DEKLARACJA WŁAŚCIWOŚCI UŻYTKOWYCH

DoP 0370
dla kotwa sworzniowa fischer ULTRACUT FBS II R (Kotwy metalowe do stosowania w betonie) PL

1. Niepowtarzalny kod identyfikacyjny typu wyrobu: **DoP 0370**

2. Zamierzone zastosowanie: **Mocowanie w betonie zarysowanym lub niezarysowanym, zobacz załącznik, w szczególności aneksy B1 - B5.**

3. Producent: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Niemcy**

4. Upoważniony przedstawiciel: **–**

5. System(-y) oceny i weryfikacji stałości właściwości użytkowych: **1**

6. Europejski dokument oceny: **EAD 330232-01-0601**
   Europejska ocena techniczna: **ETA-17/0740; 2025-01-08**
   Jednostka ds. oceny technicznej: **DIBt- Deutsches Institut für Bautechnik**
   Jednostka lub jednostki notyfikowane: **2873 TU Darmstadt**

7. Deklarowane właściwości użytkowe:

Wytrzymałość mechaniczna i stabilność osadzenia (BWR 1)

Nośność charakterystyczna na wyrywanie (nośności statyczne i quasi-statyczne) Metoda A:
Nośność do uszkodzenia stali: Aneksy C1
Nośność na wyrywanie: Aneksy C1
Nośność do wyrwania stożka betonu: Aneksy C1
Solidność: Aneksy C1
Minimalne odstępy osiowe i krawędziowe: Aneksy C4
Odległość od krawędzi zapobiegająca pękaniu pod obciążeniem: Aneksy C1

Nośność charakterystyczna na ścinanie (nośności statyczne i quasi-statyczne):
Nośność do uszkodzenia stali (obciążenie ścinające): Aneksy C1
Nośność do uszkodzenia wyważenia: Aneksy C1

Charakterystyczna wytrzymałość dla uproszczonego projektu:
Metoda B: NPD
Metoda C: NPD

Przesunięcia:
Przemieszczenia przy obciążeniu statycznym i quasi-statycznym: Aneksy C4

Nośność charakterystyczna i przemieszczenia w warunkach sejsmicznych dla kategorii C1 i C2:
Nośność na wyrywanie, kategoria C1: Aneks C2
Nośność na wyrywanie, kategoria C2: Aneks C2
Nośność na ścinanie, kategoria C1: Aneks C2
Nośność na ścinanie, kategoria C2: Aneks C2
Współczynnik szczeliny pierścieniowej: Aneks C2

Ochrona przeciwpożarowa (BWR 2)
Reakcja na ogień: Klasy (A1)

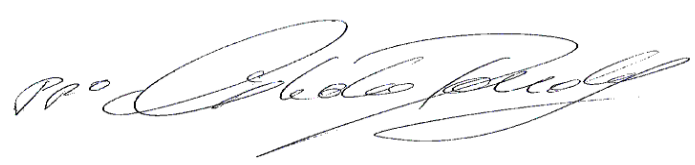
Odporność na działanie ognia:
Odporność ogniowa do zniszczenia stali (obciążenie rozciągające): Aneks C3
Odporność ogniowa na wyrywanie (obciążenie rozciągające): Aneks C3
Odporność ogniowa na zniszczenie stali (obciążenie ścinające): Aneks C3

Trwałość:
Trwałość: Aneksy B1

8. Odpowiednia dokumentacja techniczna lub specjalna dokumentacja techniczna: –

Właściwości użytkowe określonego powyżej wyrobu są zgodne z zestawem deklarowanych właściwości użytkowych. Niniejsza deklaracja właściwości użytkowych wydana zostaje zgodnie z rozporządzeniem (UE) nr 305/2011 na wyłączną odpowiedzialność producenta określonego powyżej.

W imieniu producenta podpisał(-a):



Dr. Ronald Mihala, Dyrektor ds. rozwoju i zarządzania produkcją

Dieter Pfaff, Kierownik Międzynarodowej Federacji Produkcji i Zarządzania Jakością

Tumlingen, 2025-02-03

Niniejsza Deklaracja Właściwości Użytkowych została przygotowana w różnych językach. W razie wątpliwości w interpretacji, wersja angielska jest zawsze miarodajna.

Załącznik zawiera dobrowolne i uzupełniające informacje w języku angielskim (neutralne językowo), a wykraczające poza wymagania prawne.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

Wytyczne dotyczące tłumaczenia zasadniczych właściwości oraz parametrów użytkowych dla załączników

Mechanical resistance and stability (BWR 1) **Wytrzymałość mechaniczna i stabilność osadzenia (BWR 1)**		
Characteristic resistance under static and quasi-static loading, Method A **Nośność charakterystyczna na wyrywanie (nośności statyczne i quasi-statyczne) Metoda A:**		
1	Resistance to steel failure: **Nośność do uszkodzenia stali:**	$N_{Rk,s}$ [kN], E_s [N/mm^2]
2	Resistance to pull- out failure: **Nośność na wyrywanie:**	$N_{Rk,p}$ [kN], ψ_c
3	Resistance to concrete cone failure: **Nośność do wyrwania stożka betonu:**	$k_{cr,N}$, $k_{ucr,N}$ [-], h_{ef}, $c_{cr,N}$ [mm]
4	Robustness: **Solidność:**	γ_{inst} [-]
5	Minimum edge distance and spacing: **Minimalne odstępy osiowe i krawędziowe:**	c_{min}, s_{min}, h_{min} [mm]
6	Edge distance to prevent splitting under load: **Odległość od krawędzi zapobiegająca pękaniu pod obciążeniem:**	$N^0_{Rk,sp}$ [kN], $c_{cr,sp}$ [mm]
Characteristic resistance to shear load (static and quasi-static loading), Method A **Nośność charakterystyczna na ścinanie (nośności statyczne i quasi-statyczne):**		
7	Resistance to steel failure under shear load: **Nośność do uszkodzenia stali (obciążenie ścinające):**	$V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], k_7 [-]
8	Resistance to pry-out failure: **Nośność do uszkodzenia wyważenia:**	k_8 [-]
Characteristic Resistance for simplified design **Charakterystyczna wytrzymałość dla uproszczonego projektu:**		
9	Method B: **Metoda B:**	F^0_{Rk} [kN], c_{cr}, s_{cr} [mm]
10	Method C: **Metoda C:**	F_{Rk} [kN]
Displacements **Przesunięcia:**		
11	Displacements under static and quasi-static loading: **Przemieszczenia przy obciążeniu statycznym i quasi-statycznym:**	δ_{N0}, $\delta_{N\infty}$, δ_{V0}, $\delta_{V\infty}$ [mm]
12	Stiffness characteristics for tension loading for non-linear spring models:	$k_{1,ucr}$, $k_{2,ucr}$, $k_{3,ucr}$, $k_{4,ucr}$, $k_{1,cr}$, $k_{2,cr}$, $k_{3,cr}$, $k_{4,cr}$ [kN/mm]
Characteristic resistance and displacements for seismic performance categories C1 and C2 **Nośność charakterystyczna i przemieszczenia w warunkach sejsmicznych dla kategorii C1 i C2:**		
13	Resistance to tension load, displacements, category C1: **Nośność na wyrywanie, kategoria C1:**	$N_{Rk,s,C1}$ [kN], $N_{Rk,p,C1}$ [kN]
	Resistance to tension load, displacements, category C2: **Nośność na wyrywanie, kategoria C2:**	$N_{Rk,s,C2}$ [kN], $N_{Rk,p,C2}$ [kN], $\delta_{N,C2}$ [mm]
14	Resistance to shear load, displacements, category C1: **Nośność na ścinanie, kategoria C1:**	$V_{Rk,s,C1}$ [kN]
	Resistance to shear load, displacements, category C2: **Nośność na ścinanie, kategoria C2:**	$V_{Rk,s,C2}$ [kN], $\delta_{V,C2}$ [mm]
15	Factor for annular gap **Współczynnik szczeliny pierścieniowej:**	α_{gap} [-]
Safety in case of fire (BWR 2) **Ochrona przeciwpożarowa (BWR 2)**		
16	Reaction to fire: **Reakcja na ogień:**	Class
Resistance to fire: **Odporność na działanie ognia:**		
17	Fire resistance to steel failure (tension load): **Odporność ogniowa do zniszczenia stali (obciążenie rozciągające):**	$N_{Rk,s,fi}$ [kN]
18	Fire resistance to pull-out failure (tension load): **Odporność ogniowa na wyrywanie (obciążenie rozciągające):**	$N_{Rk,p,fi}$ [kN]
19	Fire resistance to steel failure (shear load): **Odporność ogniowa na zniszczenie stali (obciążenie ścinające):**	$V_{Rk,s,fi}$ [kN], $M^0_{Rk,s,fi}$ [Nm]
Aspects of durability **Trwałość:**		
20	Durability: **Trwałość:**	Class

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.

Durability:
See annex B1.

Other Basic Requirements are not relevant.

3.2 Methods of assessment

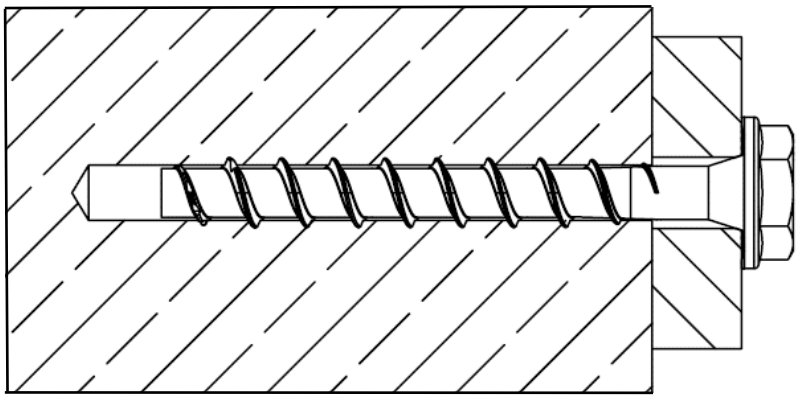
The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirement 1 has been made in accordance with EAD 330232-01-0601; Mechanical fasteners for use in concrete.

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

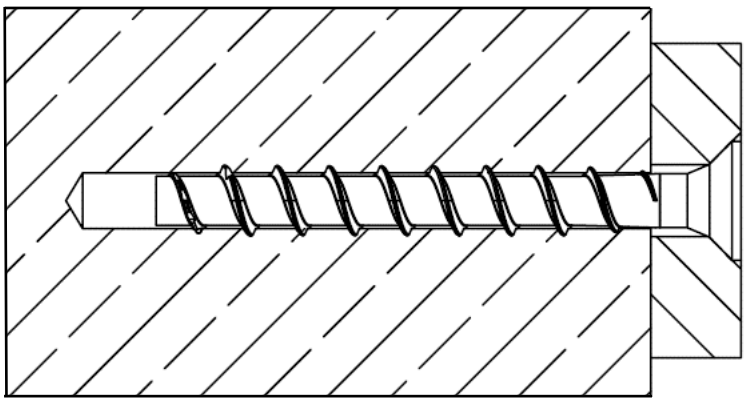
4.1 AVCP system

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.

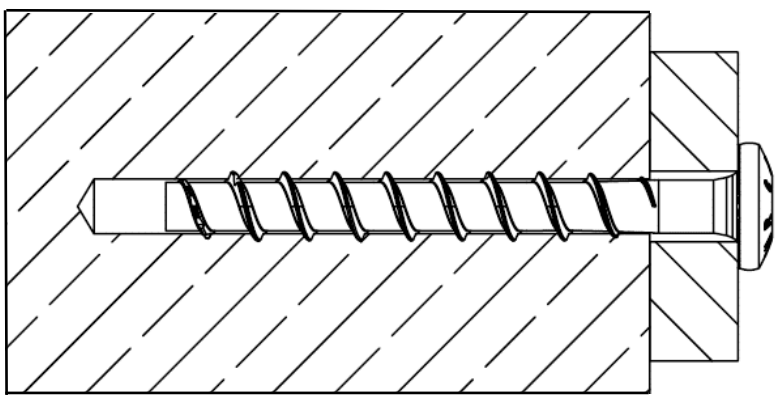
Product in the installed condition



FBS II US R/
FBS II US TX R



FBS II SK R



FBS II P R

(Figure not to scale)

fischer concrete screw UltraCut FBS II R

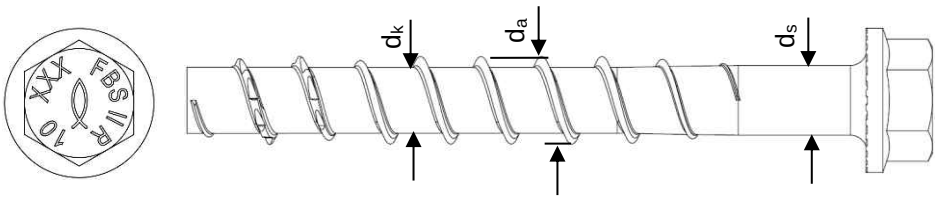
Annex A 1

Product description
Product in the installed condition

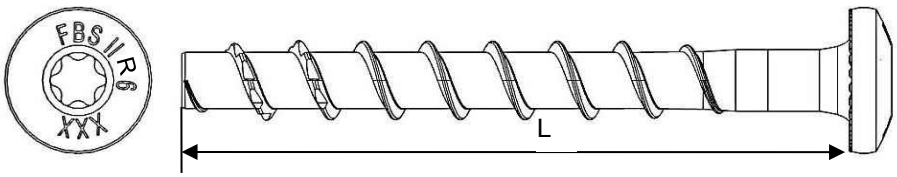
Table A2.1: Geometry and material

Type of screw / size			FBS II US R / FBS II SK R / FBS II P R			
			6	**8**	**10**	**12**
Thread outer diameter	d_a	[mm]	7,8	10,3	12,5	14,6
Core diameter	d_k		5,6	7,5	9,4	11,1
Shaft diameter	d_s		6,0	8,0	9,9	11,7
Material			Tip: hardened steel; Shaft and head: stainless steel EN 10088-1:2023			
Coating			Tip: red colour			

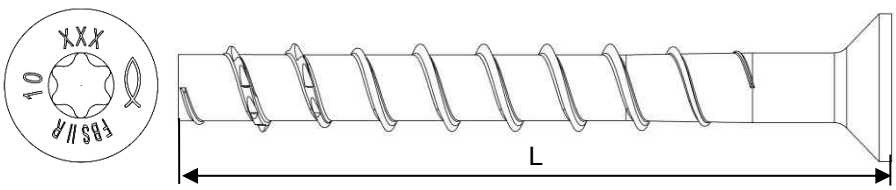
Hexagon head with formed washer **(US/US TX)**



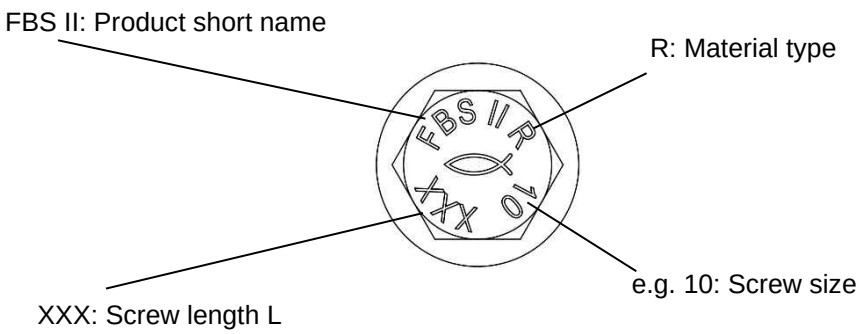
Pan head **(P)**



Countersunk Head **(SK)**



Head Marking (example)



(Figure not to scale)

fischer concrete screw UltraCut FBS II R

Product description
Geometry and material

Annex A 2

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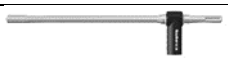
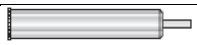
Specification of intended use:

Size	FBS II R								
	6	8		10			12		
Nominal embedment depth [mm]	60	50	65	55	65	85	60	75	100
Hammer drilling 	✓								
Hollow drilling 	- [1]	✓							
Diamond drilling 									
Static and quasi-static loads	✓								
Cracked and uncracked concrete									
Fire exposure									
Seismic performance category C1	✓	- [1]	✓	- [1]	✓		- [1]		✓
Seismic performance category C2	- [1]								

[1] No performance assessed

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres (cracked or uncracked) according to EN 206:2013+A2:2021
- Strength classes C20/25 to C50/60 according to EN 206:2013+A2:2021

Use conditions (Environmental conditions):

- Structures subjected to dry internal conditions (FBS II R)
- For all other conditions according to EN 1993-1-4:2006 + A1:2015, corresponding to corrosion resistance class
  - CRC III: for FBS II R

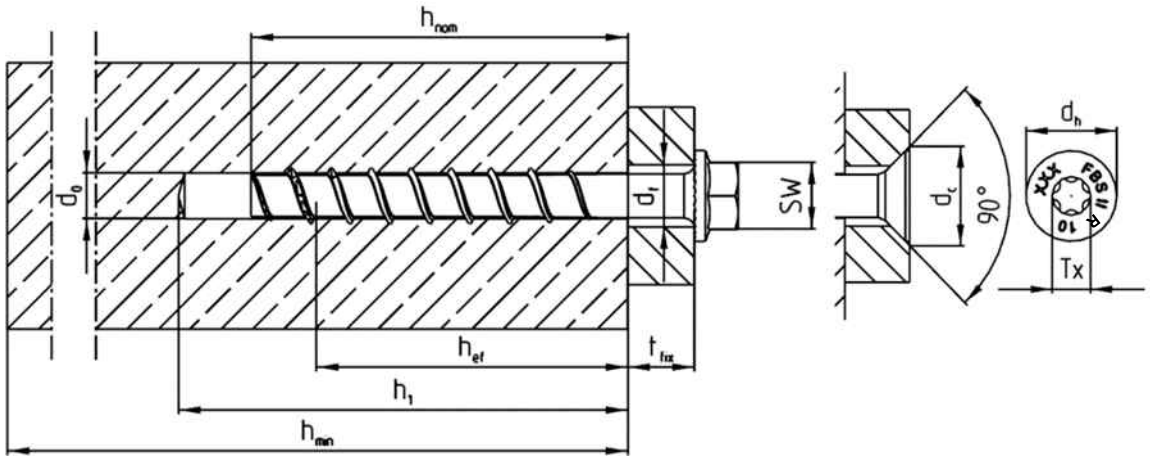
Design:

- The structural design according to EN 1992-4:2018 are conducted under responsibility of a designer expierenced in the field of anchorages and concrete works.
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the fastener 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 1992-4:2018 and EOTA Technical Report TR 055:2018

Table B2.1: Installation parameters

FBS II R			**6**	**8**		**10**			**12**		
Nominal embedment depth	h_{nom}	[mm]	60	50	65	55	65	85	60	75	100
Nominal drill hole diameter	d_0	[mm]	6	8		10			12		
Cutting diameter of drill bits	$d_{cut} \leq$	[mm]	6,40	8,45		10,45			12,50		
Cutting diameter for diamond drillers	$d_{cut} \leq$	[mm]	- [1)]	8,10		10,30			12,30		
Clearance hole diameter	d_f	[mm]	8,0	10,6 – 12,0		12,8 – 14,0			14,8 – 16,0		
Wrench size (US)	SW	[mm]	10 / 13	13		15			17		
TX-size (SK / P / US TX))	TX	[-]	30	40		50			-		
Countersunk head diameter	d_h	[mm]	13,3	18		21			-		
Countersunk diameter in fixture	d_c	[mm]	15,2	20		23			-		
Drill hole depth	$h_1 \geq$	[mm]	70	60	75	65	75	95	70	85	110
Drill hole depth (with adjustable setting)	$h_1 \geq$	[mm]	- [1)]	70	85	75	85	105	80	95	120
Thickness of fixture	$t_{fix} \leq$	[mm]	$L - h_{nom}$								
Length of screw	$L_{min} =$	[mm]	65	50	65	55	65	85	60	75	100
	$L_{max} =$	[mm]	400	400	415	405	415	435	410	425	450
Torque impact screw driver	$T_{imp,max}$	[Nm]	240	450					650		
Torque impact screw driver (with adjustable setting process)	$T_{imp,max}$	[Nm]	- [1)]	300					450		

[1)] No performance assessed



(Figure not to scale)

fischer concrete screw UltraCut FBS II R

Intended use
Installation parameters

Annex B 2

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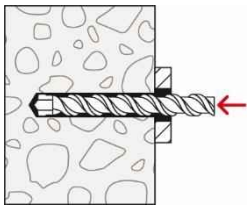
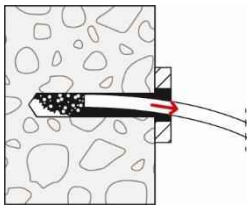
Installation instruction part 1 FBS II 8/10/12 R



Step 1: Drilling of the hole:

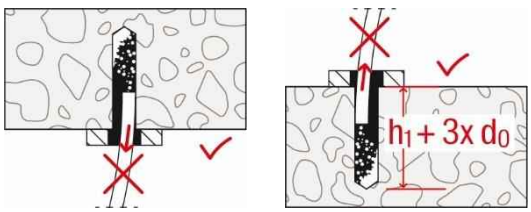
Drill the hole using hammer drill,
hollow drill or diamond core drill

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



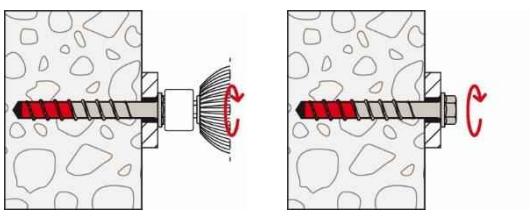
Step 2: Cleaning of the drill hole - horizontal:

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 x drilling ø when drilling vertically downwards.

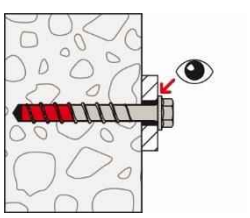


Step 3: Installation:

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

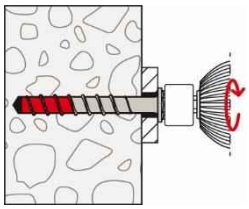
Installation with any torque impact screw driver up to the maximum mentioned torque moment ($T_{imp,max}$ according to table B2.1).

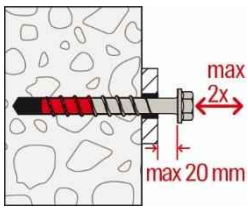
Alternatively, all other tools without an indicated torque moment are allowed (e.g. ratchet spanner). The indicated torque moments $T_{imp,max}$ for impact screw driver are not decisive for manual installation.

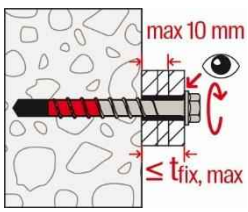


Step 4: Checking of the correct installation:

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

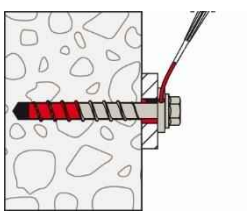






Adjustment

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 B 3)



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 ≥ 50 N/mm²
(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.

Installation instruction FBS II 6 R

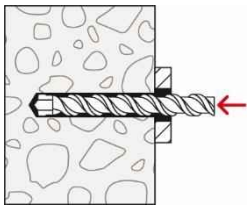
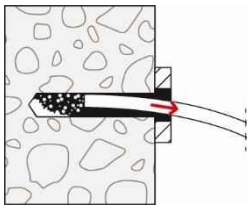
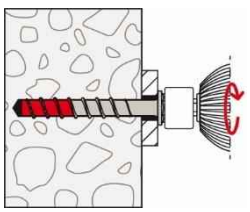
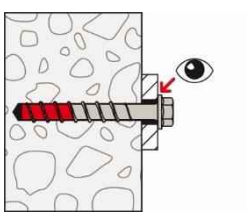
	**Step 1: Drilling of the hole:** Drill the hole using hammer drill Drill hole diameter d_0 and drill hole depth h_1 according to table B2.1
	**Step 2: Cleaning of the drill hole:** Clean the drill hole.
	**Step 3: Installation:** Turn in until the head is in contact with the fixture. Installation with any torque impact screw driver up to the maximum mentioned torque moment ($T_{imp,max}$ according to table B2.1).
	**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

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

FBS II R				**6**	**8**		**10**			**12**		
Nominal embedment depth		h_{nom}	[mm]	60	50	65	55	65	85	60	75	100
Steel failure for tension load and shear load												
Characteristic resistance		$N_{Rk,s}$	[kN]	19,3	27,8		43,8			67,7		
Partial factor		$\gamma_{Ms,N}$	-	1,5								
Characteristic resistance		$V^0_{Rk,s}$	[kN]	12,6	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		0,75								
Characteristic bending resistance		$M^0_{Rk,s}$	[Nm]	16,1	31,3		68,5			112,8		
Pullout failure												
Characteristic resistance in concrete C20/25	uncracked	$N_{Rk,p}$	[kN]	10,0	7,0	14,0	8,5	14,0	≥ $N^0_{Rk,c}$ [1]	10,0	12,0	≥ $N^0_{Rk,c}$ [1]
	cracked	$N_{Rk,p}$	[kN]	4,0	4,0	9,0	4,5	6,0	16,0	4,5	11,0	≥ $N^0_{Rk,c}$ [1]
Increasing factors concrete	C25/30	ψ_c	[-]	1,07	1,12							
	C30/37			1,13	1,22							
	C35/45			1,18	1,32							
	C40/50			1,23	1,41							
	C45/55			1,28	1,50							
	C50/60			1,32	1,58							
Installation factor		γ_{inst}	[-]	1,4	1,0							
Concrete cone failure and splitting failure; concrete pryout failure												
Effective embedment depth		h_{ef}	[mm]	37	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}								
Characteristic resistance for splitting		$N^0_{Rk,sp}$	[kN]	min{ $N^0_{Rk,c}$; $N_{Rk,p}$ }	12,0	18,4	13,0	17,9	≥ $N^0_{Rk,c}$ [1]	15,8	22,9	≥ $N^0_{Rk,c}$ [1]
Characteristic edge distance for splitting		$c_{cr,sp}$	[mm]	1,78 · h_{ef}	1,5 · h_{ef}							
Characteristic spacing for splitting		$s_{cr,sp}$		3 · h_{ef}								
Factor for pryout failure		k_8	[-]	2,6	1,0				2,0	1,0	2,0	
Installation factor		γ_{inst}		1,4 [2]	1,0							
Concrete edge failure												
Effective length in concrete		l_f	[mm]	46	50	65	55	65	85	60	75	100
Nominal diameter of screw		d_{nom}		6	8		10			12		
Adjustment												
Maximum thickness of shims		t_{adj}	[mm]	- [3]	10							
Maximum number of adjustments		n_a	[-]	- [3]	2							

[1] $N^0_{Rk,c}$ according to EN 1992-4:2018
[2] Only for concrete cone failure and splitting failure; concrete pryout failure according to EN 1992-4:2018, Table 4.1
[3] No performance assessed

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Annex C 1

Performances
Characteristic values for static and quasi-static action

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

FBS II R				**6**	**8**	**10**	**12**
Nominal embedment depth		h_{nom}	[mm]	60	65	85	100
Steel failure for tension load and shear load C1							
Characteristic resistance		$N_{Rk,s,C1}$	[kN]	19,3	27,8	43,8	67,7
		$V_{Rk,s,C1}$		7,5	18,1	29,3	36,6
Without filling of the annular gap		α_{gap}	[-]	0,5			
With filling of the annular gap[1)]				1,0			
Pullout failure							
Characteristic resistance in cracked concrete		$N_{Rk,p,C1}$	[kN]	3,5	9,0	16,0	$\geq N^0_{Rk,c}$[2)]
Concrete cone failure							
Effective embedment depth		h_{ef}	[mm]	37	52	68	81
Concrete cone failure	Edge distance	$c_{cr,N}$		$1,5 \cdot h_{ef}$			
	Spacing	$s_{cr,N}$		$3 \cdot h_{ef}$			
Installation factor		γ_{inst}	[-]	1,4	1,0		
Concrete pryout failure							
Factor for pryout failure		k_8	[-]	2,6	1,0	2,0	
Concrete edge failure							
Effective length in concrete		l_f	[mm]	46	65	85	100
Nominal diameter of screw		d_{nom}		6	8	10	12

[1)] Filling of the annular gap according to annex B 4
[2)] $N^0_{Rk,c}$ according to EN 1992-4:2018

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

FBS II R				**6**	**8**	**10**	**12**
Nominal embedment depth		h_{nom}	[mm]	- [2)]	65	85	100
Steel failure for tension load and shear load C2							
Characteristic resistance		$N_{Rk,s,C2}$	[kN]	- [2)]	27,8	43,8	67,7
		$V_{Rk,s,C2}$			9,7	8,8	19,7
With filling of the annular gap[1)]		α_{gap}	[-]		1,0		
Pullout failure							
Characteristic resistance in cracked concrete		$N_{Rk,p,C2}$	[kN]	- [2)]	2,8	5,0	7,3
Concrete cone failure							
Effective embedment depth		h_{ef}	[mm]	- [2)]	52	68	81
Concrete cone failure	Edge distance	$c_{cr,N}$		- [2)]	$1,5 \cdot h_{ef}$		
	Spacing	$s_{cr,N}$			$3 \cdot h_{ef}$		
Installation factor		γ_{inst}	[-]		1,0		
Concrete pryout failure							
Factor for pryout failure		k_8	[-]	- [2)]	1,0	2,0	
Concrete edge failure							
Effective length in concrete		$l_f = h_{nom}$	[mm]	- [2)]	65	85	100
Nominal diameter of screw		d_{nom}			8	10	12

[1)] Filling of the annular gap according to annex B 4. Application without filling of the annular gap not allowed.
[2)] No performance assessed

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Annex C 2

Performances
Characteristic values for Seismic Performance Category C1 and C2

Table C3.1: Characteristic values for resistance to fire

FBS II R				**6**	**8**		**10**			**12**		
Nominal embedment depth		h_{nom}	[mm]	60	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 ≥SW13	$F_{Rk,s,fi}$	R30	[kN]	2,1	2,3	6,4	3,5	11,0	4,6		15,2
			R60		1,7	1,8	4,7	2,7	8,1	3,7		11,2
			R90		1,2	1,3	2,9	2,0	5,2	2,7		7,3
			R120		1,0	1,0	2,0	1,6	3,8	2,2		5,3
	SK/P[1)] US SW10[1)]	$F_{Rk,s,fi}$	R30		1,8	2,1		3,0		No performance assessed		
			R60		1,4	1,7		2,3				
			R90		1,1	1,2		1,6				
			R120		0,9	1,0		1,2				
	US US TX ≥SW13	$M^0_{Rk,s,fi}$	R30	[Nm]	1,7	2,6	7,2	7,6	15,4	16,8		25,3
			R60		1,4	2,0	5,2	6,0	11,4	13,3		18,7
			R90		1,0	1,5	3,3	4,4	7,3	9,8		12,1
			R120		0,8	1,2	2,3	3,6	5,3	8,0		8,8
	SK/P[1)] US SW10[1)]	$M^0_{Rk,s,fi}$	R30		1,5	2,4		4,2		No performance assessed		
			R60		1,2	1,9		3,2				
			R90		0,9	1,4		2,2				
			R120		0,7	1,1		1,7				
Pullout failure												
Characteristic resistance		$N_{Rk,p,fi}$	R30	[kN]	1,0	1,7	2,4	2,1	3,5	4,3	2,5	3,0	6,3
			R60									
			R90									
			R120		0,8	1,4	1,9	1,7	2,8	3,4	2,0	2,4	5,0
Concrete cone failure												
Characteristic resistance		$N_{Rk,c,fi}$	R30	[kN]	1,4	1,6	3,4	2,1	3,2	6,6	2,6	4,8	10,2
			R60									
			R90									
			R120		1,1	1,3	2,7	1,7	2,6	5,3	2,1	3,8	8,1
Edge distance												
R30 to R120		$c_{cr,fi}$	[mm]	$2 \cdot h_{ef}$								
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]	$2 \cdot c_{cr,fi}$								
Concrete pryout failure												
R30 to R120		k_8	[-]	2,6	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.

[1)] Only FBS II 6 R

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

FBS II R			**6**	**8**		**10**			**12**		
Nominal embedment depth	h_{nom}	[mm]	60	50	65	55	65	85	60	75	100
Tension load in uncracked concrete	N	[kN]	5,0	3,5	7,1	4,2	7,0	11,9	5,0	6,0	17,1
Displacement in uncracked concrete	δ_{N0}	[mm]	0,1	0,5	0,7	0,4	0,6	0,8	1,0	0,9	1,25
	$\delta_{N\infty}$		0,4	0,7	0,7	0,8	0,8	0,8	1,25	1,25	1,25
Tension load in cracked concrete	N	[kN]	2,8	3,5	4,5	4,2	7,0	8,1	5,0	6,0	12,0
Displacement in cracked concrete	δ_{N0}	[mm]	0,1	0,6	0,4	0,4	0,6	0,7	0,9	0,9	1,4
	$\delta_{N\infty}$		0,5	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			**6**	**8**		**10**			**12**		
Nominal embedment depth	h_{nom}	[mm]	60	50	65	55	65	85	60	75	100
Shear load in cracked and uncracked concrete	V	[kN]	7,8	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]	2,2	4,1	2,7	1,2	1,2	3,5	1,1	2,5	2,9
	$\delta_{V\infty}$		3,4	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			**6**	**8**	**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	- [1)]	65	85	100
Displacement DLS	$\delta_{N,C2\ (DLS)}$			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			**6**	**8**	**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	- [1)]	65	85	100
Displacement DLS	$\delta_{V,C2\ (DLS)}$			1,6	1,7	2,6
Displacement ULS	$\delta_{V,C2\ (ULS)}$			5,0	3,8	6,6

[1)] No performance assessed

Table C4.5: Minimum thickness of concrete members, minimum spacing and edge distance

FBS II R			**6**	**8**		**10**			**12**		
Nominal embedment depth	h_{nom}	[mm]	60	50	65	55	65	85	60	75	100
Minimum thickness of concrete member	h_{min}		100	100	120	100	120	140	110	130	150
Minimum spacing	s_{min}		35			40			50		
Minimum edge distance	c_{min}		35			40			50		

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Annex C 4

Performances
Displacements due to tension and shear loads;
Minimum thickness of concrete members, minimum spacing and edge distance