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-18/1138 of 13 February 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	EUS2, EUSA4, EUSHCR
Product family to which the construction product belongs	Mechanical fastener for use in concrete
Manufacturer	ESSVE Produkter AB Esbogatan 14 164 74 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 330232-00-0601 EAD 330011-00-0601

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Specific Part

1 Technical description of the product

The ESSVE Concrete Screw EUS2, EUSA4 and EUSHCR is an anchor in size 6, 8, 10, 12 and 14 mm made of galvanised steel respectively steel with zinc flake coating, made of stainless or high corrosion resistant 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.

Product and 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 resistance to tension load (static and quasi-static loading)	See Annex C 1 and C 2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1 and C 2
Displacements (static and quasi-static loading)	See Annex C 3
Characteristic resistance and displacements for seismic performance category C1	See Annex C 4

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex 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 and EAD No. 330011-00-0601, 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 EAD

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 13 February 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Tempel

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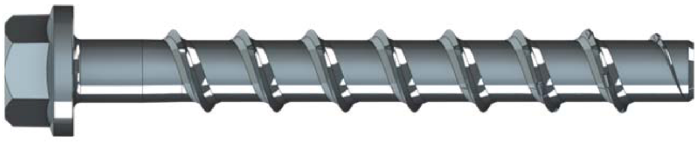
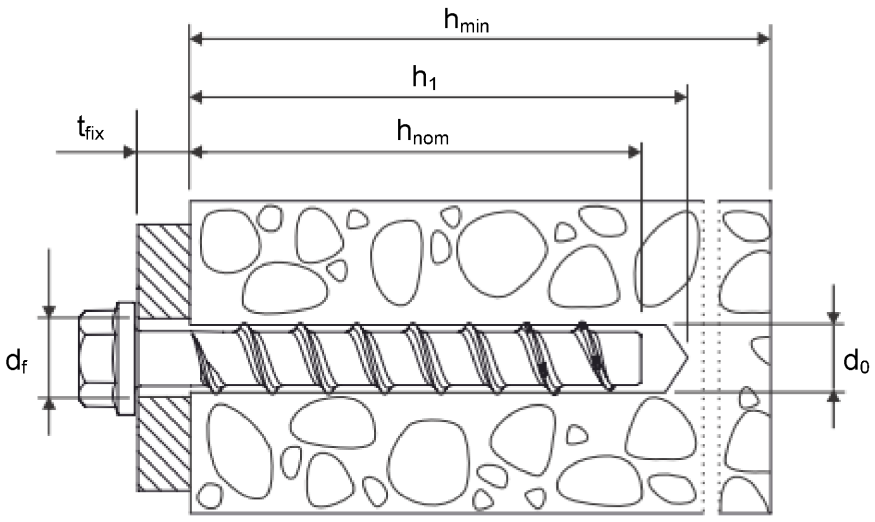
Product and installed condition

ESSVE concrete screw EUS2, EUSA4, EUSHCR



carbon steel

stainless steel A4 and HCR



d_0	=	nominal drill bit diameter
h_{nom}	=	nominal anchorage depth
h_1	=	depth of the drill hole
h_{min}	=	minimum thickness of member
t_{fix}	=	thickness of fixture
d_f	=	diameter of clearance hole in the fixture

ESSVE concrete screw EUS2, EUSA4, EUSHCR	Annex A 1
Product description Installed condition	

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Table A1: Materials and variants

part	name	Material			
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Concrete screw	EUS2	Steel EN 10263-4:2017 galvanized acc. to EN ISO 4042:2018 or zinc flake coating acc. to EN ISO 10683:2018 (≥ 5µm)		
		EUSA4	1.4401, 1.4404, 1.4571, 1.4578		
		EUSHCR	1.4529		
					EUS2, EUSA4, EUSHCR
		nominal characteristic steel yield strength	f_{yk}	[N/mm²]	560
		nominal characteristic steel ultimate strength	f_{uk}	[N/mm²]	700
		elongation at rupture	A_5	[%]	≤ 8


1) Anchor version with connection thread and hexagon socket
e.g. EUS2 8x105 M10 SW5


2) Anchor version with connection thread and hexagon drive
e.g. EUS2 8x105 M10 SW7


3) Anchor version with washer, hexagon head and TORX
e.g. EUS2-HF 8x80 SW13 TX40


4) Anchor version with washer and hexagon head
e.g. EUS2-HF 8x80 SW13


5) Anchor version with hexagon head
e.g. EUS2-H 8x80 SW13


6) Anchor version with countersunk head
e.g. EUS2-C 8x80 TX40


7) Anchor version with pan head
e.g. EUS2-PS 8x80 TX40


8) Anchor version with large pan head
e.g. EUS2-PL 8x80 TX40


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


10) Anchor version with hexagon drive and connection thread
e.g. EUS2-E 6x55 SW10


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

ESSVE concrete screw EUS2, EUSA4, EUSHCR

Product descriptions

Materials and variants

Annex A 2

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Table A2: Dimensions and markings

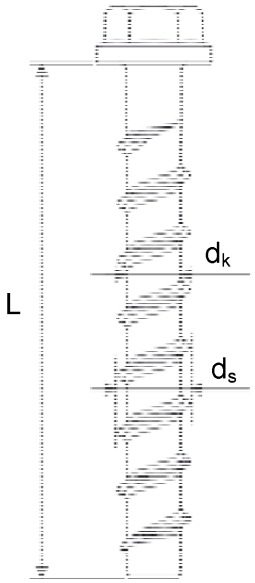
Anchor size EUS2, EUSA4, EUSHCR		6		8			10		
Nominal embedment depth h_{nom} [mm]		h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		40	55	45	55	65	55	75	85
Length of the anchor L ≤	[mm]	500							
Diameter of shaft d_k	[mm]	5,1		7,1			9,1		
Diameter of thread d_s	[mm]	7,5		10,6			12,6		

Anchor size EUS2, EUSA4, EUSHCR		12			14		
Nominal embedment depth h_{nom} [mm]		h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		65	85	100	75	100	115
Length of the anchor L ≤	[mm]	500					
Diameter of shaft d_k	[mm]	11,1			13,1		
Diameter of thread d_s	[mm]	14,6			16,6		

Marking:
EUS2
Anchor size: 10
Length of the anchor: 100
Identification code: TSM

EUSA4
Anchor size: 10
Length of the anchor: 100
Identification code: TSM
Material: A4

EUSHCR
Anchor size: 10
Length of the anchor: 100
Identification code: TSM
Material: HCR



ESSVE concrete screw EUS2, EUSA4, EUSHCR

Product descriptions
Dimensions and markings

Annex A 3

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Intended use

Anchorages subject to:

- static and quasi-static loads, all sizes and all embedment depth,
- Used for anchorages with requirements related to resistance of fire, all sizes and all embedment depth,
- used for anchorages with seismic actions category C1, sizes 8-14 for maximum embedment depth h_{nom3}.

Base materials:

- reinforced and unreinforced concrete without fibres 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):

- The anchor may only be used in dry internal conditions: All screw types,
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition no particular aggressive conditions exits: screw types made of stainless steel with marking A4,
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition if particular aggressive conditions exits: screw types made of stainless steel with marking HCR.
  Note: Such 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 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 are designed according to EN 1992-4:2018 and EOTA Technical Report TR 055,
- 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 B 2, Table B1.

Installation:

- Hammer drilling only.
- Anchor installation carried out by appropriately qualified personal 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 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 is not possible. The head of the anchor is supported on the fixture and is not damaged.
- The drill hole may be filled with injection mortar.
- Adjustability according to Annex B 4: sizes 8-14, all anchorage depths.

ESSVE concrete screw EUS2, EUSA4, EUSHCR	Annex B 1
Intended use Specifications	

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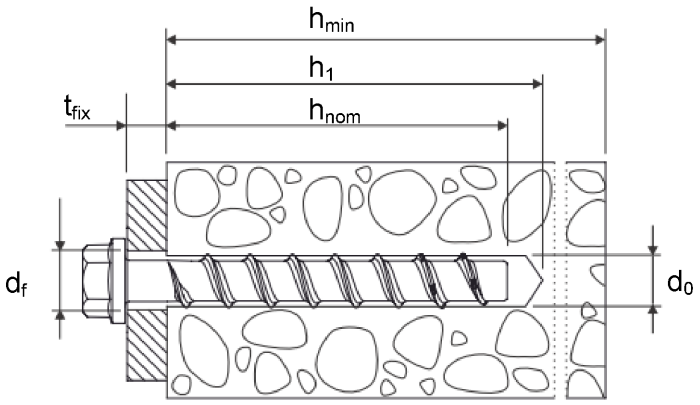
Table B1: Installation parameters

Anchor size EUS2, EUSA4, EUSHCR			**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	**55**	**45**	**55**	**65**	**55**	**75**	**85**
Nominal drill bit diameter	d_0	[mm]	6		8			10		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40		8,45			10,45		
Depth of drill hole	$h_1 \geq$	[mm]	45	60	55	65	75	65	85	95
Diameter of clearing hole in the fixture	$d_f \leq$	[mm]	8		12			14		
Installation torque for version with connection thread	$T_{inst} \leq$	[Nm]	10		20			40		
Impact screw driver max. capacity		[Nm]	Max. torque according to manufacturer's instructions							
			160		300			400		

Anchor size EUS2, EUSA4, EUSHCR			**12**			**14**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			65	**85**	**100**	**75**	**100**	**115**
Nominal drill bit diameter	d_0	[mm]	12			14		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12,50			14,50		
Depth of drill hole	$h_1 \geq$	[mm]	75	95	110	85	110	125
Diameter of clearing hole in the fixture	$d_f \leq$	[mm]	16			18		
Installation torque for version with connection thread	$T_{inst} \leq$	[Nm]	60			80		
Impact screw driver max. capacity		[Nm]	Max. torque according to manufacturer's instructions					
			650			650		



ESSVE concrete screw EUS2, EUSA4, EUSHCR

Intended use

Installation parameters

Annex B 2

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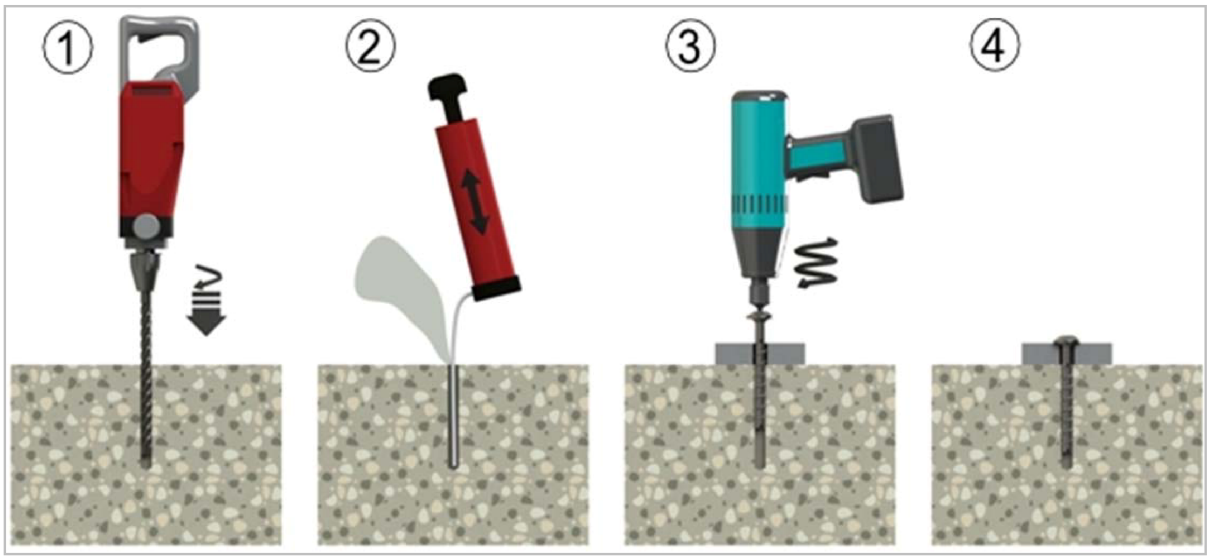
Table B2: Minimum thickness of member, minimum edge distance and minimum spacing

Anchor size EUS2, EUSA4, EUSHCR			**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	55	45	55	65	55	75	85
Minimum thickness of member	h_{min}	[mm]	100		100		120	100	130	130
Minimum edge distance	c_{min}	[mm]	40		40	50		50		
Minimum spacing	s_{min}	[mm]	40		40	50		50		

Anchor size EUS2, EUSA4, EUSHCR			**12**			**14**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			65	85	100	75	100	115
Minimum thickness of member	h_{min}	[mm]	120	130	150	130	150	170
Minimum edge distance	c_{min}	[mm]	50		70	50	70	
Minimum spacing	s_{min}	[mm]	50		70	50	70	

Installation instructions



ESSVE concrete screw EUS2, EUSA4, EUSHCR

Intended use

Minimum thickness of member, minimum spacing, minimum edge distance and installation instructions

Annex B 3

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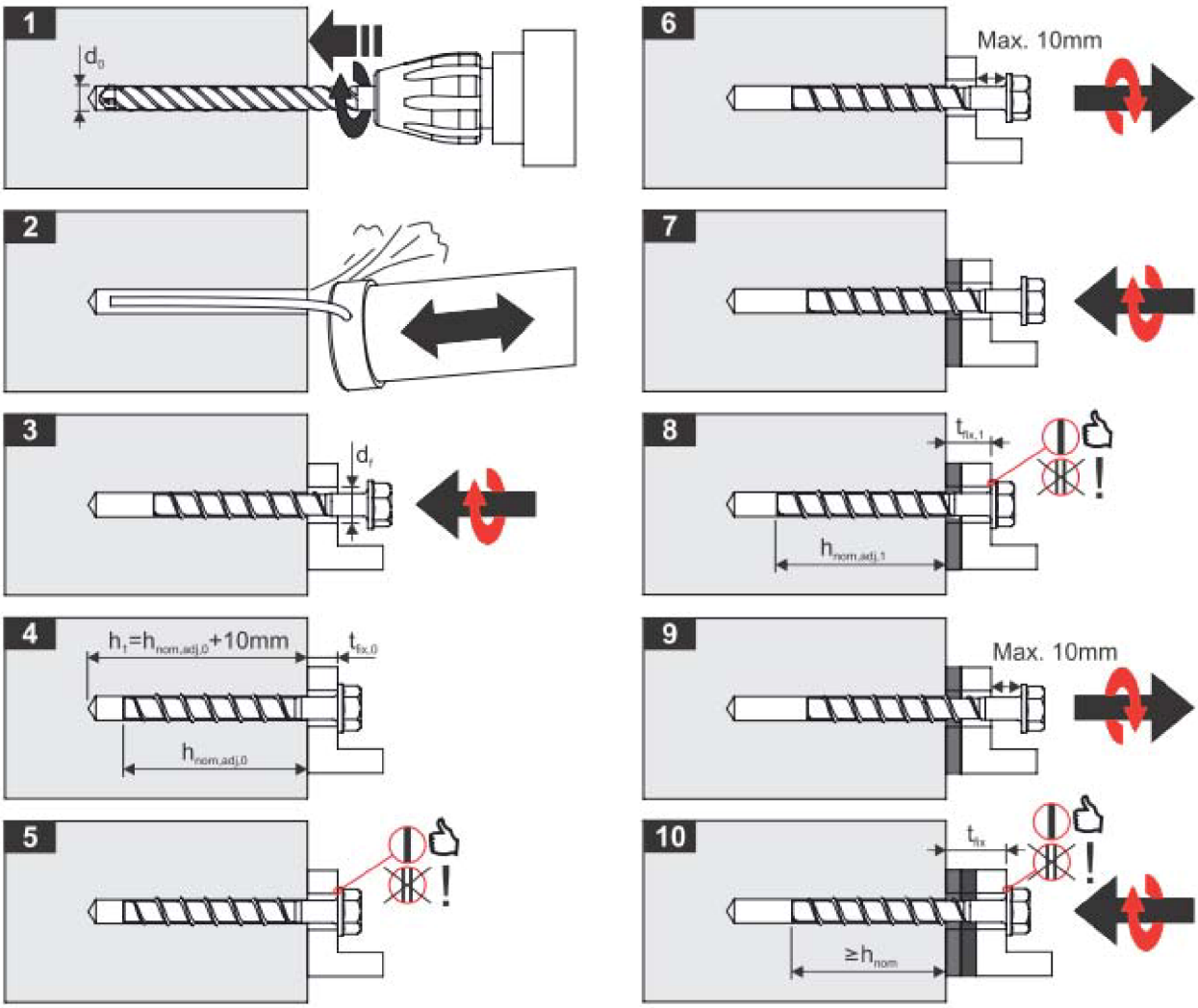
Installation instructions for adjustability



Installation instructions

The anchor may be adjusted maximum two times while the anchor may turn back at most 10 mm.
The total allowed thickness of shims added during the adjustment process is 10mm.
The final embedment depth after adjustment process must be equal or larger than h_{nom}.

ESSVE concrete screw EUS2, EUSA4, EUSHCR	Annex B 4
Intended use Installation instruction for adjustability	

Deutsches Institut für Bautechnik DIBt

Table C1: Characteristic values for design method A according to EN 1992-4 for anchor size 6, 8 and 10

Anchor size EUS2, EUSA4, EUSHCR				**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]				h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				40	**55**	**45**	**55**	**65**	**55**	**75**	**85**
steel failure for tension- and shear load											
characteristic load		$N_{Rk,s}$	[kN]	14,0		27,0			45,0		
		$V_{Rk,s}$	[kN]	7,0		13,5		17,0	22,5	34,0	
		k_7	[-]	0,8		0,8			0,8		
		$M^0_{Rk,s}$	[Nm]	10,9		26,0			56,0		
pull-out failure											
characteristic tension load in cracked concrete C20/25		$N_{Rk,p}$	[kN]	2,0	4,0	5,0	9,0	12,0	9,0	≥ $N^0_{Rk,c}$	
characteristic tension load in uncracked concrete C20/25		$N_{Rk,p}$	[kN]	4,0	9,0	7,5	12,0	16,0	12,0	20,0	26,0
increasing factor for $N_{Rk,p}$		Ψ_C	C30/37	1,22							
			C40/50	1,41							
			C50/60	1,58							
concrete cone and splitting failure											
effective anchorage depth		h_{ef}	[mm]	31	44	35	43	52	43	60	68
factor for	cracked	$k_{cr,N}$	[-]	7,7							
	uncracked	$k_{ucr,N}$	[-]	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	spacing	$s_{cr,Sp}$	[mm]	120	160	120	140	150	140	180	210
	edge distance	$c_{cr,Sp}$	[mm]	60	80	60	70	75	70	90	105
installation factor		γ_{inst}	[-]	1,0							
concrete pry out failure (pry-out)											
k-Factor		k_8	[-]	1,0					2,0		
concrete edge failure											
effective length of anchor		$l_f = h_{ef}$	[mm]	31	44	35	43	52	43	60	68
outside diameter of anchor		d_{nom}	[mm]	6		8			10		

ESSVE concrete screw EUS2, EUSA4, EUSHCR

Performances

Characteristic values for size 6, 8 and 10

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic values for design method A according to EN 1992-4 for anchor size 12 and 14

Anchor size EUS2, EUSA4, EUSHCR				**12**			**14**		
Nominal embedment depth h_{nom} [mm]				h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				65	**85**	**100**	**75**	**100**	**115**
steel failure for tension- and shear load									
characteristic load		$N_{Rk,s}$	[kN]	67,0			94,0		
		$V_{Rk,s}$	[kN]	33,5	42,0		56,0		
		k_7	[-]	0,8			0,8		
		$M^0_{Rk,s}$	[Nm]	113,0			185,0		
pull-out failure									
characteristic tension load in cracked concrete C20/25		$N_{Rk,p}$	[kN]	12,0	≥ $N^0_{Rk,c}$		≥ $N^0_{Rk,c}$		
characteristic tension load in uncracked concrete C20/25		$N_{Rk,p}$	[kN]	16,0					
increasing factor for $N_{Rk,p}$		Ψ_C	C30/37	1,22					
			C40/50	1,41					
			C50/60	1,58					
concrete cone and splitting failure									
effective anchorage depth		h_{ef}	[mm]	50	67	80	58	79	92
factor for	cracked	$k_{cr,N}$	[-]	7,7					
	uncracked	$k_{ucr,N}$	[-]	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	spacing	$s_{cr,Sp}$	[mm]	150	210	240	180	240	280
	edge distance	$c_{cr,Sp}$	[mm]	75	105	120	90	120	140
installation factor		γ_{inst}	[-]	1,0					
concrete pry out failure (pry-out)									
k-Factor		k_8	[-]	1,0	2,0		1,0	2,0	
concrete edge failure									
effective length of anchor		$l_f = h_{ef}$	[mm]	50	67	80	58	79	92
outside diameter of anchor		d_{nom}	[mm]	12			14		

ESSVE concrete screw EUS2, EUSA4, EUSHCR

Performances

Characteristic values for size 12 and 14

Annex C 2

Deutsches Institut für Bautechnik DIBt

Table C3: Displacements under tension load

Anchor size EUS2, EUSA4, EUSHCR				**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]				h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				40	**55**	**45**	**55**	**65**	**55**	**75**	**85**
Cracked concrete	tension load	N	[kN]	0,95	1,9	2,4	4,3	5,7	4,3	7,9	9,6
	displacement	δ_{N0}	[mm]	0,3	0,6	0,6	0,7	0,8	0,6	0,5	0,9
		δ_{∞}	[mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2
un-cracked concrete	tension load	N	[kN]	1,9	4,3	3,6	5,7	7,6	5,7	9,5	11,9
	displacement	δ_{N0}	[mm]	0,4	0,6	0,7	0,9	0,5	0,7	1,1	1,0
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2

Anchor size EUS2, EUSA4, EUSHCR				**12**			**14**		
Nominal embedment depth h_{nom} [mm]				h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				65	**85**	**100**	**75**	**100**	**115**
Cracked concrete	tension load	N	[kN]	5,7	9,4	12,3	7,6	12,0	15,1
	displacement	δ_{N0}	[mm]	0,9	0,5	1,0	0,5	0,8	0,7
		δ_{∞}	[mm]	1,0	1,2	1,2	0,9	1,2	1,0
un-cracked concrete	tension load	N	[kN]	7,6	13,2	17,2	10,6	16,9	21,2
	displacement	δ_{N0}	[mm]	1,0	1,1	1,2	0,9	1,2	0,8
		$\delta_{N\infty}$	[mm]	1,0	1,2	1,2	0,9	1,2	1,0

Table C4: Displacements under shear load

Anchor size EUS2, EUSA4, EUSHCR			**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	**55**	**45**	**55**	**65**	**55**	**75**	**85**
shear load	V	[kN]	3,3		8,6			16,2		
displacement	δ_{V0}	[mm]	1,55		2,7			2,7		
	$\delta_{V\infty}$	[mm]	3,10		4,1			4,3		

Anchor size EUS2, EUSA4, EUSHCR			**12**			**14**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			65	**85**	**100**	**75**	**100**	**115**
shear load	V	[kN]	20,0			30,5		
displacement	δ_{V0}	[mm]	4,0			3,1		
	$\delta_{V\infty}$	[mm]	6,0			4,7		

ESSVE concrete screw EUS2, EUSA4, EUSHCR

Performances

Displacements under tension and shear loads

Annex C 3

Deutsches Institut für Bautechnik DIBt

Table C5: Characteristic values for seismic category C1

Anchor size EUS2, EUSA4, EUSHCR			8	10	12	14
Nominal embedment depth h_{nom} [mm]			h_{nom3}			
			65	85	100	115
steel failure for tension- and shear load						
characteristic load	$N_{Rk,s,eq}$	[kN]	27,0	45,0	67,0	94,0
	$V_{Rk,s,eq}$	[kN]	8,5	15,3	21,0	22,4
pull-out failure						
characteristic tension load in cracked concrete C20/25	$N_{Rk,p,eq}$	[kN]	12,0	≥ $N^0_{Rk,c,eq}$		
concrete cone failure						
effective anchorage depth	h_{ef}	[mm]	52	68	80	92
concrete cone failure – spacing	$s_{cr,N}$	[mm]	3 x h_{ef}			
concrete cone failure – edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}			
installation factor	γ_{inst}	[-]	1,0			
concrete pry out failure (pry-out)						
k-Factor	k_8	[-]	1,0	2,0		
concrete edge failure						
effective length of anchor	$l_f = h_{ef}$	[mm]	52	68	80	92
outside diameter of anchor	d_{nom}	[mm]	8	10	12	14

ESSVE concrete screw EUS2, EUSA4, EUSHCR

Performances

Characteristic values for seismic category C1

Annex C 4

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Table C6: Characteristic values of resistance to fire exposure

Anchor size EUS2, EUSA4, EUSHCR				**6**		**8**			**10**			**12**			**14**		
Nominal embedment depth		h_{nom}		1	2	1	2	3	1	2	3	1	2	3	1	2	3
			[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
steel failure for tension- and shear load ($F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$)																	
Fire resistance class																	
R30	Characteristic Resistance	$F_{Rk,s,fi30}$	[kN]	0,9		2,4			4,4			7,4			10,3		
R60		$F_{Rk,s,fi60}$	[kN]	0,8		1,7			3,3			5,8			8,2		
R90		$F_{Rk,s,fi90}$	[kN]	0,6		1,1			2,3			4,2			5,9		
R120		$F_{Rk,s,fi120}$	[kN]	0,4		0,7			1,7			3,4			4,8		
R30		$M^0_{Rks,,fi30}$	[Nm]	0,7		2,4			5,9			12,3			20,4		
R60		$M^0_{Rk,s,fi60}$	[Nm]	0,6		1,8			4,5			9,7			15,9		
R90		$M^0_{Rk,s,fi90}$	[Nm]	0,5		1,2			3,0			7,0			11,6		
R120		$M^0_{Rks,,fi120}$	[Nm]	0,3		0,9			2,3			5,7			9,4		
edge distance																	
R30 - R120		$c_{cr,\,fi}$	[mm]	$2 \times h_{ef}$													
spacing																	
R30 - R120		$s_{cr,\,fi}$	[mm]	$4 \times h_{ef}$													

The characteristic resistance to fire exposure for pull-out failure, concrete cone failure, concrete pry-out failure and concrete edge failure shall be calculated according to EN 1992-4. If no value for $N_{Rk,p}$ is given, in equation D.4 and D.5 value of $N^0_{Rk,c}$ shall be inserted instead of $N_{Rk,p}$.

ESSVE concrete screw EUS2, EUSA4, EUSHCR

Performances

Characteristic values of resistance to fire exposure

Annex C 5