

DECLARATION OF PERFORMANCE

DoP 0294

for fischer concrete screw ULTRACUT FBS II A4 (Mechanical fastener for use in concrete)

EN

1. Unique identification code of the product-type: **DoP 0294**
2. Intended use/es: **Post-installed fastening for use in cracked or uncracked concrete, see appendix, especially annexes B1 - B4.**
3. Manufacturer: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Germany**
4. Authorised representative: **–**
5. System/s of AVCP: **1**
6. European Assessment Document: **EAD 330232-00-0601**
European Technical Assessment: **ETA-17/0740; 2018-10-23**
Technical Assessment Body: **ETA-Danmark A/S**
Notified body/ies: **2873 TU Darmstadt**
7. Declared performance/s:
Mechanical resistance and stability (BWR 1)
Characteristic resistance to tension load (static and quasi-static loading):
Resistance to steel failure: Annex C1 $E_s = 210\,000\text{ MPa}$
Resistance to pull-out failure: Annex C1
Resistance to concrete cone failure: Annex C1
Robustness: Annex C1
Minimum edge distance and spacing: Annex B3
Edge distance to prevent splitting under load: Annex C1

Characteristic resistance to shear load (static and quasi-static loading):
Resistance to steel failure (shear load): Annex C1
Resistance to pry-out failure: Annex C1
Resistance to concrete edge failure: Annex C1
Displacements under static and quasi-static loading: Annex C4
Durability: Annexes A2, B1

Characteristic resistance and displacements for seismic performance categories C1 and C2:
Resistance to steel failure: Annex C2
Resistance to pull-out failure: Annex C2
Fracture elongation: NPD
Factor for annular gap: NPD
Displacements: Annex C4

Safety in case of fire (BWR 2)
Reaction to fire: Class (A1)

Resistance to fire:
Fire resistance to steel failure (tension load): Annex C3
Fire resistance to pull-out failure (tension load): Annex C3
Fire resistance to steel failure (shear load): Annex C3
8. Appropriate Technical Documentation and/or **–**
Specific Technical Documentation:

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:




Dr.-Ing. Oliver Geibig, Managing Director Business Units & Engineering
Tumlingen, 2022-01-10

Jürgen Grün, Managing Director Chemistry & Quality

This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.

The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

fischer concrete screw ULTRACUT FBS II A4 is a concrete screw made of stainless steel. The anchor is installed in a drilled hole and anchored by mechanical interlock.

An illustration of the product is given in Annex A.

The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation of this European Technical Assessment.

The anchors are intended to be used with embedment depth given in Annex B, Table B2.1. The intended use specifications of the product are detailed in the Annex B1.

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 provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, 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 Characteristics of product

Mechanical resistance and stability (BWR 1):

The essential characteristics are detailed in the Annex C1, C2 and C4.

Safety in case of fire (BWR 2):

The essential characteristics are detailed in the Annex C3.

Other Basic Requirements are not relevant.

3.2 Methods of assessment

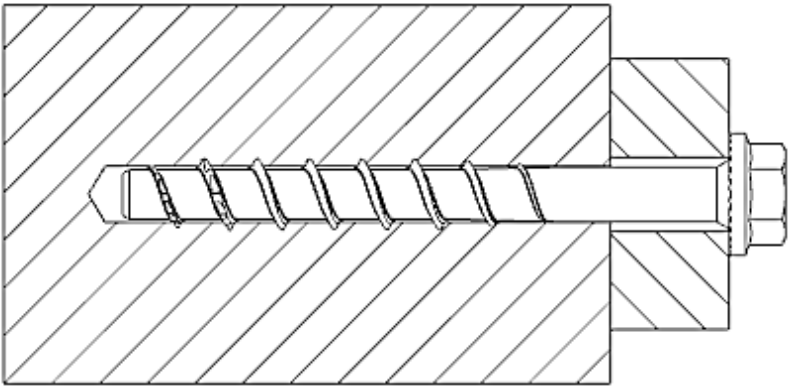
The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirement 1 has been made in accordance with EAD 330232-00-0601; Mechanical fasteners for use in concrete.

4 Assessment and verification of constancy of performance (AVCP)

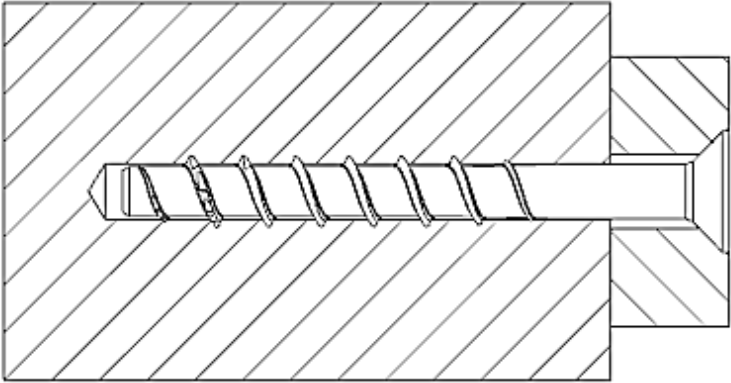
4.1 AVCP system

According to the decision 1996/582/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No. 305/2011) is 1.

Product in the installed condition



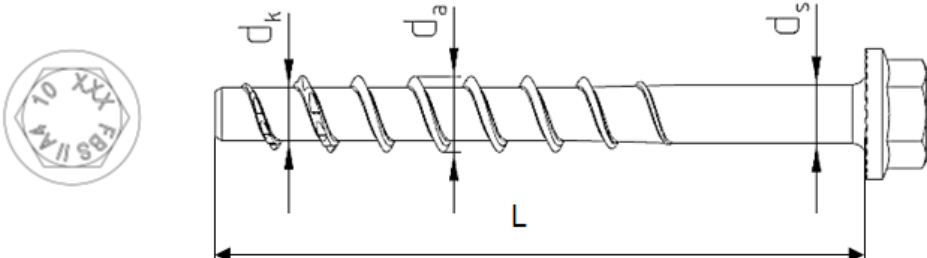
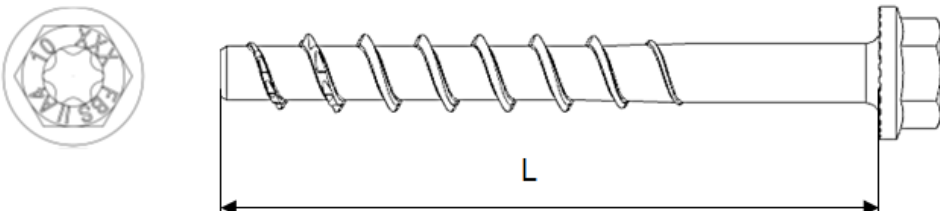
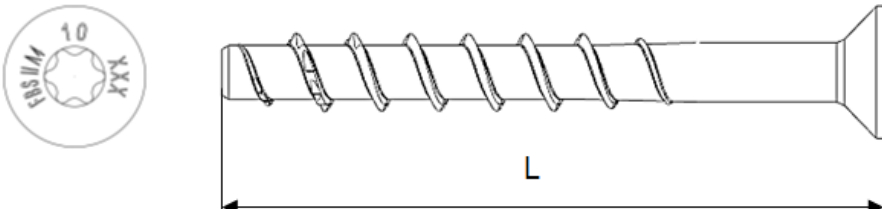

FBS II US A4 /
FBS II US TX A4



FBS II SK A4

fischer concrete screw ULTRACUT FBS II A4		Annex A1 of European Technical Assessment ETA-17/0740
Product description Product in the installed condition		

Table A2.1: Geometry and material

Type of screw / size		FBS II A4 US / SK			
		8	10	12	
Thread outer diameter	d _a	[mm]	10,3	12,5	14,6
Core diameter	d _k		7,5	9,4	11,1
Shaft diameter	d _s		8,0	9,9	11,7
Material		Tip: hardened steel; Shaft and head: stainless steel			
Hexagon head with formed washer (US)					
					
					
Head Marking					
<div><div>10: Screw size</div><div>XXX: Screw length L</div><div>A4: Material type</div><div>FBS II: Product short name</div></div>					
fischer concrete screw ULTRACUT FBS II A4					Annex A2 of European Technical Assessment ETA-17/0740
Product description Geometry and material					

Specification of intended use:

Size	FBS II A4							
	8		10			12		
Nominal embedment depth [mm]	50	65	55	65	85	60	75	100
Static and quasi-static loads	✓							
Cracked and uncracked concrete								
Fire exposure								
Seismic performance category C1 and C2		✓			✓			✓

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
- Uncracked or cracked concrete

Use conditions (Environmental conditions):

- Structures subjected to dry internal conditions
- Structures subjected to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist.

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere or indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where deicing materials are used).

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 screw is indicated on the design drawings (e.g. position of the screw relative to reinforcement or to supports, etc.).
- Design of fastenings according to FprEN 1992-4: 2016 and EOTA Technical Report TR 055
- Seismic design according to EOTA Technical Report TR 049

Installation:

- Hammer drilling or diamond drilling or hollow drilling according to Annex B4
- Screw installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- In case of aborted hole: New hole must be drilled at a minimum distance of twice the depth of the aborted hole or closer, if the hole is filled with a high strength mortar and only if the hole is not in the direction of the oblique tensile or shear load.
- Adjustability according to Annex B3
- Cleaning of drill hole is not necessary when using a hollow drill or:
 - If drilling vertically upwards
 - If drilling vertical downwards and the drill hole depth has been increased. It is recommended to increase the drill depth with additional 3 d₀.
- After correct installation further turning of the screw head should 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 $\geq 50 \text{ N/mm}^2$. (e.g. FIS V, FIS HB, FIS SB or FIS EM Plus)

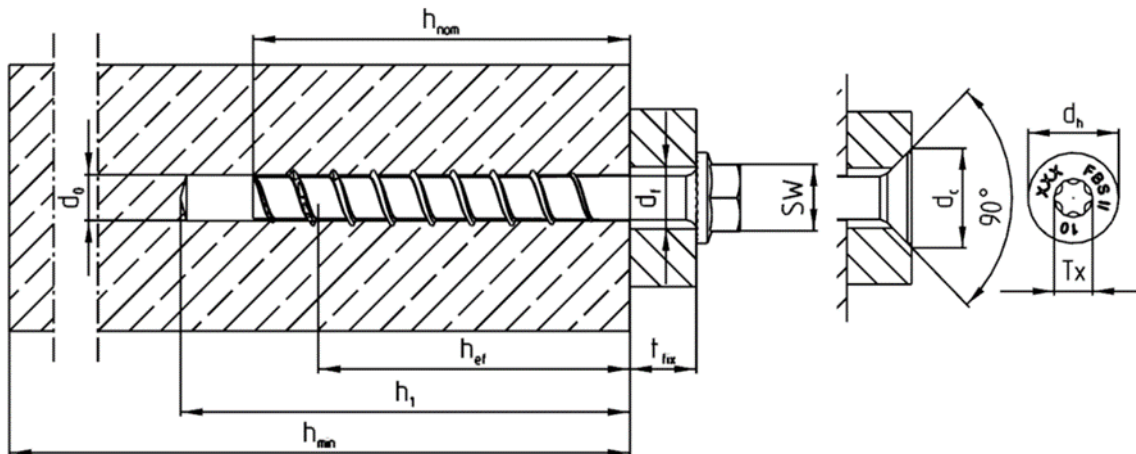
fischer concrete screw ULTRACUT FBS II A4

Intended use
Specification

Annex B1
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Table B2.1: Installation parameters

FBS II A4			8		10			12		
Nominal embedment depth	h_{nom}	[mm]	50	65	55	65	85	60	75	100
Nominal drill hole diameter	d_0		8		10			12		
Cutting diameter of drill bits			8,45		10,45			12,50		
Cutting diameter for diamond drillers	$d_{cut} \leq$		8,10		10,30			12,30		
Clearance hole diameter	d_f		10,6 – 12,0		12,8 – 14,0			14,8 – 16,0		
Wrench size (US,S)	SW		13		15			17		
Tx-size	Tx	[-]	40		50			-		
Countersunk head diameter	d_h	[mm]	18		21					
Countersunk diameter in fixture	d_c		20		23					
Drill hole depth			60	75	65	75	95	70	85	110
Drill hole depth (with adjustable setting)	$h_1 \geq$		70	85	75	85	105	80	95	120
Thickness of fixture	$t_{fix} \leq$		L - h_{nom}							
Length of screw	$L_{min} =$		[mm]	50	65	55	65	85	60	75
	$L_{max} =$	400		415	405	415	435	410	425	450
Torque impact screw driver	$T_{imp,max}$	[Nm]	450					650		
Torque impact screw driver (with adjustable setting process)	$T_{imp,max}$		300					450		

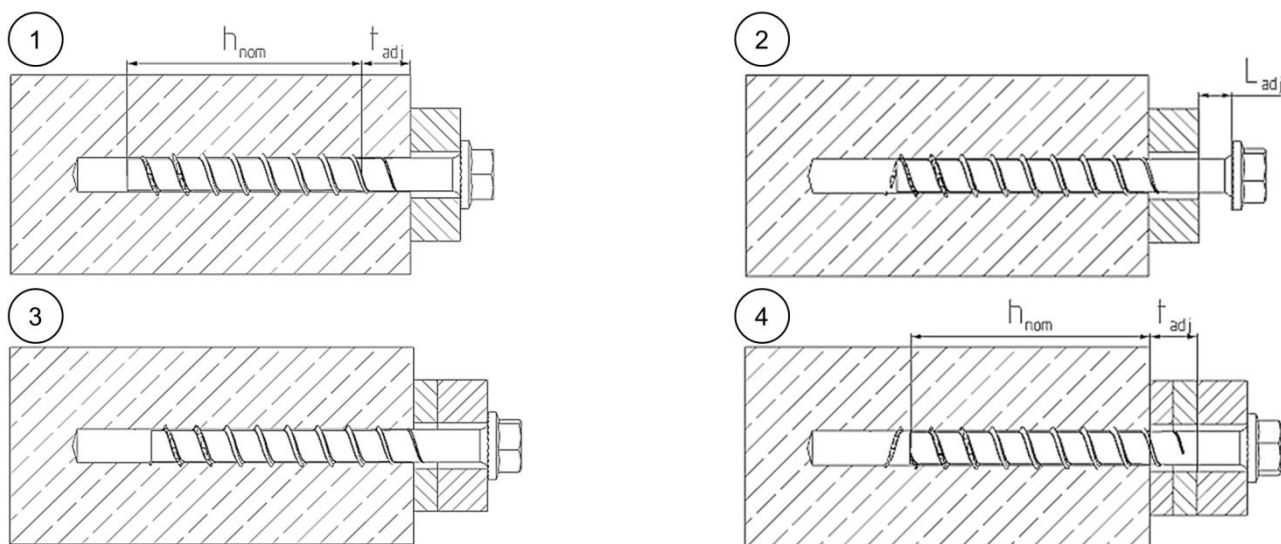

fischer concrete screw ULTRACUT FBS II A4

 Intended use
Installation parameters

Annex B2

 of European
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Adjustment



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.

Table B3.1: Minimum thickness of concrete members, minimum spacing and edge distance

FBS II A4		[mm]	8		10			12		
Nominal embedment depth	h_{nom}		50	65	55	65	85	60	75	100
Minimum thickness of concrete member	h_{min}		100	120	100	120	140	110	130	150
Minimum spacing	s_{min}		35		40			50		
Minimum edge distance	c_{min}		35		40			50		

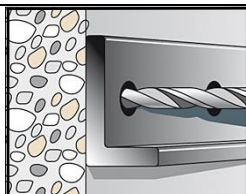
fischer concrete screw ULTRACUT FBS II A4

Intended use – Adjustment
Minimum thickness of members, minimum spacing and edge distance

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Installation instruction

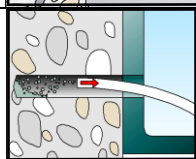
Installation of fischer concrete screw ULTRACUT FBS II A4



Drill the hole using hammer drill, hollow drill or diamond core drill.

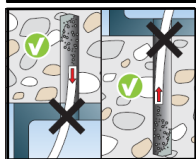
Drill hole diameter d_0 and drill hole depth h_1 according to table B2.1

a)



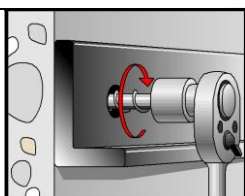
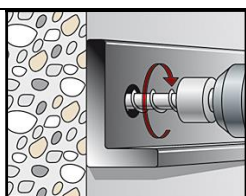
Option a) Clean the drill hole

b)

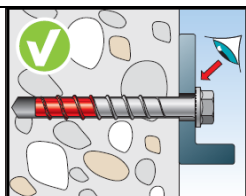


Option b) Cleaning of drill hole is not necessary when using a hollow drill or:

- If drilling vertically upwards or
- If drilling vertically downwards and the drill hole depth has been increased. It is recommended to increase the drill hole depth additional 3 times d_0 .

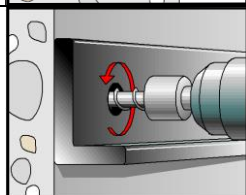


Installation with any torque impact screw driver up to the maximum mentioned torque moment ($T_{imp,max}$). Alternatively, all other tools without an indicated torque moment are allowed (e.g. ratchet spanner). The indicated torque moments for impact screw driver are therefore not decisive.

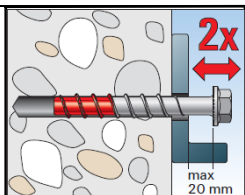


After installation a further turning of the screw must not be possible. The head of the screw must be in contact with the fixture and is not damaged.

1.



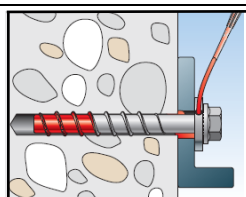
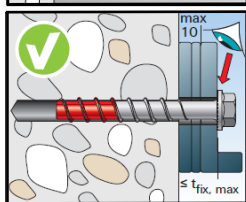
2.



OPTIONAL:

It is permissible to adjust the screw two times. 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. If screw is adjusted, only permissible impact screw driver according to table B2.1 is allowed.

3.



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)

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Installation Instructions

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Table C1.1: Characteristic values for static and quasi-static action

FBS II A4			8		10			12			
Nominal embedment depth	h _{nom}	[mm]	50	65	55	65	85	60	75	100	
Steel failure for tension load and shear load											
Characteristic resistance	N _{Rk,s}	[kN]	27,8		43,8			67,7			
Partial factor	γ _{Ms}	-	1,5								
Characteristic resistance	V _{Rk,s}	[kN]	18,0	27,8	13,2	19,3	36,6	20,4	40,1	45,8	
Partial factor	γ _{Ms}	[-]	1,25								
Factor for ductility	k ₇		1,0								
Characteristic bending resistance	M ⁰ _{Rk,s}	[Nm]	31,3		68,5			112,8			
Pullout failure											
Charact. resistance in concrete C20/25	uncracked	N _{Rk,p}	[kN]	7,0	14,0	8,5	14,0	- ¹⁾	10,0	12,0	- ¹⁾
	cracked	N _{Rk,p}	[kN]	4,0	9,0	4,5	6,0	16,0	4,5	11,0	- ¹⁾
Increasing factors concrete	C25/30	ψ _c	[-]	1,12							
	C30/37			1,22							
	C35/45			1,32							
	C40/50			1,41							
	C45/55			1,50							
	C50/60			1,58							
Installation factor	γ _{inst}	[-]	1,0								
Concrete cone failure and splitting failure; concrete pryout failure											
Effective embedment depth	h _{ef}	[mm]	40	52	43	51	68	47	60	81	
Factor for uncracked concrete	k _{ucr,N}	[-]	11,0								
Factor for cracked concrete	k _{cr,N}		7,7								
Characteristic edge distance	C _{cr,N}	[mm]	1,5 h _{ef}								
Characteristic spacing	S _{cr,N}		3 h _{ef}								
Char. resistance for splitting	N ⁰ _{Rk,Sp}	[kN]	12,0	18,4	13,0	17,9	- ¹⁾	15,8	22,9	- ¹⁾	
Char. edge distance for splitting	C _{cr,sp}	[mm]	1,5 h _{ef}								
Char. spacing for splitting	S _{cr,sp}		3 h _{ef}								
Factor for pryout failure	k ₈	[-]	1,0				2,0	1,0	2,0		
Installation factor	γ _{inst}		1,0								
Concrete edge failure											
Effective length in concrete	l _f = h _{nom}	[mm]	50	65	55	65	85	60	75	100	
Nominal diameter of screw	d _{nom}		8		10			12			
Adjustment											
Maximum thickness of shims	t _{adj}	[mm]	10								
Max. number of adjustments	n _a		2								

¹⁾ Pullout failure not decisive.

fischer concrete screw ULTRACUT FBS II A4

Characteristic values for static and quasi-static action

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Table C2.1: Characteristic values for Seismic Performance Category C1						
FBS II A4			8	10	12	
Nominal embedment depth		h_{nom}	[mm]	65	85	100
Steel failure for tension load and shear load C1						
Characteristic resistance	$N_{Rk,s,eq}$	[kN]	27,8	43,8	67,7	
	$V_{Rk,s,eq}$		18,1	29,3	36,6	
Pullout failure						
Characteristic resistance in cracked concrete		$N_{Rk,p,eq}$	[kN]	9,0	16,0	- ¹⁾
Concrete cone failure						
Effective embedment depth		h_{ef}	[mm]	52	68	81
Concrete cone failure	Edge distance	$c_{cr,N}$		$1,5 h_{ef}$		
	Spacing	$s_{cr,N}$		$3 h_{ef}$		
Installation factor		γ_{inst}	[-]	1,0		
Concrete pryout failure						
Factor for pryout failure		k_8	[-]	1,0	2,0	
Concrete edge failure						
Effective length in concrete		$l_f = h_{nom}$	[mm]	65	85	100
Nominal diameter of screw		d_{nom}		8	10	12

¹⁾ Pullout failure not decisive.

Table C2.2: Characteristic values for Seismic Performance Category C2						
Gap between screw shaft and fixture must be filled with mortar						
FBS II A4			8	10	12	
Nominal embedment depth		h_{nom}	[mm]	65	85	100
Steel failure for tension load and shear load C2						
Characteristic resistance		$N_{Rk,s,eq}$	[kN]	27,8	43,8	67,7
		$V_{Rk,s,eq}$		9,7	8,8	19,7
Pullout failure						
Characteristic resistance in cracked concrete		$N_{Rk,p,eq}$	[kN]	2,8	5,0	7,3
Concrete cone failure						
Effective embedment depth		h_{ef}	[mm]	52	68	81
Concrete cone failure	Edge distance	$c_{cr,N}$		1,5 h_{ef}		
	Spacing	$s_{cr,N}$		3 h_{ef}		
Installation factor		γ_{inst}	[-]	1,0		
Concrete pryout failure						
Factor for pryout failure		k_8	[-]	1,0	2,0	
Concrete edge failure						
Effective length in concrete		$l_f = h_{nom}$	[mm]	65	85	100
Nominal diameter of screw		d_{nom}		8	10	12

fischer concrete screw ULTRACUT FBS II A4	Annex C2 of European Technical Assessment ETA-17/0740
Characteristic values for Seismic Performance Category C1 and C2	

Table C3.1: Characteristic values for resistance to fire

FBS II A4				8		10			12				
Nominal embedment depth		h_{nom}	[mm]	50	65	55	65	85	60	75	100		
Steel failure for tension load and shear load ($F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$)													
Characteristic resistance for the head shapes	US, US TX	$F_{Rk,s,fi}$	R30	[kN]	2,3	6,4	3,5		11,0		4,6	15,2	
					R60	1,8	4,7	2,7		8,1		3,7	11,2
					R90	1,3	2,9	2,0		5,2		2,7	7,3
					R120	1,0	2,0	1,6		3,8		2,2	5,3
	SK	$F_{Rk,s,fi}$	R30		2,1		3,0		-				
			R60		1,7		2,3						
			R90		1,2		1,6						
			R120		1,0		1,2						
	US, US TX	$M^0_{Rk,s,fi}$	R30	[Nm]	2,6	7,2	7,6		15,4		16,8	25,3	
			R60		2,0	5,2	6,0		11,4		13,3	18,7	
			R90		1,5	3,3	4,4		7,3		9,8	12,1	
			R120		1,2	2,3	3,6		5,3		8,0	8,8	
	SK	$M^0_{Rk,s,fi}$	R30		2,4		4,2		-				
			R60		1,9		3,2						
			R90		1,4		2,2						
			R120		1,1		1,7						

Pullout failure											
Characteristic resistance	$N_{Rk,p,fi}$	R30	[kN]	1,7	2,4	2,1	3,5	4,3	2,5	3,0	6,3
		R60									
		R90									
		R120									

Concrete cone failure											
Characteristic resistance	$N_{Rk,c,fi}$	R30	[kN]	1,6	3,4	2,1	3,2	6,6	2,6	4,8	10,2
		R60									
		R90									
		R120									

Edge distance											
R30 to R120		$c_{cr,fi}$	[mm]	$2 h_{ef}$							
In case of fire attack from more than one side, the minimum edge distance shall be ≥ 300 mm											

Spacing											
R30 to R120		$s_{cr,fi}$	[mm]	$2 c_{cr,fi}$							

Concrete pryout failure											
R30 to R120		k_8	[-]	1,0				2,0	1,0	2,0	

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

fischer concrete screw ULTRACUT FBS II A4	Annex C3 of European Technical Assessment ETA-17/0740
Characteristic values for resistance to fire	

Table C4.1: Displacements due to tension loads (static and quasi-static)										
FBS II A4			8		10			12		
Nominal embedment depth	h_{nom}	[mm]	50	65	55	65	85	60	75	100
Tension load in uncracked concrete	N	[kN]	3,5	7,1	4,2	7,0	11,9	5,0	6,0	17,1
Displacement in uncracked concrete	δ_{N0}	[mm]	0,5	0,7	0,4	0,6	0,8	1,0	0,9	1,25
	$\delta_{N\infty}$		0,7	0,7	0,8	0,8	0,8	1,25	1,25	1,25
Tension load in cracked concrete	N	[kN]	3,5	4,5	4,2	7,0	8,1	5,0	6,0	12,0
Displacement in cracked concrete	δ_{N0}	[mm]	0,6	0,4	0,4	0,6	0,7	0,9	0,9	1,4
	$\delta_{N\infty}$		1,5	1,1	1,0	1,8	1,8	1,4	1,7	1,9

Table C4.2: Displacements due to shear loads (static and quasi-static)										
FBS II A4			8		10			12		
Nominal embedment depth	h_{nom}	[mm]	50	65	55	65	85	60	75	100
Shear load in cracked and uncracked concrete	V	[kN]	11,0	15,9	10,4	11,9	20,9	12,7	24,9	26,2
Displacement (the gap between fastener and fixture is subtracted)	δ_{V0}	[mm]	4,1	2,7	1,2	1,2	3,5	1,1	2,5	2,9
	$\delta_{V\infty}$		6,2	4,1	1,8	1,8	5,3	1,7	3,8	4,4

Table C4.3: Displacements due to tension loads (Seismic Performance Category C2)										
FBS II A4			8		10			12		
Nominal embedment depth	h_{nom}	[mm]	65		85			100		
Displacement DLS	$\delta_{N,eq}$ (DLS)		0,9		0,9			1,1		
Displacement ULS	$\delta_{N,eq}$ (ULS)		2,5		2,7			3,2		

Table C4.4: Displacements due to shear loads (Seismic Performance Category C2)										
FBS II A4			8		10			12		
Nominal embedment depth	h_{nom}	[mm]	65		85			100		
Displacement DLS	$\delta_{V,eq}$ (DLS)		1,6		1,7			2,6		
Displacement ULS	$\delta_{V,eq}$ (ULS)		5,0		3,8			6,6		

fischer concrete screw ULTRACUT FBS II A4	Annex C4 of European Technical Assessment ETA-17/0740
Displacements due to tension and shear loads	