

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-20/0321**  
**of 19 June 2020**

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 ULTRACUT FBS II

Product family  
to which the construction product belongs

Connector for Strengthening of existing concrete  
structures by concrete overlay

Manufacturer

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

Manufacturing plant

fischerwerke

This European Technical Assessment  
contains

12 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

EAD 332347-00-0601, Edition 12/2019

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

## Specific Part

### 1 Technical description of the product

The Shear connector fischer concrete screw UTRACUT FBS II is a concrete screw made of galvanised steel anchored into a predrilled cylindrical drill hole in existing concrete. The special thread of the concrete screw cuts an internal thread into the member while setting. The fischer concrete screw UTRACUT FBS II is connecting two layers of concrete cast at different times (existing concrete and concrete overlay). The side with head of concrete screw is finally embedded in the concrete overlay.

The product description is given in Annex A.

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### 3 Performance of the product and references to the methods used for its assessment

#### 3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Existing concrete: - resistances - edge distance and spacing	See Annex C 1 See Annex B 3
Concrete overlay: - resistances - edge distance and spacing	See Annex A 2 and C 2 See Annex B 3
Shear interface parameter under static and quasi-static and fatigue cyclic loading - material and geometric parameters - factor for fatigue cyclic loading	See Annex C 2 No performance assessed

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

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

In accordance with European Assessment Document EAD No. 332347-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 19 June 2020 by Deutsches Institut für Bautechnik

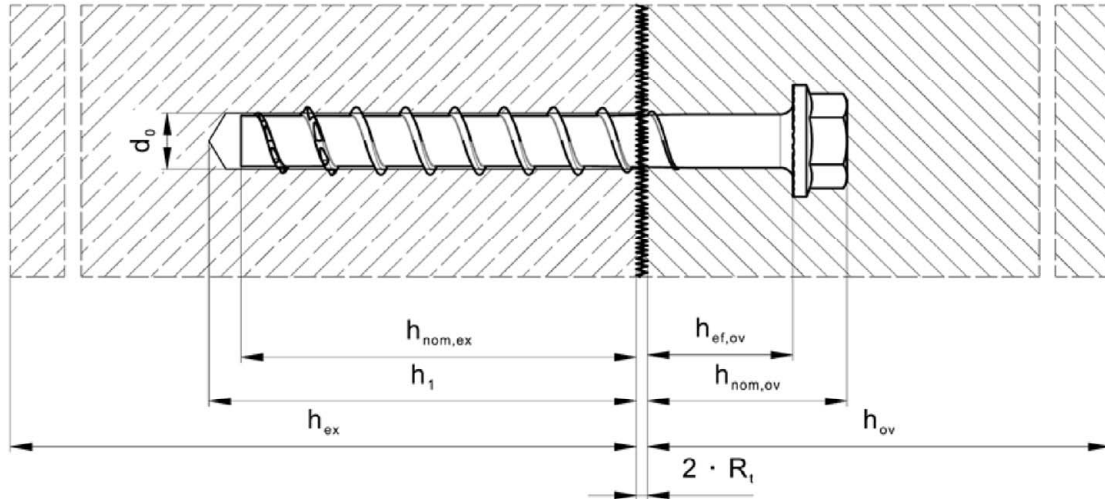
BD Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Tempel

**Installed condition**

**Existing Concrete**

**Concrete overlay**



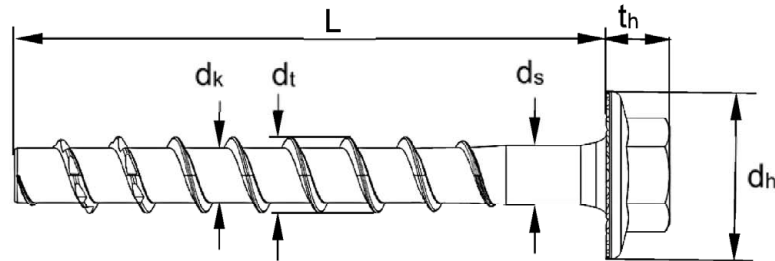
$h_{nom,ex}$	Overall embedment depth in existing concrete	$h_{ef,ov}$	Effective embedment depth in concrete overlay
$h_1$	Drill hole depth	$h_{nom,ov}$	Overall embedment depth in concrete overlay
$h_{ex}$	Thickness of existing concrete	$h_{ov}$	Thickness of concrete overlay
$R_t$	Roughness according to EOTA TR 066:2018-11	$d_0$	Nominal drill hole diameter

**Table A1.1: Screw types FBS II 8 - 14**

FBS II 8 - 14	
Hexagon head with formed washer (US)	
Hexagon head with formed washer and TX-drive (US TX)	
(Fig. not to scale)	
fischer concrete screw ULTRACUT FBS II	
<b>Product description</b> Installed condition Screw types	<b>Annex A 1</b>

**Table A2.1: Dimensions and material**

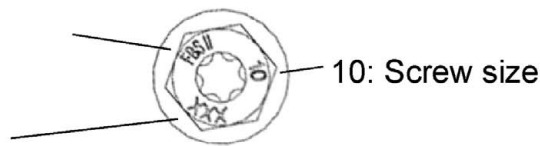
Screw types / size		All head shapes				
		8	10	12	14	
Thread outer diameter	$d_t$	[mm]	10,3	12,5	14,5	16,6
Core diameter	$d_k$		7,4	9,4	11,3	13,3
Shaft diameter	$d_s$		8,0	9,9	11,7	13,7
Stressed cross section	$A_s$	[mm <sup>2</sup> ]	43,0	69,4	100,3	138,9
Minimum length	$L_{min}$	[mm]	$h_{nom,ex} + 40$ mm			
Maximum length	$L_{max}$		415	435	450	465
Diameter of the head	$d_h$		18	20,5	23	28
Height of the head	$t_h$		8,4	9,9	10,3	11,5
Material		[-]	Hardened carbon steel; $A_{5\%} \geq 8\%$			
Coating			galvanised			
Nominal characteristic steel yield strength	$f_{yk}$	[N/mm <sup>2</sup> ]	800	750	750	750
Nominal characteristic steel ultimate tensile strength	$f_{uk}$		950	900	900	900



**Product marking FBS II US (TX)**

FBS II: Product marking

XXX: Screw length L



(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

**Product description**  
Dimensions, material and marking

**Annex A 2**

## Specifications of intended use

### Anchorage subject to:

- Static or quasi static actions
- Surface roughness “very smooth” to “very rough” of the shear interface according to EOTA Technical Report TR 066:2018-11

### Base materials:

- For use to strengthen existing concrete by concrete overlay. Both concrete members are compacted reinforced or unreinforced normal weight (cracked and uncracked) concrete without fibres in the range C20/25 to C50/60 according to EN 206:2013+A1:2016.

### 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.).
- Post-installed shear connections are designed in accordance with EOTA Technical Report TR 066:2018-11
- For the concrete overlay the following requirements on the mixture according to TR 066:2018-11, chapter 3.2 apply:
  - Concrete compressive strength of the new concrete shall be higher than the concrete compressive strength of the existing concrete.
  - Use of concrete with low shrinkage is recommended.
  - Slump of fresh concrete  $f \geq 380$  mm, a slump value  $f \geq 450$  mm is recommended, if applicable.
  - Concrete consolidation with vibratory screed. With thickness of the overlay concrete  $> 10$  cm specific vibratory screed must be checked for its maximum working depth.
  - Very good posttreatment.

### Installation:

- The screw installation is executed by trained personal, ensuring that the installation instruction and the specifications by the engineer are observed.
- Hammer drilling, hollow drilling or diamond drilling:  
All sizes and embedment depths
- Screw installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site
- Cleaning of drill hole is not necessary when using a hollow drill with functional suction or:
  - If drilling vertically upwards
  - If drilling vertically downwards and the drill hole depth has been increased. It is recommended to increase the drill hole depth with additional  $3 d_0$ .
- The requirements for construction works given in EOTA Technical Report TR 066:2018-11 have to be observed.

fischer concrete screw ULTRACUT FBS II

Intended use  
Specifications

Annex B 1

**Table B2.1:** Installation parameters FBS II 8 – 14 in existing concrete

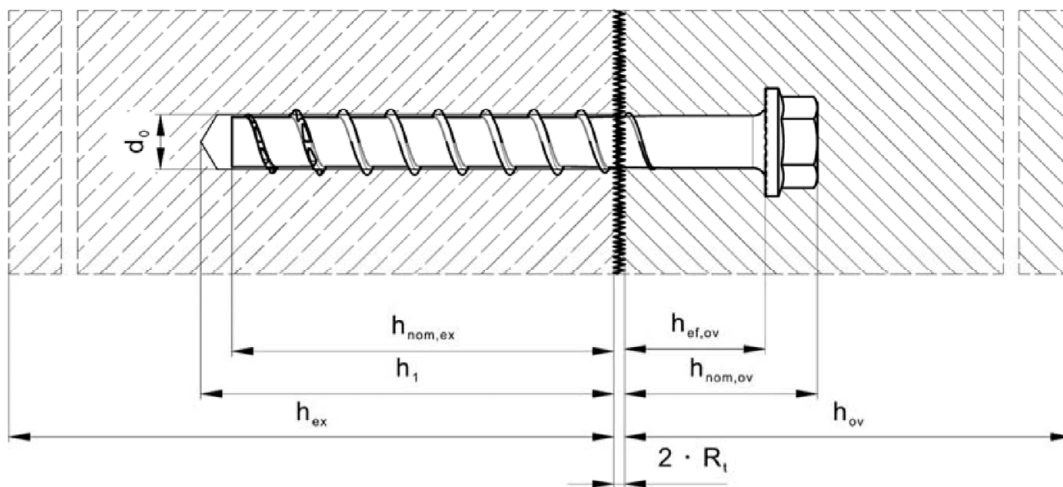
Size		FBS II										
		8		10			12			14		
Nominal embedment depth	$h_{nom,ex}$	50	65	55	65	85	60	75	100	65	85	115
Nominal drill hole diameter	$d_0$	8		10			12			14		
Cutting diameter of drill bits	$d_{cut} \leq$	8,45		10,45			12,50			14,50		
Cutting diameter of diamond driller		8,10		10,30			12,30			14,30		
Wrench size (US, S)	SW	13		15			17			21		
TX size	TX	40		50			-					
Drill hole depth	$h_1 \geq$	60	75	65	75	95	70	85	110	80	100	130
Drill hole depth (for vertical downwards installation without cleaning)		85	100	105	115	135	95	130	155	130	150	180
Length of screw		$L_{min} =$	90	105	95	105	125	100	115	140	105	125
	$L_{max} =$	400	415	405	415	435	410	425	450	415	435	465
Torque impact wrench	$T_{imp,max}$	600		650								

**Table B2.2:** Installation parameters FBS II 8 – 14 in concrete overlay

Size		FBS II			
		8	10	12	14
Minimum effective embedment depth	$h_{ef,ov,min}$	40			
Maximum effective embedment depth	$h_{ef,ov,max}$	$L - h_{nom,ex} - 2 R_t$			
Nominal embedment depth	$h_{nom,ov}$	$h_{ef,ov} + L_h$			
Min. thickness of concrete overlay	$h_{min,ov}$	$h_{nom,ov} + c_{nom}^{1)}$			

<sup>1)</sup> Nominal concrete cover according to EN 1992-1-1:2004 + AC:2010

**Existing Concrete** **Concrete overlay**



(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

**Intended use**  
Installation parameters FBS II 8 - 14

**Annex B 2**



**Table B3.1: Minimum member thickness, minimum spacing and edge distance**

Size		FBS II											
		8		10		12		14					
<b>Existing Concrete</b>													
Nominal embedment depth	$h_{nom,ex}$	50	65	55	65	85	60	75	100	65	85	115	
Minimum thickness of concrete member	$h_{min,ex}$	100	120	100	120	140	110	130	150	120	140	180	
Minimum spacing	$s_{min,ex}$	35		40		50		60					
Minimum edge distance	$c_{min,ex}$	35		40		50		60					
<b>Concrete Overlay</b>													
Minimum thickness of concrete member	$h_{min,ov}$	$h_{nom,ov} + c_{nom}^{1)}$											
Minimum spacing	$s_{min,ov}$	40		40		45		55					
Minimum edge distance	$c_{min,ov}$	$10 + c_{nom}^{1)}$		$10 + c_{nom}^{1)}$		$15 + c_{nom}^{1)}$		$15 + c_{nom}^{1)}$					

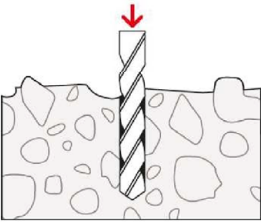
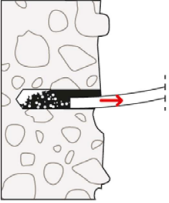
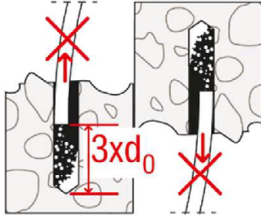
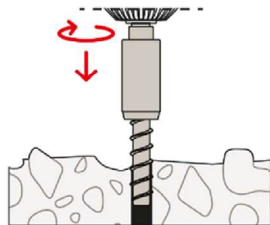
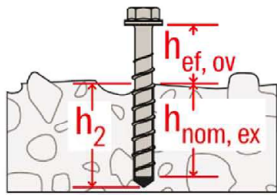
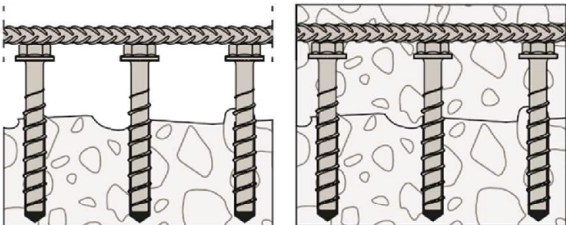
<sup>1)</sup>Nominal concrete cover according to EN 1992-1-1:2004 + AC:2010

fischer concrete screw ULTRACUT FBS II

**Intended use**

Minimum member thickness, minimum spacing and edge distance

**Annex B 3**

<b>Installation instruction</b>	
	<p><b>Step 1: Creation of the drill hole:</b></p> <p>Drill a hole to the required setting depth using a hammer drill bit, hollow drill bit or a diamond drill bit.</p>
	<p><b>Step 2: Cleaning of the drill hole - horizontal:</b></p> <p>Clean the drill hole. This step can be omitted in the preparation of the hole by using a hollow drill bit. (recommendation: use the fischer FHD hollow drill bit)</p>
	<p><b>Step 2: Cleaning of the drill hole - vertical:</b></p> <p>Cleaning of the drill hole can be omitted, if drilling vertically upwards or if drilling vertically downwards and the hole depth has been increased. We recommend increasing the drill hole depth by an additional 3 x drilling <math>\varnothing</math> when drilling vertically downwards.</p>
	<p><b>Step 3: Installation via Impact Wrench:</b></p> <p>Installation with any impact wrench at a max. mentioned torque moment (<math>T_{imp, max}</math>) and with simultaneous axial pressure on the impact wrench. (recommendation: use the fischer FSS 18V 400BL)</p>
	<p><b>Step 4: Installation on the right depth:</b></p> <p>First, install the concrete screw FBS II in the existing concrete to the defined setting depth <math>h_{nom, ex}</math>, while ensuring the desired setting depth <math>h_{ef, ov}</math> is fulfilled in the top concrete layer (for an easy installation it is allowed to use the fischer setting tool SC-ST).</p>
	<p><b>Process after the installation of the screw:</b></p> <p>After installing the concrete screw, further work can be completed on the reinforcements and using the top concrete layer. ATTENTION: In accordance with TR 066: 2018-11, the requirements for properties of the composite surface and concrete mixture must be observed.</p>
<p>fischer concrete screw ULTRACUT FBS II</p>	
<p><b>Intended use</b> Installation instructions</p>	<p><b>Annex B 4</b></p>

Electronic copy of the ETA by DIBt: ETA-20/0321

<b>Table C1.1: Characteristic tension resistance under static and quasi-static action in the existing concrete</b>													
Size			FBS II										
			8		10			12			14		
Nominal embedment depth	$h_{nom,ex}$	[mm]	50	65	55	65	85	60	75	100	65	85	115
<b>Steel failure</b>													
Characteristic resistance	$N_{Rk,s,ex}$	[kN]	35		55			76			103		
Partial factor	$\gamma_{Ms,N,ex}$	[-]	1,4										
<b>Pullout failure</b>													
Characteristic resistance in concrete C20/25	uncracked	$N_{Rk,p,ex}$	$\geq N^0_{Rk,c,ex}$										
	cracked	$N_{Rk,p,ex}$	6	12	9	12	$\geq N^0_{Rk,c,ex}$						
Increasing factors concrete	C25/30	$\psi_{c,ex}$	[-]	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</b>													
Effective embedment depth	$h_{ef,ex}$	[mm]	40	52	43	51	68	47	60	81	50	67	93
Factor for uncracked concrete	$k_{ucr,N,ex}$	[-]	11,0										
Factor for cracked concrete	$k_{cr,N,ex}$		7,7										
Characteristic edge distance	$c_{cr,N,ex}$	[mm]	$1,5 h_{ef,ex}$										
Characteristic spacing	$s_{cr,N,ex}$		$3 h_{ef,ex}$										
Charact. edge distance for splitting	$c_{cr,sp,ex}$		$1,5 h_{ef,ex}$										
Charact. spacing for splitting	$s_{cr,sp,ex}$		$3 h_{ef,ex}$										
fischer concrete screw ULTRACUT FBS II												<b>Annex C 1</b>	
<b>Performances</b> Characteristic tension resistance in the existing concrete													

<b>Table C2.1: Characteristic resistance under static and quasi-static action in the concrete overlay</b>						
Size			FBS II			
			8	10	12	14
<b>Steel failure</b>						
Characteristic resistance	$N_{RK,s,ov}$	[kN]	35,0	55,0	76,0	103,0
Partial factor	$\gamma_{Ms,N,ov}$	[-]	1,4			
<b>Pullout failure</b>						
Projected area of the head	$A_h$	[mm <sup>2</sup> ]	205	255	308	472
<b>Concrete cone failure and splitting failure</b>						
Effective embedment depth min	$h_{ef,ov}$	[mm <sup>2</sup> ]	40			
Effective embedment depth max	$h_{ef,ov}$		$L-h_{nom,ex} - 2 R_t$			
Factor for uncracked concrete	$K_{ucr,N,ov}$	[-]	12,7			
Factor for cracked concrete	$K_{cr,N,ov}$		8,9			
Characteristic edge distance	$c_{cr,N,oc}$	[mm]	$1,5 h_{ef,ov}$			
Characteristic spacing	$s_{cr,N,ov}$		$3 h_{ef,ov}$			
Charact. edge distance for splitting	$c_{cr,sp,ov}$		$3 h_{ef,ov}$			
Charakt. spacing for splitting	$s_{cr,sp,ov}$		$6 h_{ef,ov}$			
<b>Blowout failure</b>						
Projected area of the head	$A_h$	[mm <sup>2</sup> ]	205	255	308	472
<b>Table C2.2: Characteristic shear resistance in the interface under static and quasi-static action</b>						
Size			FBS II			
			8	10	12	14
Characteristic yield strength	$f_{yk}$	[N/mm <sup>2</sup> ]	800	750	750	750
Product specific factor for ductility	$\alpha_{k1}$	[-]	0,8			
Stressed cross section	$A_s$	[mm <sup>2</sup> ]	43,0	69,4	100,3	138,9
Product specific factor for geometry	$\alpha_{k2}$	[-]	1,0			
fischer concrete screw ULTRACUT FBS II						<b>Annex C 2</b>
<b>Performances</b>						
Characteristic tension resistance in the concrete overlay Characteristic shear resistance in the interface						