



## DECLARATION OF PERFORMANCE



**DoP: 0146**

for fischer concrete screw ULTRACUT FBS II (Metal anchors for use in concrete (heavy-duty type)) – EN

1. Unique identification code of the product-type: **DoP: 0146**
2. Intended use/es: **Post-installed fastening in cracked or uncracked concrete, see appendix, especially Annexes B 1 to B 5**
3. Manufacturer: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Straße 1, 72178 Waldachtal, Germany**
4. Authorised representative: --
5. System/s of AVCP: **1**
6. European Assessment Document: **EAD 330232-00-0601**

European Technical Assessment: **ETA-15/0352; 2018-10-30**

Technical Assessment Body: **DIBt**

Notified body/ies: **1343 – MPA Darmstadt**

7. Declared performance/s:

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

- **Characteristic resistance to tension load (static and quasi-static loading): See appendix, especially Annexes C 1 and C 2**
- **Characteristic resistance to shear load (static and quasi-static loading): See appendix, especially Annexes C 1 and C 2**
- **Displacements (static and quasi-static loading): See appendix, especially Annex C 7**
- **Characteristic resistance and displacements for seismic performance categories C1 and C2: See appendix, especially Annexes C 3, C 4 and C 7**

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

- **Reaction to fire: Anchorages satisfy requirements for Class A 1**
- **Resistance to fire: See appendix, especially Annex C 5 and C 6**

8. Appropriate Technical Documentation and/or Specific Technical Documentation: ---

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

Signed for and on behalf of the manufacturer by:

Andreas Bucher, Dipl.-Ing.

Wolfgang Hengesbach, Dipl.-Ing., Dipl.-Wirtsch.-Ing.

*i.V. A. Bucher*

*i.V. W. Hengesbach*

Tumlingen, 2018-11-06

- This DoP has been prepared in different languages. In case there is a dispute on the interpretation the english version shall always prevail.
- The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

**Specific Part****1 Technical description of the product**

The fischer concrete screw ULTRACUT FBS II is an anchor of sizes 6, 8, 10, 12 and 14 mm made of hardened carbon steel. 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.

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                |
|------------------------------------------------------------------------------------------|----------------------------|
| Characteristic resistance to tension load (static and quasi-static loading)              | See Annex C 1 and C 2      |
| Characteristic resistance to shear load (static and quasi-static loading)                | See Annex C 1 and C 2      |
| Displacements (static and quasi-static loading)                                          | See Annex C 7              |
| Characteristic resistance and displacements for seismic performance categories C1 and C2 | See Annex C 3, C 4 and C 7 |

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

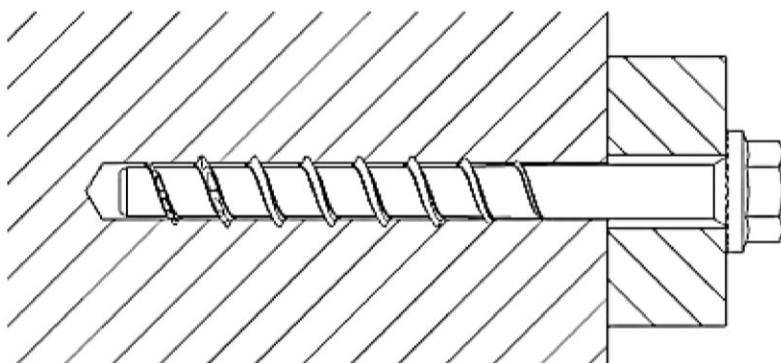
| Essential characteristic | Performance           |
|--------------------------|-----------------------|
| Reaction to fire         | Class A1              |
| Resistance to fire       | See Annex C 5 and C 6 |

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

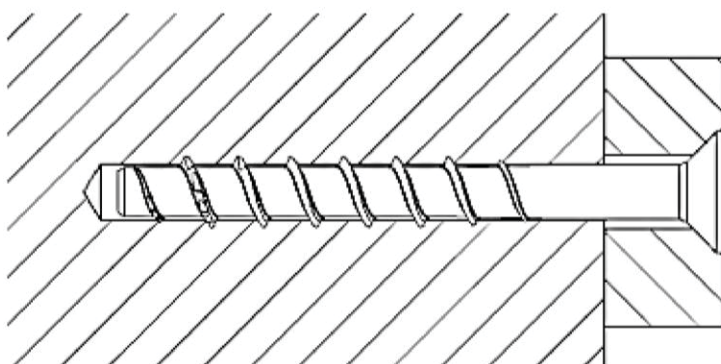
In accordance with European Assessment Document EAD No. 330232-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

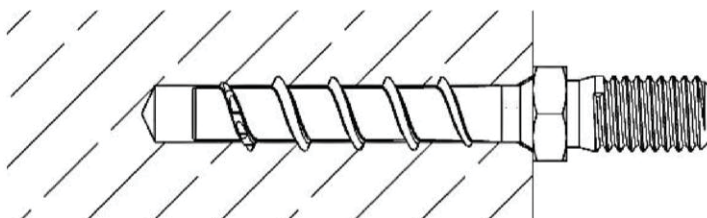
**Product in the installed condition**



FBS II US



FBS II SK



FBS II 6 M8

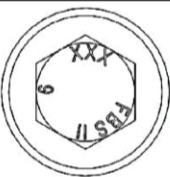
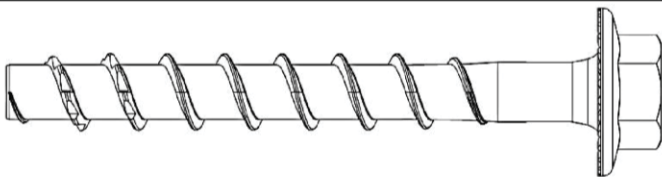
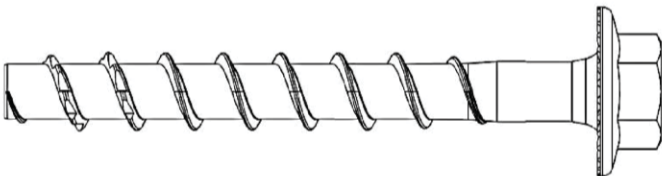
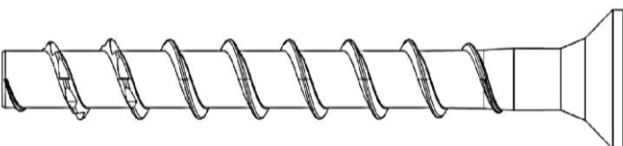
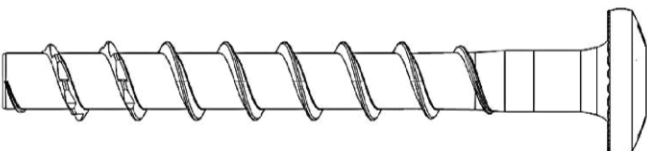
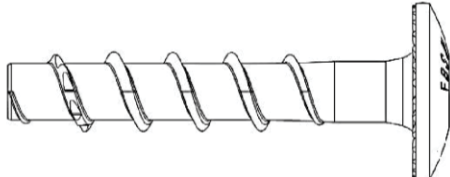
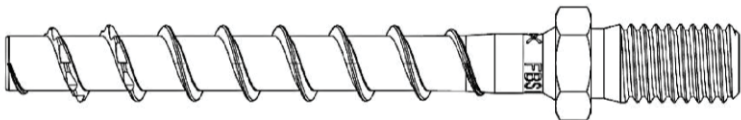
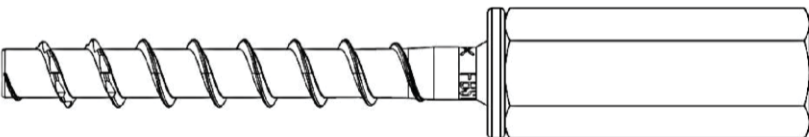
fischer concrete screw ULTRACUT FBS II

**Product description**

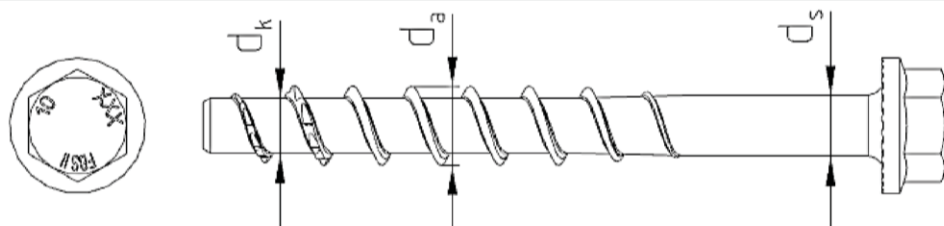
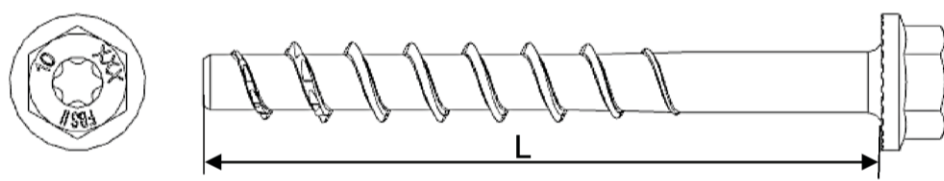
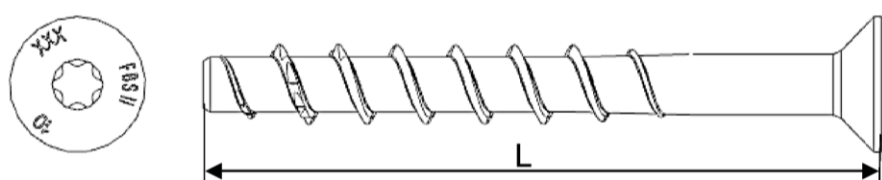
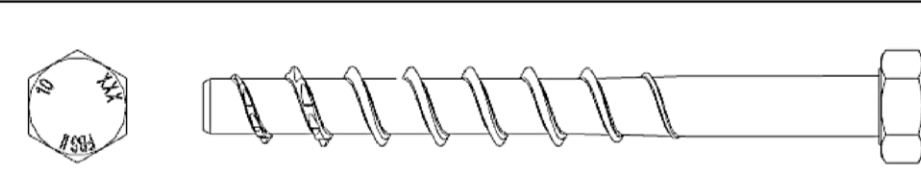
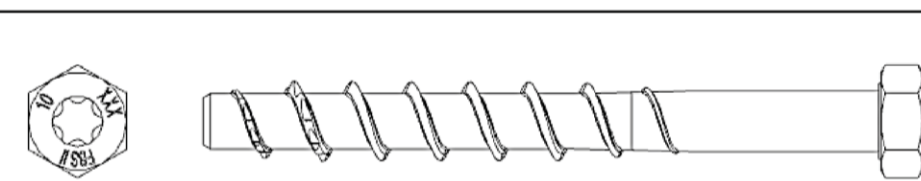
Product in the installed condition

**Annex A 1**

**Table A2.1: Screw types FBS II 6**

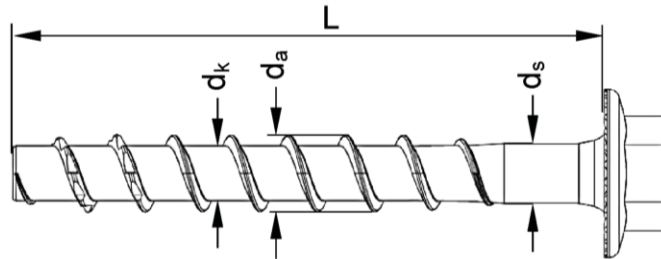
| FBS II 6                                                      |                                                                                     |                                                                                      |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Hexagon head<br>with formed washer<br>(US)                    |    |    |
| Hexagon head<br>with formed washer<br>and TX-drive<br>(US TX) |    |    |
| Countersunk Head<br>(SK)                                      |    |    |
| Pan head<br>(P)                                               |   |   |
| Large Pan head<br>(LP)                                        |  |  |
| Hexagon head and<br>connection thread<br>M8 or M10<br>(M)     |  |  |
| Internal thread<br>M8 / M10 combined<br>(M8/M10 I)            |  |  |
|                                                               |                                                                                     |                                                                                      |
| fischer concrete screw ULTRACUT FBS II                        |                                                                                     | Annex A 2                                                                            |
| Product description<br>Screw types FBS II 6                   |                                                                                     |                                                                                      |

**Table A3.1: Screw types FBS II 8 - 14**

| FBS II 8 - 14                                                 |                                                                                      |           |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------|
| Hexagon head<br>with formed washer<br>(US)                    |    |           |
| Hexagon head<br>with formed washer<br>and TX-drive<br>(US TX) |    |           |
| Countersunk Head<br>(SK)                                      |    |           |
| Hexagon head<br>(S)                                           |  |           |
| Hexagon head<br>with TX-drive<br>(S TX)                       |  |           |
|                                                               |                                                                                      |           |
| fischer concrete screw ULTRACUT FBS II                        |                                                                                      | Annex A 3 |
| Product description<br>Screw types FBS II 8 to 14             |                                                                                      |           |

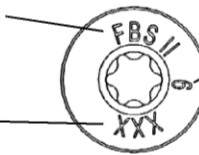
**Table A4.1: Geometry and material**

| Screw types / size    |       |      | All head shapes                           |      |      |      |      |
|-----------------------|-------|------|-------------------------------------------|------|------|------|------|
|                       |       |      | 6                                         | 8    | 10   | 12   | 14   |
| Thread outer diameter | $d_a$ | [mm] | 7,75                                      | 10,3 | 12,5 | 14,5 | 16,6 |
| Core diameter         | $d_k$ |      | 5,65                                      | 7,4  | 9,4  | 11,3 | 13,3 |
| Shaft diameter        | $d_s$ |      | 6,0                                       | 8,0  | 9,9  | 11,7 | 13,7 |
| Material              |       | [-]  | Hardened carbon steel; $A_{5\%} \geq 8\%$ |      |      |      |      |
| Coating               |       |      | galvanized                                |      |      |      |      |

**Head marking US, US TX, S; S TX, SK, P, LP**

FBS II: Product identification

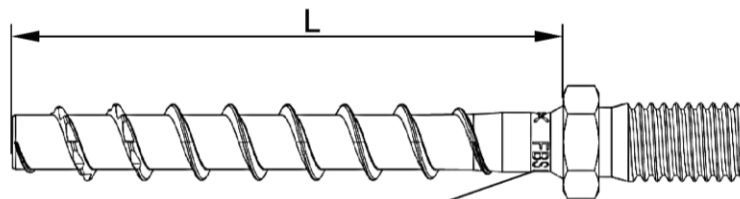
XXX: Screw length L



6: Screw size

**Marking at M8, M10, M8/M10 I**

Head marking:  
XX: Screw length L



Rotary marking:  
FBS II: Product identification  
6: Screw size

fischer concrete screw ULTRACUT FBS II

**Product description**  
Geometry and marking

**Annex A 4**



| Specification of intended use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. The device is intended for use by healthcare professionals (HCPs) in the clinical setting for the purpose of monitoring the heart rate (HR) of patients during medical procedures.</p> <p>2. The device is intended for use on patients who are conscious and able to follow instructions.</p> <p>3. The device is intended for use on patients who are not at high risk of bleeding or other complications.</p> <p>4. The device is intended for use on patients who are not taking anticoagulant or antiplatelet therapy.</p> <p>5. The device is intended for use on patients who are not pregnant or breastfeeding.</p> <p>6. The device is intended for use on patients who are not allergic to the materials used in the device.</p> <p>7. The device is intended for use on patients who are not taking any medications that may interfere with the device's operation.</p> <p>8. The device is intended for use on patients who are not taking any medications that may affect the heart rate.</p> <p>9. The device is intended for use on patients who are not taking any medications that may affect the blood pressure.</p> <p>10. The device is intended for use on patients who are not taking any medications that may affect the oxygen saturation.</p> |

**Table B1.1:** Anchorages subject to

| Size                                                            | 6     | 8  |    | 10 |    |    | 12 |    |     | 14 |    |     |
|-----------------------------------------------------------------|-------|----|----|----|----|----|----|----|-----|----|----|-----|
| Nominal embedment depth [mm]                                    | 40-55 | 50 | 65 | 55 | 65 | 85 | 60 | 75 | 100 | 65 | 85 | 115 |
| Static and quasi-static loads in cracked and uncracked concrete | ✓     |    |    |    |    |    |    |    |     |    |    |     |
| Fire exposure                                                   |       |    |    |    |    |    |    |    |     |    |    |     |
| Seismic performance category C1                                 | ✓     |    | ✓  |    | ✓  |    | ✓  |    | ✓   |    | ✓  |     |
| Seismic performance category C2                                 |       |    |    |    |    |    |    |    |     |    |    |     |

**Base materials:**

- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013
- Strength classes C20/25 to C50/60 according to EN 206:2013
- Uncracked or cracked concrete

**Use conditions (Environmental conditions):**

- Structures subjected to dry internal conditions

**Design:**

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the screw is indicated on the design drawings (e.g. position of the screw relative to reinforcement or to supports, etc.).
- Design of fastenings according to FprEN 1992-4: 2016 and EOTA Technical Report TR 055
- Seismic design according to EOTA Technical Report TR 049

### Installation:

- Hammer drilling or hollow drilling:  
All sizes and embedment depths
- Alternative diamond drilling: All sizes and embedment depths from diameter 8
- 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 B4 for: All sizes and embedment depths
- Cleaning of drill hole is not necessary when using a hollow drill with functional suction 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 shall not be possible
- The head of the screw must be fully engaged on the fixture and show no signs of damage
- For seismic performance category C2 applications: The gap between screw shaft and fixture must be filled with mortar; mortar compressive strength  $\geq 50 \text{ N/mm}^2$  (e. g. FIS V, FIS HB, FIS SB or FIS EM Plus).

fischer concrete screw ULTRACUT FBS II

**Intended use**  
Specification

## Annex B 1

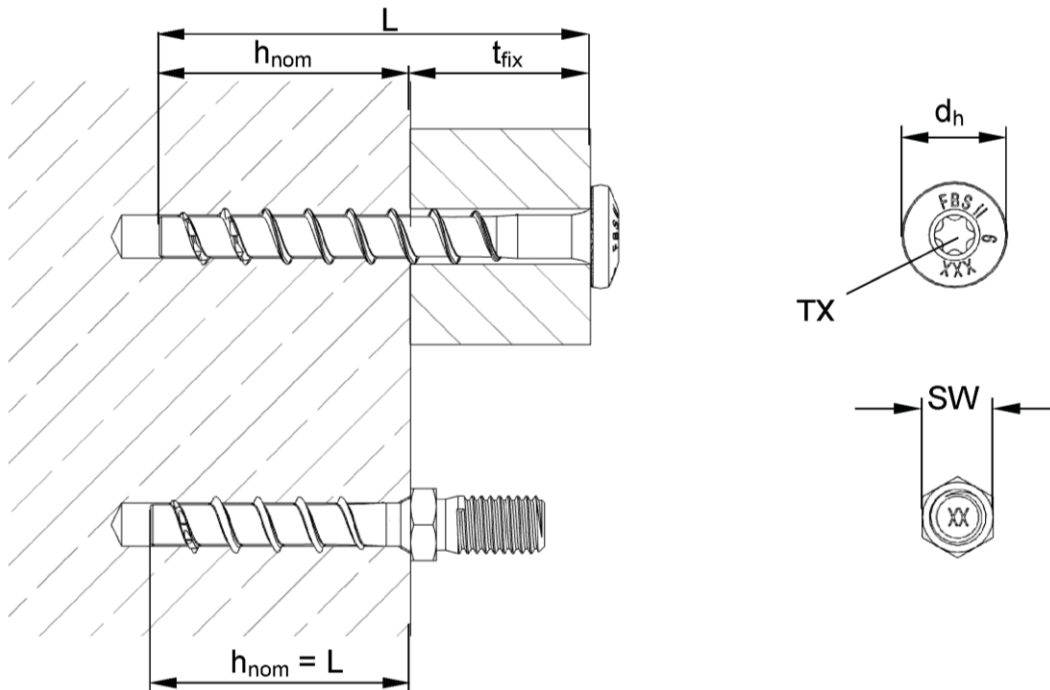
**Table B2.1:** Installation parameters FBS II 6 - drilling bore hole and setting tools

| FBS II 6                                                                               |                |      | All head shapes           |
|----------------------------------------------------------------------------------------|----------------|------|---------------------------|
| Nominal embedment depth                                                                | $h_{nom}$      | [mm] | $40 \leq h_{nom} \leq 55$ |
| Nominal drill hole diameter                                                            | $d_0$          |      | 6                         |
| Cutting diameter of drill bits                                                         | $d_{cut} \leq$ |      | 6,4                       |
| Clearance hole diameter                                                                | $d_f \leq$     |      | 8                         |
| Drill hole depth                                                                       |                |      | $h_{nom} + 10^{1)}$       |
| Drill hole depth<br>(with adjustable setting)                                          | $h_1 \geq$     |      | $h_{nom} + 20$            |
| Torque impact screw driver                                                             | $T_{imp,max}$  | [Nm] | 450                       |
| Maximum installation torque with<br>hexagon nut on head shapes M8,<br>M10 and M8/M10 I | $T_{max}$      | [Nm] | 10                        |

<sup>1)</sup> Value can be reduced to  $h_{nom} + 5$  for installation vertically upwards

**Table B2.2:** Installation parameters FBS II 6 – drive and fixture

| FBS II 6             |                    |      | US                   | US TX | SK   | P    | LP   | M8 | M10 | M8/M10 I |
|----------------------|--------------------|------|----------------------|-------|------|------|------|----|-----|----------|
| Wrench size          | SW                 | [mm] | 10                   |       | -    |      |      | 10 | 13  |          |
| TX size              | TX                 | [-]  | -                    | 30    |      |      |      | -  |     |          |
| Head diameter        | d <sub>h</sub>     | [mm] | 17                   |       | 13,5 | 14,4 | 17,5 |    |     |          |
| Thickness of fixture | t <sub>fix</sub> ≤ |      | L - h <sub>nom</sub> |       |      |      |      |    |     |          |
| Length of screw      | L <sub>min</sub> = |      | 40                   |       |      |      |      |    |     |          |
|                      | L <sub>max</sub> = | 325  |                      |       |      |      |      | 55 |     |          |



fischer concrete screw ULTRACUT FBS II

**Intended use**

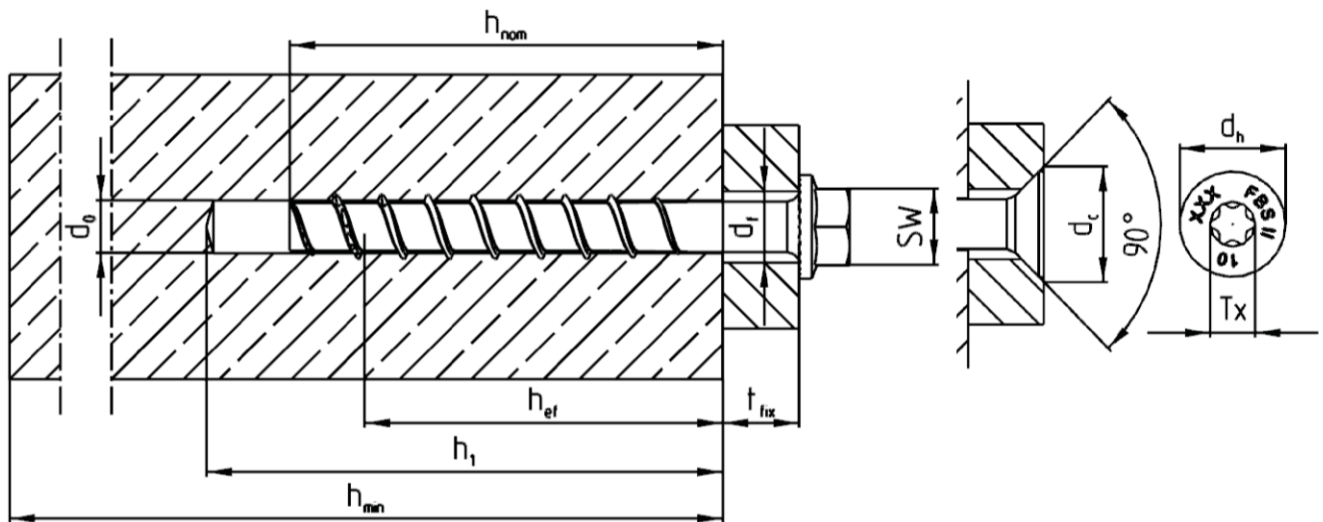
Installation parameters FBS II 6

**Annex B 2**



**Table B3.1:** Installation parameters FBS II 8 - 14

| Size                                       |           |               | FBS II         |               |       |             |     |       |             |     |       |             |     |     |
|--------------------------------------------|-----------|---------------|----------------|---------------|-------|-------------|-----|-------|-------------|-----|-------|-------------|-----|-----|
|                                            |           |               | 8              |               | 10    |             |     | 12    |             |     | 14    |             |     |     |
| Nominal embedment depth                    | $h_{nom}$ | [mm]          | 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             |           |               | 8,45           |               | 10,45 |             |     | 12,50 |             |     | 14,50 |             |     |     |
| Cutting diameter of diamond driller        |           |               | $d_{cut} \leq$ | 8,10          |       | 10,30       |     |       | 12,30       |     |       | 14,30       |     |     |
| Clearance hole diameter                    |           |               | $d_f$          | 10,6 – 12,0   |       | 12,8 – 14,0 |     |       | 14,8 – 16,0 |     |       | 16,9 – 18,0 |     |     |
| Wrench size (US,S)                         |           | SW            | 13             |               | 15    |             |     | 17    |             |     | 21    |             |     |     |
| Tx size                                    |           | Tx            | 40             |               | 50    |             |     | -     |             |     |       |             |     |     |
| Head diameter                              |           | $d_h$         | 18             |               | 21    |             |     |       |             |     |       |             |     |     |
| Countersunk diameter in fixture            |           | $d_c$         | 20             |               | 23    |             |     |       |             |     |       |             |     |     |
| Drill hole depth                           |           | [mm]          | 60             | 75            | 65    | 75          | 95  | 70    | 85          | 110 | 80    | 100         | 130 |     |
| Drill hole depth (with adjustable setting) |           |               | $h_1 \geq$     | 70            | 85    | 75          | 85  | 105   | 80          | 95  | 120   | 90          | 110 | 140 |
| Thickness of fixture                       |           |               | $t_{fix} \leq$ | L - $h_{nom}$ |       |             |     |       |             |     |       |             |     |     |
| Length of screw                            |           |               | $L_{min} =$    | 50            | 65    | 55          | 65  | 85    | 60          | 75  | 100   | 65          | 85  | 115 |
|                                            |           |               | $L_{max} =$    | 400           | 415   | 405         | 415 | 435   | 410         | 425 | 450   | 415         | 435 | 465 |
| Torque impact screw driver                 |           | $T_{imp,max}$ | [Nm]           |               | 600   |             | 650 |       |             |     |       |             |     |     |



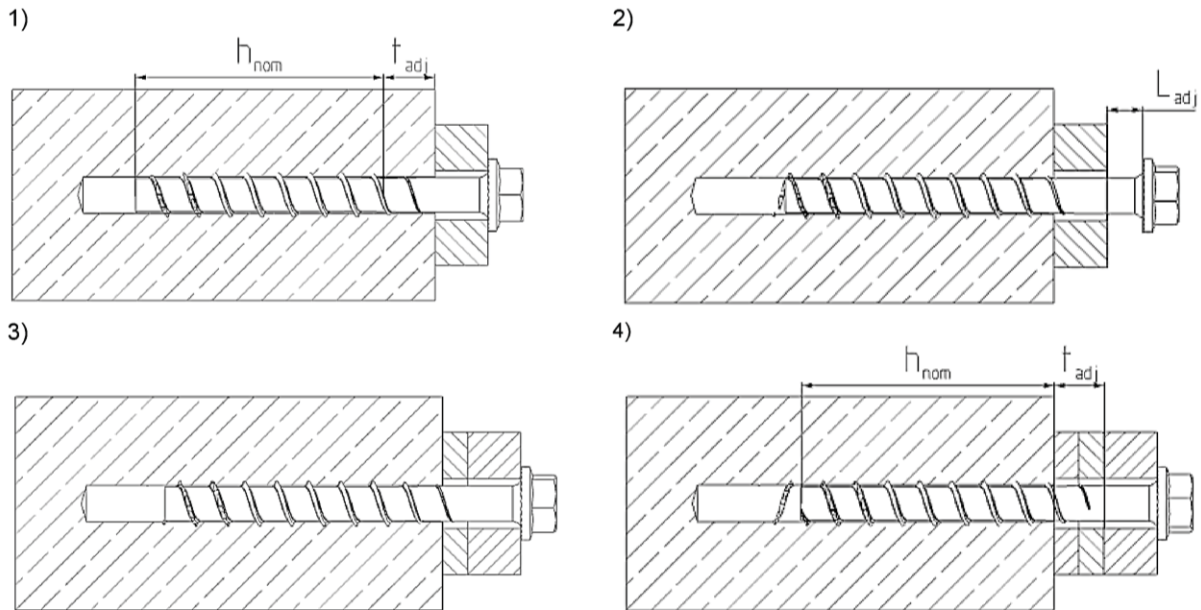
fischer concrete screw ULTRACUT FBS II

**Intended use**

Installation parameters FBS II 8 - 14

**Annex B 3**

## Adjustment



It is permissible to untighten the screw up to two times for adjustment purposes.  
Therefore the screw may be untightened to a maximum of  $L_{adj} = 20$  mm to the surface of the initial fixture.

The total permissible thickness of shims added during the adjustment process is  $t_{adj} = 10$  mm

**Table B4.1:** Minimum thickness of concrete members, minimum spacing and edge distance

| Size                                 |           | FBS II                    |     |     |     |     |     |     |     |     |     |     |     |
|--------------------------------------|-----------|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                      |           | 6                         | 8   |     | 10  |     |     | 12  |     |     | 14  |     |     |
| Nominal embedment depth              | $h_{nom}$ | 40 to 55                  | 50  | 65  | 55  | 65  | 85  | 60  | 75  | 100 | 65  | 85  | 115 |
| Minimum thickness of concrete member | $h_{min}$ | max.(80; $h_1^{1)}$ + 30) | 100 | 120 | 100 | 120 | 140 | 110 | 130 | 150 | 120 | 140 | 180 |
| Minimum spacing                      | $s_{min}$ | 35                        | 35  |     | 40  |     |     | 50  |     |     | 60  |     |     |
| Minimum edge distance                | $c_{min}$ | 35                        | 35  |     | 40  |     |     | 50  |     |     | 60  |     |     |

<sup>1)</sup> Drill hole depth according to table B3.1

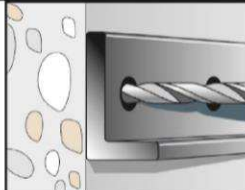
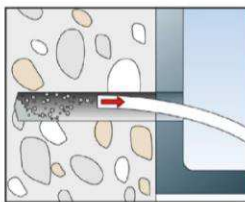
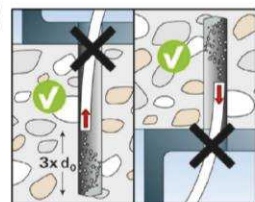
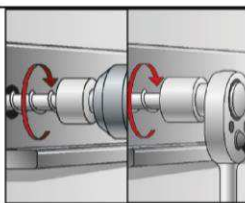
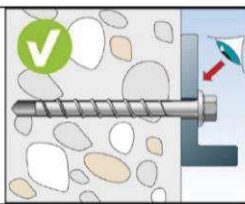
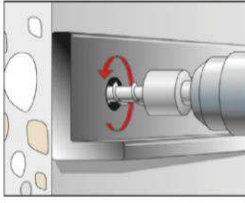
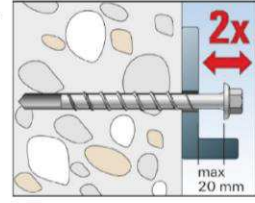
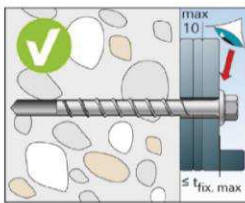
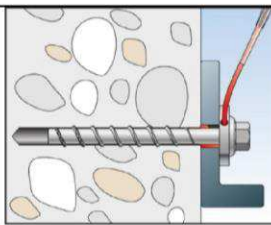
fischer concrete screw ULTRACUT FBS II

**Intended use**

Adjustment

Minimum thickness of members, minimum spacing and edge distance

**Annex B 4**

| Installation instruction                                                               |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                                                                                        | Drill the hole using hammer drill, hollow drill or diamond core drill.<br><br>Drill hole diameter $d_0$ and drill hole depth $h_1$ according to table B2.1 and B3.1                                                                                                                                                                                                                           |
| a)    | b)    | Option a): Clean the drill hole<br><br>Option b): Cleaning of drill hole is not necessary when using a hollow drill or a diamond drill or:<br><br>- If drilling vertically upwards or<br>- If drilling vertically downwards and the drill hole depth has been increased. It is recommended to increase the drill hole depth additional 3 times $d_0$ .                                        |
|       |                                                                                        | Installation with any torque impact screw driver up to the maximum mentioned torque moment ( $T_{imp,max}$ according to table B2.1 and B3.1). Alternatively, all other tools without an indicated torque moment are allowed (e.g. ratchet spanner). The indicated torque moments for impact screw driver are therefore not decisive.                                                          |
|     |                                                                                        | After installation a further turning of the screw must not be possible. The head of the screw must be in contact with the fixture and is not damaged                                                                                                                                                                                                                                          |
| 1.  | 2.  | Optional:<br>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.                                                                                                                 |
| 3.  |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                               |
|     |                                                                                        | <ul style="list-style-type: none"><li>Filling of the annular gap:<br/>For seismic performance category C2 applications:<br/>The gap between screw shaft and fixture must be filled with mortar; mortar compressive strength <math>\geq 50</math> N/mm<sup>2</sup> (e. g. FIS V, FIS HB, FIS SB or FIS EM Plus). As an aid for filling the gap, the filling disc FFD is recommended.</li></ul> |
| fischer concrete screw ULTRACUT FBS II                                                 |                                                                                        | Annex B 5                                                                                                                                                                                                                                                                                                                                                                                     |
| Intended use<br>Installation instruction                                               |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                               |

**Table C1.1:** Characteristic values for static and quasi-static action with FBS II 6

| FBS II 6                                                                               |           |                 |      |              |      |           |      |
|----------------------------------------------------------------------------------------|-----------|-----------------|------|--------------|------|-----------|------|
| Nominal embedment depth                                                                |           | $h_{nom}$       | [mm] | 40           | 45   | 50        | 55   |
| Steel failure for tension load and shear load                                          |           |                 |      |              |      |           |      |
| Characteristic resistance                                                              |           | $N_{Rk,s}$      | [kN] | 21           |      |           |      |
| Partial factor                                                                         |           | $\gamma_{Ms}$   | [-]  | 1,4          |      |           |      |
| Characteristic resistance                                                              |           | $V_{Rk,s}$      | [kN] | 9,0          |      |           | 13,3 |
| Partial factor                                                                         |           | $\gamma_{Ms}$   | [-]  | 1,5          |      |           |      |
| Factor for ductility                                                                   |           | $k_7$           |      | 1,0          |      |           |      |
| Characteristic bending resistance                                                      |           | $M^0_{Rk,s}$    | [Nm] | 17,1         |      |           |      |
| Pullout failure                                                                        |           |                 |      |              |      |           |      |
| Characteristic resistance in concrete C20/25                                           | uncracked | $N_{Rk,p}$      | [kN] | 8,0          | 10,0 | 12,0      | 13,5 |
|                                                                                        | cracked   | $N_{Rk,p}$      |      | 2,5          | 3,5  | 4,0       | 5,0  |
| 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          |      |           |      |
| Concrete cone failure and splitting failure; concrete pryout failure                   |           |                 |      |              |      |           |      |
| Effective embedment depth                                                              |           | $h_{ef}$        | [mm] | 32           | 36   | 40        | 44   |
| 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                                                                 |           | $s_{cr,N}$      |      | $3 h_{ef}$   |      |           |      |
| Charakt. resistance for splitting                                                      |           | $N^0_{Rk,sp}$   | [kN] | $N_{Rk,c}$   |      |           |      |
| Charact. edge distance for splitting                                                   |           | $c_{cr,sp}$     | [mm] | $1,5 h_{ef}$ |      |           |      |
| Charakt. spacing for splitting                                                         |           | $s_{cr,sp}$     |      | $3 h_{ef}$   |      |           |      |
| Factor for pryout failure                                                              |           | $k_8$           | [-]  | 2,0          |      |           |      |
| Installation factor                                                                    |           | $\gamma_{inst}$ |      | 1,0          |      |           |      |
| Concrete edge failure                                                                  |           |                 |      |              |      |           |      |
| Effective length in concrete                                                           |           | $l_f$           | [mm] | 40           | 45   | 50        | 55   |
| Nominal diameter of screw                                                              |           | $d_{nom}$       |      | 6            |      |           |      |
| Adjustment                                                                             |           |                 |      |              |      |           |      |
| Maximum thickness of shims                                                             |           | $t_{adj}$       | [mm] | 10           |      |           |      |
| Max. number of adjustments                                                             |           | $n_a$           | [-]  | 2            |      |           |      |
|                                                                                        |           |                 |      |              |      |           |      |
| fischer concrete screw ULTRACUT FBS II                                                 |           |                 |      |              |      | Annex C 1 |      |
| Performances<br>Characteristic values for static and quasi-static action with FBS II 6 |           |                 |      |              |      |           |      |

**Table C2.1:** Characteristic values for static and quasi-static action with FBS II 8 - 14

| Size                                                                                        |           |                 | FBS II          |      |      |     |                 |      |    |           |      |    |      |
|---------------------------------------------------------------------------------------------|-----------|-----------------|-----------------|------|------|-----|-----------------|------|----|-----------|------|----|------|
|                                                                                             |           |                 | 8               |      | 10   |     |                 | 12   |    |           | 14   |    |      |
| Nominal embedment depth $h_{nom}$ [mm]                                                      |           |                 | 50              | 65   | 55   | 65  | 85              | 60   | 75 | 100       | 65   | 85 | 115  |
| Steel failure for tension load and shear load                                               |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |
| Characteristic resistance $N_{Rk,s}$ [kN]                                                   |           |                 | 35              |      | 55   |     |                 | 76   |    |           | 103  |    |      |
| Partial factor $\gamma_{Ms}$ [-]                                                            |           |                 | 1,4             |      |      |     |                 |      |    |           |      |    |      |
| Characteristic resistance $V_{Rk,s}$ [kN]                                                   |           |                 | 13,1            | 19,0 | 29,4 |     | 34,9            | 31,9 |    | 42,7      | 46,5 |    | 61,7 |
| Partial factor $\gamma_{Ms}$ [-]                                                            |           |                 | 1,5             |      |      |     |                 |      |    |           |      |    |      |
| Factor for ductility $k_7$                                                                  |           |                 | 1,0             |      |      |     |                 |      |    |           |      |    |      |
| Characteristic bending resistance $M^0_{Rk,s}$ [Nm]                                         |           |                 | 51              |      | 95   |     |                 | 165  |    |           | 269  |    |      |
| Pullout failure                                                                             |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |
| Characteristic resistance in concrete C20/25                                                | uncracked | $N_{Rk,p}$ [kN] | - <sup>1)</sup> |      |      |     |                 |      |    |           |      |    |      |
|                                                                                             | cracked   | $N_{Rk,p}$ [kN] | 6               | 12   | 9    | 12  | - <sup>1)</sup> |      |    |           |      |    |      |
| 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             |      |      |     |                 |      |    |           |      |    |      |
| Concrete cone failure and splitting failure; concrete pryout failure                        |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |
| Effective embedment depth $h_{ef}$ [mm]                                                     |           |                 | 40              | 52   | 43   | 51  | 68              | 47   | 60 | 81        | 50   | 67 | 93   |
| Factor for uncracked concrete $k_{ucr,N}$ [mm]                                              |           |                 | 11,0            |      |      |     |                 |      |    |           |      |    |      |
| Factor for cracked concrete $k_{cr,N}$ [mm]                                                 |           |                 | 7,7             |      |      |     |                 |      |    |           |      |    |      |
| Characteristic edge distance $c_{cr,N}$ [mm]                                                |           |                 | 1,5 $h_{ef}$    |      |      |     |                 |      |    |           |      |    |      |
| Characteristic spacing $s_{cr,N}$ [mm]                                                      |           |                 | 3 $h_{ef}$      |      |      |     |                 |      |    |           |      |    |      |
| Charact. edge distance for splitting $c_{cr,sp}$ [mm]                                       |           |                 | 1,5 $h_{ef}$    |      |      |     |                 |      |    |           |      |    |      |
| Charakt. spacing for splitting $s_{cr,sp}$ [mm]                                             |           |                 | 3 $h_{ef}$      |      |      |     |                 |      |    |           |      |    |      |
| Factor for pryout failure $k_8$ [-]                                                         |           |                 | 1,0             | 2,0  | 1,0  | 2,0 |                 |      |    |           |      |    |      |
| Installation factor $\gamma_{inst}$ [-]                                                     |           |                 | 1,0             |      |      |     |                 |      |    |           |      |    |      |
| Concrete edge failure                                                                       |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |
| Effective length in concrete $l_f$ [mm]                                                     |           |                 | 50              | 65   | 55   | 65  | 85              | 60   | 75 | 100       | 65   | 85 | 115  |
| Nominal diameter of screw $d_{nom}$ [mm]                                                    |           |                 | 8               |      | 10   |     |                 | 12   |    |           | 14   |    |      |
| Adjustment                                                                                  |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |
| Maximum thickness of shims $t_{adj}$ [mm]                                                   |           |                 | 10              |      |      |     |                 |      |    |           |      |    |      |
| Max. number of adjustments $n_a$ [-]                                                        |           |                 | 2               |      |      |     |                 |      |    |           |      |    |      |
| <sup>1)</sup> Pullout failure not decisive                                                  |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |
| fischer concrete screw ULTRACUT FBS II                                                      |           |                 |                 |      |      |     |                 |      |    | Annex C 2 |      |    |      |
| Performances<br>Characteristic values for static and quasi-static action with FBS II 8 - 14 |           |                 |                 |      |      |     |                 |      |    |           |      |    |      |



**Table C3.1:** Characteristic values for seismic performance category C1 with FBS II 6

|                                                      |                 |      |              |     |     |     |
|------------------------------------------------------|-----------------|------|--------------|-----|-----|-----|
| <b>FBS II 6</b>                                      |                 |      |              |     |     |     |
| Nominal embedment depth                              | $h_{nom}$       | [mm] | 40           | 45  | 50  | 55  |
| <b>Steel failure for tension load and shear load</b> |                 |      |              |     |     |     |
| Characteristic resistance                            | $N_{Rk,s,eq}$   | [kN] | 21           |     |     |     |
|                                                      | $V_{Rk,s,eq}$   |      | 6,3          |     |     | 9,3 |
| Without filling of the annular gap                   | $\alpha_{gap}$  | [-]  | 0,5          |     |     |     |
| With filling of the annular gap <sup>1)</sup>        | $\alpha_{gap}$  |      | 1,0          |     |     |     |
| <b>Pullout failure</b>                               |                 |      |              |     |     |     |
| Characteristic resistance in cracked concrete        | $N_{Rk,p,eq}$   | [kN] | 2,5          | 3,5 | 4,0 | 5,0 |
| <b>Concrete cone failure</b>                         |                 |      |              |     |     |     |
| Effective embedment depth                            | $h_{ef}$        | [mm] | 32           | 36  | 40  | 44  |
| Characteristic edge distance                         | $c_{cr,N}$      |      | 1,5 $h_{ef}$ |     |     |     |
| Characteristic spacing                               | $s_{cr,N}$      |      | 3 $h_{ef}$   |     |     |     |
| Installation factor                                  | $\gamma_{inst}$ | [-]  | 1,0          |     |     |     |
| <b>Concrete pryout failure</b>                       |                 |      |              |     |     |     |
| Factor for pryout failure                            | $k_8$           | [-]  | 2,0          |     |     |     |
| <b>Concrete edge failure</b>                         |                 |      |              |     |     |     |
| Effective length in concrete                         | $l_f$           | [mm] | 40           | 45  | 50  | 55  |
| Nominal diameter of screw                            | $d_{nom}$       |      | 6            |     |     |     |

**Table C3.2:** Characteristic values for seismic performance category C1 with FBS II 8 – 14 <sup>1)</sup>





| Table C5.1: Characteristic values for resistance to fire with FBS II 6 <sup>1)</sup>                                  |                 |      |               |      |           |    |
|-----------------------------------------------------------------------------------------------------------------------|-----------------|------|---------------|------|-----------|----|
| FBS II 6                                                                                                              |                 |      |               |      |           |    |
| Nominal embedment depth                                                                                               | $h_{nom}$       | [mm] | 40            | 45   | 50        | 55 |
| Steel failure for tension load and shear load ( $F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$ )                           |                 |      |               |      |           |    |
| Characteristic resistance for all head shapes                                                                         | $F_{Rk,s,fi}$   | R30  | [kN]          | 1,00 |           |    |
|                                                                                                                       |                 | R60  |               | 0,60 |           |    |
|                                                                                                                       |                 | R90  |               | 0,50 |           |    |
|                                                                                                                       |                 | R120 |               | 0,40 |           |    |
| Characteristic bending resistance for all head shapes                                                                 | $M^0_{Rk,s,fi}$ | R30  | [Nm]          | 0,80 |           |    |
|                                                                                                                       |                 | R60  |               | 0,50 |           |    |
|                                                                                                                       |                 | R90  |               | 0,40 |           |    |
|                                                                                                                       |                 | R120 |               | 0,35 |           |    |
| Edge distance                                                                                                         |                 |      |               |      |           |    |
| R30 to R120                                                                                                           | $c_{cr,fi}$     | [mm] | 2 $h_{ef}$    |      |           |    |
| In case of fire attack from more than one side, the minimum edge distance shall be $\geq 300$ mm                      |                 |      |               |      |           |    |
| Spacing                                                                                                               |                 |      |               |      |           |    |
| R30 to R120                                                                                                           | $s_{cr,fi}$     | [mm] | 2 $c_{cr,fi}$ |      |           |    |
| <sup>1)</sup> The embedment depth has to be increased for wet concrete by at least 30 mm compared to the given value. |                 |      |               |      |           |    |
| fischer concrete screw ULTRACUT FBS II                                                                                |                 |      |               |      | Annex C 5 |    |
| Performances<br>Characteristic values for resistance to fire with FBS II 6                                            |                 |      |               |      |           |    |

**Table C6.1:** Characteristic values for resistance to fire with FBS II 8 – 14 <sup>1)</sup>

| Size                                                                                                                |                      |                                   |      | FBS II               |      |     |      |     |      |     |     |           |     |     |  |
|---------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|------|----------------------|------|-----|------|-----|------|-----|-----|-----------|-----|-----|--|
|                                                                                                                     |                      |                                   |      | 8                    |      | 10  |      |     | 12   |     |     | 14        |     |     |  |
| Nominal embedment depth h <sub>nom</sub> [mm]                                                                       |                      |                                   |      | 50                   | 65   | 55  | 65   | 85  | 60   | 75  | 100 | 65        | 85  | 115 |  |
| Steel failure for tension load and shear load (F <sub>Rk,s,fi</sub> = N <sub>Rk,s,fi</sub> = V <sub>Rk,s,fi</sub> ) |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |
| Characteristic resistance for the head shapes                                                                       | US, S                | F <sub>Rk,s,fi</sub>              | R30  | [kN]                 | 2,33 |     | 3,45 |     | 4,62 |     |     | 6,46      |     |     |  |
|                                                                                                                     |                      |                                   | R60  |                      | 1,82 |     | 2,73 |     | 3,66 |     |     | 5,11      |     |     |  |
|                                                                                                                     |                      |                                   | R90  |                      | 1,30 |     | 2,00 |     | 2,69 |     |     | 3,75      |     |     |  |
|                                                                                                                     |                      |                                   | R120 |                      | 1,04 |     | 1,64 |     | 2,20 |     |     | 3,08      |     |     |  |
|                                                                                                                     | SK, US TX, S TX      | F <sub>Rk,s,fi</sub>              | R30  | [kN]                 | 2,12 |     | 2,96 |     | -    |     |     |           |     |     |  |
|                                                                                                                     |                      |                                   | R60  |                      | 1,67 |     | 2,26 |     |      |     |     |           |     |     |  |
|                                                                                                                     |                      |                                   | R90  |                      | 1,21 |     | 1,56 |     |      |     |     |           |     |     |  |
|                                                                                                                     |                      |                                   | R120 |                      | 0,99 |     | 1,21 |     |      |     |     |           |     |     |  |
|                                                                                                                     | All head shapes      | M <sup>0</sup> <sub>Rk,s,fi</sub> | [Nm] | R30                  | 2,62 |     | 4,92 |     | 7,83 |     |     | 12,89     |     |     |  |
|                                                                                                                     |                      |                                   |      | R60                  | 2,05 |     | 3,89 |     | 6,20 |     |     | 10,19     |     |     |  |
|                                                                                                                     |                      |                                   |      | R90                  | 1,46 |     | 2,85 |     | 4,56 |     |     | 7,48      |     |     |  |
|                                                                                                                     |                      |                                   |      | R120                 | 1,17 |     | 2,34 |     | 3,73 |     |     | 6,14      |     |     |  |
| Pullout failure                                                                                                     |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |
| Characteristic resistance                                                                                           | N <sub>Rk,p,fi</sub> | R30                               | [kN] | 1,5                  | 3,0  | 2,3 | 3,0  | 5,0 | 2,9  | 4,2 | 6,6 | 3,2       | 4,9 | 8,1 |  |
|                                                                                                                     |                      | R60                               |      |                      |      |     |      |     |      |     |     |           |     |     |  |
|                                                                                                                     |                      | R90                               |      |                      |      |     |      |     |      |     |     |           |     |     |  |
|                                                                                                                     |                      | R120                              |      |                      |      |     |      |     |      |     |     |           |     |     |  |
|                                                                                                                     |                      |                                   |      | 1,2                  | 2,4  | 1,8 | 2,4  | 4,0 | 2,3  | 3,3 | 5,2 | 2,5       | 3,9 | 6,5 |  |
| Edge distance                                                                                                       |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |
| R30 to R120 c <sub>cr,fi</sub> [mm]                                                                                 |                      |                                   |      | 2 h <sub>ef</sub>    |      |     |      |     |      |     |     |           |     |     |  |
| In case of fire attack from more than one side, the minimum edge distance shall be ≥ 300 mm                         |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |
| Spacing                                                                                                             |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |
| R30 to R120 s <sub>cr,fi</sub> [mm]                                                                                 |                      |                                   |      | 2 c <sub>cr,fi</sub> |      |     |      |     |      |     |     |           |     |     |  |
| 1) The embedment depth has to be increased for wet concrete by at least 30 mm compared to the given value.          |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |
| fischer concrete screw ULTRACUT FBS II                                                                              |                      |                                   |      |                      |      |     |      |     |      |     |     | Annex C 6 |     |     |  |
| Performances<br>Characteristic values for resistance to fire with FBS II 8 - 14                                     |                      |                                   |      |                      |      |     |      |     |      |     |     |           |     |     |  |

**Table C7.1:** Displacements due to tension loads (static)

| Size                               |                                        |      | FBS II          |     |     |      |     |     |      |     |      |      |     |      |      |
|------------------------------------|----------------------------------------|------|-----------------|-----|-----|------|-----|-----|------|-----|------|------|-----|------|------|
|                                    |                                        |      | 6 <sup>1)</sup> |     | 8   |      | 10  |     |      | 12  |      |      | 14  |      |      |
| Nominal embedment depth            | $h_{nom}$                              | [mm] | 40              | 55  | 50  | 65   | 55  | 65  | 85   | 60  | 75   | 100  | 65  | 85   | 115  |
| Tension load in cracked concrete   | N                                      | [kN] | 2,0             | 3,5 | 2,9 | 5,7  | 4,3 | 5,7 | 9,6  | 5,5 | 8,0  | 12,5 | 6,1 | 9,4  | 15,3 |
| Displacement                       | $\frac{\delta_{N0}}{\delta_{N\infty}}$ | [mm] | 1,1             | 1,4 | 0,5 | 0,9  | 0,7 | 0,7 | 0,8  | 0,7 | 0,9  | 0,8  | 0,8 | 1,0  | 0,8  |
|                                    |                                        |      | 2,5             | 2,5 | 1,3 | 1,0  | 0,7 | 0,7 | 0,8  | 1,3 | 0,9  | 0,8  | 1,1 | 1,0  | 1,1  |
| Tension load in uncracked concrete | N                                      | [kN] | 4,0             | 7,0 | 7,9 | 12,0 | 6,8 | 8,8 | 13,5 | 7,7 | 11,0 | 17,4 | 8,5 | 13,2 | 21,6 |
| Displacement                       | $\frac{\delta_{N0}}{\delta_{N\infty}}$ | [mm] | 1,0             | 1,8 | 0,9 | 1,4  | 0,9 | 0,9 | 1,4  | 0,9 | 1,1  | 1,4  | 1,0 | 1,3  | 1,1  |
|                                    |                                        |      | 1,7             | 2,6 | 1,4 | 1,4  | 1,4 | 1,4 | 1,4  | 1,4 | 1,4  | 1,4  | 1,1 | 1,3  | 1,1  |

<sup>1)</sup> Intermediate values by linear interpolation**Table C7.2:** Displacements due to shear loads (static)

| Size                                         |                                        |      | FBS II          |     |     |     |      |      |      |      |      |      |      |      |      |
|----------------------------------------------|----------------------------------------|------|-----------------|-----|-----|-----|------|------|------|------|------|------|------|------|------|
|                                              |                                        |      | 6 <sup>1)</sup> |     | 8   |     | 10   |      |      | 12   |      |      | 14   |      |      |
| Nominal embedment depth                      | $h_{nom}$                              | [mm] | 40              | 55  | 50  | 65  | 55   | 65   | 85   | 60   | 75   | 100  | 65   | 85   | 115  |
| Shear load in cracked and uncracked concrete | V                                      | [kN] | 4,5             | 6,7 | 6,2 | 9,0 | 14,0 | 14,0 | 16,6 | 15,9 | 15,9 | 21,2 | 23,0 | 23,0 | 30,5 |
| Displacement                                 | $\frac{\delta_{V0}}{\delta_{V\infty}}$ | [mm] | 2,0             | 2,9 | 1,4 | 1,4 | 3,2  | 3,2  | 3,2  | 2,5  | 2,5  | 3,4  | 2,8  | 2,8  | 5,4  |
|                                              |                                        |      | 2,9             | 4,4 | 2,0 | 2,1 | 4,9  | 4,9  | 4,9  | 3,8  | 3,8  | 5,1  | 4,2  | 4,2  | 8,1  |

<sup>1)</sup> Intermediate values by linear interpolation**Table C7.3:** Displacements due to tension loads (seismic performance category C2)

| Size                    |                      |      | FBS II |     |     |     |
|-------------------------|----------------------|------|--------|-----|-----|-----|
|                         |                      |      | 8      | 10  | 12  | 14  |
| Nominal embedment depth | $h_{nom}$            |      | 65     | 85  | 100 | 115 |
| Displacement DLS        | $\delta_{N,eq(DLS)}$ | [mm] | 0,5    | 0,8 | 0,9 | 1,3 |
| Displacement ULS        | $\delta_{N,eq(ULS)}$ |      | 1,7    | 2,8 | 2,7 | 5,0 |

**Table C7.4:** Displacements due to shear loads (seismic performance category C2)

| Size                    |                      |      | FBS II |     |     |     |
|-------------------------|----------------------|------|--------|-----|-----|-----|
|                         |                      |      | 8      | 10  | 12  | 14  |
| Nominal embedment depth | $h_{nom}$            |      | 65     | 85  | 100 | 115 |
| Displacement DLS        | $\delta_{V,eq(DLS)}$ | [mm] | 1,6    | 2,7 | 3,1 | 4,1 |
| Displacement ULS        | $\delta_{V,eq(ULS)}$ |      | 3,9    | 7,1 | 5,3 | 8,7 |

fischer concrete screw ULTRACUT FBS II

**Performances**

Displacements due to tension and shear loads

**Annex C 7**