Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

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

European Technical Assessment ETA-24/1152 of 13 January 2025

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	ESSVE Concrete screw EUS2, EUS A4, EUS HCR
Product family to which the construction product belongs	Fasteners for use in concrete for redundant non-structural systems
Manufacturer	ESSVE AB Borgarfjordsgatan 18 SE-164 40 Kista SCHWEDEN
Manufacturing plant	ESSVE Plants
This European Technical Assessment contains	16 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, Edition 06/2018

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Specific Part

1 Technical description of the product

The ESSVE Concrete screw EUS2, EUS A4, EUS HCR of sizes 5 and 6 mm is an anchor made of galvanised steel respectively steel with zinc flake coating and of stainless steel. 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 EAD

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 Safety in case of fire (BWR 2)

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

3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex B2, Annex C1 and C2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1 and C2
Durability	See Annex B1

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

In accordance with European Assessment Document EAD No. 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 at Deutsches Institut für Bautechnik.

Issued in Berlin on 13 January 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

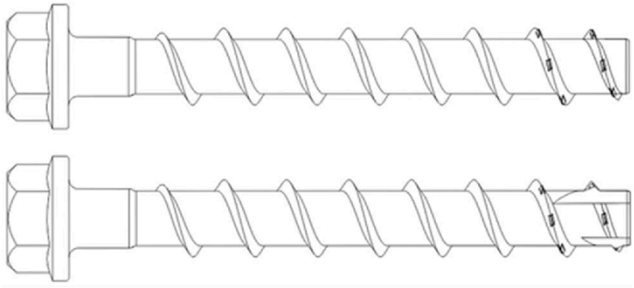
beglaubigt:
Tempel

Deutsches Institut für Bautechnik DIBt

Product in installed condition

ESSVE EUS2, EUS A4, EUS HCR (size 5 and 6)

- Galvanized carbon steel
- Zinc flakes coated carbon steel



- Stainless steel A4
- High corrosion resistant steel HCR

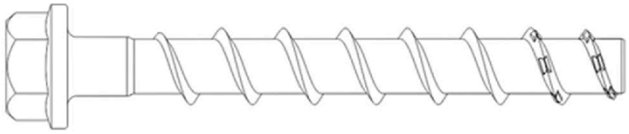
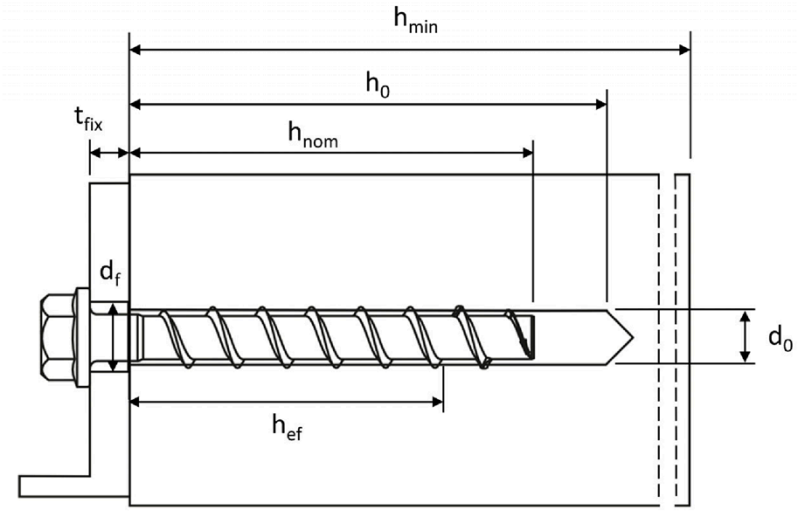


Figure illustrating concrete screw with hexagon head and fixture



d_0 = nominal drill hole diameter
t_{fix} = thickness of fixture
d_f = clearance hole diameter

h_{min} = minimum thickness of member
h_{nom} = nominal embedment depth
h_0 = drill hole depth
h_{ef} = effective embedment depth

ESSVE Concrete screw EUS2, EUS A4, EUS HCR	Annex A1
Product description Product in installed condition	

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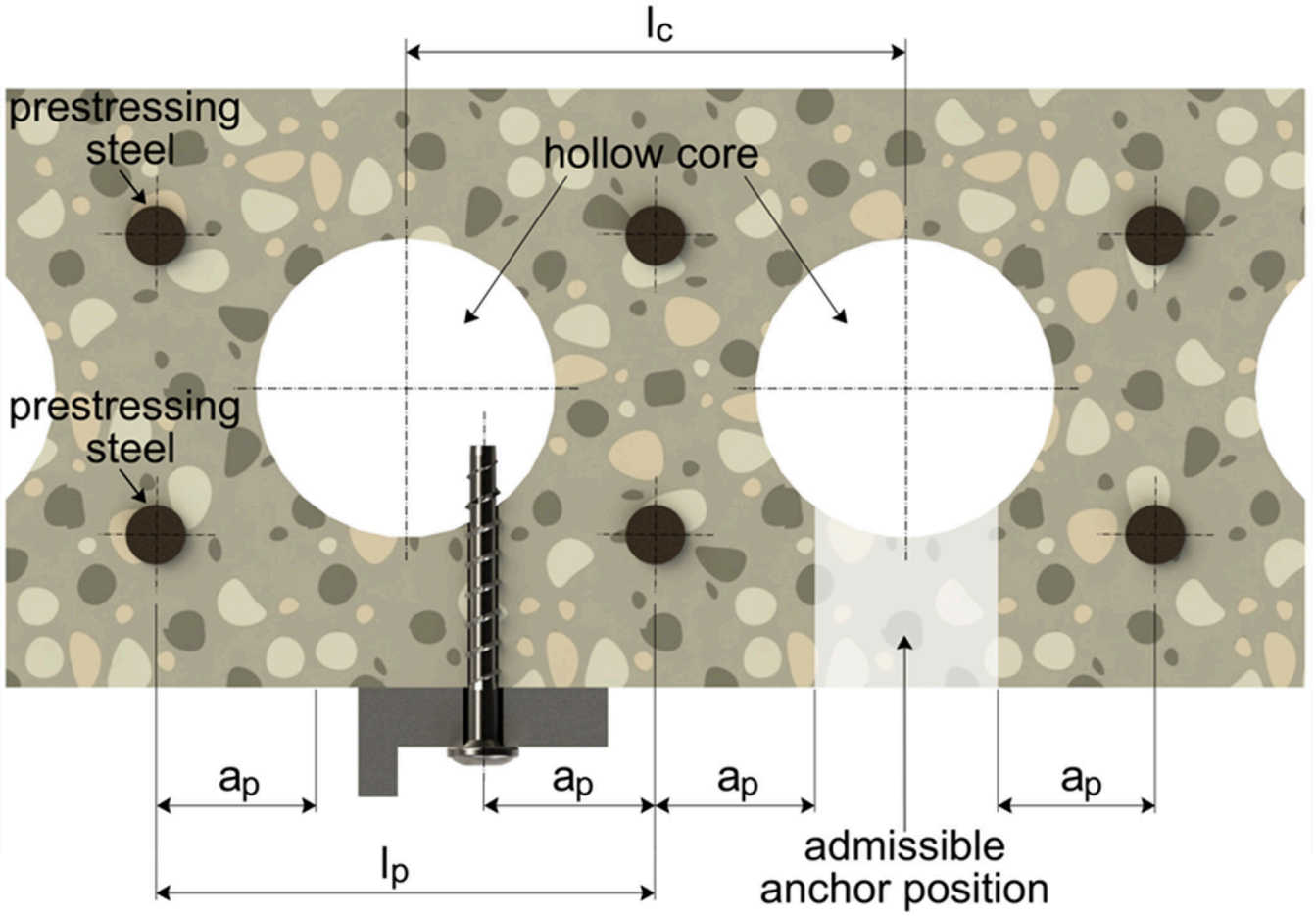
Installed condition in precast prestressed hollow core slabs



Important ratio: $\frac{w}{e} \leq 4,2$

w = core width

e = web thickness

l_c = core distance ≥ 100 mm

l_p = prestressing steel ≥ 100 mm

a_p = distance between anchor position and prestressing steel ≥ 50mm

ESSVE Concrete screw EUS2, EUS A4, EUS HCR	Annex A2
Product description Installed condition in precast prestressed hollow core slabs	

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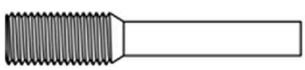
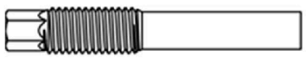
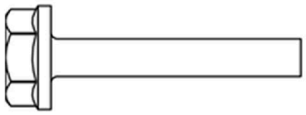


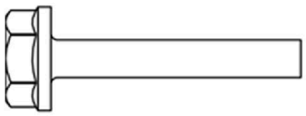

1. Configuration with metric connection threat and hexagon socket e.g. EUS2 8x105 M10 SW5



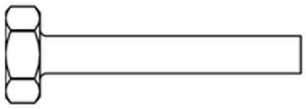

2. Configuration with metric connection threat and hexagon drive e.g. EUS2 8x105 M10 SW7



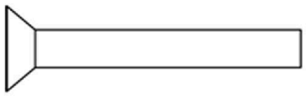

3. Configuration with washer and hexagon head e.g. EUS2-HF 8x80 SW13



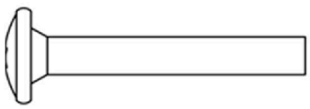

4. Configuration with washer, hexagon head and TORX drive e.g. EUS2-HF 8x80 SW13 TX40



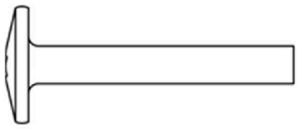

5. Configuration with hexagon head e.g. EUS2-H 8x80 SW13



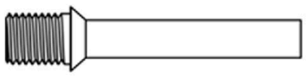

6. Configuration with countersunk head and TORX drive e.g. EUS2-C 8x80 C TX40



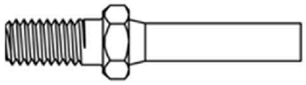

7. Configuration with pan head and TORX drive e.g. EUS2-PS 8x80 TX40



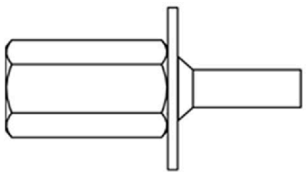

8. Configuration with large pan head and TORX drive e.g. EUS2-PL 8x80 TX40




9. Configuration with countersunk head and connection thread e.g. EUS2-E 6x55 M8




10. Configuration with hexagon drive and connection thread e.g. EUS2-E 6x55 M8 SW10




11. Configuration with internal thread and hexagon drive e.g. EUS2-I 6x55 M8/10

ESSVE Concrete screw EUS2, EUS A4, EUS HCR

Product description
Screw types

Annex A3

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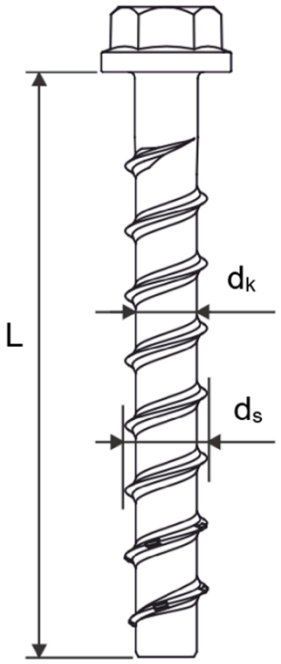
Table 1: Material

Part	Product name	Material
all types	EUS2	- Steel EN 10263-4:2017 galvanized acc. to EN ISO 4042:2018 - Zinc flake coating according to EN ISO 10683:2018 (≥5µm)
	EUS A4	1.4401; 1.4404; 1.4571; 1.4578
	EUS HCR	1.4529

Part	Product name	Nominal characteristic steel		Rupture elongation A_5 [%]
		Yield strength f_{yk} [N/mm²]	Ultimate strength f_{uk} [N/mm²]	
all types	EUS2	560	700	≤ 8
	EUS A4			
	EUS HCR			

Table 2: Dimensions

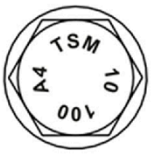
Anchor size			5	6
Screw length	≤ L	[mm]	200	
Core diameter	d_k	[mm]	4,0	5,1
Thread outer diameter	d_s	[mm]	6,5	7,5



Marking:

EUS2
Screw type: TSM
Screw size: 10
Screw length: 100

EUS A4
Screw type: TSM
Screw size: 10
Screw length: 100
Material: A4



EUS HCR
Screw type: TSM
Screw size: 10
Screw length: 100
Material: HCR

Marking "k" or "x"
for anchors with connection thread and h_{nom}= 35mm

ESSVE Concrete screw EUS2, EUS A4, EUS HCR

Product description
Material, Dimensions and markings

Annex A4

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Specification of Intended use

Anchorages subject to:

- static and quasi static loads
- Used only for multiple use for non-structural application according to EN 1992-4:2018
- Used for anchorages with requirements related to resistance of fire (not for using in prestressed hollow core slabs): size 5 and 6
- Used for anchorages in prestressed hollow core slabs: size 6

Base materials:

- Compacted reinforced and compacted unreinforced concrete without fibers according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked and uncracked concrete.

Use conditions (Environmental conditions):

- Concrete screws subject to dry internal conditions: all screw types.
- For all other conditions corresponding to corrosion resistance classes CRC according to EN 1993-1-4:2006 + A1:2015
  - Stainless steel according to Annex A4, screw with marking A4: CRC III
  - High corrosion resistant steel according to Annex A4, screw with marking HCR: CRC V

Design:

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are to be 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 are designed according to EN 1992-4:2018 and EOTA Technical Report TR 055, Version February 2018.
- The design for shear load according to EN 1992-4:2018, Section 6.2.2 applies for all specified diameters d_f of clearance hole in the fixture in Annex B2, Table 3.

Installation:

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

ESSVE Concrete screw EUS2, EUS A4, EUS HCR	Annex B1
Intended use Specification	

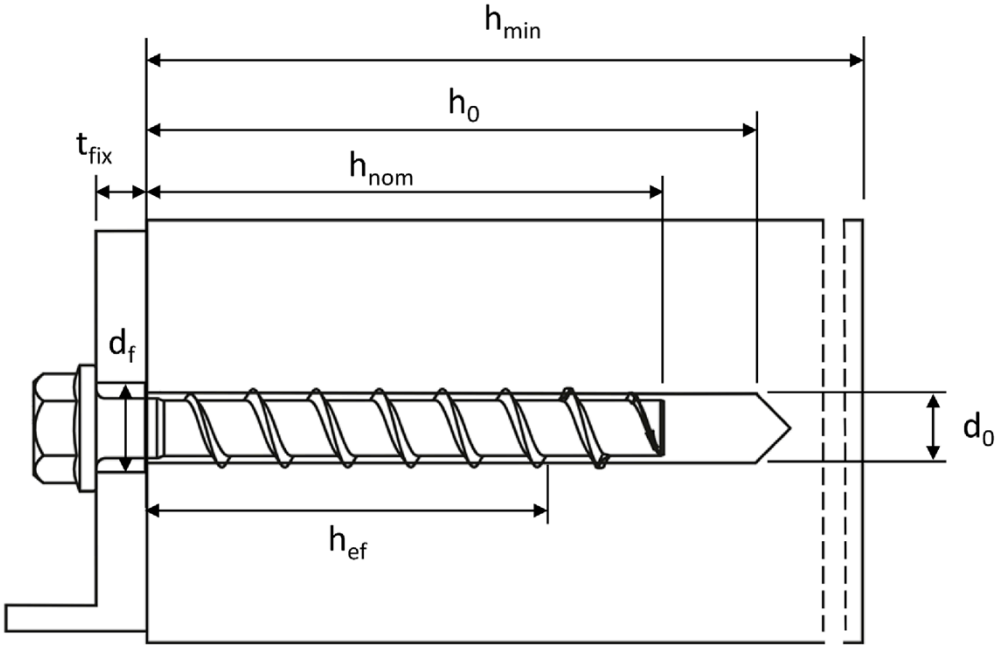
Deutsches Institut für Bautechnik DIBt

Table 3: Installation parameters

Concrete screw size			5	6	
Nominal embedment depth		h_{nom}	h_{nom1}	h_{nom1}	h_{nom2}
		[mm]	35	35	55
Nominal drill hole diameter	d_0	[mm]	5	6	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	5,40	6,40	
Drill hole depth	$h_0 \geq$	[mm]	40	40	60
Clearance hole diameter	$d_f \leq$	[mm]	7	8	
Installation torque (version with connection thread)	$T_{inst} \leq$	[Nm]	8	10	
Recommended torque impact screw driver		[Nm]	Max. torque according to manufacturer's instructions		
			110	160	

Table 4: Minimum thickness of member, minimum edge distance and minimum spacing

Concrete screw size			5	6	
Nominal embedment depth		h_{nom1}	h_{nom1}	h_{nom1}	h_{nom2}
		[mm]	35	35	55
Minimum thickness of member	h_{min}	[mm]	80	80	100
Minimum edge distance	c_{min}	[mm]	35	35	40
Minimum spacing	s_{min}	[mm]	35	35	40



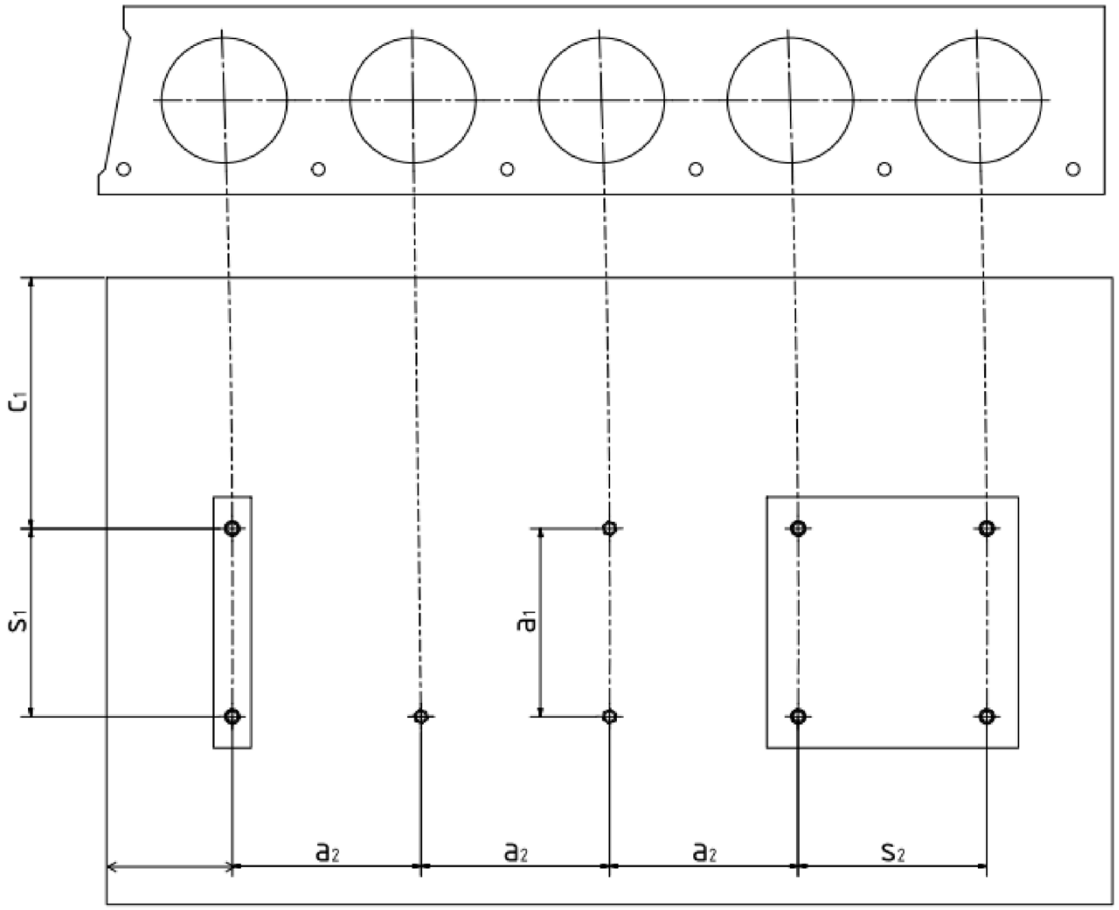
ESSVE Concrete screw EUS2, EUS A4, EUS HCR

Intended use
Installation parameters

Annex B2

Deutsches Institut für Bautechnik DIBt

Installation parameters for anchorages in precast prestressed hollow core slabs



c_1, c_2 = edge distance

s_1, s_2 = anchor spacing

a_1, a_2 = distance between anchor groups

c_{min} = minimum edge distance ≥ 100 mm

s_{min} = minimum anchor spacing ≥ 100 mm

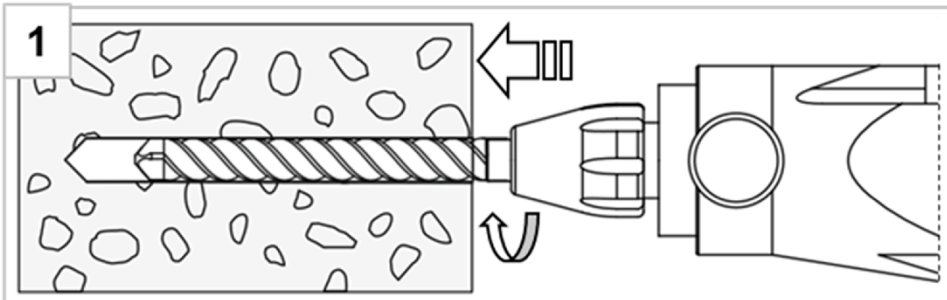
a_{min} = minimum distance between anchor groups ≥ 100 mm

ESSVE Concrete screw EUS2, EUS A4, EUS HCR	Annex B3
Intended use Installation parameters for anchorages in precast prestressed hollow slabs	

Deutsches Institut für Bautechnik DIBt

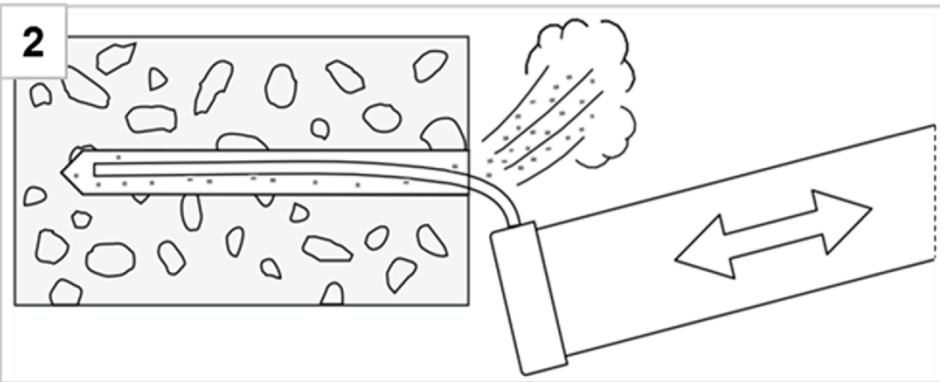
Installation Instructions

1



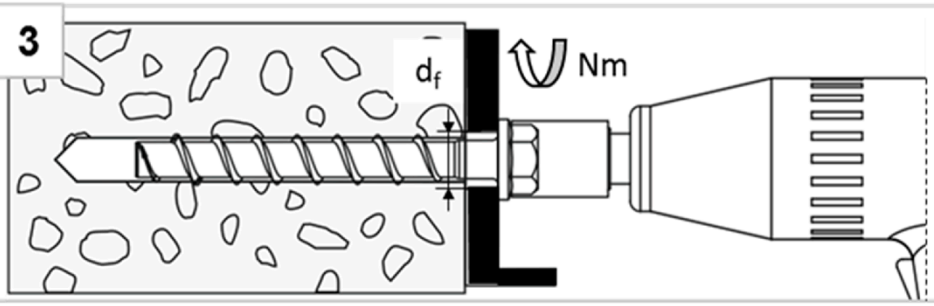
Create hammer drilled or hollow drilled borehole

2



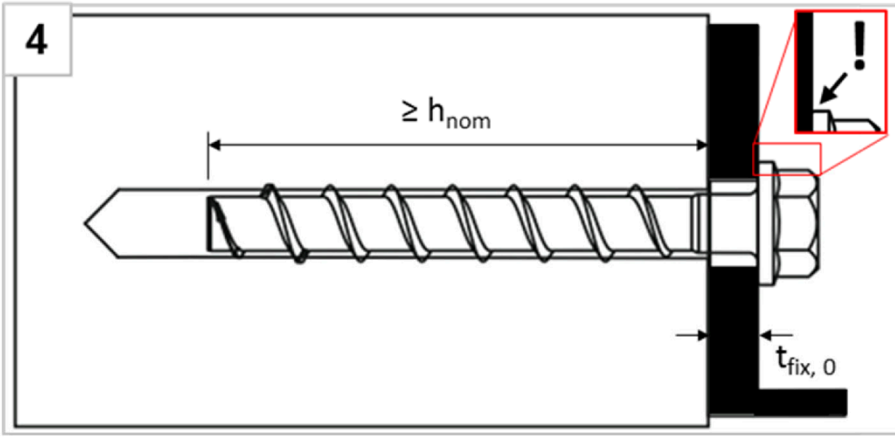
Remove drill dust by vacuuming or blowing of

3



Install with torque impact screw driver or torque wrench

4



The head must be undamaged and in contact with the fixture

ESSVE Concrete screw EUS2, EUS A4, EUS HCR	**Annex B4**
Intended use Installation instructions	

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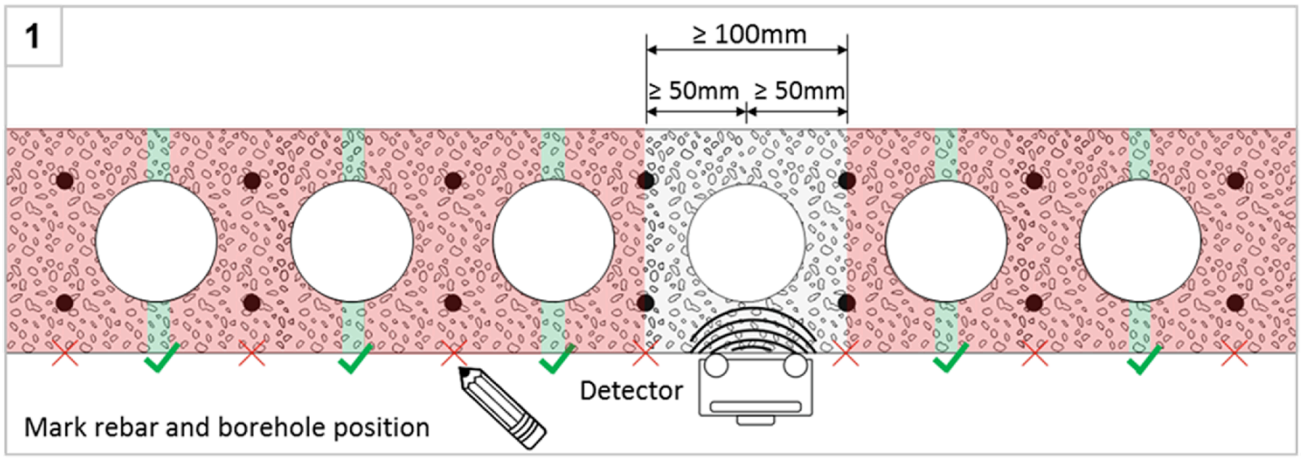
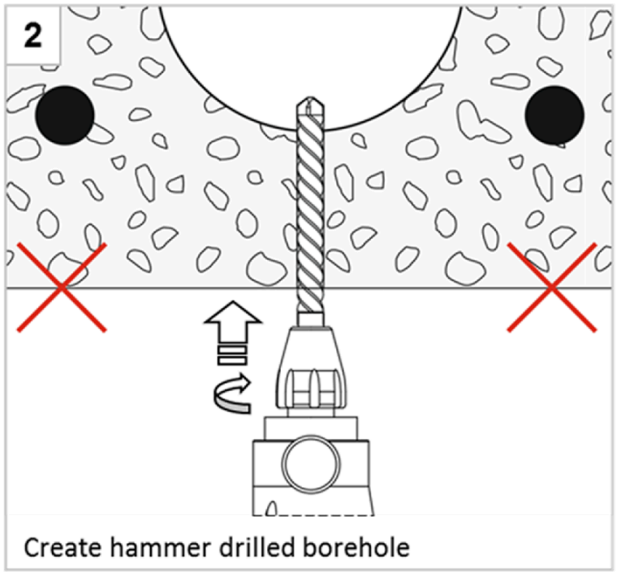
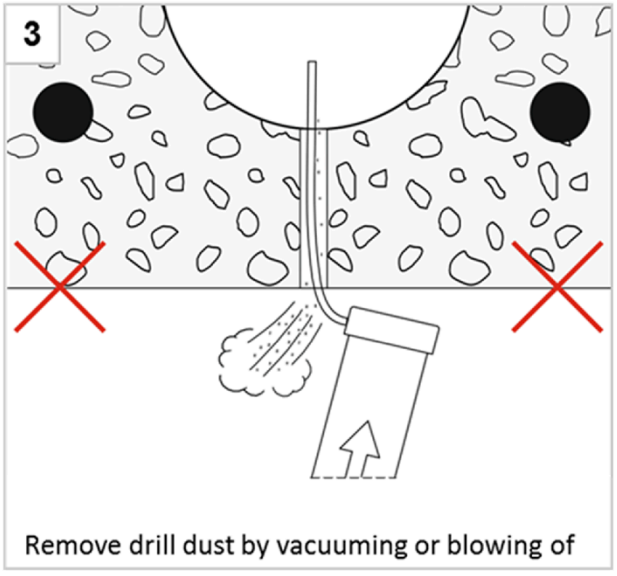
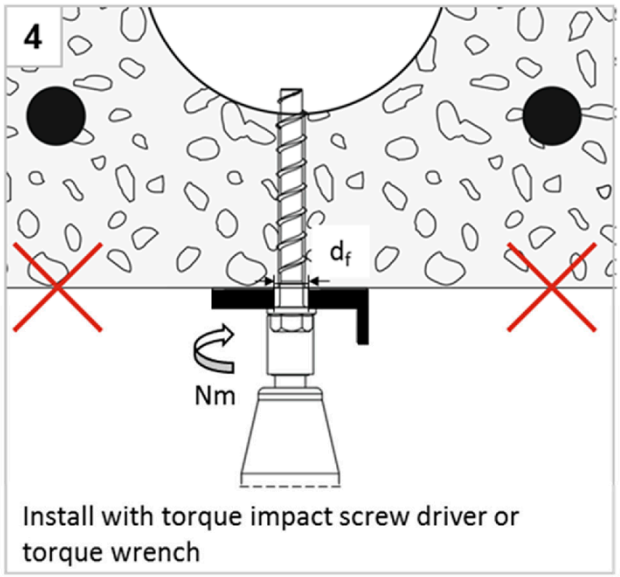
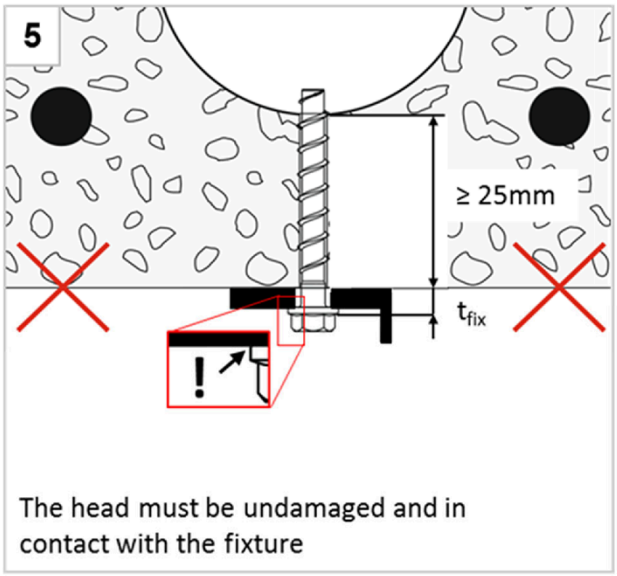
Installation Instructions for anchorages in prestressed hollow slabs











ESSVE Concrete screw EUS2, EUS A4, EUS HCR	
Intended use Installation instructions for anchorages in prepressed hollow slabs	**Annex B5**

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Table 5: Characteristic values for static and quasi-static loading

Concrete screw size				5	6	
Nominal embedment depth		h_{nom}		h_{nom1}	h_{nom1}	h_{nom2}
		[mm]		35	35	55
Steel failure for tension and shear loading						
Characteristic tension load		$N_{Rk,s}$	[kN]	8,7	14,0	
Partial factor		$\gamma_{Ms,N}$	[-]	1,5		
Characteristic shear load		$V_{Rk,s}$	[kN]	4,4	7,0	
Partial factor		$\gamma_{Ms,V}$	[-]	1,25		
Ductility factor		k_7	[-]	0,8		
Characteristic bending load		$M^0_{Rk,s}$	[Nm]	5,3	10,9	
Pull-out failure						
Characteristic tension load C20/25	cracked	$N_{Rk,p}$	[kN]	1,5	3,0	7,5
	uncracked	$N_{Rk,p}$	[kN]	1,5	3,0	7,5
Increasing factor for $N_{Rk,p\,p}$ = $N_{Rk,p(C20/25)}$ * ψ_c	C25/30	Ψ_c	[-]	1,12		
	C30/37			1,22		
	C40/50			1,41		
	C50/60			1,58		
Concrete failure: Splitting failure, concrete cone failure and pry-out failure						
Effective embedment depth		h_{ef}	[mm]	27	27	44
k-factor	cracked	$k_1 = k_{cr}$	[-]	7,7		
	uncracked	$k_1 = k_{ucr}$	[-]	11,0		
Concrete cone failure	spacing	$s_{cr,N}$	[mm]	3 x h_{ef}		
	edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}		
Splitting failure	resistance	$N^0_{Rk,Sp}$	[kN]	min($N^0_{Rk,c}$; $N_{Rk,p}$)		
	spacing	$s_{cr,Sp}$	[mm]	120	120	160
	edge distance	$c_{cr,Sp}$	[mm]	60	60	80
Factor for pry-out failure		k_8	[-]	1,0		
Installation factor		γ_{inst}	[-]	1,2	1,0	1,0
Concrete edge failure						
Effective length in concrete		$l_f = h_{ef}$	[mm]	27	27	44
Nominal outer diameter of screw		d_{nom}	[mm]	5	6	

ESSVE Concrete screw EUS2, EUS A4, EUS HCR

Performances
Characteristic values for static and quasi-static loading

Annex C1

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Table 6: Characteristic values of resistance in precast prestressed hollow core slabs C30/37 to C50/60

Concrete screw size			6		
Bottom flange thickness	d_b	[mm]	≥ 25	≥ 30	≥ 35
Characteristic resistance	F^0_{Rk}	[kN]	1	2	3
Edge distance	c_{cr}	[mm]	100		
Spacing	s_{cr}	[mm]	200		
Installation factor	γ_{inst}	[-]	1,0		

Table 7: Limiting distances for application in precast prestressed hollow core slabs

Distances for application in precast prestressed hollow core slabs			
Minimum edge distance	c_{min}	[mm]	≥ 100
Minimum anchor spacing	s_{min}	[mm]	≥ 100
Minimum distance between anchor groups	a_{min}	[mm]	≥ 100
Distance of core	l_c	[mm]	≥ 100
Distance of prestressing steel	l_p	[mm]	≥ 100
Distance between anchor position and prestressing steel	a_p	[mm]	≥ 50

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Table 8: Fire exposure – characteristic values of resistance [1)]

Concrete screw size				5	6			
Material				EUS2	EUS2		EUS A4/HCR	
Nominal embedment depth			h_{nom}	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}
			[mm]	35	35	55	35	55
Steel failure for tension and shear load ($F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$)								
Characteristic Resistance	R30	$F_{Rk,s,fi30}$	[kN]	0,8	0,9		1,2	
	R60	$F_{Rk,s,fi60}$	[kN]	0,6	0,8		1,2	
	R90	$F_{Rk,s,fi90}$	[kN]	0,4	0,6		1,2	
	R120	$F_{Rk,s,fi120}$	[kN]	0,3	0,4		0,8	
	R30	$M^0_{Rk,s,fi30}$	[Nm]	0,5	0,7		0,9	
	R60	$M^0_{Rk,s,fi60}$	[Nm]	0,4	0,6		0,9	
	R90	$M^0_{Rk,s,fi90}$	[Nm]	0,2	0,5		0,9	
	R120	$M^0_{Rk,s,fi120}$	[Nm]	0,2	0,3		0,6	
Pull-out failure								
Characteristic Resistance	R30-R90	$N_{Rk,p,fi}$	[kN]	0,375	0,75	1,875	0,75	1,875
	R120	$N_{Rk,p,fi}$	[kN]	0,3	0,6	1,5	0,6	1,5
Concrete cone failure								
Characteristic Resistance	R30-R90	$N^0_{Rk,c,fi}$	[kN]	0,65	0,65	2,21	0,65	2,21
	R120	$N^0_{Rk,c,fi}$	[kN]	0,52	0,52	1,76	0,52	1,76

Edge distance			
R30 - R120	$c_{cr,fi}$	[mm]	2 x h_{ef}
In case of fire attack from more than one side, the minimum edge distance shall be ≥300mm.			
Spacing			
R30 - R120	$s_{cr,fi}$	[mm]	4 x h_{ef}
Pry-out failure			
R30 - R120	k_8	[-]	1,0
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.			

[1)] Not for application in prestressed hollow core slabs

ESSVE Concrete screw EUS2, EUS A4, EUS HCR

Performances
Characteristic values under fire exposure

Annex C3