

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 12 November 2018

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 HUS3 and HUS

Product family
to which the construction product belongs

Concrete screw for redundant non-structural systems

Manufacturer

Hilti Aktiengesellschaft
9494 SCHAAN
FÜRSTENTUM LIECHTENSTEIN

Manufacturing plant

Hilti Werke

This European Technical Assessment
contains

18 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

EAD 330747-00-0601

This version replaces

ETA-10/0005 issued on 17 August 2018

**European Technical Assessment
ETA-10/0005**

English translation prepared by DIBt

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Specific Part

1 Technical description of the product

The Hilti screw anchor HUS3 and HUS is an anchor made of galvanised steel (HUS3 -H, -C, -A, -P, -PS, -PL, -I, I-Flex) or stainless steel (HUS-HR, HUS-CR) 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)

The essential characteristic regarding Mechanical resistance and stability are included under the Basic Works Requirement Safety in use.

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C3

3.3 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance for static and quasi-static loads for simplified design method B	See Annex C1 and C2

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

In accordance with EAD 330747-00-0601, the applicable European legal act is: [97/161/EC].

The system to be applied is: 2+

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

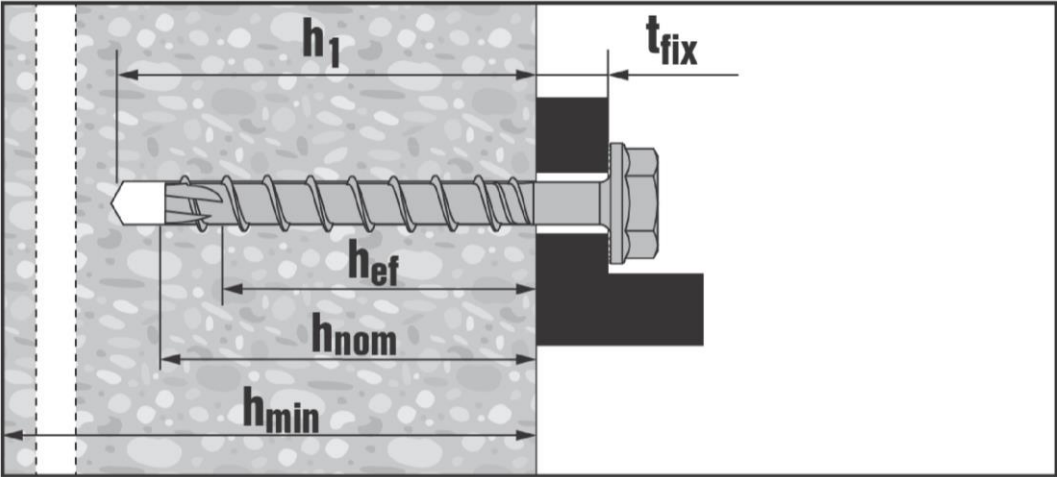
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 12 November 2018 by Deutsches Institut für Bautechnik

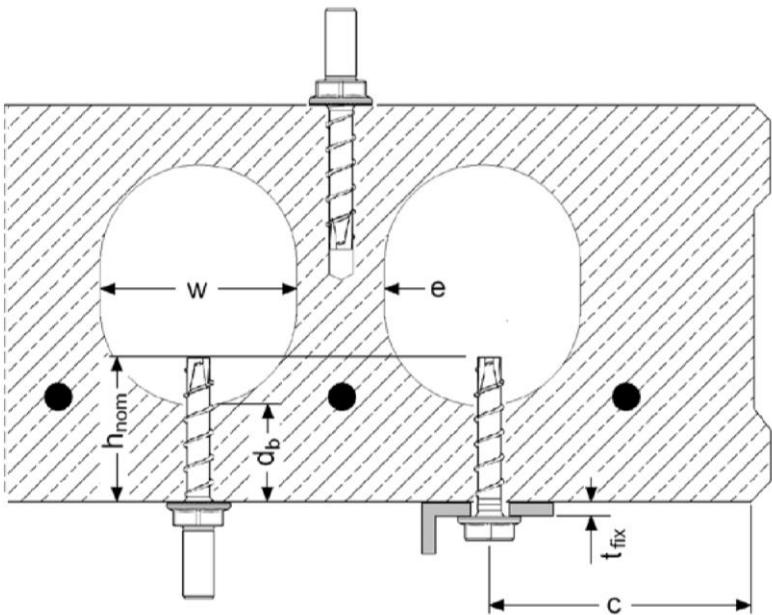
BD Dipl.-Ing. Andreas Kummerow
Head of Department

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Product and installed condition



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

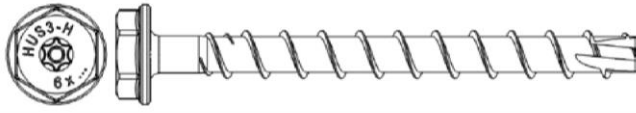
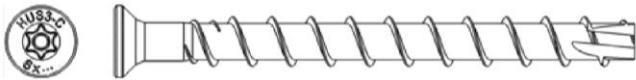
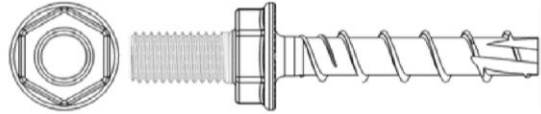
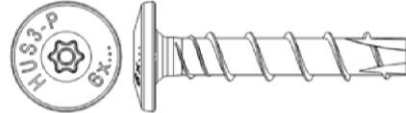
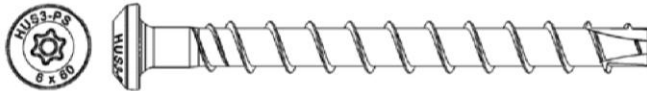
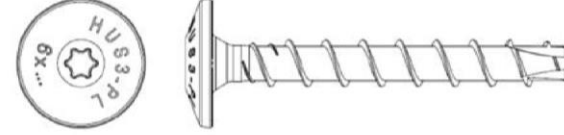
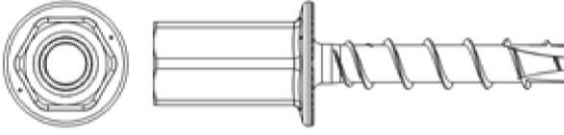
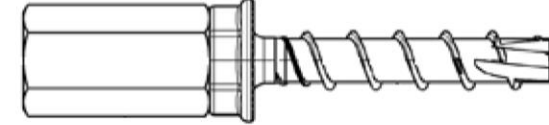
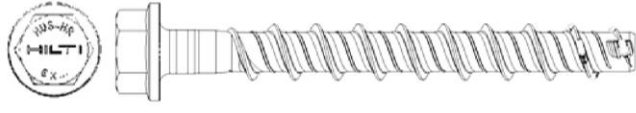



Hilti screw anchor HUS3 and HUS

Product description
Installed condition

Annex A1

Table A1: Screw types

	1) Hilti HUS3-H, size 6, hexagonal head configuration, galvanized;
	2) Hilti HUS3-C, sizes 6, countersunk head configuration, galvanized;
	3) Hilti HUS3-A, size 6, external thread M8/16 and M10/21, galvanized;
	4) Hilti HUS3-P, size 6, pan head configuration, galvanized;
	5) Hilti HUS3-PS, size 6, pan head (small) configuration, galvanized;
	6) Hilti HUS3-PL, size 6, pan head (large) configuration, galvanized;
	7) Hilti HUS3-I, size 6, internal thread M8 and M10, galvanized;
	8) Hilti HUS3-I Flex, size 6, galvanized, with external thread: - M8/16 preassembled with coupler M6 or M8, - M10/21 preassembled with coupler M10 or M12;
	9) Hilti HUS-HR, size 6, hexagonal head configuration, stainless steel (A4 grade);
	10) Hilti HUS-CR, size 6, countersunk head configuration, stainless steel (A4 grade).

Hilti screw anchor HUS3 and HUS

Product description
Screw types

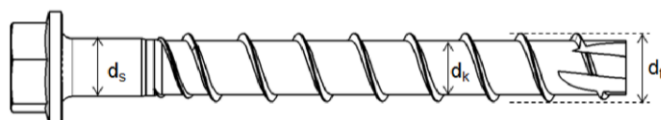
Annex A2

Table A2: Materials

Part	Designation	Material	
Screw anchor HUS3 (all types in Table A1)	Size 6 all lengths	$f_{yk} \geq 745 \text{ N/mm}^2$, $f_{uk} \geq 930 \text{ N/mm}^2$	Carbon steel, galvanized ($\geq 5 \mu\text{m}$) Rupture elongation $A_5 \leq 8\%$
Screw anchor HUS-HR and HUS-CR	Size 6 all lengths	$f_{yk} \geq 900 \text{ N/mm}^2$, $f_{uk} \geq 1050 \text{ N/mm}^2$	Stainless steel (A4 grade) Rupture elongation $A_5 > 8\%$

Table A3: Fastener dimensions and marking

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



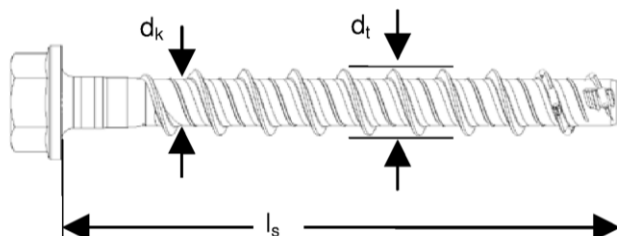
Hilti : Manufacturer

HUS3 : Hilti Universal Screw anchor 3rd generation

e.g. "H" : Hexagonal head

R : Corrosion resistance (stainless steel, grade A4)

6 : Nominal anchor diameter/ drill bit diameter



Head stamp:

e.g. Hilti HUS-HR 6 x ...
or circle marks

Hilti screw anchor HUS3 and HUS

Product description

Materials and fastener dimensions and marking

Annex A3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loadings.
- Only for fasteners for use in concrete for redundant non-structural systems according to EAD 330747-00-0601, Edition May 2018.
- Fire exposure: only for concrete C20/25 to C50/60, not pre-stressed hollow concrete slabs.

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Non-cracked or cracked concrete.
- Precast, pre-stressed 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: all screw types.
- Anchorages subject to dry internal conditions or external atmospheric exposure including industrial and marine environment or permanently damp internal condition, if no particular aggressive conditions exist: screw types made of stainless steel (HUS-HR, CR).
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 fastener is indicated on the design drawings (e. g. position of the fastener relative to reinforcement or to supports, etc.).
- Anchorages are designed in accordance with:
EN 1992-4:2018 Design method B and EOTA Technical Report TR 055.

Installation:

- Hammer drilling only.
- Fastener 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 fastener must not be possible.
- The head of the fastener must be supported on the fixture and is not damaged.

Hilti screw anchor HUS3 and HUS

Intended use
Specifications

Annex B1

Table B1: Installation parameters

Type			HUS		HUS3				
			HR	CR	H	C	A	P, PS, PL	I, I-Flex
Fastener size			6						
Nominal embedment depth	h_{nom}	[mm]	35						
Nominal drill hole diameter	d_0	[mm]	6						
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40						
Clearance hole diameter	$d_f \leq$	[mm]	9						
Wrench size (H, A, I -type)	SW	[mm]	13	-	13	-	13	-	13
Countersunk head diameter	d_h	[mm]	-	11,0	-	11,5	-	-	-
Torx size	TX	[-]	-	T30	T30	T30	-	T30	-
Depth of drill hole in floor/ wall position	$h_1 \geq$	[mm]	45						
Depth of drill hole in ceiling position	$h_1 \geq$	[mm]	38						
Installation Torque	T_{inst}	[Nm]	- ¹⁾	- ¹⁾	18				
Setting tool ²⁾	Strength class \geq C20/25		Impact screw driver, e.g. Hilti SIW 14 A or Hilti SIW 22 A ²⁾						

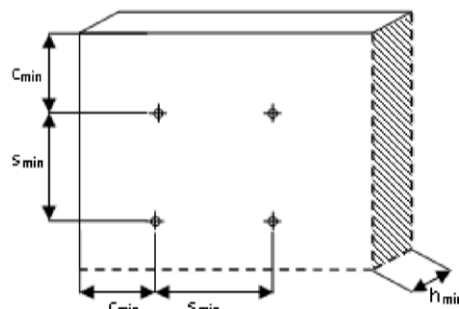
¹⁾ Hand setting in concrete base material not allowed (machine setting only).

²⁾ Hilti recommended electrical impact screw drivers are listed in the related MPII.

Table B2: Minimum thickness of concrete member, minimum edge distance and spacing

Type			HUS		HUS3				
			HR	CR	H	C	A	P, PS, PL	I, I-Flex
Fastener size			6						
Nominal embedment depth	h_{nom}	[mm]	35						
Minimum thickness of concrete member	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 HUS3 and HUS

Intended use

Installation parameters.
Minimum concrete thickness and minimum edge distance and spacing

Annex B2

Table B3: Screw length and maximum thickness of fixture

Type	HUS		HUS3							
	HR	CR	H	C	A	P	PS	PL	I	I-Flex
Fastener size	6									
<div> <div>Nominal embedment depth [mm]</div> <div>Length of screw [mm]</div> </div>	h_{nom} 35									
	Maximum thickness of fixture [mm] t_{fix}									
35	-	-	-	-	0	-	-	-	0	-
40	-	5	5	5	-	5	5	-	-	-
45	10	-	-	-	-	-	-	-	-	-
55	-	-	-	-	20	-	-	-	20	20
60	25	25	25	25	-	25	25	25	-	-
70	35	35	-	35	-	-	-	-	-	-
80	-	-	45	-	-	45	-	-	-	-
100	-	-	65	-	-	-	-	-	-	-
120	-	-	85	-	-	-	-	-	-	-
135	-	-	-	-	-	-	-	-	-	100
155	-	-	-	-	-	-	-	-	-	120
175	-	-	-	-	-	-	-	-	-	140
195	-	-	-	-	-	-	-	-	-	160

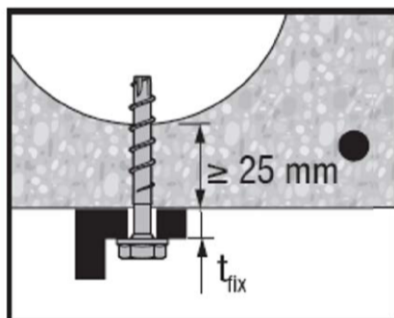
Hilti screw anchor HUS3 and HUS

Intended use
Screw length and thickness of the fixture

Annex B3

Table B4: Screw length and thickness of fixture used in precast pre-stressed hollow core slabs

Type	HUS		HUS3							
	HR	CR	H	C	A	P	PS	PL	I	I-Flex
Fastener size	6									
Thickness of fixture [mm]	t_{fix}									
Length of screw [mm]										
35	-	-	-	-	0	-	-	-	0	-
40	-	10	5	5	-	5	5	-	-	-
45	15	-	-	-	-	-	-	-	-	-
55	-	-	-	-	20	-	-	-	20	20
60	5-25	5-25	5-25	5-25	-	5-25	5-25	5-25	-	-
70	15-35	15-35	-	15-35	-	-	-	-	-	-
80	-	-	25-45	-	-	25-45	-	-	-	-
100	-	-	45-65	-	-	-	-	-	-	-
120	-	-	65-85	-	-	-	-	-	-	-
135	-	-	-	-	-	-	-	-	-	80-100
155	-	-	-	-	-	-	-	-	-	100-120
175	-	-	-	-	-	-	-	-	-	120-140
195	-	-	-	-	-	-	-	-	-	140-160



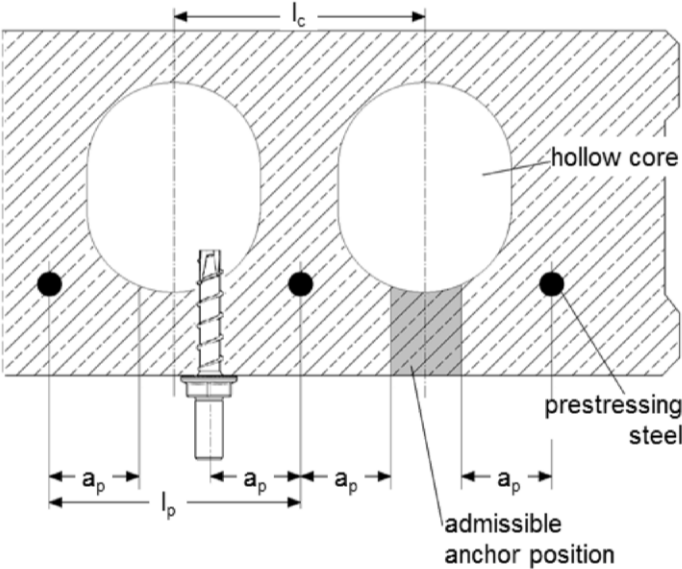
Hilti screw anchor HUS3 and HUS

Intended use

Screw length and thickness of the fixture used in precast pre-stressed hollow core slabs

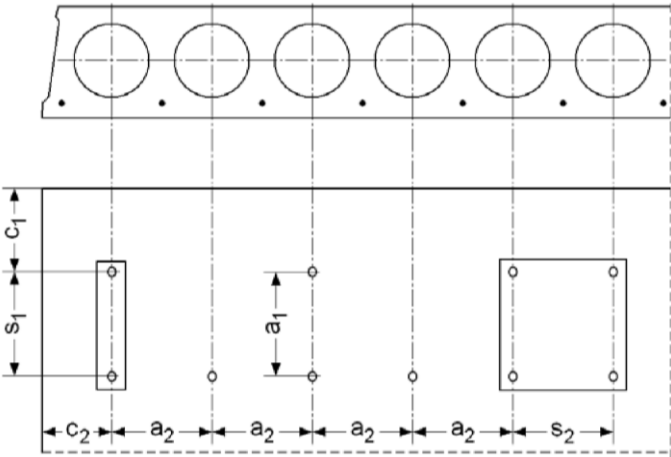
Annex B4

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

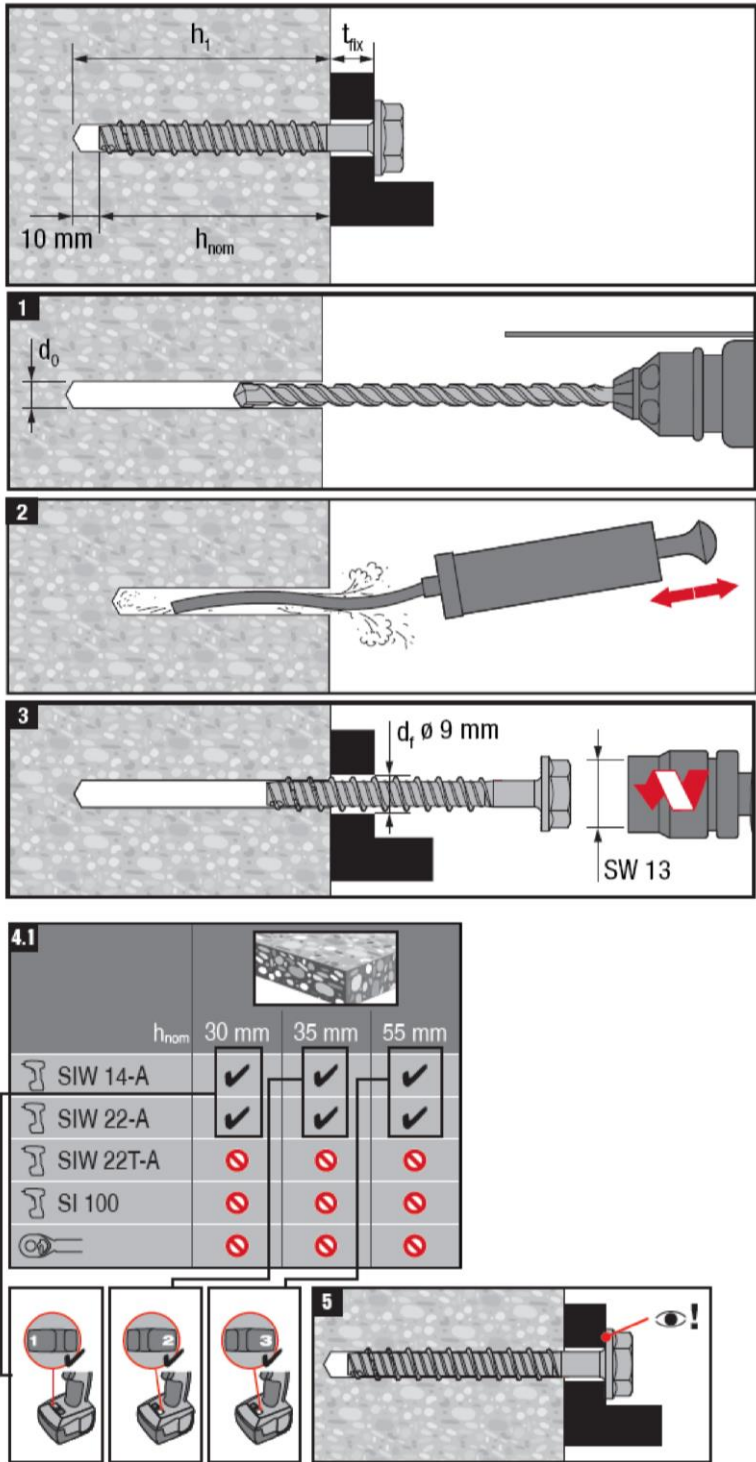
Hilti screw anchor HUS3 and HUS

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 B5

Installation instruction (HUS-HR, CR)



Hand setting of HUS-HR, CR 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.

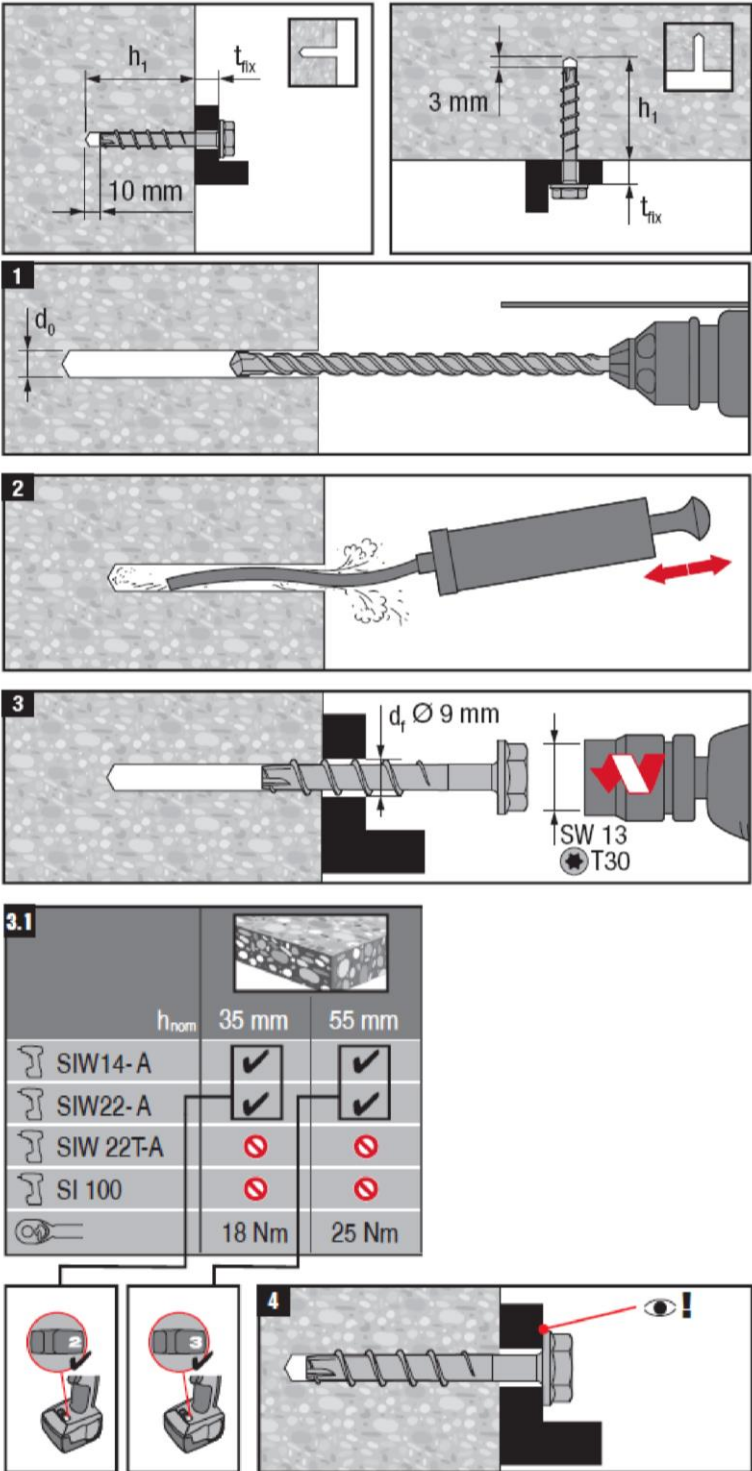
Installation with other electrical impact screw drivers of equivalent force and performance is possible.

Hilti screw anchor HUS3 and HUS

Intended use
Installation instruction

Annex B6

Installation instruction (HUS3-H, C, I, I-Flex, A, P, PS, PL)



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

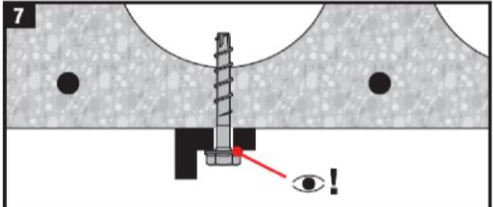
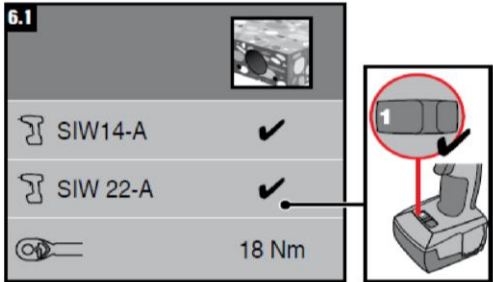
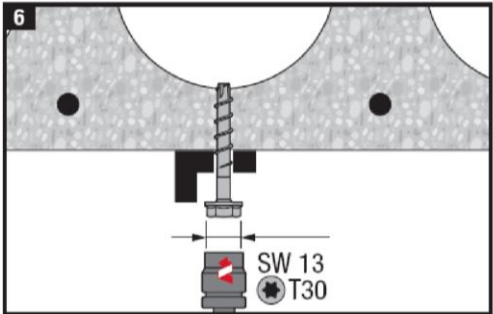
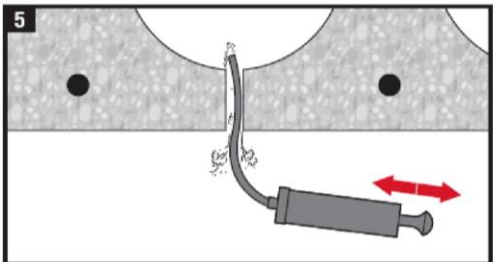
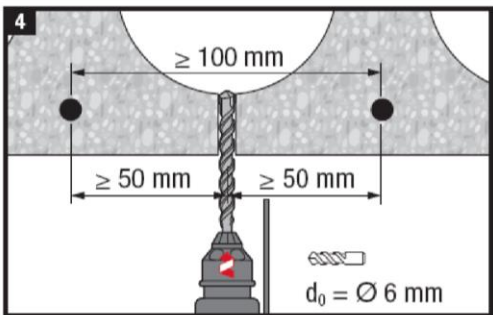
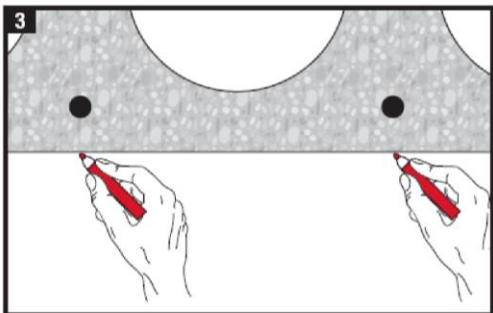
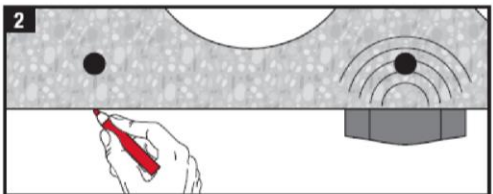
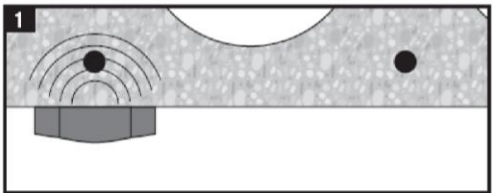
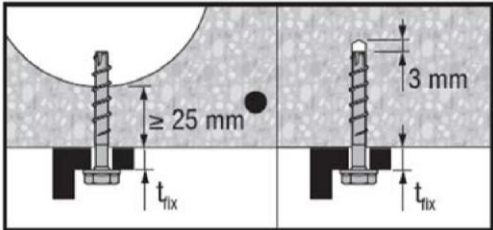
Installation with other electrical impact screw drivers of equivalent force and performance is possible.

Hilti screw anchor HUS3 and HUS

Intended use
Installation instruction

Annex B7

Installation instruction in 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 HUS3 and HUS

Intended use
Installation instruction in precast pre-stressed hollow core slabs

Annex B8

Table C1: Characteristic values of resistance in case of static and quasi-static loading

Type				HUS		HUS3				
				HR, CR		H	P, PS, PL	I, I-Flex	A	C
Fastener size				6x40, 6x45	6x60, 6x70	6 all lengths				
Nominal embedment depth				$h_{nom} \geq$	[mm]	35				
All load directions										
Characteristic resistance in C20/25	$c \geq 35\text{mm}$	F^0_{Rk}	[kN]	3		2				
	$c \geq 80\text{ mm}$	F^0_{Rk}	[kN]	3,5	5	3				
Partial factor		γ_M	[-]	1,5						
Installation factor		γ_{inst}	[-]	1,4		1,0				
Increasing factors of concrete for F^0_{Rk} , 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		$M^0_{Rk,s}$	[Nm]	19		22				
Partial factor		$\gamma_{Ms,V}$	[-]	1,5						

Hilti screw anchor HUS3 and HUS

Performances

Characteristic values for resistance under static and quasi-static action

Annex C1

Table C2: Characteristic values of resistance in case of static and quasi-static loading in precast pre-stressed hollow core slabs C30/37 to C50/60

Type	HUS-HR, CR		HUS-HR, CR	HUS3-H, P, PS, PL, I, I-Flex, A, C			
Fastener size	6x40, 6x45		6x60, 6x70	6 all lengths			
All load directions							
Bottom flange thickness	d _b	[mm]	≥ 25	≥ 30	≥ 25	≥ 30	≥ 35
Characteristic resistance	F ⁰ _{Rk}	[kN]	1	2	1	2	3
Partial factor	γ _M	[-]	1,5				
Installation factor	γ _{inst}	[-]	1,0				

Note: the fixture thickness values according to Table B4 (Annex B4) shall be considered.

Hilti screw anchor HUS3 and HUS

Performances

Characteristic values of resistance in case of static and quasi-static loading in precast pre-stressed hollow core slabs C30/37 to C50/60

Annex C2

Table C3: Characteristic values of resistance under fire exposure

Type				HUS		HUS3				
				HR	CR	H	P, PS, PL	I, I-Flex	A	C
Fastener size				6						
Nominal embedment depth $h_{nom} \geq$ [mm]				35						
All load directions										
Characteristic resistance	R30...R90	$F_{Rk,fi}$	[kN]	0,7	0,2	0,5				
	R120	$F_{Rk,fi}$	[kN]	0,5	0,1	0,4				
Edge distance	R30...R120	$c_{cr,fi}$	[mm]	54		50				
Anchor spacing	R30...R120	$s_{cr,fi}$	[mm]	108		100				

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 one side.

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

Hilti screw anchor HUS3 and HUS

Performances

Characteristic values of resistance under fire exposure

Annex C3