

## DICHIARAZIONE DI PRESTAZIONE

### DoP 0344

per vite per calcestruzzo fischer ULTRACUT FBS II R (ancorante meccanico per l'utilizzo nel calcestruzzo)

IT

1. Codice di identificazione unico del prodotto-tipo: **DoP 0344**
2. Usi previsti: **Fissaggio post-installato in calcestruzzo fessurato o non fessurato, vedi appendice, in particolare gli allegati da B1 - B5.**
3. Fabbricante: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Germany**
4. Mandatario: **-**
5. Sistemi di VVCP: **1**
6. Documento per la valutazione europea: **EAD 330232-01-0601**  
Valutazione tecnica europea: **ETA-17/0740; 2022-03-08**  
Organismo di valutazione tecnica: **ETA-Danmark A/S**  
Organismi notificati: **2873 TU Darmstadt**
7. Prestazioni dichiarate:  
**Resistenza meccanica e stabilità (BWR 1)**  
**Resistenza caratteristica al carico di tensione (carico statico e quasi-statico) Metodo A:**
  - 1 Resistenza alla rottura dell'acciaio: Allegato C1
  - 2 Resistenza alla rottura per sfilamento: Allegato C1
  - 3 Resistenza alla rottura del cono di calcestruzzo: Allegato C1
  - 4 Robustezza: Allegato C1
  - 5 Distanza dal bordo e interassi minimi: Allegato B3
  - 6 Distanza dal bordo per evitare lo splitting sotto carico: Allegato C1**Resistenza caratteristica al carico di taglio (carico statico e quasi statico):**
  - 7 Resistenza alla rottura dell'acciaio (carico di taglio): Allegato C1
  - 8 Resistenza alla rottura per pry-out: Allegato C1**Resistenza caratteristica per una progettazione semplificata:**
  - 9 Metodo B: NPD
  - 10 Metodo C: NPD**Spostamenti:**
  - 11 Spostamenti sotto azioni statiche e quasi statiche: Allegato C4**Resistenza e spostamenti caratteristici per le categorie di prestazione sismica C1 e C2:**
  - 12 Resistenza al carico di trazione, spostamenti, categoria C1: Allegato C2  
Resistenza al carico di trazione, spostamenti, categoria C2: Allegato C2
  - 13 Resistenza al carico di taglio, spostamenti, categoria C1: Allegato C2  
Resistenza al carico di taglio, spostamenti, categoria C2: Allegato C2
  - 14 Fattore spazio anulare: Allegato C2**Sicurezza in caso di incendio (BWR 2)**
  - 15 Reazione al fuoco: Classe (A1)**Resistenza al fuoco:**
  - 16 Resistenza al fuoco alla rottura dell'acciaio (carico di trazione): Allegato C3
  - 17 Resistenza al fuoco alla rottura per sfilamento (carico di trazione): Allegato C3
  - 18 Resistenza al fuoco alla rottura dell'acciaio (carico di taglio): Allegato C3**Durabilità:**
  - 19 Durabilità: Allegati B1
8. Documentazione tecnica appropriata e/o documentazione tecnica specifica: **-**

Firmato a nome e per conto del fabbricante da:



Dr.-Ing. Oliver Geibig, Direttore Generale Unità di Business & Engineering  
Tumlingen, 2024-02-16



Jürgen Grün, Direttore Generale Chimica & Qualità

Questa Dichiarazione di Prestazione (DoP) è stata preparata in varie lingue. In caso di contestazioni sull'interpretazione, prevarrà sempre la versione inglese.

L'Appendice include informazioni volontarie e complementari in lingua inglese che superano i requisiti di legge (lingua specificata in modo neutrale).

Translation guidance Essential Characteristics and Performance Parameters for Annexes

**Guida alla traduzione delle Caratteristiche Essenziali e dei Parametri di Prestazione per gli Annessi**

Mechanical resistance and stability (BWR 1)		
Resistenza meccanica e stabilità (BWR 1)		
Characteristic resistance to tension load (static and quasi-static loading) Method A:		
<b>Resistenza caratteristica al carico di tensione (carico statico e quasi-statico) Metodo A:</b>		
1	Resistance to steel failure: <b>Resistenza alla rottura dell'acciaio:</b>	$N_{Rk,s}$ [kN]
2	Resistance to pull-out failure: <b>Resistenza alla rottura per sfilamento:</b>	$N_{Rk,p}$ [kN], $\psi_c$ [-]
3	Resistance to concrete cone failure: <b>Resistenza alla rottura del cono di calcestruzzo:</b>	$k_{cr,N}$ , $k_{ucr,N}$ [-], $h_{ef}$ , $c_{cr,N}$ [mm]
4	Robustness: <b>Robustezza:</b>	$\gamma_{inst}$ [-]
5	Minimum edge distance and spacing: <b>Distanza dal bordo e interassi minimi:</b>	$c_{min}$ , $s_{min}$ , $h_{min}$ [mm]
6	Edge distance to prevent splitting under load: <b>Distanza dal bordo per evitare lo splitting sotto carico:</b>	$N_{Rk,sp}^0$ [kN], $c_{cr,sp}$ [mm]
Characteristic resistance to shear load (static and quasi-static loading):		
<b>Resistenza caratteristica al carico di taglio (carico statico e quasi statico):</b>		
7	Resistance to steel failure (shear load): <b>Resistenza alla rottura dell'acciaio (carico di taglio):</b>	$V_{Rk,s}^0$ [kN], $M_{Rk,s}^0$ [Nm], $k_7$ [-]
8	Resistance to pry-out failure: <b>Resistenza alla rottura per pry-out:</b>	$k_8$ [-]
Characteristic Resistance for simplified design:		
<b>Resistenza caratteristica per una progettazione semplificata:</b>		
9	Method B: <b>Metodo B:</b>	$F_{Rk}^0$ [kN], $M_{Rk,s}^0$ [Nm], $\psi_c$ [-], $c_{cr}$ , $s_{cr}$ , $s_{min}$ , $c_{min}$ , $h_{min}$ [mm]
10	Method C: <b>Metodo C:</b>	$F_{Rk}$ [kN], $M_{Rk,s}^0$ [Nm], $c_{cr}$ , $s_{cr}$ , $s_{min}$ , $h_{min}$ [mm]
Displacements:		
<b>Spostamenti:</b>		
9	Displacements under static and quasi-static loading: <b>Spostamenti sotto azioni statiche e quasi statiche:</b>	$\delta_{N0}$ , $\delta_{N\infty}$ , $\delta_{V0}$ , $\delta_{V\infty}$ [mm]
Characteristic resistance and displacements for seismic performance categories C1 and C2:		
<b>Resistenza e spostamenti caratteristici per le categorie di prestazione sismica C1 e C2:</b>		
12	Resistance to tension load, displacements, category C1: <b>Resistenza al carico di trazione, spostamenti, categoria C1:</b>	$N_{Rk,s,C1}$ , $N_{Rk,p,C1}$ [kN]
	Resistance to tension load, displacements, category C2: <b>Resistenza al carico di trazione, spostamenti, categoria C2:</b>	$N_{Rk,s,C2}$ , $N_{Rk,p,C2}$ [kN], $\delta_{N,C2}$ [mm]
13	Resistance to shear load, displacements, category C1: <b>Resistenza al carico di taglio, spostamenti, categoria C1:</b>	$V_{Rk,s,C1}$ [kN]
	Resistance to shear load, displacements, category C2: <b>Resistenza al carico di taglio, spostamenti, categoria C2:</b>	$V_{Rk,s,C2}$ [kN], $\delta_{V,C2}$ [mm]
14	Factor for annular gap: <b>Fattore spazio anulare:</b>	$\alpha_{gap}$ [-]
Safety in case of fire (BWR 2)		
<b>Sicurezza in caso di incendio (BWR 2)</b>		
15	Reaction to fire: <b>Reazione al fuoco:</b>	Class
Resistance to fire:		
<b>Resistenza al fuoco:</b>		
16	Fire resistance to steel failure (tension load): <b>Resistenza al fuoco alla rottura dell'acciaio (carico di trazione):</b>	$N_{Rk,s,fi}$ [kN]
17	Fire resistance to pull-out failure (tension load): <b>Resistenza al fuoco alla rottura per sfilamento (carico di trazione):</b>	$N_{Rk,p,fi}$ [kN]
18	Fire resistance to steel failure (shear load): <b>Resistenza al fuoco alla rottura dell'acciaio (carico di taglio):</b>	$V_{Rk,s,fi}$ [kN], $M_{Rk,s,fi}^0$ [Nm]
Durability:		
<b>Durabilità:</b>		
19	Durability: <b>Durabilità:</b>	Description/Level

## **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 R 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 European Assessment Document (hereinafter 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**

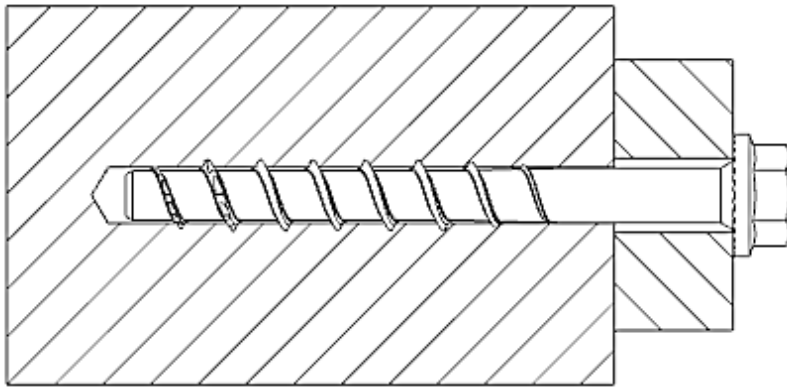
The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirement 1 has been made in accordance with EAD 330232-01-0601; Mechanical fasteners for use in concrete.

## **4 Assessment and verification of constancy of performance (AVCP)**

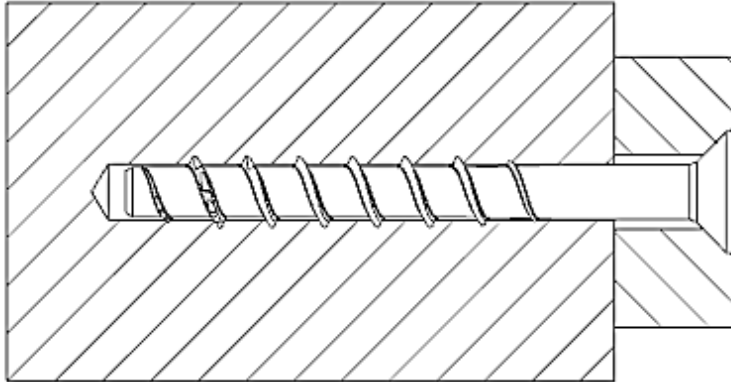
### **4.1 AVCP system**

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 R /  
FBS II US TX R



FBS II SK R

(Fig. not to scale)

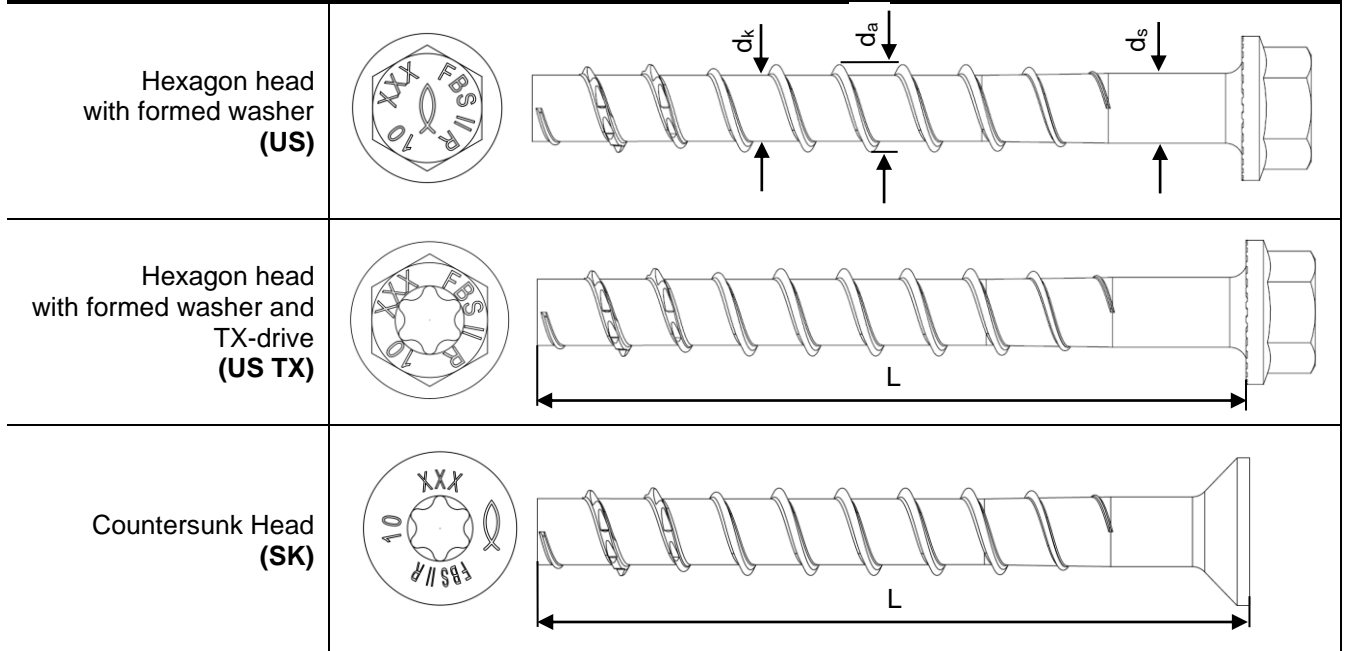
**fischer concrete screw UltraCut FBS II R**

Product description  
Product in the installed condition

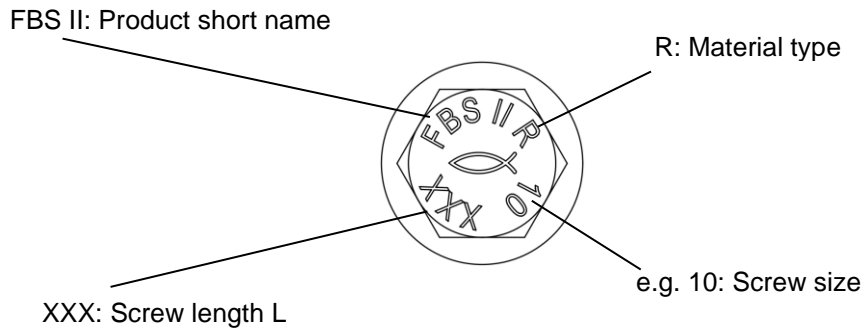
**Annex A1**  
of European  
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**Table A2.1: Geometry and material**

Type of screw / size		FBS II US R / SK R			
		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			



**Head Marking**



(Fig. not to scale)

<b>fischer concrete screw UltraCut FBS II R</b>	<b>Annex A2</b> of European Technical Assessment ETA-17/0740
Product description Geometry and material	

## Specification of intended use:

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

### Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres (cracked and uncracked) according to EN 206:2013 + A1:2016
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A1:2016

### Use conditions (Environmental conditions):

- Structures subjected to dry internal conditions
- For all other conditions according to EN 1993-1-4:2015-10, corresponding to corrosion resistance class CRC III

### 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 EN 1992-4:2016 and EOTA Technical Report TR 055

### 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  $3 d_0$ .
- 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 Plus, FIS HB, FIS SB or FIS EM Plus)

**fischer concrete screw UltraCut FBS II R**

Intended use  
Specification

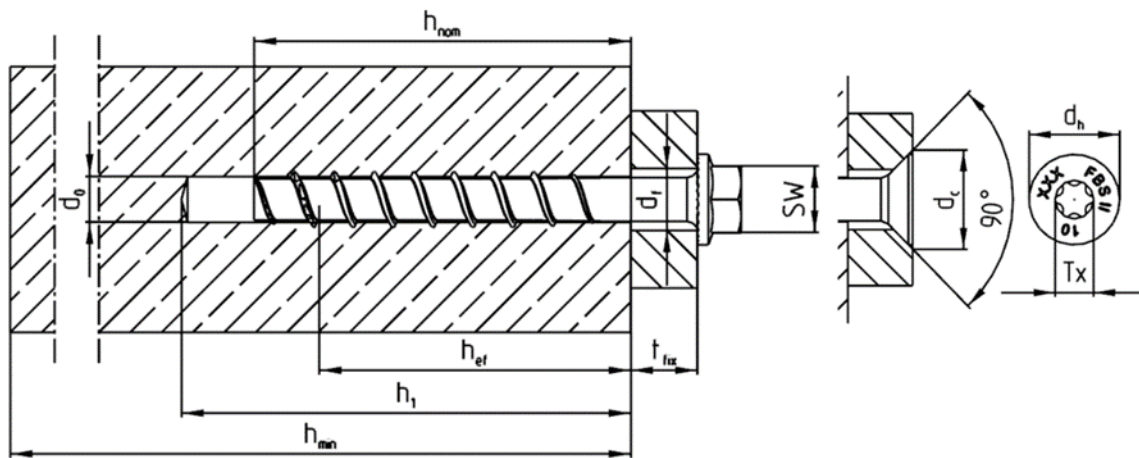
**Annex B1**

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**Table B2.1: Installation parameters**

FBS II R		8		10			12		
Nominal embedment depth	$h_{nom}$	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	$d_h$	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	$L_{min} =$	50	65	55	65	85	60	75	100
	$L_{max} =$	400	415	405	415	435	410	425	450
Torque impact screw driver	$T_{imp,max}$	450					650		
Torque impact screw driver (with adjustable setting process)	$T_{imp,max}$	300					450		



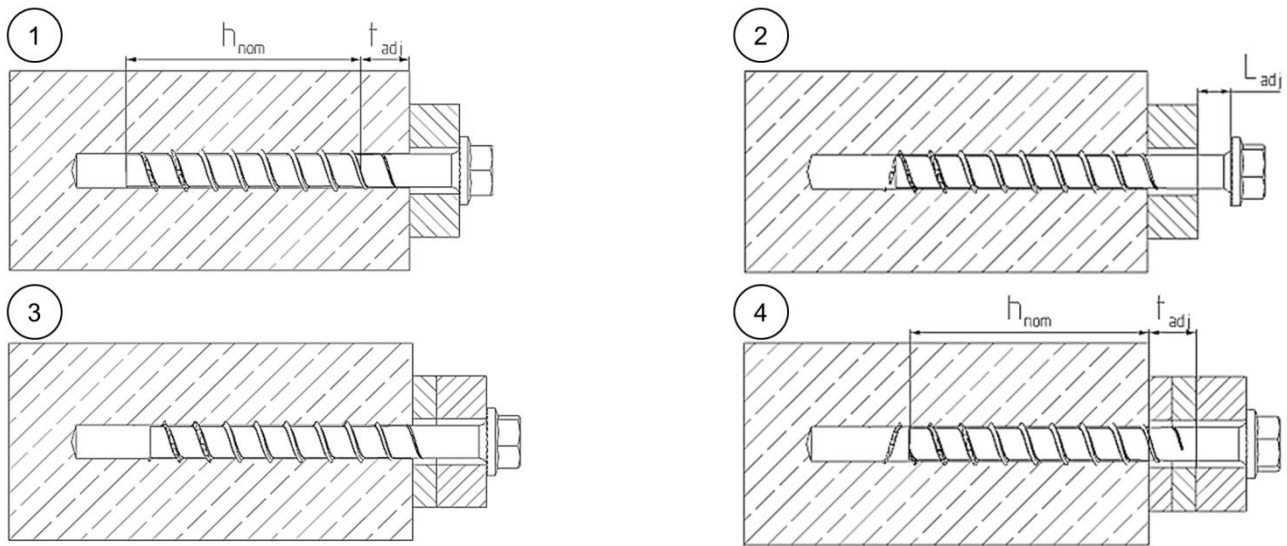
(Fig. not to scale)

**fischer concrete screw UltraCut FBS II R**

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. The required nominal anchoring depth  $h_{nom}$  must be kept after the adjustment process.

(Fig. not to scale)

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

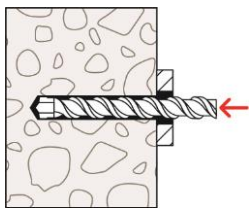
FBS II R		8		10			12			
Nominal embedment depth	$h_{nom}$	[mm]	50	65	55	65	85	60	75	100
Minimum thickness of concrete member	$h_{min}$		100	120	100	120	140	110	130	150
Minimum spacing	$s_{min}$		35		40			50		
Minimum edge distance	$c_{min}$		35		40			50		

**fischer concrete screw UltraCut FBS II R**

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

**Annex B3**  
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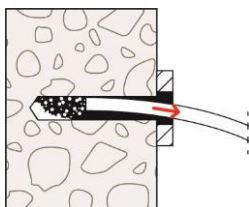
# Installation instruction part 1



## Step 1: Creation of the drill hole:

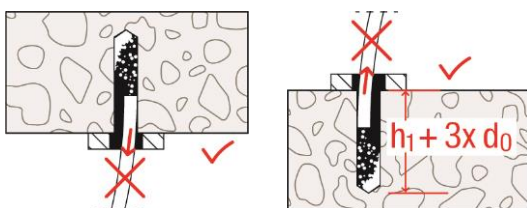
Drill the hole using hammer drill, hollow drill or diamond core drill

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



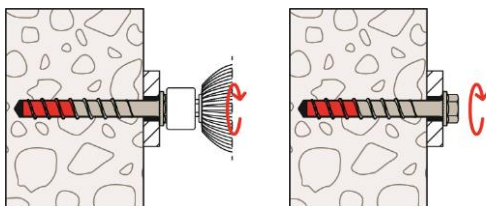
## Step 2: Cleaning of the drill hole - horizontal:

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  $3 \times$  drilling  $\varnothing$  when drilling vertically downwards.



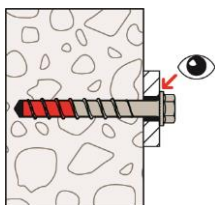
## Step 3: Installation:

Turn in until the head is in contact with the fixture.

Installation with any torque impact screw driver up to the maximum mentioned torque moment ( $T_{imp,max}$  according to table B2.1).

(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:

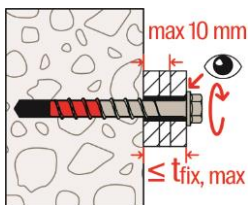
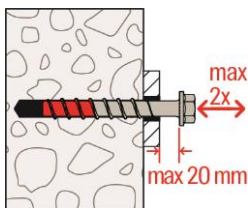
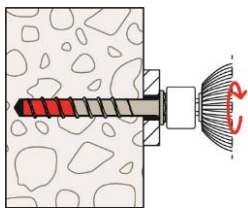
After installation a further turning of the screw must not be possible. The head of the screw must be in contact with the fixture and is not damaged

fischer concrete screw UltraCut FBS II R

Installation Instructions

**Annex B4**  
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## Installation instruction part 2



### Adjustment

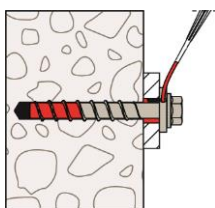
Optional:

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.

The required nominal anchoring depth  $h_{nom}$  must be kept after the adjustment process. (see also annex B3)



### 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<sup>2</sup> (e. g. FIS V Plus, 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 R**

Installation Instructions

**Annex B5**  
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**Table C1.1: Characteristic values for static and quasi-static action**

<b>FBS II R</b>			<b>8</b>		<b>10</b>			<b>12</b>			
Nominal embedment depth	$h_{nom}$	[mm]	50	65	55	65	85	60	75	100	
<b>Steel failure for tension load and shear load</b>											
Characteristic resistance	$N_{Rk,s}$	[kN]	27,8		43,8			67,7			
Partial factor	$\gamma_{Ms,N}$	-	1,5								
Characteristic resistance	$V^0_{Rk,s}$	[kN]	18,0	27,8	13,2	19,3	36,6	20,4	40,1	45,8	
Partial factor	$\gamma_{Ms,V}$	[-]	1,25								
Factor for ductility	$k_7$		1,0								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	31,3		68,5			112,8			
<b>Pullout failure</b>											
Charact. resistance in concrete C20/25	uncracked	$N_{Rk,p}$	[kN]	7,0	14,0	8,5	14,0	$\geq N^0_{Rk,c^{(1)}}$	10,0	12,0	$\geq N^0_{Rk,c^{(1)}}$
	cracked	$N_{Rk,p}$	[kN]	4,0	9,0	4,5	6,0	16,0	4,5	11,0	$\geq N^0_{Rk,c^{(1)}}$
Increasing factors concrete	C25/30	$\psi_c$	[-]	1,12							
	C30/37			1,22							
	C35/45			1,32							
	C40/50			1,41							
	C45/55			1,50							
	C50/60			1,58							
Installation factor	$\gamma_{inst}$	[-]	1,0								
<b>Concrete cone failure and splitting failure; concrete pryout failure</b>											
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	$\geq N^0_{Rk,c^{(1)}}$	15,8	22,9	$\geq N^0_{Rk,c^{(1)}}$	
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	$\gamma_{inst}$		1,0								
<b>Concrete edge failure</b>											
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			
<b>Adjustment</b>											
Maximum thickness of shims	$t_{adj}$	[mm]	10								
Max. number of adjustments	$n_a$		2								

<sup>1)</sup>  $N^0_{Rk,c}$  according EN 1992-4:2018

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Characteristic values for static and quasi-static action

**Annex C1**  
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**Table C2.1: Characteristic values for Seismic Performance Category C1**

FBS II R			8	10	12	
Nominal embedment depth	$h_{nom}$	[mm]	65	85	100	
<b>Steel failure for tension load and shear load C1</b>						
Characteristic resistance	$N_{Rk,s,C1}$	[kN]	27,8	43,8	67,7	
	$V_{Rk,s,C1}$		18,1	29,3	36,6	
Without filling of the annular gap <sup>1)</sup>	$\alpha_{gap}$	[-]	0,5			
With filling of the annular gap <sup>1)</sup>			1,0			
<b>Pullout failure</b>						
Characteristic resistance in cracked concrete	$N_{Rk,p,C1}$	[kN]	9,0	16,0	$\geq N^0_{Rk,c}$ <sup>2)</sup>	
<b>Concrete cone failure</b>						
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	$\gamma_{inst}$	[-]	1,0			
<b>Concrete pryout failure</b>						
Factor for pryout failure	$k_8$	[-]	1,0	2,0		
<b>Concrete edge failure</b>						
Effective length in concrete	$l_f = h_{nom}$	[mm]	65	85	100	
Nominal diameter of screw	$d_{nom}$		8	10	12	

<sup>1)</sup> Filling of the annular gap according annex B 5      <sup>2)</sup>  $N^0_{Rk,c}$  according EN 1992-4:2018

**Table C2.2: Characteristic values for Seismic Performance Category C2**

FBS II R			8	10	12	
Nominal embedment depth	$h_{nom}$	[mm]	65	85	100	
<b>Steel failure for tension load and shear load C2</b>						
Characteristic resistance	$N_{Rk,s,C2}$	[kN]	27,8	43,8	67,7	
	$V_{Rk,s,C2}$		9,7	8,8	19,7	
With filling of the annular gap <sup>1)</sup>	$\alpha_{gap}$	[-]	1,0			
<b>Pullout failure</b>						
Characteristic resistance in cracked concrete	$N_{Rk,p,C2}$	[kN]	2,8	5,0	7,3	
<b>Concrete cone failure</b>						
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	$\gamma_{inst}$	[-]	1,0			
<b>Concrete pryout failure</b>						
Factor for pryout failure	$k_8$	[-]	1,0	2,0		
<b>Concrete edge failure</b>						
Effective length in concrete	$l_f = h_{nom}$	[mm]	65	85	100	
Nominal diameter of screw	$d_{nom}$		8	10	12	

<sup>1)</sup> 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 C1 and C2

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**Table C3.1: Characteristic values for resistance to fire**

<b>FBS II R</b>			<b>8</b>		<b>10</b>			<b>12</b>			
Nominal embedment depth	$h_{nom}$	[mm]	50	65	55	65	85	60	75	100	
<b>Steel failure for tension load and shear load (<math>F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}</math>)</b>											
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	[kN]	2,1		3,0		No performance declared		
			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	[Nm]	2,4		4,2		No performance declared		
			R60		1,9		3,2				
			R90		1,4		2,2				
			R120		1,1		1,7				
<b>Pullout failure</b>											
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									
<b>Concrete cone failure</b>											
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									
<b>Edge distance</b>											
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 $\geq 300$ mm											
<b>Spacing</b>											
R30 to R120	$S_{cr,fi}$	[mm]	2 $C_{cr,fi}$								
<b>Concrete pryout failure</b>											
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.											
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Characteristic values for resistance to fire											

**Table C4.1: Displacements due to tension loads (static and quasi-static)**

FBS II R			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	$\delta_{N0}$	[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	$\delta_{N0}$	[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 R			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)	$\delta_{V0}$	[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 R			8	10	12
Nominal embedment depth	$h_{nom}$		65	85	100
Displacement DLS	$\delta_{N,C2 (DLS)}$	[mm]	0,9	0,9	1,1
Displacement ULS	$\delta_{N,C2 (ULS)}$		2,5	2,7	3,2

**Table C4.4: Displacements due to shear loads (Seismic Performance Category C2)**

FBS II R			8	10	12
Nominal embedment depth	$h_{nom}$		65	85	100
Displacement DLS	$\delta_{V,C2 (DLS)}$	[mm]	1,6	1,7	2,6
Displacement ULS	$\delta_{V,C2 (ULS)}$		5,0	3,8	6,6

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Displacements due to tension and shear loads

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