Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-19/0206 of 9 July 2019

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	HUS-H 12
Product family to which the construction product belongs	Mechanical fasteners for use in concrete
Manufacturer	Hilti Aktiengesellschaft Business Unit Anchors 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti plants
This European Technical Assessment contains	14 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 330232-00-0601

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Specific Part

1 Technical description of the product

The Hilti screw anchor HUS-H 12 is an anchor made of galvanized steel in of size 12. 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 concrete screw 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 concrete screw 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 resistance to tension load (static and quasi-static loading)	see Annex C 1
Characteristic resistance to shear load (static and quasi-static loading)	see Annex C 2
Displacements (static and quasi-static loading)	see Annex C 3
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed
Durability	See Annex B 1

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 4 and C 5

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

In accordance with European Assessment Documents EAD No. 330232-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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 9 July 2019 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt
p.p. Head of Department

beglaubigt:
Baderschneider

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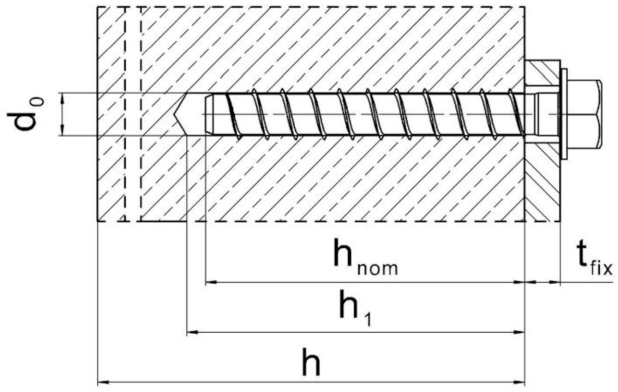
Installed condition



HUS-H (hexagon head size 12)

Table A1: Screw types

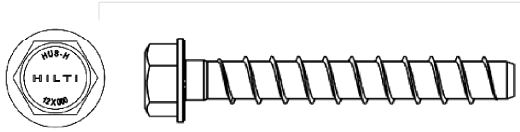
	1) Hilti HUS-H, size 12, hexagon head zinc coated

Table A2: Materials

Designation	Part	Material	
HUS-H 12 screw anchor	Size 12 all lengths	Steel 10B21 acc. To SAE-J403 $f_{yk} \geq 750$ N/mm², $f_{uk} \geq 850$ N/mm²	Electroplated zinc coated (> 5µm) or mechanical plated (> 30µm)

Hilti screw anchor HUS-H 12	Annex A1
Product description Installed condition, screw types and material	

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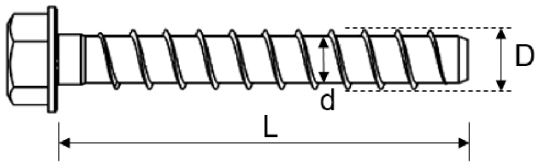
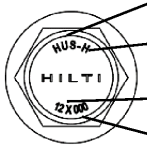
Table A3: Fastener dimensions and marking

Fastener size HUS			**12**
Type			**H**
Nominal embedment depth	h_{nom}	[mm]	95
Length of fastener	min L	[mm]	100
	max L	[mm]	150
Outer diameter of thread	D	[mm]	14,3
Core diameter	d	[mm]	11,3
Thread pitch	p	[mm]	8,1



Reverse Locking Serrations



HUS : Hilti Universal Screw

H : Hexagon head

12 : Screw diameter

000 : Length of screw

Hilti screw anchor HUS-H 12	**Annex A2**
Production description Fastener dimensions	

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Specifications of intended use

Anchorages subject to:

- Static and quasi static loading.
- Fire exposure.

Base material:

- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013+A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016.
- Cracked and uncracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel or high corrosion resistant steel).

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.).
- The anchorages are designed in accordance with: EN 1992-4:2018 and EOTA Technical Report TR 055, February 2016.

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 shall not be possible.
- The head of the fastener must be fully engaged on the fixture and show no signs of damage.

Hilti screw anchor HUS-H 12	
Intended Use Specifications	**Annex B1**

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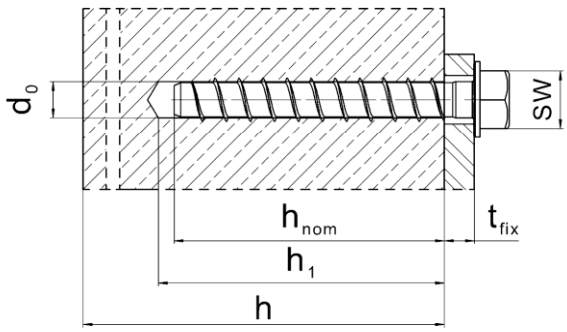
Table B1: Installation parameters

Fastener size HUS **Type**			**12** **H**
Diameter of drill bit	d_0	[mm]	12
Nominal embedment depth	h_{nom}	[mm]	95
Min. hole depth in concrete	$h_1 \geq$	[mm]	105
Effective embedment depth	$h_{ef} \leq$	[mm]	75,4
Clearance hole in the fixture	d_f	[mm]	15
Fixture thickness	t_{fix}	[mm]	5-55
Installation torque moment	T_{inst}	[Nm]	80
Wrench size	SW	[mm]	19
Max. power output, machine setting	$T_{max} \leq$	[Nm]	350
Setting tool[1)] Strength class	≥ C20/25		Hilti SIW 22-A or Hilti 6AT-A22

[1)] Installation with other impact screw driver of equivalent power is possible.

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

Fastener size HUS **Type**			**12** **H**
Nominal embedment depth	h_{nom}	[mm]	95
Minimum member thickness	h_{min}	[mm]	160
Minumum edge distance	c_{min}	[mm]	70
Minumum spacing	s_{min}	[mm]	70



Hilti screw anchor HUS-H 12	**Annex B2**
Intended Use Installation parameters	

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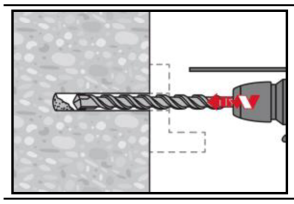
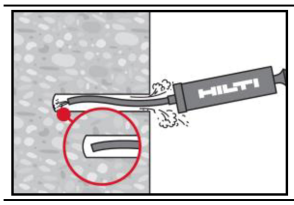
Installation instruction

Hole drilling



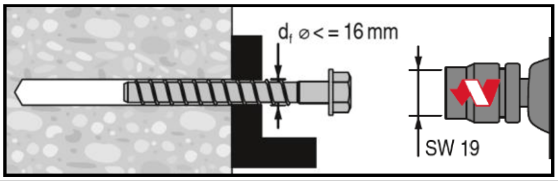
Hammer drilling.

Drill hole cleaning



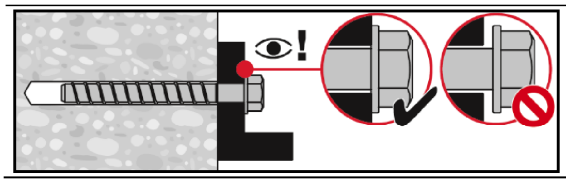
Clean the drill hole.

Anchor installation



Use torque wrench or impact screw driver.
Torque wrench: T_{inst} acc. to Table B1.
Impact screw driver: T_{max} acc. to Table B1.

Checking of correct setting



Ensure that the head of the fastener is fully supported on the fixture and it is not damaged.

Hilti screw anchor HUS-H 12	Annex B3
Intended Use Installation instructions	

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Table C1: Essential characteristics HUS-H under tension load

Fastener size HUS			**12**
Type			**H**
Nominal embedment depth	h_{nom}	[mm]	95
Installation factor	γ_{inst}	[-]	1,2
Steel failure			
Characteristic resistance	$N_{Rk,s}$	[kN]	83,0
Partial factor	$\gamma_{Ms,N}$ [1)]	[-]	1,4
Pull-out failure			
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	25,0
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p}$	[kN]	12,0
Increasing factors for $N_{Rk,p}$ in cracked or uncracked concrete	ψ_c	C30/37	1,22
		C40/50	1,41
		C50/60	1,58
Concrete cone failure			
Effective embedment depth	h_{ef}	[mm]	75,4
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0
Edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}
Spacing	$s_{cr,N}$	[mm]	3 h_{ef}
Splitting failure			
Edge distance	$c_{cr,sp}$	[mm]	1,5 h_{ef}
Spacing	$s_{cr,sp}$	[mm]	3 h_{ef}

[1)] In absence of national regulations.

Hilti screw anchor HUS-H 12

Performances
Essential characteristics under tension load in concrete

Annex C1

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Table C2: Essential Characteristics for HUS-H under shear loads

Fastener size HUS **Type**			**12** **H**
Nominal embedment depth	h_{nom}	[mm]	95
Effective embedment depth	h_{ef}	[mm]	75,4
Steel failure without level arm			
Characteristic resistance	$V^0_{Rk,s}$	[kN]	39,0
Factor for groups	k_7	[-]	0,8
Partial factor	γ_{Ms} [1)]	[-]	1,5
Steel failure with level arm			
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	138,8
Partial factor	γ_{Ms} [1)]	[-]	1,5
Concrete pry-out failure			
Pry-out factor	k_8	[-]	2,0
Partial factor	γ_{Mcp} [1)]	[-]	1,5
Concrete edge failure			
Effective length of fastener	$l_f = h_{ef}$	[mm]	75,4
Outside diameter of fastener	d_{nom}	[mm]	11,15
Partial factor	γ_{Mc} [1)]	[-]	1,5

1) In absence of national regulations.

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Table C3: Displacements under tension load for uncracked and cracked concrete

Fastener size HUS				**12**
Type				**H**
Cracked concrete C20/25	Tension Load	N	[kN]	4,8
	Displacement	δ_{N0}	[mm]	0,3
		$\delta_{N\infty}$	[mm]	1,2
Uncracked concrete C20/25	Tension Load	N	[kN]	9,9
	Displacement	δ_{N0}	[mm]	0,3
		$\delta_{N\infty}$	[mm]	1,2

Table C4: Displacements under shear load for uncracked and cracked concrete

Fastener size HUS				**12**
Type				**H**
Cracked and uncracked concreteC20/25	Shear Load	V	[kN]	18,6
	Displacement	δ_{N0}	[mm]	1,8
		$\delta_{N\infty}$	[mm]	2,7

Hilti screw anchor HUS-H 12

Performances
Displacements

Annex C3

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Table C5: Essential Characteristics for HUS-H under tension load in case of fire exposure

Fastener size HUS				**12**
Type				**H**
Nominal embedment depth		h_{nom}	[mm]	95
Steel failure				
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	2,0
	R60	$N_{Rk,s,fi}$	[kN]	1,5
	R90	$N_{Rk,s,fi}$	[kN]	1,3
	R120	$N_{Rk,s,fi}$	[kN]	1,0
Pull-out failure				
Characteristic resistance in concrete ≥ C20/25	R30	$N_{Rk,p,fi}$	[kN]	3,0
	R60	$N_{Rk,p,fi}$	[kN]	
	R90	$N_{Rk,p,fi}$	[kN]	
	R120	$N_{Rk,p,fi}$	[kN]	2,4
Concrete cone failure				
Characteristic resistance in concrete ≥ C20/25	R30	$N^0_{Rk,c,fi}$	[kN]	8,5
	R60	$N^0_{Rk,c,fi}$	[kN]	
	R90	$N^0_{Rk,c,fi}$	[kN]	
	R120	$N^0_{Rk,c,fi}$	[kN]	6,8
Effective embedment depth		h_{ef}	[mm]	75,4
Minimum member thickness		h_{min}	[mm]	160
Spacing		$c_{cr,N,fi}$	[mm]	4 h_{ef}
		s_{min}	[mm]	70
Edge distance		$c_{cr,N,fi}$	[mm]	2 h_{ef}
Fire exposure from one side only		c_{min}	[mm]	70
Fire exposure from more than one side				≥ 300 mm

1) In absence of national regulations.

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Table C6: Essential Characteristics for HUS-H under shear load in case of fire exposure

Fastener size HUS Type				12 H
Nominal embedment depth		h_{nom}	[mm]	95
Steel failure without level arm				
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	2,0
	R60	$V_{Rk,s,fi}$	[kN]	1,5
	R90	$V_{Rk,s,fi}$	[kN]	1,3
	R120	$V_{Rk,s,fi}$	[kN]	1,0
Steel failure with level arm				
Characteristic resistance	R30	$M^0_{Rk,s,fi}$	[Nm]	3,4
	R60	$M^0_{Rk,s,fi}$	[Nm]	2,5
	R90	$M^0_{Rk,s,fi}$	[Nm]	2,1
	R120	$M^0_{Rk,s,fi}$	[Nm]	1,6
Pry-out failure				
Pry-out factor		k_8	[-]	2,0
Characteristic resistance	R30	$V_{Rk,cp,fi}$	[kN]	17,0
	R60	$V_{Rk,cp,fi}$	[kN]	
	R90	$V_{Rk,cp,fi}$	[kN]	
	R120	$V_{Rk,cp,fi}$	[kN]	13,6
Concrete edge failure				
Characteristic resistance	R30	$V_{Rk,c,fi}$	[kN]	$V^0_{Rk,c,fi} = 0{,}25 \cdot V^0_{Rk,c}$ [2)]
	R60	$V_{Rk,c,fi}$	[kN]	
	R90	$V_{Rk,c,fi}$	[kN]	
	R120	$V_{Rk,c,fi}$	[kN]	$V^0_{Rk,c,fi} = 0{,}20 \cdot V^0_{Rk,c}$ [2)]

1) In absence of national regulations.
2) $V^0_{Rk,c}$ = characteristic resistance for concrete edge failure in cracked concrete C20/25 under normal temperature calculated acc. to EN 1992-4:2018.

Hilti screw anchor HUS-H 12

Performances
Essential Characteristics under shear load in case of fire exposure

Annex C5