

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-11/0095
of 11 March 2016

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

fischer concrete screw FBS, FBS A4 and FBS C

Product family
to which the construction product belongs

Concrete screw made of galvanised steel and stainless
steel of sizes 8, 10, 12 and 14 for use in concrete

Manufacturer

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

Manufacturing plant

fischerwerke

This European Technical Assessment
contains

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

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

Guideline for European technical approval of "Metal
anchors for use in concrete", ETAG 001 Part 3: "Undercut
anchors", April 2013,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

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Specific Part

1 Technical description of the product

The Fischer concrete screw FBS is an anchor in size of 8, 10, 12 and 14 made of zinc-plated steel respectively steel with zinc flake coating (FBS) or made of stainless steel (FBS A4, FBS C). 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 for tension and shear loads as well as bending moments in concrete	See Annex C 1 and C 2
Edge distances and spacing	See Annex C 1 and C 2
Displacements under tension and shear loads	See Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	See Annex C 4

3.3 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 001, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 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 at Deutsches Institut für Bautechnik.

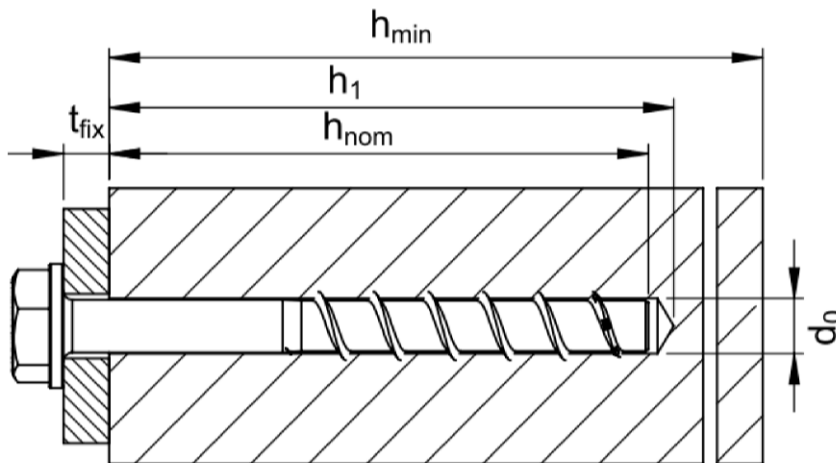
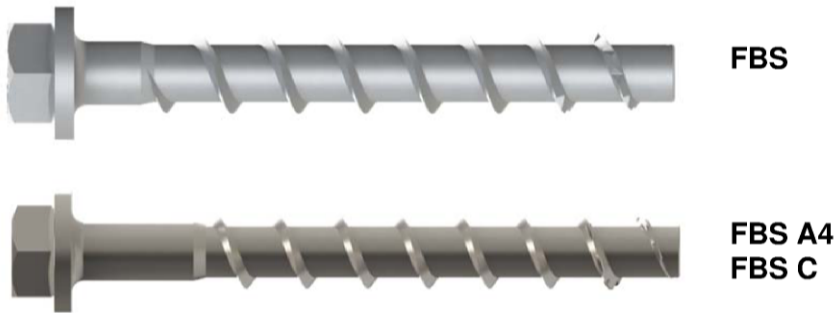
Issued in Berlin on 11 March 2016 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Tempel

Product and installed condition

fischer concrete screw FBS, FBS A4 and FBS C



- 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

fischer concrete screw FBS, FBS A4 and FBS C

Product description

Installed condition

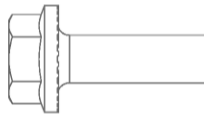
Annex A 1

Table A1: Materials and variants

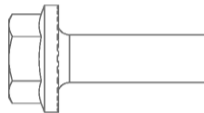
Part	Name	Material				
1, 2, 3, 4, 5	Screw anchor	FBS	Steel EN 10263-4 galvanized acc. to EN ISO 4042 or zinc flake coating acc. to EN ISO 10683 ($\geq 5\mu\text{m}$)			
		FBS A4	1.4401, 1.4404, 1.4571, 1.4578			
		FBS C	1.4529			
					FBS	FBS A4 / FBS C
		Nominal characteristic steel yield strength	f_{yk}	[N/mm ²]	600	700
Nominal characteristic steel ultimate strength	f_{uk}	[N/mm ²]	700	800		



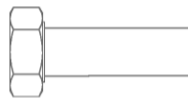
- 1) **FBS ST** - Anchor version with connection thread and hexagon
e.g. FBS 10x120 M 12x20 ST



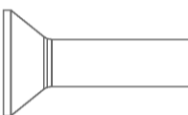
- 2) **FBS-US** - Anchor version with washer, hexagon head and hexalobular internal driving feature (only FBS 8)
e.g. FBS 8x100 US



- 3) **FBS US** - Anchor version with washer and hexagon head
e.g. FBS 10x100 US



- 4) **FBS-S** - Anchor version with hexagon head
e.g. FBS 10x100 S A4



- 5) **FBS-SK** - Anchor version with counter sunk socket head and hexalobular internal driving feature
e.g. FBS 10x75 SK

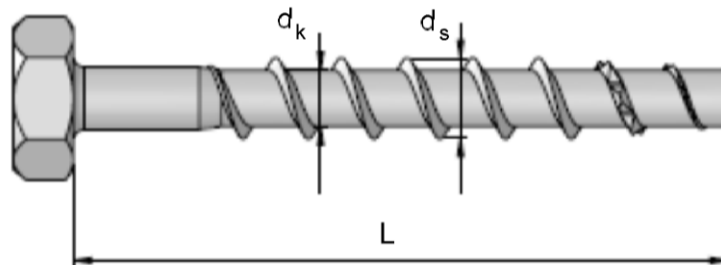
fischer concrete screw FBS, FBS A4 and FBS C

Product description
Material and screw types

Annex A 2

Table A2: Dimensions and markings

Anchor size			FBS 8	FBS 10	FBS 12	FBS 14
Nominal embedment depth			$h_{nom} = 65 \text{ mm}$	$h_{nom} = 85 \text{ mm}$	$h_{nom} = 100 \text{ mm}$	$h_{nom} = 125 \text{ mm}$
Length of the anchor	$L \leq$	[mm]	300			
Diameter of shaft	d_k	[mm]	6,8	8,8	10,8	12,8
Diameter of thread	d_s	[mm]	10,6	12,6	14,6	16,6



Marking:

Anchor type: FBS / TSM

Anchor size: 10

Length of the anchor in mm: 100

e.g. FBS 10 100

fischer concrete screw FBS, FBS A4 and FBS C

Product descriptions

Dimensions and markings

Annex A 3

Intended use

Anchorage subject to:

- Static and quasi static loads,
- Used for anchorages with requirements related to resistance of fire.

Base materials:

- Reinforced and unreinforced concrete according to EN 206-1:2000-12,
- Strength classes C20/25 to C50/60 according to EN 206-1:2000-12,
- 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 conditions if no particular aggressive conditions exist: 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 exist: screw types made of stainless steel with marking C

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 under static or quasi-static actions are designed for design Method A designed in accordance with:
 - ETAG 001, Annex C, Edition August 2010 or
 - or CEN/TS 1992-4:2009,
- Anchorages under fire exposure are designed in accordance with:
 - EOTA Technical Report TR 020, Edition May 2004 or
 - CEN/TS 1992-4:2009, Annex D (It must be ensured that local spalling of the concrete cover does not occur).

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,
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.

fischer concrete screw FBS, FBS A4 and FBS C

Intended use
Specifications

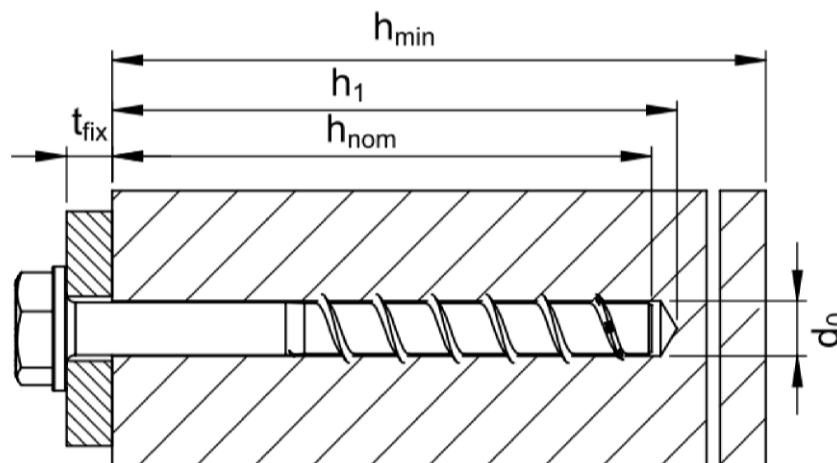
Annex B 1

Table B1: Installation parameters

Anchor size		FBS 8	FBS 10	FBS 12	FBS 14
Nominal embedment depth		$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Nominal drill bit diameter	d_0 [mm]	8	10	12	14
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	8,45	10,45	12,50	14,50
Depth of drill hole	$h_1 \geq$ [mm]	75	95	110	135
Nominal embedment depth	$h_{nom} \geq$ [mm]	65	85	100	125
Diameter of clearing hole in the fixture	$d_f \leq$ [mm]	12	14	16	18

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

Anchor size		FBS 8	FBS 10	FBS 12	FBS 14
Nominal embedment depth		$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Minimum thickness of member	h_{min} [mm]	120	130	150	200
Minimum edge distance	c_{min} [mm]	50	70	80	100
Minimum spacing	s_{min} [mm]	50	70	80	100



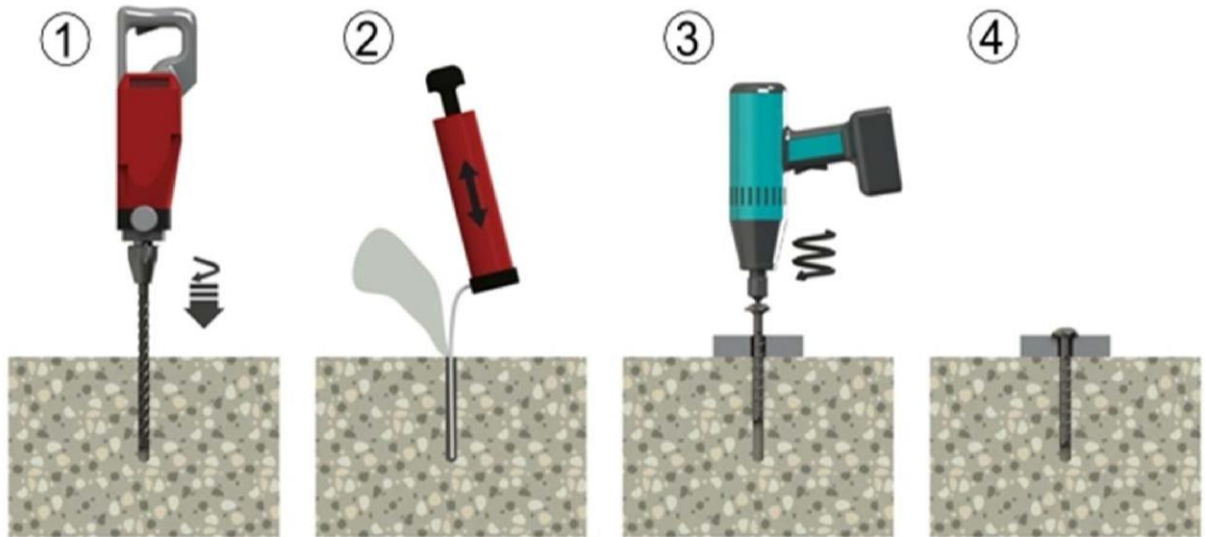
fischer concrete screw FBS, FBS A4 and FBS C

Intended use

Installation parameters

Annex B 2

Installation instructions



fischer concrete screw FBS, FBS A4 and FBS C

Intended use

Installation instructions

Annex B 3

**Table C1: Characteristic values for design method A according to ETAG 001, Annex C
or CEN/TS 1992-4 for FBS**

Anchor size			FBS 8	FBS 10	FBS 12	FBS 14
Nominal embedment depth			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Steel failure for tension- and shear load						
Characteristic load	$N_{RK,s}$	[kN]	25,0	42,0	64,0	90,0
	$V_{RK,s}$	[kN]	18,0	34,0	42,0	64,0
	$M_{RK,s}^0$	[Nm]	26,0	56,0	123,0	200,0
Pull-out failure						
Characteristic tension load in cracked concrete C20/25	$N_{RK,p}$	[kN]	9	16	Pull-out Failure is not decisive	Pull-out Failure is not decisive
Characteristic tension load in uncracked concrete C20/25	$N_{RK,p}$	[kN]	12	Pull-out Failure is not decisive	Pull-out Failure is not decisive	Pull-out Failure is not decisive
Increasing factor concrete for $N_{RK,p}$	Ψ_C	C30/37	1,22			
		C40/50	1,41			
		C50/60	1,55			
Concrete cone and splitting failure						
Effective anchorage depth	h_{ef}	[mm]	51	68	80	100
Factor for	cracked concrete	$k_{cr}^{2)}$	7,2			
	uncracked concrete	$k_{ucr}^{2)}$	10,1			
Concrete cone failure	spacing	$s_{cr,N}$	3 x h_{ef}			
	edge distance	$c_{cr,N}$	1,5 x h_{ef}			
Splitting failure	spacing	$s_{cr,sp}$	3 x h_{ef}			
	edge distance	$c_{cr,sp}$	1,5 x h_{ef}			
Installation safety factor	$\gamma_2^{1)} = \gamma_{inst}^{2)}$	[-]	1,0			
Concrete pry out failure (pry-out)						
k-Factor	$k^{1)} = k_3^{2)}$	[-]	1,0	2,0		
Concrete edge failure						
Effective length of anchor	$l_f = h_{ef}$	[mm]	51	68	80	100
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	14

¹⁾ Parameter relevant only for design according to ETAG 001, Annex C

²⁾ Parameter relevant only for design according to CEN/TS 1992-4:2009

fischer concrete screw FBS, FBS A4 and FBS C

Performances

Characteristic values for FBS for design method A

Annex C 1

**Table C2: Characteristic values for design method A according to ETAG 001, Annex C
or CEN/TS 1992-4 for FBS A4 and FBS C**

Anchor size			FBS 8 A4 FBS 8 C	FBS 10 A4 FBS 10 C	FBS 12 A4 FBS 12 C	FBS 14 A4 FBS 14 C	
Nominal embedment depth			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm	
Steel failure for tension- and shear load							
Characteristic load	$N_{Rk,s}$	[kN]	29,0	48,0	73,0	103,0	
	$V_{Rk,s}$	[kN]	21,0	40,0	49,0	64,0	
	$M^0_{Rk,s}$	[Nm]	29,0	64,0	141,0	229,0	
Pull-out failure							
Characteristic tension load in cracked concrete C20/25	$N_{Rk,p}$	[kN]	9	16	Pull-out Failure is not decisive	Pull-out Failure is not decisive	
Characteristic tension load in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	12	Pull-out Failure is not decisive	Pull-out Failure is not decisive	Pull-out Failure is not decisive	
Increasing factor concrete for $N_{Rk,p}$	Ψ_C	C30/37	1,22				
		C40/50	1,41				
		C50/60	1,55				
Concrete cone and splitting failure							
Effective anchorage depth	h_{ef}	[mm]	51	68	80	100	
Factor for	cracked concrete	$k_{cr}^{2)}$	[-]				7,2
	uncracked concrete	$k_{ucr}^{2)}$	[-]				10,1
Concrete cone failure	spacing	$s_{cr,N}$	[mm]				$3 \times h_{ef}$
	edge distance	$c_{cr,N}$	[mm]				$1,5 \times h_{ef}$
Splitting failure	spacing	$s_{cr,sp}$	[mm]				$3 \times h_{ef}$
	edge distance	$c_{cr,sp}$	[mm]				$1,5 \times h_{ef}$
Installation safety factor	$\gamma_2^{1)} = \gamma_{inst}^{2)}$	[-]					1,0
Concrete pry out failure (pry-out)							
k-Factor	$k^{1)} = k_3^{2)}$	[-]	1,0				2,0
Concrete edge failure							
Effective length of anchor	$l_f = h_{ef}$	[mm]	51	68	80	100	
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	14	

¹⁾ Parameter relevant only for design according to ETAG 001, Annex C

²⁾ Parameter relevant only for design according to CEN/TS 1992-4:2009

fischer concrete screw FBS, FBS A4 and FBS C

Performances

Characteristic values for FBS A4 and FBS C for design method A

Annex C 2

Table C3: Displacements under tension load for FBS, FBS A4 and FBS C

Anchor size			FBS 8	FBS 10	FBS 12	FBS 14
			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Tension load	N	[kN]	4,3	7,6	11,1	15,9
Displacement	δ_{N0}	[mm]	0,5			
	δ_{∞}	[mm]	1,0			

Table C4 : Displacements under shear load for FBS

Anchor size			FBS 8	FBS 10	FBS 12	FBS 14
			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Shear load	V	[kN]	8,6	16,2	20,0	30,5
Displacement	δ_{V0}	[mm]	2,7	2,7	4,0	3,1
	δ_{∞}	[mm]	4,1	4,3	6,0	4,7

Table C5 : Displacements under shear load for FBS A4 and FBS C

Anchor size			FBS 8 A4 FBS 8 C	FBS 10 A4 FBS 10 C	FBS 12 A4 FBS 12 C	FBS 14 A4 FBS 14 C
			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Shear load	V	[kN]	10,0	19,1	23,2	30,5
Displacement	δ_{V0}	[mm]	2,9	3,5	4,1	4,6
	δ_{∞}	[mm]	4,4	5,3	6,2	7,0

fischer concrete screw FBS, FBS A4 and FBS C

Performances

Displacements under tension and shear loads

Annex C 3

Table C6: Characteristic values of resistance to fire exposure for FBS

Anchor size				FBS 8	FBS 10	FBS 12	FBS 14
Nominal embedment depth				$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
Fire resistance class							
R 30	Characteristic resistance	$F_{Rk,fi30}$	[kN]	2,3	4,0	6,3	9,8
R 60	Characteristic resistance	$F_{Rk,fi60}$	[kN]	1,7	3,3	5,8	8,1
R 90	Characteristic resistance	$F_{Rk,fi90}$	[kN]	1,1	2,2	4,2	5,9
R 120	Characteristic resistance	$F_{Rk,fi120}$	[kN]	0,8	1,7	3,4	4,8
R 30 to R 120	Spacing	$s_{min,fi} = s_{cr,fi}$	[mm]	4 h_{ef}			
	Edge distance	$c_{min,fi} = c_{cr,fi}$		2 h_{ef}			

Table C7: Characteristic values of resistance to fire exposure for FBS A4 and FBS C

Anchor size				FBS 8	FBS 10	FBS 12	FBS 14		
Nominal embedment depth				$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm		
Fire resistance class									
R 30	Characteristic resistance	$F_{Rk,fi30}$	[kN]	2,3 ¹⁾	2,3 ²⁾	4,0 ¹⁾	4,0 ²⁾	6,3	9,8
R 60	Characteristic resistance	$F_{Rk,fi60}$	[kN]	1,7 ¹⁾	2,3 ²⁾	3,3 ¹⁾	4,0 ²⁾	5,8	8,1
R 90	Characteristic resistance	$F_{Rk,fi90}$	[kN]	1,1 ¹⁾	2,3 ²⁾	2,2 ¹⁾	4,0 ²⁾	4,2	5,9
R 120	Characteristic resistance	$F_{Rk,fi120}$	[kN]	0,8 ¹⁾	1,8 ²⁾	1,7 ¹⁾	3,2 ²⁾	3,4	4,8
R 30 to R 120	Spacing	$s_{min,fi} = s_{cr,fi}$	[mm]	4 h_{ef}					
	Edge distance	$c_{min,fi} = c_{cr,fi}$		2 h_{ef}					

¹⁾ For anchor version with hexagon head and counter sunk socket head

²⁾ For anchor version with connection thread

fischer concrete screw FBS, FBS A4 and FBS C

Performances

Characteristic values of resistance to fire exposure

Annex C 4