,2	18,5	7,7	10,5	8,4	41,7	10,7
<b>Fire Exposure R120</b>										
Tension	$N_{Rd}$ [kN]	1,7	0,6	2,1	2,4	3,1	4,4	4,3	5,0	4,5
Shear	$V_{Rd}$ [kN]	1,7	0,6	2,1	2,4	3,1	4,4	4,3	5,4	4,5

For more information about different failure modes and fire resistance times please see the full ETA-18/1160 report.

## Materials

**Foil capsule HUS4-MAX size 10 to 14:** resin and hardener

Marking:

HUS4-MAX size

Expiry date mm/yyyy



## Material quality

Type	Material
HUS4 – H, A, C	Carbon steel, galvanized
HUS4 – HF, AF	Carbon steel, multi-layer coating <sup>a)</sup>
HUS4 – HR, CR	Stainless steel

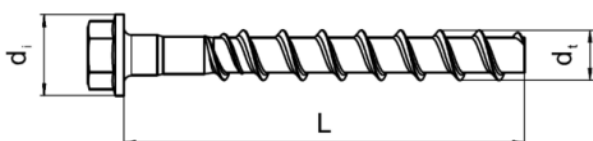
a) Multi-layer coating provides a higher corrosion resistance compared to regular hot dip galvanized (HDG) systems with a 40µm coating thickness.

## Head configuration

Type	Part	
<b>HUS4-H</b> <b>HUS4-HF</b>	Hexagonal head	
<b>HUS4-C</b>	Countersunk head	
<b>HUS4-A</b>	External thread	 Hilti HUS4-A, size 10 with external thread M12 and size 14 with external thread M16
<b>HUS4-HR</b>	Hexagonal head	
<b>HUS4-CR</b>	Countersunk head	

## Fastener dimensions and marking HUS4-H(F)

Anchor size		10		12	14		16
Type	HUS4	H(F)	HR	H	H(F)	HR	H
Outer diameter of screw	d <sub>t</sub> [mm]	12,70	12,25	14,70	16,70	16,56	18,80
Diameter of integrated	d <sub>i</sub> [mm]	20,50	20,50	23,60	29,00	30,00	32,60
Length of the screw	L [mm]	90/305	95/130	130/150	130/150	120/135	100/205



**HUS4:** Hilti Universal Screw 4<sup>th</sup> generation

**H:** Hexagonal head, galvanized

**HF:** Hexagonal head, multilayer coating

**HR:** Hexagonal head, stainless steel

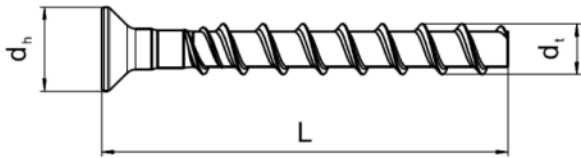
**10:** Nominal screw diameter

**100:** total length of the screw



### Fastener dimensions and marking HUS4-C

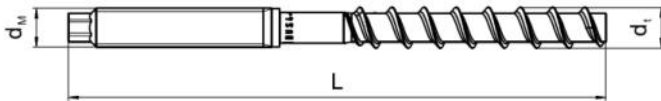
Anchor size		10	
Type	HUS4	C	CR
Outer diameter of the screw thread	$d_t$ [mm]	12,70	12,25
Countersunk head diameter	$d_h$ [mm]	21,00	21,00
Length of the screw (min/max)	L [mm]	100/120	105



**HUS4:** Hilti Universal Screw 4<sup>th</sup> generation  
**C:** Countersunk head  
**CR:** Countersunk head, stainless steel  
**10:** Nominal screw diameter  
**100:** total length of the screw

### Fastener dimensions and marking HUS4-A(F)

Anchor size		10	14
Type	HUS4	A(F)	A(F)
Outer diameter of the screw thread	$d_t$ [mm]	12,70	16,70
Diameter of the metric thread	$d_M$ [mm]	M12	M16
Length of the screw (min/max)	L [mm]	140/165	185/205



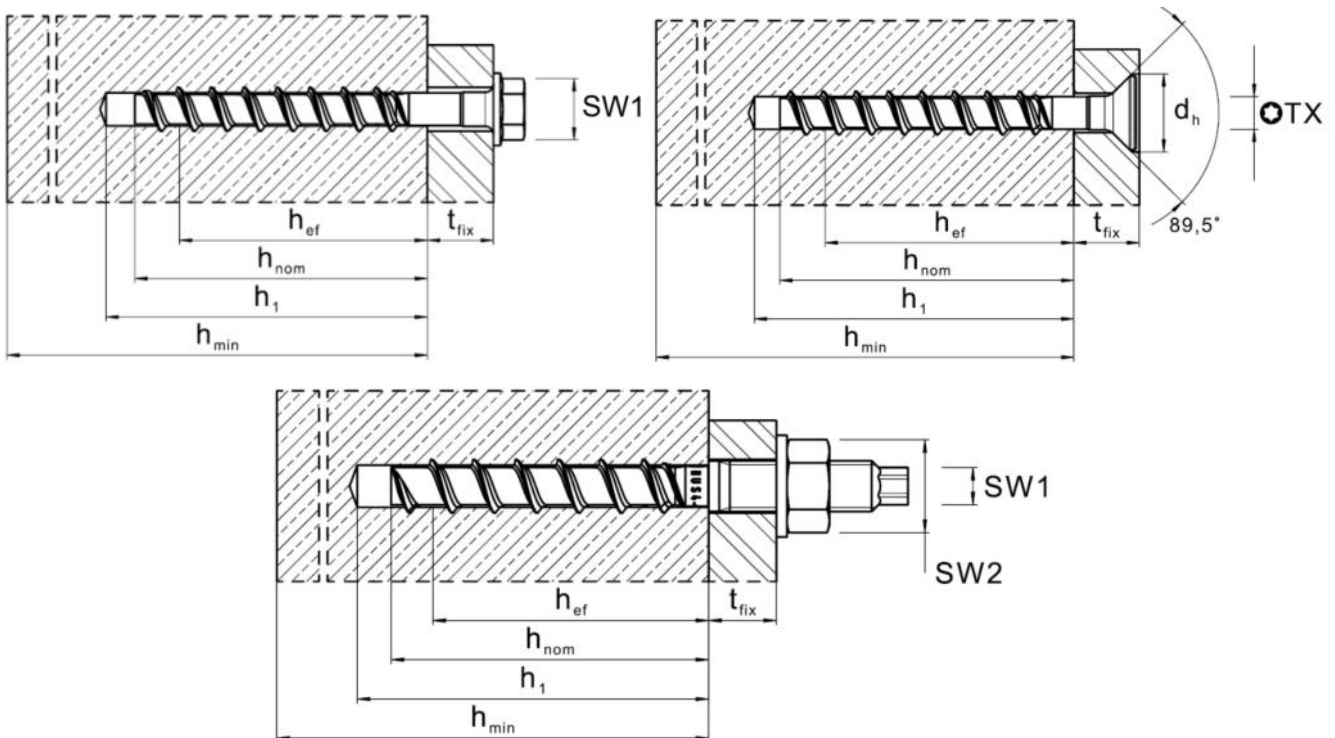
**HUS4:** Hilti Universal Screw 4<sup>th</sup> generation  
**A:** Threaded head  
**10:** Screw diameter  
**100:** total length of the screw  
**8:** carbon steel 8.8  
**K:** length of the screw (more info in ETA)



## Setting information

### Setting details

Anchor size		10		12	14		16	
Type	HUS4	H(F), C, A(F)	HR, CR	H	H(F), A(F)	HR	H(F), A(F)	
Nominal embedment depth	[mm]	$h_{nom3}$	$h_{nom3}$	$h_{nom3}$	$h_{nom3}$	$h_{nom3}$	$h_{nom3}$	
		85	90	100	115	110	130	
Nominal diameter of drill	$d_0$	[mm]	10	10	12	14	14	16
Clearance hole diameter	$d_r \leq$	[mm]	14	14	16	18	18	20
Wrench size HEX head	SW1	[mm]	15	15	17	21	21	24
Wrench size Threaded head	SW1	[mm]	8	-	-	12	-	-
Wrench size for nut on threaded head	SW2	[mm]	19	-	-	24	-	-
Torx size "C" head	TX	-	50	45	-	-	65	-
Countersunk head diameter	$d_h$	[mm]	21	21	-	-	-	-
Depth of drill hole for cleaned hole overhead	$h_1 \geq$	[mm]	95	100	110	125	120	140
Depth of drill hole for uncleaned hole	$h_1 \geq$	[mm]	115	120	134	153	148	-





**Installation equipment table (HUS4 H(F), C, A(F)):**

Anchor size	10	12	14	16
Type	HUS4- H(F), C, A(F)	H(F)	H(F), A(F)	H(F)
Rotary hammer	TE4 – TE30			
Diamond drilling rig	DD-30			
Drill bit for concrete	TE-CX 10	TE-CX 12 TE-CD 12	TE-CX 14 TE-CD 14	TE-CX 16
Diamond drilling core bits	SPX-T 10	SPX-T 12	SPX-T 14	-
Socket wrench insert for hex screw	SI-S ½" 15S SI-S ¾" 15S	SI-S ½" 17S SI-S ¾" 17S	SI-S ½" 21S SI-S ¾" 21S	SI-S ½" 24S SI-S ¾" 24S
Socket wrench insert for threaded head screw	SI-S ½" 8S SI-S ¾" 8S	-	SI-S ½" 12S SI-S ¾" 12S	-
Check gauge for reusability <sup>a)</sup>	HRG 10	HRG 12	HRG 14	HRG 16
Torx bit for countersunk	S-SY TX50	-	-	-
Setting tool for cracked and un-cracked concrete	SIW 6AT-A22 ½" SIW 4AT-22 ½" SIW 22T-A ½", ¾" SIW 6-22 ½", SIW 8-22 ½" gear 1 SIW 9-A22 ¾"	SIW 22T-A ½", ¾" SIW 6-22 ½", SIW 8-22 ½" SIW 9-A22 ¾"		

a) For HUS4-A and HUS4-H

**Installation equipment table (HUS4 HR, CR):**

Anchor size	10	14
Type	HUS4- HR, CR	HR
Rotary hammer	TE 2 – TE 30	
Drill bit	TE-CX4 (SDS PLUS) 10/22	TE-CX4 (SDS PLUS) 14/22
Socket wrench insert	SI-S 13 ½" (S)	SI-S 13 ½" (S)
Torx (CR type only)	S-SY TX 50	-
Impact screw driver <sup>1)</sup>	SIW 6AT-A22 ½" SIW 4AT-A22 ½" SIW22T-A ½", ¾" SIW6-22 gr.2 ½"	SIW22T-A ½" SIW6-22 gr.2 ½" SIW8-22 gr.1 ½" SIW9-22 ¾"

### Setting parameters

Anchor size		10		12	14		16
Type	HUS4	H(F), C, A(F)	HR	H	H(F), A(F)	HR	H
Nominal embedment depth	$h_{nom}$ [mm]	85	90	100	115	110	130
Minimum base material thickness	$h_{min}$ [mm]	140	140	160	200	160	195
Minimum spacing	$s_{min}$ [mm]	40	50	50	60	60	90
Minimum edge distance	$c_{min}$ [mm]	40	50	50	60	60	65
Critical spacing for splitting failure	$s_{cr,sp}$ [mm]	272	351	340	423	407	507
Critical edge distance for splitting failure	$c_{cr,sp}$ [mm]	136	176	170	213	204	254
Critical spacing for concrete cone failure	$s_{cr,N}$ [mm]	255	270	300	345	330	390
Critical edge distance for concrete cone failure	$c_{cr,N}$ [mm]	128	135	150	173	165	195

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 decisive.

### Storage and transport temperature range:

-20°C to +25°C

### Installation temperature

-10°C to +40°C

### Service temperature range

HUS4-MAX anchors may be applied in the temperature range given below.

Temperature range	Base material temperature	Max. long term base material temperature	Max. short term base material temperature
Temperature range I	-40 °C to +120 °C	+72 °C	+120 °C

### Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

### Max long term base material temperature

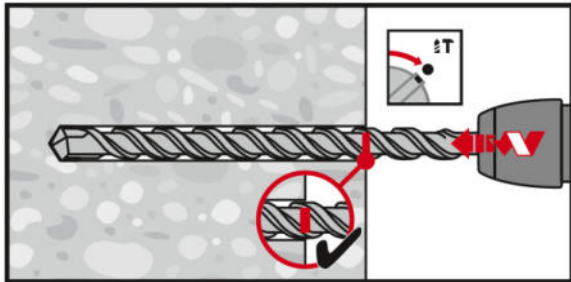
Long-term elevated base material temperatures are roughly constant over significant periods of time

**Setting instructions**

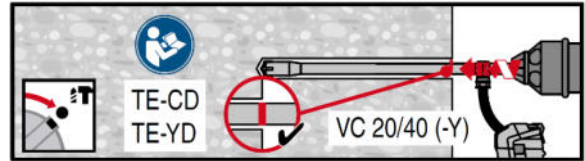
\*For detailed information on installation see instruction for use given with the package of the product

**Setting instruction - H(F), C, A(F), HR, CR**

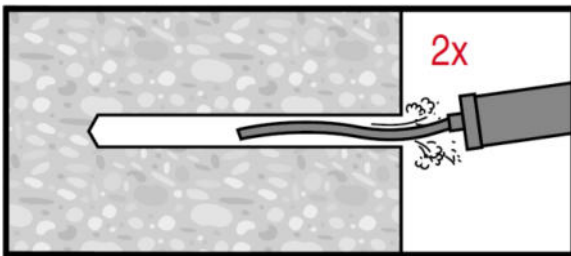
**1a. Hammer drilling:**



**1b. Hollow drill bit (HUS4-H(F) and HUS4-C(F)):**



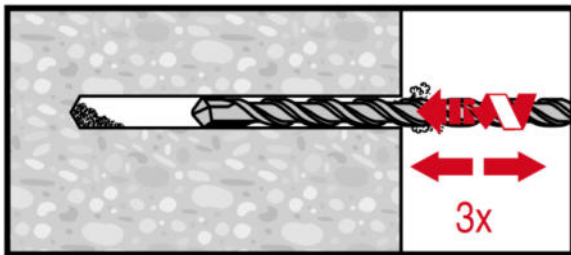
**2a. Cleaning:**



Cleaning needed in downward and horizontal installation direction with drill hole depth  $h_{nom} + 10\text{mm}$

Not needed if hammer drilling with Hilti hollow drill bit.

**2b. Non-cleaning – 3x ventilation**

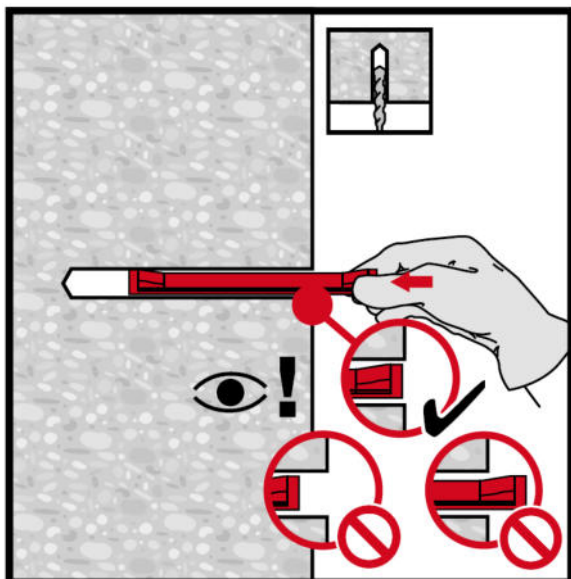


No cleaning is allowed in upward installation direction. No cleaning is allowed in downward and horizontal installation direction when 3x ventilation<sup>1)</sup> after drilling is executed.

Drill hole depth  $h_{nom} + 10\text{ mm} + 2 * d_0$

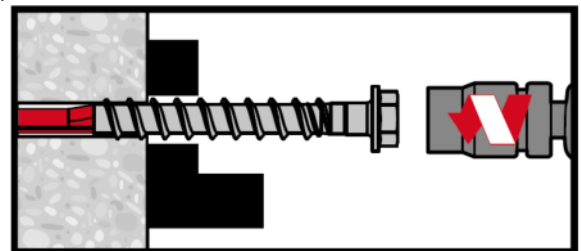
<sup>1)</sup> moving the drill bit in and out of the drill hole 3 times after the recommended drilling depth  $h_1$  is achieved. This procedure shall be done with both revolution and hammer functions activated in the drilling machine. For more details read the relevant installation instruction (MPII).

**3. Insert capsule in borehole**

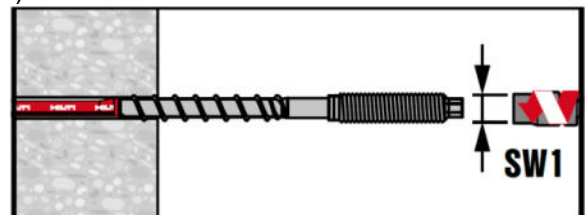


**4. Setting by impact screw driver**

(H(F), C, HR, CR)

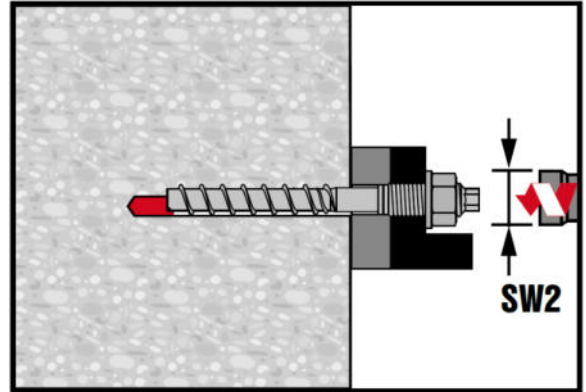
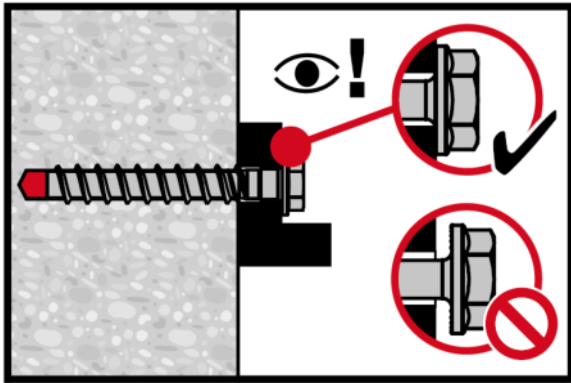


A(F)

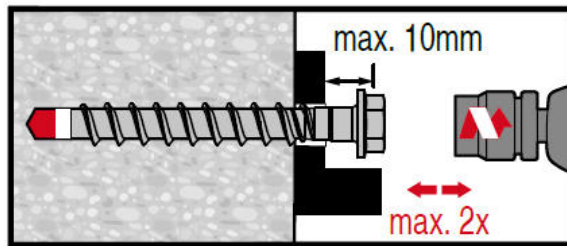


**5a. Setting check – H(F), C, HR, CR**

**5b. load anchor – A(F)**

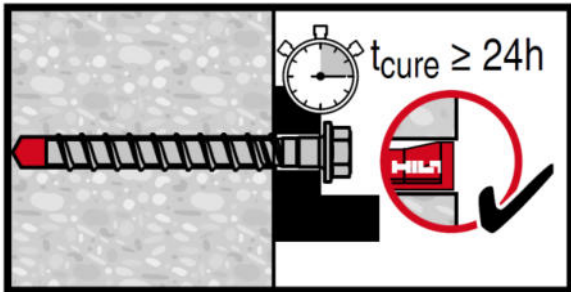


Optional – screw adjustability (only H(F), C, A(F) versions)

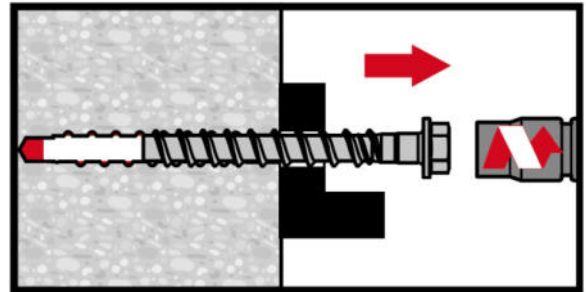


Full removability and reusability of the fastening point (H(F), C, A(F))

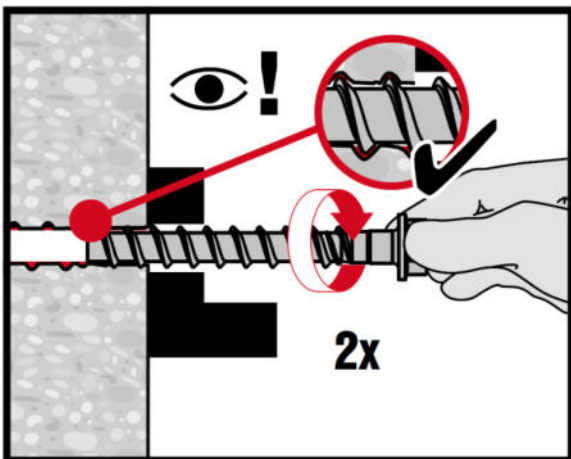
1. Wait at least 24h after first installation:



2. remove completely using setting tool:



3. Re-insert in borehole by hand:



4. Complete setting by impact screw driver:

