



Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



European Technical Assessment

ETA-15/0352 of 5 October 2020

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

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

This version replaces

Deutsches Institut für Bautechnik

fischer concrete screw ULTRACUT FBS II

Mechanical fasteners for use in concrete

fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND

fischerwerke

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

EAD 330232-01-0601, Edition 12/2019

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Specific Part

1 Technical description of the product

The fischer concrete screw ULTRACUT FBS II is an anchor of sizes 6, 8, 10, 12 and 14 mm made of hardened carbon 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 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 B 4, Annex C 1 and C 2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1 and C 2
Displacements and Durability	See Annex C 7 and Annex B 1
Characteristic resistance and displacements for seismic performance categories C1 and C2	See Annex C 3, C 4 and C 7

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 5 and C 6



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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. 330232-01-0601 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 5 October 2020 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow Head of Department *beglaubigt:* Tempel







Table A2.1: Screw ty	pes FBS II 6		
FBS II 6			
Hexagon head with formed washer (US)	(ASA	AANNAN (
Hexagon head with formed washer and TX-drive (US TX)		TITTI	
Countersunk Head (SK)	XXX © © ISB3	ANNI	
Pan head (P)	FBS	<u>ATTTT</u>	
Large Pan head (LP)	Page And	A A A A	
Hexagon head and connection thread M8 or M10 (M)		<u>AANNA</u>	
Hexagon connecting nut with metric internal thread (I)			
		(1	-ig. not to scale)
fischer concrete scre		FBS II	
Product description Screw types FBS II 6			Annex A 2



Table A3.1: Screw types	s FBS II 8 – 1	4	
FBS II 8 - 14			
Hexagon head with formed washer (US)		THILL	
Hexagon head with formed washer and TX-drive (US TX)		THUTT	
Countersunk Head (SK)	FRS/	<u>ATTTT</u>	
Hexagon head (S)	ATT B	<u>ANNIN</u>	
Hexagon head with TX-drive (S TX)	A CONTRACTOR	<u>IANNI</u>	
			(Fig. not to scale)
fischer concrete screw	ULTRACUT F	BS II	
Product description Screw types FBS II 8 to 14			Annex A 3

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Screw type	nd material				All head sha	apes	
, i	es / size		6	8	10	12	14
Thread outer diameter	da		7,75	10,3	12,5	14,5	16,6
Core diameter	dĸ	[mm]	5,65	7,4	9,4	11,3	13,3
Shaft diameter	d₅		6,0	8,0	9,9	11,7	13,7
Material			Hardeneo	l carbon s	teel; A₅≥ 8%	%	
Coating FBS II	[-]		galvanize				
Coating FBS II CP			-	Multilay	er coating		
	<u>IJ</u>	a a a a a a a a a a a a a a a a a a a	M				
Head marking US, US XXX: Screw length L	TX, S, S 1	X, SK, P, L	P	- FBS II	: Product	identificat	ion
e.g. 10: Screw size —			Fas II) CP	: Identific	ation CP v	rersion
Marking at M8, M10, I			L				
					\Box		
Head marking: XX: Screw length L		Rotary m FBS II: P e.g. 6: So	roduct ide	ntificatio	n		
		FBS II: P	roduct ide	ntificatio		ig. not to sc	ale)
	LTRACUT	FBS II: P e.g. 6: So	roduct ide	ntificatio		īg. not to sc	ale)



Specification of intended use												
Table B1.1: Anchorages subject to												
Size	6	6 8		10				12		14		
Nominal embedment depth [mm]	40- 55 50 65 55 65 85 60 75 100 65						85	115				
Static and quasi-static loads in cracked and uncracked concrete	ed 🗸											
Fire exposure												
Seismic performance category C1	\checkmark		\checkmark			\checkmark			\checkmark			\checkmark
Seismic performance category C2			v			•			•			v
 according to EN 206:2013+A1:2016 Strength classes C20/25 to C50/60 acco Use conditions (Environmental condition Structures subjected to dry internal cond Design: Anchorages are to be designed under th concrete work. Verifiable calculation notes and drawings The position of the screw is indicated on (e.g. position of the screw relative to rein Design of fastenings according to EN 19 Installation: Hammer drilling or hollow drilling: 	ns): litions e response s are to the de inforcem	onsibi o be p esign c nent o	ility of repare drawir r to su	an er ed tak gs	iginee ing ac	er exp ccour :.).	nt of the	e load	s to b	-		
 Hammer drilling of hollow drilling: All sizes and embedment depths. Alternative diamond drilling: All sizes and Screw installation carried out by appropr responsible for technical matters on site. In case of aborted hole: New hole must be hole or closer, if the hole is filled with a hoblique tensile or shear load. Adjustability according to Annex B4 for: A Cleaning of drill hole is not necessary where I drilling vertically upwards 	iately o be drillo ligh str All size	qualifi ed at a ength es and	ed per a mini morta I embe	rsonn mum ar and edmei	el and distar I only nt dep	d undence of if the oths.	er the s f twice hole is	the d s not i	epth c n the	of the a	aborte	ed

- If drilling vertical downwards and the drill hole depth has been increased. It is recommended to increase the drill depth with additional 3 do
- After correct installation further turning of the screw shall not be possible.
- The head of the screw must be fully engaged on the fixture and show no signs of damage.
- For seismic performance category C2 applications: The gap between screw shaft and fixture must be filled with mortar; mortar compressive strength ≥ 50 N/mm² (e. g. FIS V, FIS HB, FIS SB or FIS EM Plus).

fischer concrete screw UL	TRACUT FBS II
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Intended use

Specification

Annex B 1



FBS II 6		eters FBS					ead shap					
Nominal embedment depth	ו	h _{nom}					$\leq h_{nom} \leq 5$					
Nominal drill hole diameter		do	-				6					
Cutting diameter of drill bits		d _{cut} ≤	1			6,4						
Clearance hole diameter	arance hole diameter $d_f \leq$		[mm] 8									
Drill hole depth							om + 10 ¹⁾					
Drill hole depth		h1≥					nom + 20					
(with adjustable setting)			h _{nom} +				nom + 20	20				
Torque impact screw drive	r	T _{imp,max}	[Nm]				450					
Maximum installation torqu metrical screws or hexagor head shapes M and I ¹⁾ Value can be reduced	n nuts on	T _{max}	[Nm]	cally upy	vards		10					
Table B2.2: Installatio						•						
FBS II 6			JS TX	SK	P	LP	M8	M10	I			
Wrench size SW	[mm]	10 / 1	3		-		10	13	-			
TX size TX	[-]	-		30								
Head diameter dh		17		13,5	14,4	17,5		-				
Thickness of fixture t _{fix} ≤	[mm]		L	h _{nom}								
Length of screw					4	0						
Lmax	=			325				55				
	Inom	Ltfi>	<									
	<u>Inom</u>				тх		dh Be for a start of the start					
	om = L				TX		SW (XX)	ig. not to sca	ale)			
	om = L				TX		SW (XX)	ig. not to sca	ale)			



Table B3.1: Installation parameters FBS II 8 - 14													
Size			FBS II										
			8			10		12			14		
Nominal embedment depth	h _{nom}		50	65	55	65	85	60	75	100	65	85	115
Nominal drill hole diameter	do		8	3		10			12			14	
Cutting diameter of drill bits			8,	45		10,45			12,50			14,50	
Cutting diameter of diamond driller	d _{cut} ≤	[mm]	8,	10		10,30			12,30			14,30	
Clearance hole diameter	df		10,6 -	- 12,0	12	.,8 – 14	1,0	14	,8 – 16	6,0	16	,9 – 18	3,0
Wrench size (US,S)	SW		1	3		15		17			21		
Tx size	Тx	[-]	4	0	50								
Head diameter	dh		1	8	21			1					
Countersunk diameter in fixture	dc		2	20 23									
Drill hole depth			60	75	65	75	95	70	85	110	80	100	130
Drill hole depth (with adjustable setting)	[−] h ₁ ≥	[mm]	70	85	75	85	105	80	95	120	90	110	140
Thickness of fixture	t _{fix} ≤						L	- h _{nom}	ı				
Length of earour	L _{min} =		50	65	55	65	85	60	75	100	65	85	115
Length of screw	L _{max} =		400	415	405	415	435	410	425	450	415	435	465
Torque impact screw driver	T _{imp,max}	[Nm]	60	00					650				



(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

Intended use

Installation parameters FBS II 8 - 14

Annex B 3

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It is permissible to untighten the screw up to two times for adjustment purposes. Therefore, the screw may be untightened to a maximum of $L_{adj} = 20$ mm to the surface of the initial fixture.

The total permissible thickness of shims added during the adjustment process is t_{adj} = 10 mm

(Fig. not to scale)

Table B4.1: Minimum thickness of concrete members, minimum spacing and edge distance

Size					FBS II										
		6		8		10			12			14			
h _{nom}		40 to 55	50	65	55	65	85	60	75	100	65	85	115		
h _{min}	[mm]	max.(80; h1 ¹⁾ + 30)	100	120	100	120	140	110	130	150	120	140	180		
Smin		35	З	5		40			50			60			
Cmin		35	3	5		40			50			60			
	h _{min} S _{min}	h _{min} [mm]	$\begin{array}{c} & & \\ h_{min} \\ s_{min} \end{array} \begin{bmatrix} mm \\ h_{11} + 30 \end{bmatrix} \\ \hline \\ 35 \end{array}$	$\begin{array}{c c} & & & & & & \\ h_{min} & & & \\ s_{min} & & & \\ \hline \end{array} \begin{array}{c} mm \\ mm \\ h_{1}^{1} + 30 \\ \hline \end{array} \begin{array}{c} 100 \\ 35 \\ \hline \end{array}$	$\begin{array}{c c} & & & & & & \\ h_{min} & & & \\ s_{min} & & \\ \hline \end{array} \begin{array}{c} mm \\ mm \\ h_{1}^{1)} + 30 \\ \hline \end{array} \begin{array}{c} mm \\ 100 \\ 35 \\ \hline \end{array} \begin{array}{c} 120 \\ 35 \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	6 \times 10 hnom 40 to 55 50 65 55 65 hmin [mm] $\frac{max.(80;}{h_1^{1)} + 30)}$ 100 120 120 Smin 35 35 40 35 35 40	6 8 10 h_{nom} $40 \text{ to } 55$ 50 65 55 85 h_{min} $[mm]$ $max.(80; \\ h_1^{1)} + 30)$ 100 120 100 120 140 s_{min} 35 35 35 40 140	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	6 8 10 12 100 12 100 65 h_{nom} $40 \text{ to } 55$ 50 65 55 65 85 60 75 100 65 h_{min} $[mm]$ $\frac{max.(80;}{h_1^{1)} + 30)}$ 100 120 120 140 110 130 150 120 s_{min} 35 35 -40 -50 -50 -50	6 8 10 12 14 h_{nom} $40 \text{ to } 55$ 50 65 55 65 85 60 75 100 65 85 h_{min} $[mm]$ $\frac{max.(80;}{h_1^{1)} + 30)}$ 100 120 120 140 110 130 150 120 140 s_{min} 35 35 40 50 50 60		

¹⁾ Drill hole depth according to table B2.1

fischer concrete screw ULTRACUT FBS II

Intended use Adjustment

Minimum thickness of members, minimum spacing and edge distance

Annex B 4

Z75120.20



Installation instruction part 1	
	Step 1: Creation of the drill hole:
	Drill the hole using hammer drill, hollow drill or diamond core drill (from diameter 8).
	Drill hole diameter d_0 and drill hole depth h_1 according to table B2.1 and B3.1
	Step 2: Cleaning of the drill hole - horizontal:
	Clean the drill hole. This step can be omitted in the preparation of the hole by using a hollow drill bit or diamond core drill. (recommendation: use the fischer FHD hollow drill bit)
	Step 2: Cleaning of the drill hole - vertical:
	Cleaning of the drill hole can be omitted, if drilling vertically upwards or if drilling vertically downwards and the hole depth has been increased. It is recommended to increase the drill hole depth by an additional 3 x drilling ø when drilling vertically downwards.
	Step 3: Installation:
	Installation with any torque impact screw driver up to the maximum mentioned torque moment ($T_{imp,max}$ according to table B2.1 and B3.1). (recommendation: use the fischer FSS 18V 400BL)
	Alternatively, all other tools without an indicated torque moment are allowed (e.g. ratchet spanner). The indicated torque moments T _{imp,max} for impact screw driver are not decisive for manual installation.
	Step 4: Checking of the correct installation:
	After installation a further turning of the screw must not be possible. The head of the screw must be in contact with the fixture and is not damaged

fischer concrete screw ULTRACUT FBS II

Intended use

Installation instruction

Annex B 5



Installation instruction part 2	
	Adjustment
	Optional: It is permissible to adjust the screw twice. Therefore, the screw may be untightened to a maximum of $L_{adj} = 20$ mm off the surface of the initial fixture. The total permissible thickness of shims added during the adjustment process is $t_{adj} = 10$ mm.
max 20 mm	
S Ifix, max	
	Filling of the annular gap
	For seismic performance category C2 applications: The gap between screw shaft and fixture must be filled with mortar; mortar compressive strength \geq 50 N/mm ² (e. g. FIS V, FIS HB, FIS SB or FIS EM Plus). As an aid for filling the gap, the filling disc FFD is recommended.

fischer concrete screw ULTRACUT FBS II

Intended use

Installation instruction

Annex B 6



FBS II 6	and allowedly	L.	[10	4 5	50	
Nominal embedm	· ·	h _{nom}	[mm]	40	45	50	55
Steel failure for t			1 1				
Characteristic res	istance	N _{Rk,s}	[kN]			:1	
Partial factor		γMs,N	[-]			,4	
Characteristic res	istance	$V^0_{Rk,s}$	[kN]		9,0		13,3
Partial factor		γMs,V				,5	
Factor for ductility		k 7					
Characteristic ber	nding resistance	M ⁰ Rk,s	[Nm]		17	7,1	
Pullout failure			· · ·				-
Characteristic resistance in	uncracked	N _{Rk,p}	[kN]	8,0	10,0	12,0	13,5
concrete C20/25	cracked	N _{Rk,p}	[]	2,5	3,5	4,0	5,0
	C25/30				1,	12	
	C30/37	_			1,	22	
Increasing	C35/45	- Ψc	L., [1,	32	
factors concrete	C40/50	- ⁴⁰			1,	41	
	C45/55	_			1,	50	
	C50/60	-			1,	58	
Installation factor		γinst	[-]		1	,0	
Concrete cone fa	ailure and splitti	ng failur		ete pryout fa	ilure		
Effective embedm	nent depth	h _{ef}	[mm]	32	36	40	44
Encouve embean							1
	ked concrete	k _{ucr,N}	ra		11	1,0	
Factor for uncrack		Kucr,N K _{cr,N}	[-]				
Factor for uncrack	d concrete				7	,7	
Factor for uncrack Factor for cracked	d concrete ge distance	k _{cr,N}	[-] [mm] –		7 1,5	,7 h _{ef}	
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charakt. resistand	d concrete ge distance acing ce for splitting	K _{cr,N} C _{cr,N}			7 1,5 3	,7 h _{ef}	
Factor for uncrack Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charact. edge dis	d concrete ge distance acing ce for splitting	K _{cr,N} C _{cr,N} S _{cr,N}	[mm] — [kN]		7 1,5 3 min (Nº _R	,7 h _{ef} h _{ef} _{k,c¹⁾;N_{Rk,p})}	
Factor for uncrack Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charact. edge dis	d concrete ge distance acing ce for splitting tance for	k _{cr,N} C _{cr,N} S _{cr,N} N ⁰ _{Rk,sp}	[mm] -		7 1,5 3 <u>min (N⁰R</u> 1,5	,7 h _{ef} k,c ¹⁾ ;Ν _{RK,p})	
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charact. edge dis splitting	d concrete ge distance acing ce for splitting tance for for splitting	k _{cr,N} C _{cr,N} S _{cr,N} N ⁰ _{Rk,sp} C _{cr,sp}	[mm]		7 1,5 3 <u>min (N⁰R</u> 1,5 3	,7 h _{ef} h _{cf} h _c (¹⁾ ;N _{Rk,p}) h _{ef}	
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charact. resistand Charact. edge dis splitting Charakt. spacing Factor for pryout f	d concrete ge distance acing ce for splitting tance for for splitting	K _{cr,N} C _{cr,N} S _{cr,N} N ⁰ _{Rk,sp} C _{cr,sp} S _{cr,sp}	[mm] — [kN]		7 1,5 3 <u>min (N⁰R</u> 1,5 3 2	,7 h _{ef} h _{cf} k,c ¹⁾ ;N _{Rk,p}) b h _{ef} h _{ef}	
Factor for uncrack Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charakt. edge dis splitting Charakt. spacing	d concrete ge distance acing ce for splitting tance for for splitting failure	K _{cr,N} C _{cr,N} S _{cr,N} N ⁰ _{Rk,sp} C _{cr,sp} S _{cr,sp} K ₈	[mm]		7 1,5 3 <u>min (N⁰R</u> 1,5 3 2	,7 h _{ef} h _{cf} k,c ¹⁾ ;N _{Rk,p}) b h _{ef} h _{ef}	
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charact. edge dis splitting Charakt. spacing Factor for pryout f Installation factor Concrete edge f	d concrete ge distance acing ce for splitting tance for for splitting failure	K _{cr,N} C _{cr,N} S _{cr,N} N ⁰ _{Rk,sp} C _{cr,sp} S _{cr,sp} K ₈	[Nm] = 1,0 $[Nm] = 17,1$ $[KN] = 8,0 = 10,0 = 12,0$ $2,5 = 3,5 = 4,0$ $1,12 = 1,22 = 1,32 = 1,12$ $1,22 = 1,32 = 1,32 = 1,141 = 1,50$ $1,58 = [-] = 1,0 = 1,58$ $[-] = 1,0 = 1,0 = 1,58$ $[-] = 1,0 = 1,0 = 1,58$	55			
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charakt. resistand Charakt. edge dis splitting Charakt. spacing Factor for pryout f Installation factor Concrete edge f Effective length in	d concrete ge distance acing ce for splitting tance for for splitting failure ailure	K _{cr,N} C _{cr,N} S _{cr,N} C _{cr,sp} C _{cr,sp} K ₈ γinst	[mm] - [kN] - [mm] -	40	7 1,5 3 min (N ⁰ R 1,5 3 2 1 45	,7 h _{ef} h _{ef} h _{ef} h _{ef} ,0 ,0 50	55
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charact. edge dis splitting Charakt. spacing Factor for pryout f Installation factor Concrete edge fa Effective length in Nominal diameter	d concrete ge distance acing ce for splitting tance for for splitting failure ailure	K _{cr,N} C _{cr,N} S _{cr,N} C _{cr,sp} C _{cr,sp} S _{cr,sp} K ₈ γinst	[mm] - [kN] - [mm] -	40	7 1,5 3 min (N ⁰ R 1,5 3 2 1 45	,7 h _{ef} h _{ef} h _{ef} h _{ef} ,0 ,0 50	55
Factor for uncracl Factor for cracked Characteristic edg Characteristic spa Charakt. resistand Charact. edge dis splitting Charakt. spacing Factor for pryout t Installation factor	d concrete ge distance acing ce for splitting tance for for splitting failure ailure a concrete of screw	K _{cr,N} C _{cr,N} S _{cr,N} C _{cr,sp} C _{cr,sp} S _{cr,sp} K ₈ γinst	[mm] - [kN] - [mm] -	40	7 1,5 3 min (N ⁰ R 1,5 3 2 2 1 45	,7 h _{ef} h _{ef} h _{ef} h _{ef} ,0 ,0 50	55

fischer concrete screw ULTRACUT FBS II

Performances

Characteristic values for static and quasi-static action with FBS II 6



Table C2.1: C	haracteristic	values	for st	atic a	nd qu	uasi-s	static	action	n with	FBS	6 II 8 -	14				
Size				FBS II 8 10 12 14												
Nominal embedm		h _{nom}	[mm]	50	65	55	65	85	60	75	100	65	85	115		
Steel failure for																
Characteristic res	istance	N _{Rk,s}	[kN]	3	5		55			76			103			
Partial factor		γMs,N	[-]						1,4							
Characteristic res	istance	V^0 Rk,s	[kN]	13,1	19,0	29	9,4	34,9	31,	9	42,7	46	5,5	61,7		
Partial factor		γMs,V	[-]						1,5							
Factor for ductility		k 7	[]						1,0							
Characteristic ber resistance	nding	M ⁰ Rk,s	[Nm]	5	1		95			165			269			
Pullout failure																
Characteristic	uncracked	N _{Rk,p}	[kN]					≥	N ⁰ Rk,c ¹⁾)						
resistance in concrete C20/25	cracked	N _{Rk,p}	[kN]	6	12	9	12			≥	N ⁰ Rk,c ¹)				
	C25/30								1,12							
	C30/37	-		1,22												
Increasing	C35/45	_ _Ψc		1,32												
factors concrete	C40/50	_ '	[-]						1,41							
	C45/55	-							1,50							
	C50/60	-							1,58							
Installation factor		γinst	[-]						1,0							
Concrete cone fa	ailure and split	ting fail	ure; co	oncret	e pry	out fai	ilure									
Effective embedm	nent depth	h _{ef}	[mm]	40	52	43	51	68	47	60	81	50	67	93		
Factor for uncracl	ked concrete	k _{ucr,N}	[mm]						11,0							
Factor for cracked	d concrete	k _{cr,N}	[mm]						7,7							
Characteristic ed	ge distance	Ccr,N	[mm]						1,5 h _{ef}							
Characteristic spa	acing	Scr,N	[mm]						3 h _{ef}							
Charakt. resistand	ce for splitting	N^0 Rk,sp	[kN]					min (N	J ⁰ Rk,c ¹⁾ ;I	N _{Rk,p})						
Charact. edge dis splitting	tance for	Ccr,sp	[mm]						1,5 h _{ef}							
Charakt. spacing	for splitting	Scr,sp	[mm]						3 h _{ef}							
Factor for pryout	failure	k ₈	[-]	1,0	2,0	1,0				2	,0					
Installation factor		γinst	[-]						1,0							
Concrete edge fa	ailure		1					1	I		1 1		I	_		
Effective length in		lf	[mm]	50	65	55	65	85	60	75	100	65	85	115		
Nominal diameter	of screw	dnom	[mm]	8	3		10			12			14			
Adjustment																
Maximum thickne		t _{adj}	[mm]						10							
Max. number of a	djustments	na	[-]						2							
¹⁾ N ⁰ _{Rk,e} accor	ding EN 1992-4	1:2018														

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Performances

Characteristic values for static and quasi-static action with FBS II 8 - 14



Table C3.1: Characteristic va	alues fo	or seis	smic perform	nance category	C1 with FBS	ll 6
FBS II 6						
Nominal embedment depth	h _{nom}	[m	m] 40	45	50	55
Steel failure for tension load and	d shear l	oad				
Characteristic resistance	N _{Rk,s,C}	<u>1</u> [kľ			21	
	V _{Rk,s,C}	1		6,3		9,3
Without filling of the annular gap ¹⁾	— a	[-]			0,5	
With filling of the annular gap ¹⁾	$- \alpha_{gap}$	[[-]			1,0	
Pullout failure						
Characteristic resistance in	NRk,p,C	1 [kl	N] 2,5	3,5	4,0	5,0
cracked concrete	• • • • • • • • • • •	· [•] =;0	6,6	1,0	6,6
Concrete cone failure						
Effective embedment depth	h _{ef}		32	36	40	44
Characteristic edge distance	Ccr,N	[m	m]		,5 h _{ef}	
Characteristic spacing	Scr,N				3 h _{ef}	
Installation factor	γinst	[-]			1,0	
Concrete pryout failure		1				
Factor for pryout failure	k ₈	[-]			2,0	
Concrete edge failure					1	
Effective length in concrete	lf	—[m	m] 40	45	50	55
Nominal diameter of screw	dnom		1		6	
Size			8	FB:	S II 12	14
Nominal embedment depth	h _{nom}	[mm]	65	85	100	115
Steel failure for tension load and						
	NRk,s,C1		35	55	76	103
Characteristic resistance	V _{Rk,s,C1}	[kN]	11,4	22,3	26,9	38,3
Without filling of the annular gap ¹⁾				0,	5	
With filling of the annular gap ¹⁾	- α _{gap}	[-]		1,	0	
Pullout failure						
Characteristic resistance in	N _{Rk,p,C1}		12		$\geq N^{0}_{Rk,c^{2}}$	
cracked concrete	INRK,p,C1		12		≥ IN [°] Rk,c [−]	
Concrete cone failure						
Effective embedment depth	h _{ef}		52	68	81	93
Characteristic edge distance	Ccr,N	[mm]		1,5		
Characteristic spacing	S cr,N			31		
Installation factor	γinst	[-]		1,	,0	
Concrete pryout failure	. 1				•	
Concrete pryout failure Factor for pryout failure	k ₈	[-]		2,	.0	
Concrete pryout failure Factor for pryout failure Concrete edge failure		[-]		1		I
Concrete pryout failure Factor for pryout failure Concrete edge failure Effective length in concrete	lf		65	85	100	115
Concrete pryout failure Factor for pryout failure Concrete edge failure		[-] [mm]	65 8	1		115 14
Concrete pryout failure Factor for pryout failure Concrete edge failure Effective length in concrete	l _f d _{nom} cording a	[mm]	8	85	100	

Performances

Characteristic values for seismic performance category C1



Table C4.1: Characteristic	values	for se	ismic perform	ance category	C2	
<u>Cia</u>				FB	S II	
Size			8	10	12	14
Nominal embedment depth	h_{nom}	[mm]	65	85	100	115
Steel failure for tension load a	nd shear	load				
Characteristic resistance	NRk,s,C2	[LN]]	35,0	55	76,0	103
	V _{Rk,s,C2}	[kN]	13,3	20,4	29,9	35,2
With filling of the annular gap ¹⁾	α_{gap}	[-]		1,	0	
Pullout failure						
Characteristic resistance in cracked concrete	N _{Rk,p,C2}	[kN]	2,1	6,0	8,9	17,1
Concrete cone failure						
Effective embedment depth	h _{ef}		52	68	81	93
Characteristic edge distance	Ccr,N	[mm]		1,5	h _{ef}	
Characteristic spacing	Scr,N			31	Jef	
Installation factor	γinst	[-]		1,	0	
Concrete pryout failure	·					
Factor for pryout failure	k ₈	[-]		2,	0	
Concrete edge failure						
Effective length in concrete	lf	[mm]	65	85	100	115
Nominal diameter of screw	dnom	[mm]	8	10	12	14

¹⁾ Filling of the annular gap according annex B 5. Application without filling of the annular gap not allowed.

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Characteristic values for seismic performance category C2 with FBS II 8 - 14



Table C5.1: Characteristic	values	for resi	stance	to fire with	FBS II 6 ¹⁾								
FBS II 6						1							
Nominal embedment depth		h _{nom}	[mm]	40	45	50	55						
Steel failure for tension load a	and shea	r load											
		R30			1,0	60 50 40 00 60 50 40 80 50 40 35 1,0 1,2 0,8 1,0 hef 300 mm							
	N	R60			60								
	N _{Rk,s,fi}	R90			0,5	50							
Characteristic resistance for all		R120	[kN]		0,4	40							
head shapes		R30			1,0	00							
	V _{Rk,s,fi}	R60			0,6	60							
	V Rk,s,fi	R90			0,5	50							
		R120			0,4	40							
		R30			0,8	30							
Characteristic bending					0,60 0,50 0,40 1,00 0,60 0,50 0,50 0,40 0,80 0,50 0,40 0,50 0,40 0,35								
resistance for all head shapes			[Nm]	0,40									
		R120			0,3	35							
Pullout failure						1,00 0,60 0,50 0,40 1,00 0,60 0,50 0,40 0,80 0,50 0,40 0,35 1,0 1,2 0,8 1,0 1,2 2 hef 2 Ccr,fi							
		R30											
sistance for all head shapes ullout failure haracteristic resistance dge distance 30 to R120 case of fire attack from more to pacing	N _{Rk,p,fi}	R60	[kN]	0,6	0,9	1,0	1,2						
Characteristic resistance	тинк,р,п	R90											
		R120		0,5	0,7	0,8	1,0						
Edge distance													
	<u> </u>	Ccr,fi	[mm]										
Spacing	than one	side, the	e minimu	m edge distan									
R30 to R120		Scr,fi	[mm]		2 c	cr,fi							
¹⁾ The embedment depth has value.	to be inc	reased fo	or wet co	ncrete by at le	ast 30 mm con	npared to the g	liven						

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Characteristic values for resistance to fire with FBS II 6



									FBS							
								12			14					
depth		h _{nom}	[mm]	50	65	55	65	85	60	75	100	65	85	115		
ion load	and sh	near loa	d													
		R30		2,3	33		3,45			4,62		6,46				
	NI	R60		1,8	32		2,73		3,66			5,11				
	INRk,s,fi	R90		1,3	1,30		2,00			2,69		3,75				
		R120		1,0)4		1,64			2,20		3,08				
00, 0		R30		2,33			3,45			4,62			6,4	6		
	$V_{Rk,s,fi}$	R60		1,8	32		2,73			3,66			5,1	1		
		R90	ן נאואן	1,3	30		2,00			2,69			3,7	'5		
		R120		1,0)4		1,64			2,20			3,0	8		
		R30		2,	12		2,96									
	NI	R60		1,67 1,21 0,99 2,12		2,26			1							
	INRk,s,fi	R90					1,56									
		R120					1,21		No performance declarec							
S TX		R30					2,96							ared		
	<i>\</i> /	R60		1,6	67		2,26									
	V Rk,s,fi	R90		1,21		1,56										
		R120		0,9	0,99 1,21											
All		R30		2,62 4		4,92		7,83				12,	89			
	M ⁰ Rk.s.f	R60	[]	2,05		3,89		6,20			10,19					
		R90	linul	1,46			2,85			4,56		7,48				
onapoo		R120		1,1	17	2,34		3,73			6,14					
		R30														
	Nour	R60		1,5	3,0	2,3	3,0	5,0	2,9	4,2	6,6	3,2	4,9	8,1		
ice	і мнк,р,ті	R90														
		R120		1,2	2,4	1,8	2,4	4,0	2,3	3,3	5,2	2,5	3,9	6,5		
		Ccr,fi				م م ماند										
rom more	e than c	one side,	the m	inimu	m ea	ge dis	stance	e snai	i be -	2 300	mm					
		Scr fi	[mm]						2 c	er fi						
depth ha	s to be	increase	ed for v	vet cc	oncret	e by	at lea	st 30	mm c	compa	ared t	o the	giver	I		
	US, S SK, US TX, S TX All head shapes	ion load and sh N _{Rk,s,fi} US, S V _{Rk,s,fi} US, S V _{Rk,s,fi} N _{Rk,s,fi} All head shapes nce N _{Rk,p,fi}	ion load and shear load ion load and shear load	ion load and shear load $ \begin{array}{c ccc} I & I & I & I \\ I$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ion load and shear load $US, S = \frac{V_{Rk,s,fi}}{V_{Rk,s,fi}} = \frac{R30}{R90} = \frac{2,33}{1,82} = \frac{1,30}{1,30} = \frac{1,30}{1,04} = \frac{1,30}{1,21} =$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	depth h_nom [mm] 50 65 55 65 85 60 75 ion load and shear load US, S $\frac{R30}{R_{Rs,s,fi}}$ $\frac{R30}{R00}$ $2,33$ $3,45$ $4,62$ US, S $\frac{R30}{R_{Rs,s,fi}}$ $\frac{R30}{R00}$ $R120$ $1,82$ $2,73$ $3,66$ $V_{Rk,s,fi}$ $\frac{R30}{R00}$ $R120$ $1,04$ $1,64$ $2,20$ $V_{Rk,s,fi}$ $\frac{R30}{R120}$ $R120$ $1,82$ $2,73$ $3,66$ $1,30$ $2,00$ $2,69$ $1,64$ $2,20$ $2,69$ $N_{Rk,s,fi}$ $R30$ $R120$ $0,99$ $1,21$ $1,64$ $2,20$ SK, US TX, S TX, S TX, V_{Rk,s,fi} $R30$ $2,12$ $2,96$ $1,67$ $2,26$ $1,21$ $1,56$ M0 $_{Rk,s,fi}$ $R30$ $2,12$ $2,96$ $1,41$ $2,62$ $4,92$ $7,83$ All head shapes $N^0_{Rk,s,fi}$ $R30$ $R120$ $0,99$ $1,21$ $1,56$ $1,17$ $2,34$ $3,73$ Ance $N_{Rk,$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	B 10 12 depth hnom [mm] 50 65 55 65 85 60 75 100 65 ion load and shear load R60 R120 R120 3,66 1,82 2,73 3,66 1,82 2,00 2,69 1,04 1,64 2,20 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,00 2,69 1,30 2,12 2,96 1,67 2,26 1,21 1,56 1,67 2,26 1,21 1,56 1,21 1,56 1,21 1,56 1,17 2,33 3,45 4,50 1,17 2,34 3,73 1 1 1 1,17 2,12 2,96 1,121 1,56 1,167 2,26	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		

Characteristic values for resistance to fire with FBS II 8 - 14



Size							1		FBS II	1			1			
		1	6	1)		B		10			12			14		
Nominal embedment depth	h _{nom}	[mm]	40	55	50	65	55	65	85	60	75	100	65	85	115	
Tension load in cracked concrete	Ν	[kN]	2,0	3,5	2,9	5,7	4,3	5,7	9,6	5,5	8,0	12,5	6,1	9,4	15,	
Displacement	δn0 δn∞	[mm]	1,1 2,5	1,4 2,5	0,5 1,3	0,9 1,0	0,7	0,7	0,8 0,8	0,7 1,3	0,9 0,9	0,8 0,8	0,8 1,1	1,0 1,0	0,8 1,1	
Tension load in uncracked concrete	Ν	[kN]	4,0	7,0	7,9	12,0	6,8	8,8	13,5	7,7	11,0	17,4	8,5	13,2	21,	
Displacement	δνο δν∞	[mm]	1,0 1,7	1,8 2,6	0,9 1,4	1,4 1,4	0,9 1,4	0,9 1,4	1,4 1,4	0,9 1,4	1,1 1,4	1,4 1,4	1,0 1,1	1,3 1,3	1,1	
¹⁾ Intermediate value		l inear ir	,		• • •	•,•	.,.	.,.	• • •	•••	•••	•••	• • •	1,0	•••	
Table C7.2: Displa	acem	ents c	lue to	shea	r Ioa	ds (st	atic)		FBS II							
Size			6	1)	8			10			12		14		-	
Nominal embedment depth	\mathbf{h}_{nom}	[mm]	40	55	50	65	55	65	85	60	75	100	65	85	115	
Shear load in cracked and uncracked concrete	V	[kN]	4,5	6,7	6,2	9,0	14,0	14,0	16,6	15,9	15,9	21,2	23,0	23,0	30,	
Displacement	δνο	[mm]	2,0	2,9	1,4	1,4	3,2	3,2	3,2	2,5	2,5	3,4	2,8	2,8	5,4	
Bioplacomont	δν∞	[]	2,9	4,4	2,0	2,1	4,9	4,9	4,9	3,8	3,8	5,1	4,2	4,2	8,1	
Table C7.3: Displa	acem	ents c	lue to	tensi	on lo	,	seisn	•		nance FBS II			C2)			
				1		8			10		12			14		
Nominal embedment of	depth		nom			65			85		10		_	115		
Displacement DLS Displacement ULS			2 (DLS)	[mm]		0,5),8 2,8		0,9			1,3		
Table C7.4: Displa	acem		lue to	shea	r loa	1,7 ds (se	eismi		-	nce o	2, [°] categ		2)	5,0		
•						(FBS II		,	,			
Size						8			10		12	2		14		
Nominal embedment of	depth	h	nom	-		65			85		10			115		
Displacement DLS		δv,c		[mm]		1,6			2,7		3,		_	4,1		
Displacement ULS	· · · · · ·					3,9		7,1			5,3			8,7		

fischer concrete screw ULTRACUT FBS II

Performances Displacements due to tension and shear loads