

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-10/0005
of 27 August 2015

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Hilti Concrete screw HUS

Product family
to which the construction product belongs

Concrete screw for multiple use for non-structural
applications in concrete and in prestressed
hollow core slabs

Manufacturer

Hilti Aktiengesellschaft
9494 SCHAAN
FÜRSTENTUM LIECHTENSTEIN

Manufacturing plant

Hilti Werke

This European Technical Assessment
contains

17 pages including 3 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

Guideline for European technical approval of "Metal
anchors for use in concrete", ETAG 001 Part 6: "Anchors
for multiple use for non-structural applications", August
2010,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

European Technical Assessment

ETA-10/0005

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Page 2 of 17 | 27 August 2015

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Specific Part

1 Technical description of the product

The Hilti screw anchor HUS is an anchor made of galvanised steel (HUS/HUS3 -H, -C, -A, -P, -PS, -I) or stainless steel (HUS-HR) of size 6. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic values for resistance for static and quasi-static loads	See Annex C1 and C2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	See Annex C3

3.3 Safety in use (BWR 4)

For Basic Works Requirement Safety in use the same criteria are valid as for Basic Works Requirement Mechanical resistance and stability.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with guideline for European technical approval ETAG 001, April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: [97/161/EC].

The system to be applied is: 2+

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5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

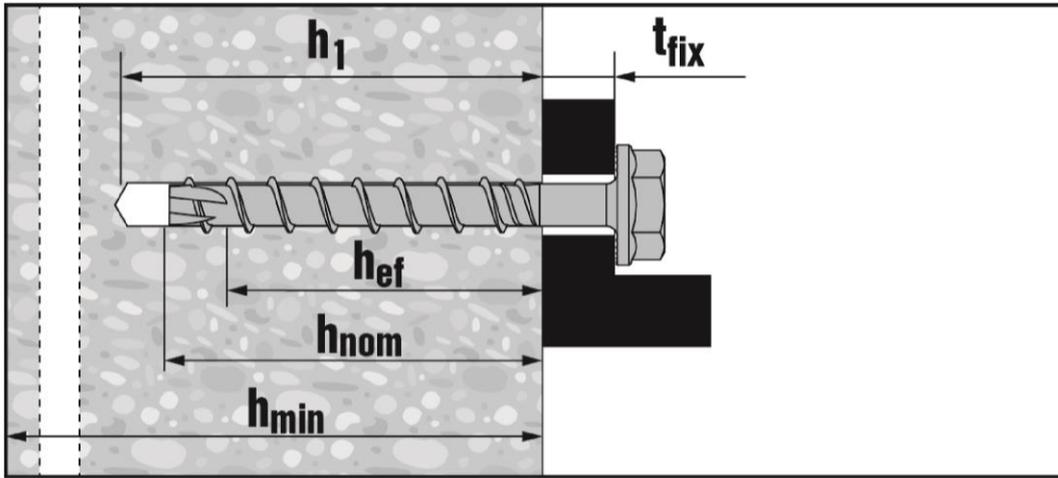
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 27 August 2015 by Deutsches Institut für Bautechnik

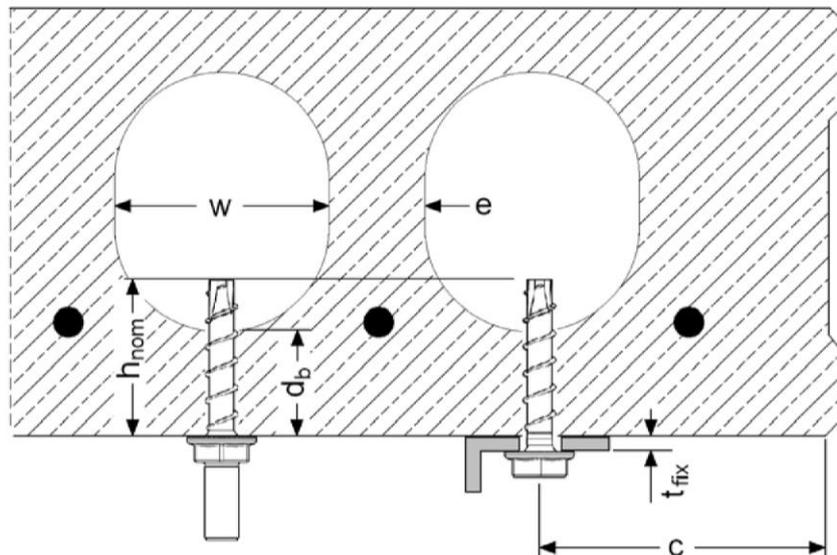
Uwe Bender
Head of Department

beglaubigt:
Baderschneider

Product and installed condition



Product and installed condition in precast pre-stressed hollow core slabs

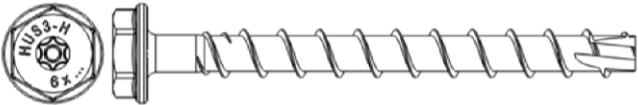
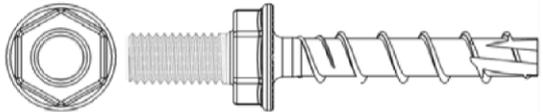
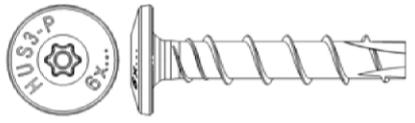
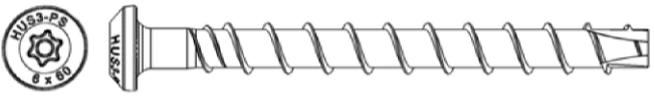
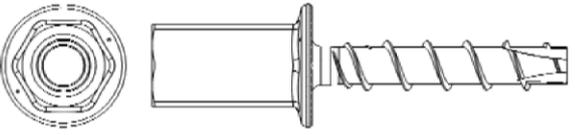
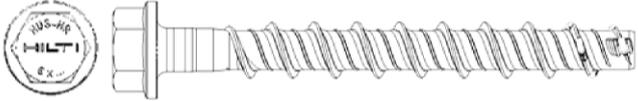


Hilti Screw anchor HUS

Product description
Installed condition

Annex A1

Table A1: Material and screw types

Part	Designation / Material				
1, 2, 3, 4, 5, 6, 7.	Size			6	6
	Type			HUS3 H, C, A, P, PS, I HUS H, A, P, I	HUS-HR
	Characteristic yield strength	f_{yk}	[N/mm ²]	745	900
	Characteristic ultimate strength	f_{uk}	[N/mm ²]	930	1050
	Elongation at rupture	A_5	[%]	≤8	> 8%
	1) Hilti HUS-H; HUS3-H, size 6, hexagonal head configuration, galvanized				
	2) Hilti HUS3-C, sizes 6, countersunk head configuration, galvanized				
	3) Hilti HUS-A, HUS3-A, size 6, external thread M8/16 and M10/21, galvanized				
	4) Hilti HUS-P, HUS3-P, size 6, pan head configuration, galvanized				
	5) Hilti HUS3-PS, size6, pan head (small) configuration, galvanized				
	6) Hilti HUS-I, HUS3-I, size 6, internal thread M8 and M10, galvanized				
	7) Hilti HUS-HR, size 6, hexagonal head configuration, stainless steel A4.				

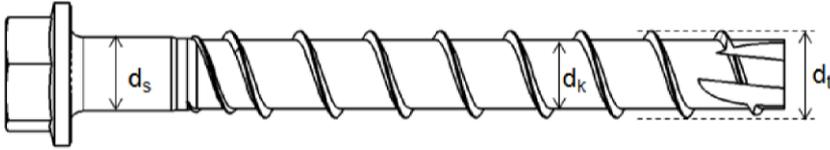
Hilti Screw anchor HUS

Production description
Material and screw types

Annex A2

Table A2: Dimensions and marking

Anchor size			6	6
Type			HUS3 H, C, A, P, PS, I HUS H, A, P, I	HUS HR
Nominal embedment depth [mm]			h_{nom} 35	h_{nom} 35
Threaded outer diameter	d_t	[mm]	7,85	7,6
Core diameter	d_k	[mm]	5,85	5,4
Shaft diameter	d_s	[mm]	6,15	5,8
Stressed section	A_s	[mm ²]	26,9	22,9



HUS3 : Hilti Universal Screw
3rd generation

H : Hexagonal head

R : corrosion resistance
(stainless steel, grade A4)

Hilti Screw anchor HUS

Production description
Dimensions and marking

Annex A3

Specifications of Intended use

Anchorage subject to:

- Static and quasi-static loads.
- Only to be used for multiple use for non-structural applications, according to ETAG 001, Part 6, Edition August 2010.
- Fire exposure: only for concrete C20/25 to C50/60, not prestressed hollow concrete slabs.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked or non-cracked concrete.
- Precast, prestressed hollow concrete slabs with $w/e \leq 4,2$ and strength classes C30/37 to C50/60.

Use conditions (Environmental conditions)

- Anchorages subject to dry internal conditions (galvanized steel, stainless steel).
- External atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist (stainless steel).
Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used)

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi-static actions are designed in accordance with:
 - ETAG 001, Annex C, design method B, Edition August 2010 or
 - CEN/TS 1992-4:2009, design method B
- Anchorages under fire exposure are designed in accordance with:
 - ETAG 001, Annex C, design method A, Edition August 2010 and EOTA Technical Report TR 020, Edition May 2004 or
 - CEN/TS 1992-4:2009, Annex D
 - In case of requirements to resistance to fire local spalling of the concrete cover must be avoided.

Installation:

- Hammer drilling only.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- After installation further turning of the anchor must not be possible.
- The head of the anchor must be supported on the fixture and is not damaged.

Hilti Screw anchor HUS

Intended Use
Specifications

Annex B1

Table B1: Installation parameters

Anchor size	6					
Hilti screw anchor HUS	HR	H	P / PS	I	A	C
Nominal anchorage depth h_{nom} [mm]	35					
Nominal diameter of drill bit d_0 [mm]	6					
Cutting diameter of drill bit $d_{cut} \leq$ [mm]	6,4					
Clearance hole diameter d_f [mm]	9					
Wrench size SW [mm]	13	13	-	13		-
TORX	-	T30	T30	-		T30
Installation torque T_{inst} [Nm]	- ¹⁾	18				
Setting tool	Impact screw driver, e.g. Hilti SIW 14-A or 22-A ²⁾					
Depth of drill hole in floor/wall position $h_1 \geq$ [mm]	$h_{nom}+10$ mm					
Depth of drill hole in ceiling position $h_1 \geq$ [mm]	$h_{nom}+3$ mm					
Thickness of fixture $t_{fix} \leq$ [mm]	40	85	45	-	-	-

1) Hand setting in concrete base material not allowed (machine setting only)

2) Hilti recommended electrical impact screw drivers are listed in the instruction for use included in the sales box.

Table B2: Screw length

Hilti screw anchor	HUS-HR 6x60	HUS-HR 6x70	HUS-H / HUS3 6x40	HUS-H / HUS3 6x60	HUS-H / HUS3 6x80	HUS-H / HUS3 6x100	HUS-H / HUS3 6x120	HUS-P / HUS3 6x40	HUS-P / HUS3 6x60	HUS-P / HUS3 6x80	HUS-I / HUS3 6x35 M8/M10	HUS-I / HUS3 6x55 M8/M10	HUS-A / HUS3 6x35 M8	HUS-A / HUS3 6x35 M10	HUS-A / HUS3 6x55 M8	HUS-A / HUS3 6x55 M10	HUS3-PS 6x40	HUS3-PS 6x60	HUS3-C 6x40	HUS3-C 6x60	HUS3-C 6x70
Nominal length of screw l_s [mm]	60	70	40	60	80	100	120	40	60	80	35	55	35	35	55	55	40	60	40	60	70
Thread length l_t [mm]	55	55	37	55	72			37	55	72	32	52	32	52		37	55	37	55		
Outer diameter of thread d_t [mm]	7,6		7,85																		
Core diameter d_k [mm]	5,4		5,85																		

Hilti Screw anchor HUS

Intended Use
Installation parameter, Screw length

Annex B2

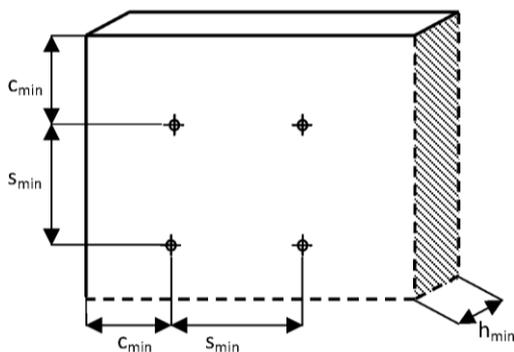
Table B3: Additional Installation parameter for use in precast pre-stressed hollow core slabs

Hilti screw anchor		HUS / HUS3 H 6x40	HUS / HUS3 H 6x60	HUS / HUS3 H 6x80	HUS / HUS3 H 6x100	HUS / HUS3 H 6x120	HUS / HUS3 P 6x40	HUS / HUS3 P 6x60	HUS / HUS3 P 6x80	HUS / HUS3 I 6x35 M8/M10	HUS / HUS3 I 6x55 M8/M10	HUS / HUS3 A 6x35 M8	HUS / HUS3 A 6x35 M10	HUS / HUS3 A 6x55 M8	HUS / HUS3 A 6x55 M10	HUS3-PS 6x40	HUS3-PS 6x60	HUS3-C 6x40	HUS3-C 6x60	HUS3-C 6x70
		Nominal length of screw	l_s [m]	40	60	80	100	120	40	60	80	35	55	35	35	55	55	40	60	40
Thickness of fixture	$t_{fix} \geq$ [m]	0	2	5	25	45	0	2	5	-	-	-	-	-	-	0	2	0	2	5
	$t_{fix} \leq$ [m]	5	25	45	65	85	5	25	45	-	-	-	-	-	-	5	25	5	25	35

Table B4: Minimum thickness of concrete member, minimum edge distance and spacing

Anchor size		6					
Type		HR	H	P / PS	I	A	C
Nominal anchorage depth	$h_{nom} \geq$ [mm]	35					
Minimum member thickness	h_{min} [mm]	80					
Minimum edge distance	c_{min} [mm]	35 (80) ¹⁾					
Minimum spacing	s_{min} [mm]	35					

1) see Table C1, Annex C1



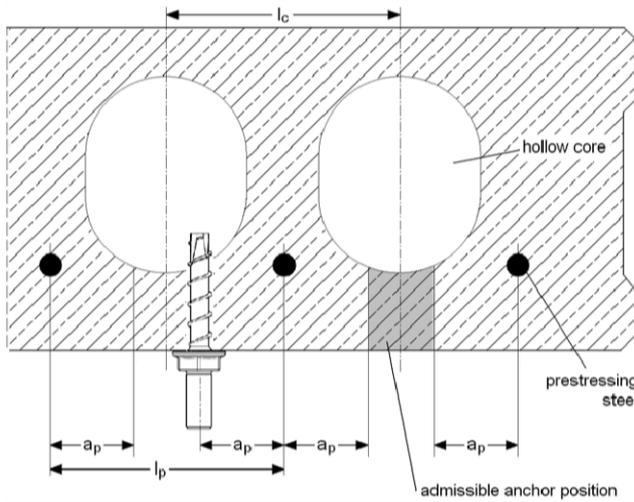
Hilti Screw anchor HUS

Intended Use

Additional Installation parameter for use in precast pre-stressed hollow core slabs,
Minimum thickness of concrete member, minimum edge distance and spacing

Annex B3

Admissible anchor positions in precast pre-stressed hollow core slabs

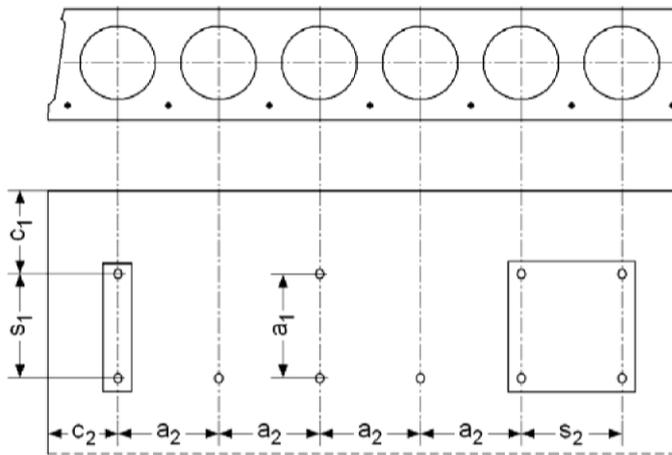


core distance $l_c \geq 100 \text{ mm}$

prestressing steel distance $l_p \geq 100 \text{ mm}$

distance between anchor position and prestressing steel $a_p \geq 50 \text{ mm}$

Minimum spacing and edge distance of anchors and distance between anchor groups in precast pre-stressed hollow core slabs



Minimum edge distance $c_{min} \geq 100 \text{ mm}$

Minimum anchor spacing $s_{min} \geq 100 \text{ mm}$

Minimum distance between anchor groups $a_{min} \geq 100 \text{ mm}$

c_1, c_2 edge distance

s_1, s_2 anchor spacing

a_1, a_2 distances between anchor groups

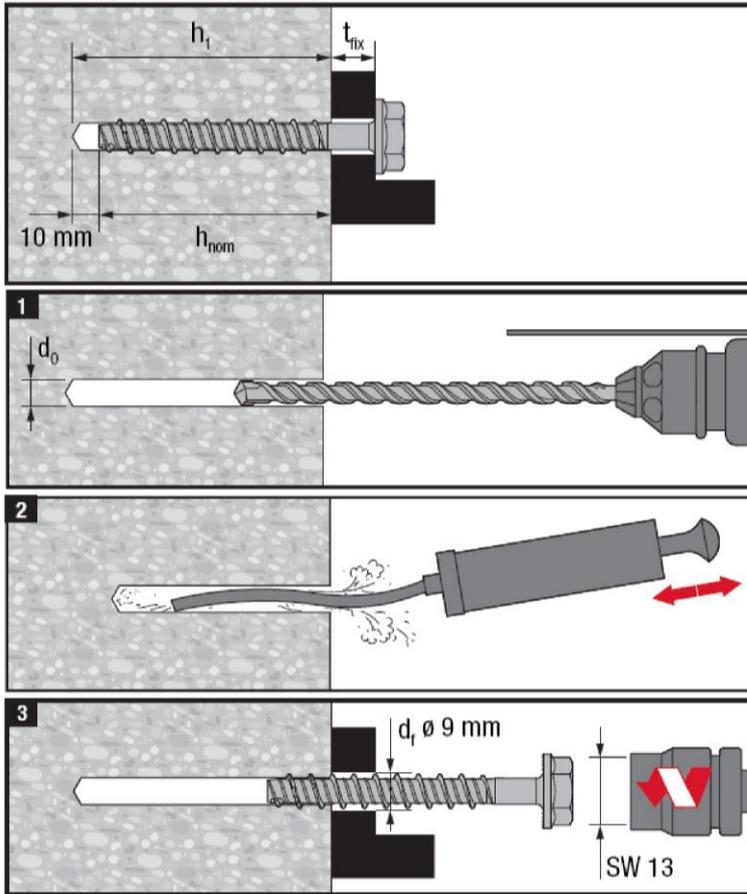
Hilti Screw anchor HUS

Intended Use

Admissible anchor positions, minimum spacing and edge distance of anchors and distance between anchor groups in precast pre-stressed hollow core slabs

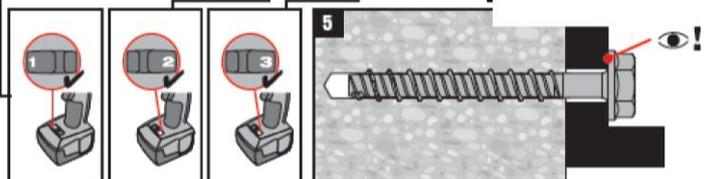
Annex B4

Installation instruction (HUS HR)



4.1

	h_{nom} 30 mm	35 mm	55 mm
SIW 14-A	✓	✓	✓
SIW 22-A	✓	✓	✓
SIW 22T-A	✗	✗	✗
SI 100	✗	✗	✗
	✗	✗	✗



Installation with other electrical impact screw drivers of equivalent force and performance is possible.

Hand setting of HUS-HR in concrete base material not allowed (machine setting only).

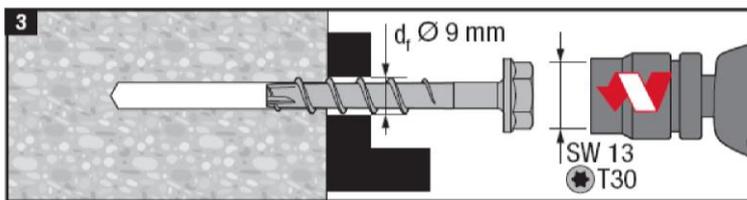
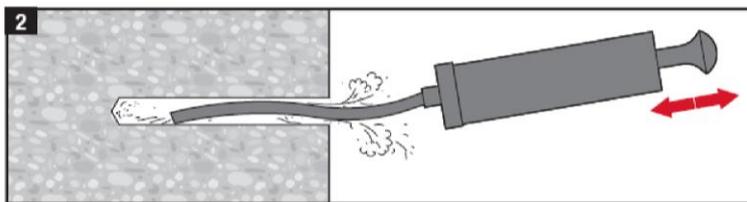
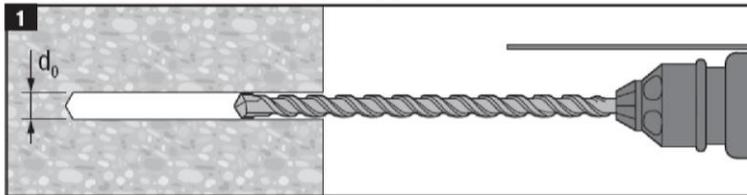
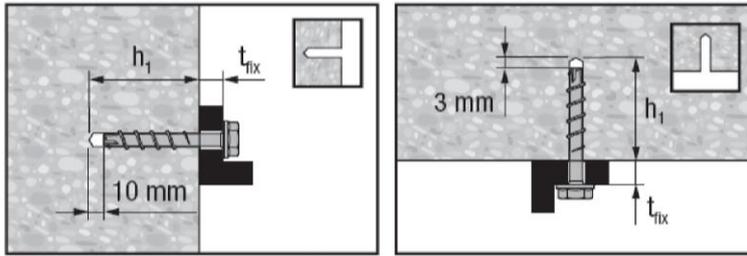
Hilti recommended electrical impact screw drivers are listed in the instruction for use included in the sales box.

Hilti Screw anchor HUS

Intended Use
Installation Instruction

Annex B5

Installation instruction (HUS/HUS3 H, C, I, A, P, PS)



	h _{nom}	
	35 mm	55 mm
SIW14-A	✓	✓
SIW22-A	✓	✓
SIW 22T-A	✗	✗
SI 100	✗	✗
	18 Nm	25 Nm



Installation with other electrical impact screw drivers of equivalent force and performance is possible.

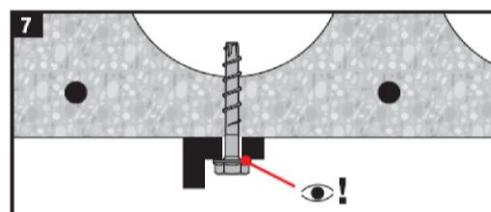
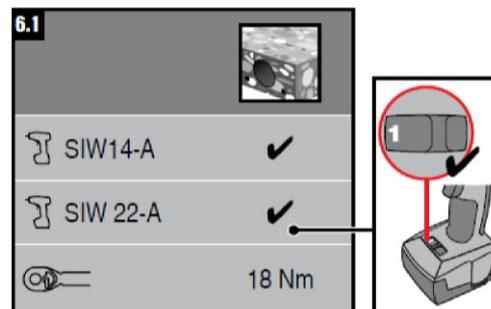
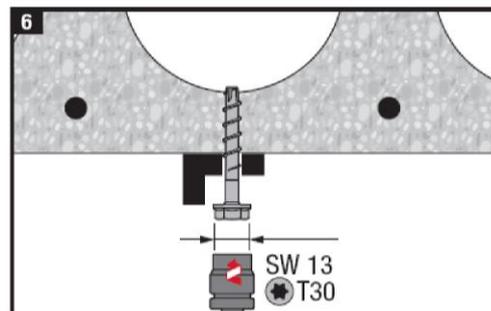
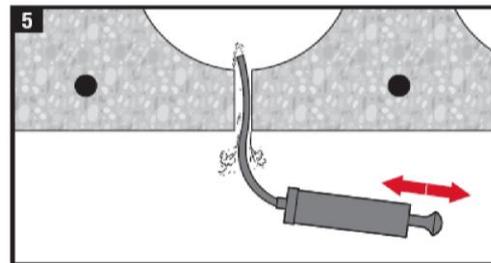
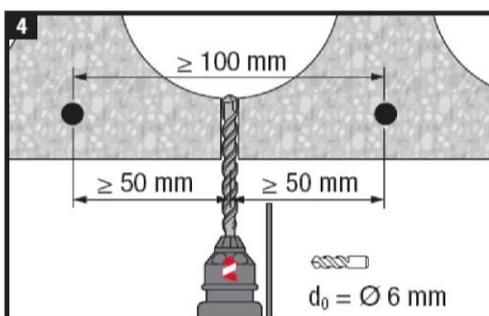
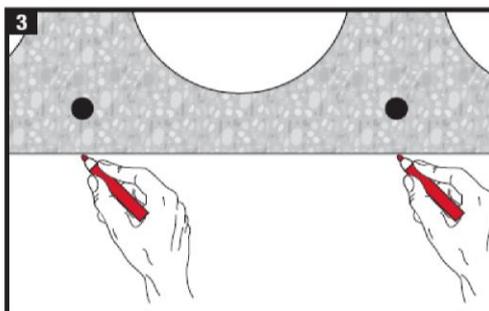
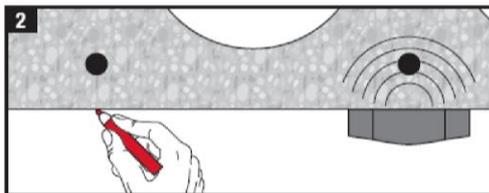
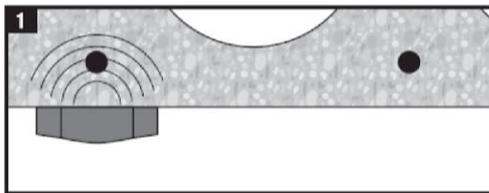
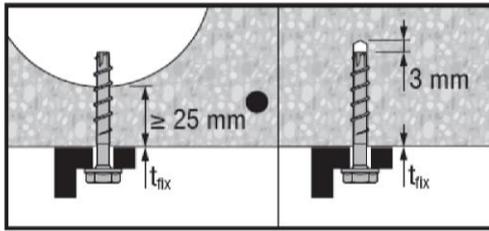
Hilti recommended electrical impact screw drivers are listed in the instruction for use included in the sales box.

Hilti Screw anchor HUS

Intended Use
Installation Instruction

Annex B6

Installation instruction precast pre-stressed hollow core slabs



Installation with other electrical impact screw drivers of equivalent force and performance is possible.
Hilti recommended electrical impact screw drivers are listed in the instruction for use included in the sales box

Hilti Screw anchor HUS

Intended Use

Installation instruction in precast pre-stressed hollow core slabs

Annex B7

Table C1: Characteristic values for static and quasi-static loads

Anchor size				6					
Type				HR	H 6	P / PS	I	A	C
Nominal anchorage depth $h_{nom} \geq$ [mm]				35					
All load directions									
Characteristic resistance in C20/25 for spacing	$c \geq 35\text{mm}$	F_{Rk}^0	[kN]	3	2				
	$c \geq 80\text{ mm}$	F_{Rk}^0	[kN]	5	3				
Installation safety factor		$\gamma_2^{1)} = \gamma_{inst}^{2)}$	[-]	1,4	1,0				
Increasing factors for F_{Rk}^0			Ψ_c	C30/37	1,22				
				C40/50	1,41				
				C50/60	1,55				
Effective anchorage depth		h_{ef}	[mm]	27	25				
Characteristic edge distance		c_{cr}	[mm]	1,5 h_{ef}					
Characteristic spacing		s_{cr}	[mm]	3 h_{ef}					
Shear load with lever arm									
Characteristic bending resistance		$M_{Rk,s}^0$	[Nm]	19	22				

¹⁾ Parameters relevant only for design according to CEN/TS 1992-4:2009

²⁾ Parameter relevant only for design according to ETAG001 Annex C

Hilti Screw anchor HUS

Performances

Characteristic values for static and quasi-static loads

Annex C1

Table C2: Characteristic values for static and quasi-static loads in precast pre-stressed hollow core slabs C30/37 to C50/60

Anchor size	6		
Type	HR, H, P, PS, I, A, C		
All load directions			
Bottom flange thickness [mm]	≥ 25	≥ 30	≥ 35
Characteristic resistance F_{Rk}^0 [kN]	1	2	3
Partial safety factor $\gamma_2^{1)} = \gamma_{inst}^{2)}$ [-]	1,0 ²⁾		

¹⁾ Parameters relevant only for design according to CEN/TS 1992-4:2009

²⁾ Parameter relevant only for design according to ETAG001 Annex C

Hilti Screw anchor HUS

Performances

Characteristic values for static and quasi-static loads in precast pre-stressed hollow core slabs C30/37 to C50/60

Annex C2

Table C3: Characteristic values for resistance to fire

Anchor size			6			
Type			HR		H, P, PS, I, A, C	
Nominal anchorage depth	$h_{nom} \geq$	[mm]	35	55	35	55
All load directions						
Characteristic resistance	R30...R90	$F_{Rk,fi}$ [kN]	0,7	1,3	0,5	0,8
	R120	$F_{Rk,fi}$ [kN]	0,5	1,0	0,4	0,6
Edge distance	R30...R120	$c_{cr,fi}$ [mm]	54	90	50	84
Anchor spacing	R30...R120	$s_{cr,fi}$ [mm]	108	180	100	168

The fire resistance data is only valid for concrete C20/25 to C50/60 with a minimum slab thickness of 80 mm.

The data is not valid for precast pre-stressed hollow core slabs.

The edge distance of the anchor must be $c \geq 300$ mm and $\geq 2h_{ef}$ if the fire attack is from more than on side.

The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.

Hilti Screw anchor HUS

Performances

Characteristic values for resistance to fire

Annex C3