

## DECLARAÇÃO DE DESEMPENHO

### DoP 0227

para fischer Parafuso de concreto ULTRACUT FBS II (Ancoragem metálica para utilização em betão)

PT

|                                                                                               |                                                                                                       |               |                              |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------|------------------------------|
| 1. <u>Código de identificação único do produto-tipo:</u>                                      | DoP 0227                                                                                              |               |                              |
| 2. <u>Utilização(ões) prevista(s):</u>                                                        | Fixação pós-instalada em betão fissurado ou não fissurado.<br>Ver anexos, especialmente anexos B1- B6 |               |                              |
| 3. <u>Fabricante:</u>                                                                         | fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Alemanha                          |               |                              |
| 4. <u>Representante autorizado:</u>                                                           | -                                                                                                     |               |                              |
| 5. <u>Sistema(s) de avaliação e verificação da regularidade do desempenho (AVCP):</u>         | 1                                                                                                     |               |                              |
| 6. <u>Documento de Avaliação Europeu:</u>                                                     | EAD 330232-01-0601, (Edition 12/ 2019)                                                                |               |                              |
| Avaliação Técnica Europeia:                                                                   | ETA-15/0352; 2020-10-05                                                                               |               |                              |
| Organismo de Avaliação Técnica:                                                               | DIBt- Deutsches Institut für Bautechnik                                                               |               |                              |
| Organismo(s) notificado(s):                                                                   | 1343 MPA Darmstadt / 2873 TU Darmstadt                                                                |               |                              |
| 7. <u>Desempenho(s) declarado(s):</u>                                                         |                                                                                                       |               |                              |
| <b>Resistência mecânica e estabilidade (BWR 1)</b>                                            |                                                                                                       |               |                              |
| Características de resistência à tração (para acção estática e quase-estática):               | Resistência à rotura do aço:                                                                          | Anexos C1, C2 | E <sub>s</sub> = 210 000 MPa |
|                                                                                               | Resistência à rotura por arranque:                                                                    | Anexos C1, C2 |                              |
|                                                                                               | Resistência à rotura por cone de betão:                                                               | Anexos C1, C2 |                              |
|                                                                                               | Robustez:                                                                                             | Anexos C1, C2 |                              |
|                                                                                               | Distância mínima ao bordo e espaçamento:                                                              | Anexo B4      |                              |
|                                                                                               | Distância ao bordo para prevenir rotura por fendilhação:                                              | Anexo C1, C2  |                              |
|                                                                                               |                                                                                                       |               |                              |
| Características de resistência ao corte (para acção estática e quase-estática), Método A:     | Resistência à rotura do aço (corte):                                                                  | Anexos C1, C2 |                              |
|                                                                                               | Resistência do betão ao destacamento:                                                                 | Anexos C1, C2 |                              |
|                                                                                               |                                                                                                       |               |                              |
| Resistência característica e Deslocamentos para as categorias de performance sísmica C1 e C2: | Resistência à tração, deslocamentos, categoria C1:                                                    | Anexo C3      |                              |
|                                                                                               | Resistência à tração, deslocamentos, categoria C2:                                                    | Anexos C4, C7 |                              |
|                                                                                               | Resistência ao corte, deslocamentos, categoria C1:                                                    | Anexo C3      |                              |
|                                                                                               | Resistência ao corte, deslocamentos, categoria C2:                                                    | Anexos C4, C7 |                              |
|                                                                                               | Factor espaço anular:                                                                                 | Anexo C3, C4  |                              |
| Resistência característica para design simplificado:                                          | Método B:                                                                                             | NPD           |                              |
|                                                                                               | Método C:                                                                                             | NPD           |                              |
| Deslocamentos e durabilidade:                                                                 | Deslocamentos sobre acções estáticas ou quase-estáticas:                                              | Anexo C7      |                              |
|                                                                                               | Durabilidade:                                                                                         | Anexos A4, B1 |                              |
| <b>Segurança em caso de incêndio (BWR 2)</b>                                                  |                                                                                                       |               |                              |
| Reação ao fogo:                                                                               | Classe (A1)                                                                                           |               |                              |
| Resistência ao fogo:                                                                          | Resistência em caso de incêndio, rotura do aço                                                        | Anexos C5, C6 |                              |
|                                                                                               | Resistência em caso de incêndio, rotura por                                                           | Anexos C5, C6 |                              |
|                                                                                               | Resistência em caso de incêndio, rotura do aço                                                        | Anexos C5, C6 |                              |



8. Documentação Técnica Adequada e/ou  
Documentação Técnica Específica:

O desempenho do produto identificado acima está em conformidade com o conjunto de desempenhos declarados. A presente declaração de desempenho é emitida, em conformidade com o Regulamento (UE) n.º 305/2011, sob a exclusiva responsabilidade do fabricante identificado acima.

Assinado por e em nome do fabricante por:

ppa. Thilo Prg

Thilo Pregartner, Dr.-Ing.  
Tumlingen, 2020-10-19

i.V. P. Sch

Peter Schillinger, Dipl.-Ing.

Este DoP foi preparado em diferentes línguas. Em caso de litígio sobre a interpretação, a versão em inglês prevalecerá sempre.

O Anexo inclui informações voluntárias e complementares em inglês que excedem os requisitos legais (linguisticamente especificados).

## 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 B 4, Annex C 1 and C 2 |
| Characteristic resistance to shear load (static and quasi-static loading)                | See Annex C 1 and C 2            |
| Displacements and Durability                                                             | See Annex C 7 and Annex B 1      |
| 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)

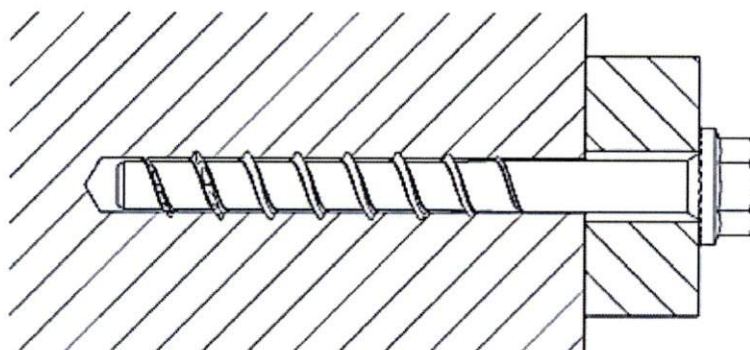
| Essential characteristic | Performance           |
|--------------------------|-----------------------|
| Reaction to fire         | Class A1              |
| Resistance to fire       | See Annex C 5 and C 6 |

#### 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. 330232-01-0601 the applicable European legal act is: [96/582/EC].

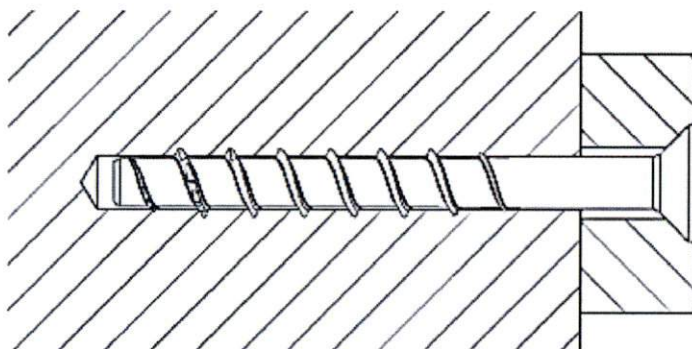
The system to be applied is: 1

## Product in the installed condition



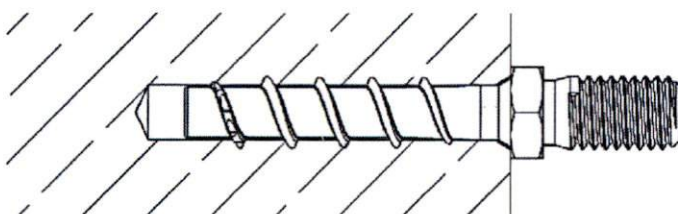
FBS II US  
(6 – 14)

FBS II US CP  
(8 – 14)



FBS II SK  
(6 – 10)

FBS II SK CP  
(8 – 10)



FBS II 6 M8

(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

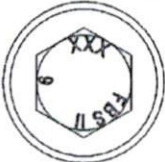
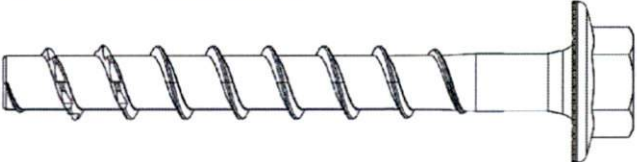
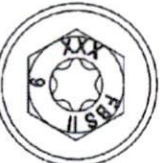
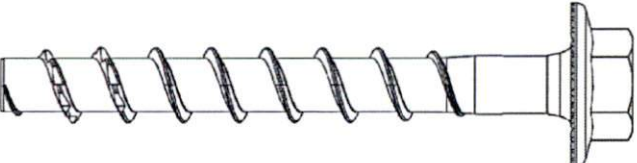
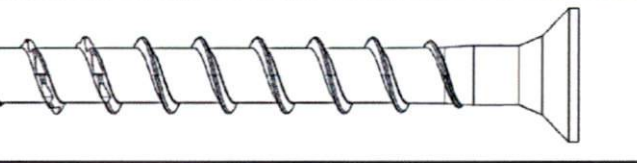
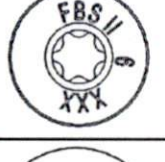
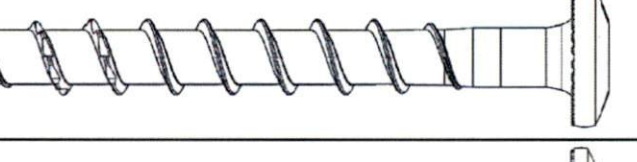
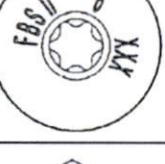
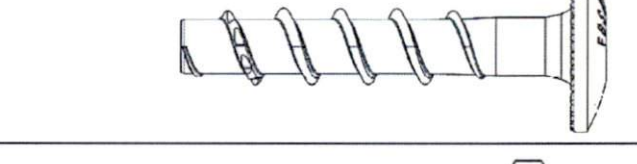
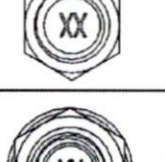
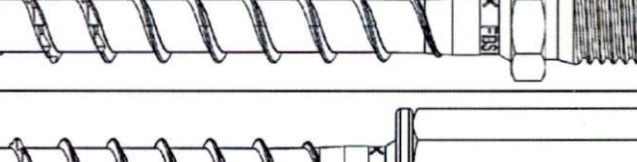
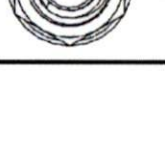
### Product description

Product in the installed condition

**Annex A 1**

Appendix 3/ 19

**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)     |  |  |
| Hexagon connecting nut<br>with metric internal thread<br>(I)  |  |  |

(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

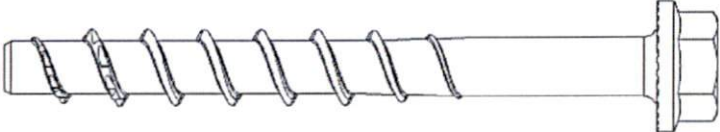
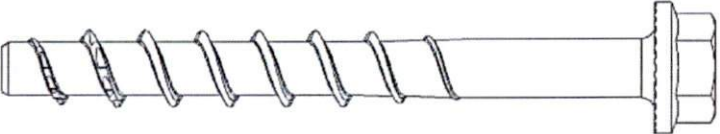
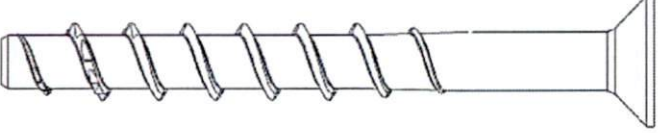
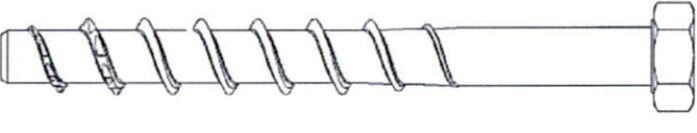
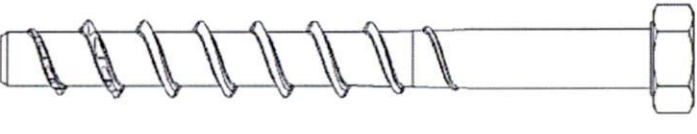
**Product description**  
Screw types FBS II 6

**Annex A 2**

Appendix 4/ 19



**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)                       |  |  |

(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

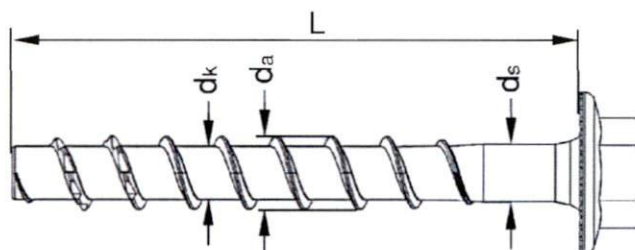
**Product description**  
Screw types FBS II 8 to 14

**Annex A 3**

Appendix 5/ 19

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

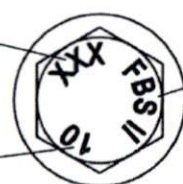
| Screw types / size    |       | All head shapes |                                       |                    |      |      |
|-----------------------|-------|-----------------|---------------------------------------|--------------------|------|------|
|                       |       | 6               | 8                                     | 10                 | 12   | 14   |
| Thread outer diameter | $d_a$ | [mm]            | 7,75                                  | 10,3               | 12,5 | 14,5 |
| Core diameter         | $d_k$ |                 | 5,65                                  | 7,4                | 9,4  | 11,3 |
| Shaft diameter        | $d_s$ |                 | 6,0                                   | 8,0                | 9,9  | 11,7 |
| Material              |       | [-]             | Hardened carbon steel; $A_5 \geq 8\%$ |                    |      |      |
| Coating FBS II        |       |                 | galvanized                            |                    |      |      |
| Coating FBS II CP     |       |                 | -                                     | Multilayer coating |      |      |

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

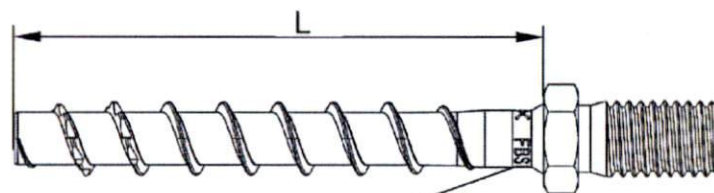
XXX: Screw length L

FBS II: Product identification

e.g. 10: Screw size



CP: Identification CP version

**Marking at M8, M10, I**Head marking:  
XX: Screw length LRotary marking:  
FBS II: Product identification  
e.g. 6: Screw size

(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

**Product description**  
Geometry and marking**Annex A 4**

Appendix 6/ 19



## Specification of intended use

**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 (cracked and uncracked) according to EN 206:2013+A1:2016
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

### Use conditions (Environmental conditions):

- Structures subjected to dry internal conditions

### Design:

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the screw is indicated on the design drawings (e.g. position of the screw relative to reinforcement or to supports, etc.).
- Design of fastenings according to EN 1992-4: 2018 and EOTA Technical Report TR 055.

### 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<sub>0</sub>
- After correct installation further turning of the screw 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**

Appendix 7/ 19

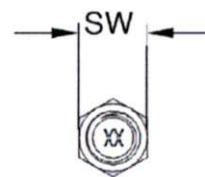
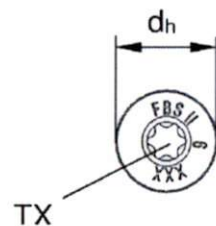
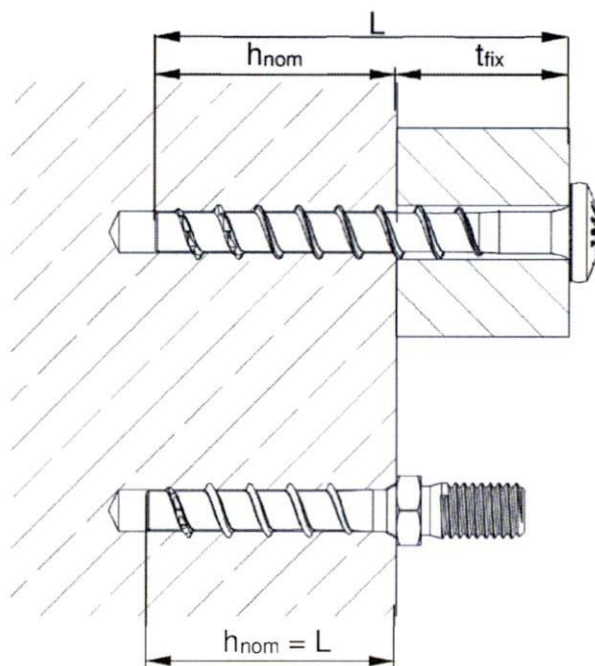
**Table B2.1:** Installation parameters FBS II 6 - drilling bore hole and setting tools

| 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>metrical screws or hexagon nuts on<br>head shapes M and 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 | I |
|----------------------|--------------------|------|----------------------|-------|------|------|------|----|-----|---|
| Wrench size          | SW                 | [mm] | 10 / 13              |       | -    |      |      | 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 |     |   |



(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

#### Intended use

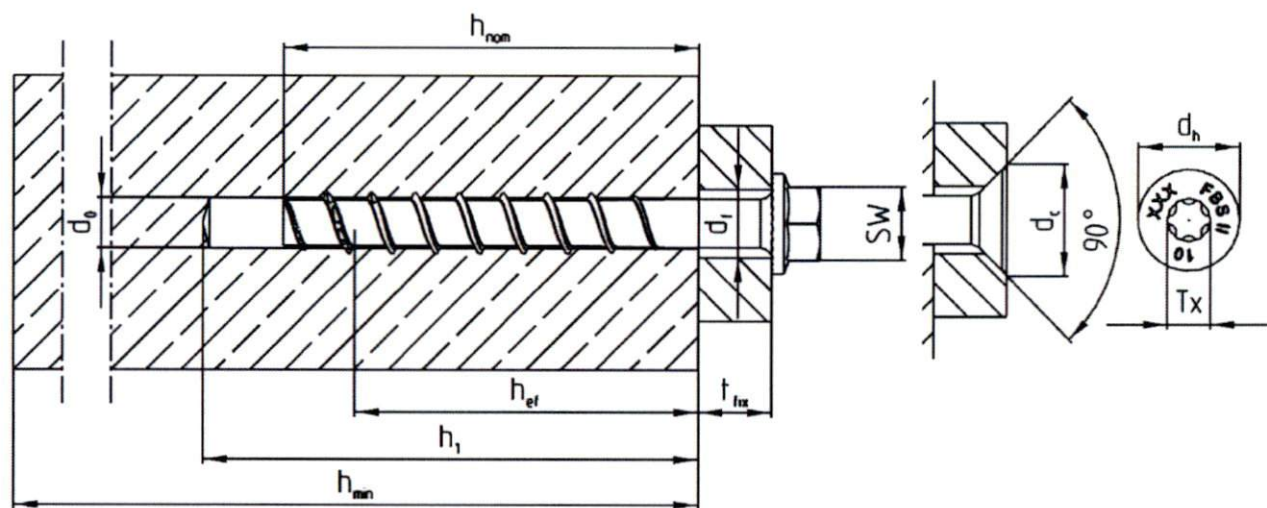
Installation parameters FBS II 6

**Annex B 2**

Appendix 8/ 19

**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             | $d_{cut} \leq$ |      | 8,45           |               | 10,45       |     |     | 12,50       |     |     | 14,50       |     |     |
| Cutting diameter of diamond driller        |                |      | 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                              | $d_h$          | [mm] | 18             |               | 21          |     |     |             |     |     |             |     |     |
| Countersunk diameter in fixture            | $d_c$          |      | 20             |               | 23          |     |     |             |     |     |             |     |     |
| Drill hole depth                           | $h_1 \geq$     |      | 60             | 75            | 65          | 75  | 95  | 70          | 85  | 110 | 80          | 100 | 130 |
| Drill hole depth (with adjustable setting) |                |      | 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         |     |     |             |     |     |             |     |     |



(Fig. not to scale)

fischer concrete screw ULTRACUT FBS II

**Intended use**

Installation parameters FBS II 8 - 14

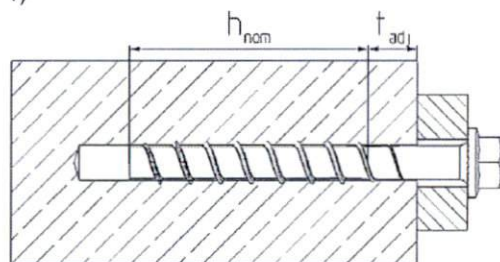
**Annex B 3**

Appendix 9/ 19

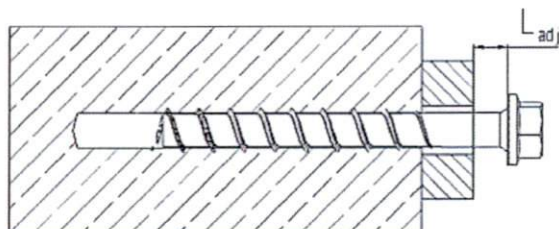


## Adjustment

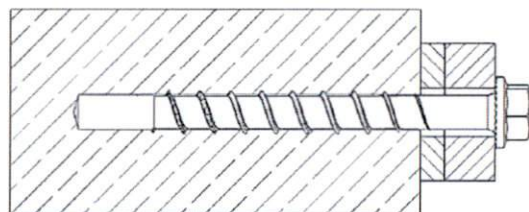
1)



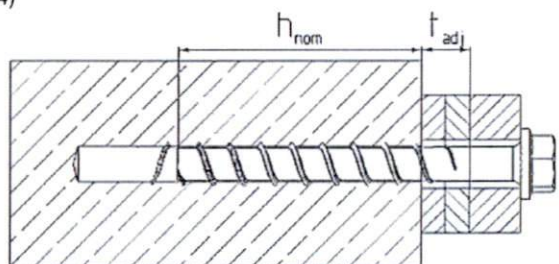
2)



3)



4)



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

(Fig. not to scale)

**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;<br>$h_1^{1)} + 30$ ) | 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 B2.1

fischer concrete screw ULTRACUT FBS II

### Intended use

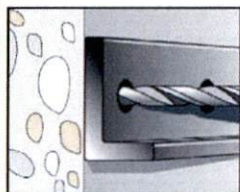
Adjustment

Minimum thickness of members, minimum spacing and edge distance

## Annex B 4

Appendix 10/ 19

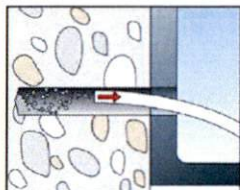
## Installation instruction part 1



### Step 1: Creation of the drill hole:

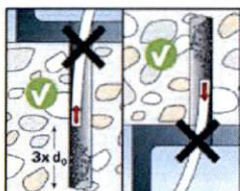
Drill the hole using hammer drill, hollow drill or diamond core drill (from diameter 8).

Drill hole diameter  $d_0$  and drill hole depth  $h_1$  according to table B2.1 and B3.1



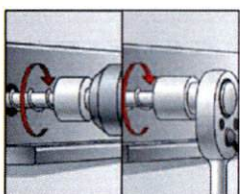
### Step 2: Cleaning of the drill hole - horizontal:

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  $\phi$  when drilling vertically downwards.

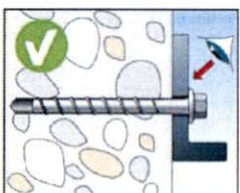


### Step 3: Installation:

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).

(recommendation: use the fischer FSS 18V 400BL)

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



### Step 4: Checking of the correct installation:

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

fischer concrete screw ULTRACUT FBS II

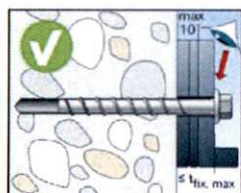
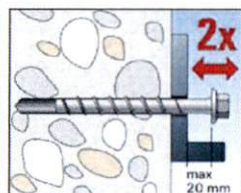
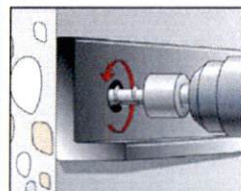
**Intended use**  
Installation instruction

**Annex B 5**

Appendix 11/ 19



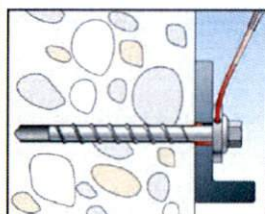
## Installation instruction part 2



### Adjustment

Optional:

It is permissible to adjust the screw twice. Therefore, the screw may be untightened to a maximum of  $L_{adj} = 20 \text{ mm}$  off the surface of the initial fixture. The total permissible thickness of shims added during the adjustment process is  $t_{adj} = 10 \text{ mm}$ .



### Filling of the annular gap

For seismic performance category C2 applications: The gap between screw shaft and fixture must be filled with mortar; mortar compressive strength  $\geq 50 \text{ N/mm}^2$  (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.

fischer concrete screw ULTRACUT FBS II

**Intended use**  
Installation instruction

**Annex B 6**

Appendix 12/ 19

**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                                                       |           | $\gamma_{Ms,N}$ | [-]  | 1,4                              |      |      |      |
| Characteristic resistance                                            |           | $V^0_{Rk,s}$    | [kN] | 9,0                              |      |      | 13,3 |
| Partial factor                                                       |           | $\gamma_{Ms,V}$ | [-]  | 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] | $\min(N^0_{Rk,c}{}^1; N_{Rk,p})$ |      |      |      |
| 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                                |      |      |      |

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

fischer concrete screw ULTRACUT FBS II

#### Performances

Characteristic values for static and quasi-static action with FBS II 6

#### Annex C 1

Appendix 13/ 19



**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 $\gamma_{Ms,N}$ [-]                                                          |           |                 | 1,4                                |      |      |     |                         |      |    |      |                 |    |      |
| Characteristic resistance $V^0_{Rk,s}$ [kN]                                                 |           |                 | 13,1                               | 19,0 | 29,4 |     | 34,9                    | 31,9 |    | 42,7 | 46,5            |    | 61,7 |
| Partial factor $\gamma_{Ms,V}$ [-]                                                          |           |                 | 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] | $\geq N^0_{Rk,c^{(1)}}$            |      |      |     |                         |      |    |      |                 |    |      |
|                                                                                             | cracked   | $N_{Rk,p}$ [kN] | 6                                  | 12   | 9    | 12  | $\geq N^0_{Rk,c^{(1)}}$ |      |    |      |                 |    |      |
| Increasing factors concrete                                                                 | C25/30    | $\psi/c$        | [-]                                | 1,12 |      |     |                         |      |    |      |                 |    |      |
|                                                                                             | C30/37    |                 |                                    | 1,22 |      |     |                         |      |    |      |                 |    |      |
|                                                                                             | C35/45    |                 |                                    | 1,32 |      |     |                         |      |    |      |                 |    |      |
|                                                                                             | C40/50    |                 |                                    | 1,41 |      |     |                         |      |    |      |                 |    |      |
|                                                                                             | C45/55    |                 |                                    | 1,50 |      |     |                         |      |    |      |                 |    |      |
|                                                                                             | C50/60    |                 |                                    | 1,58 |      |     |                         |      |    |      |                 |    |      |
| Installation factor $\gamma_{inst}$ [-]                                                     |           |                 | 1,0                                |      |      |     |                         |      |    |      |                 |    |      |
| 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 $h_{ef}$                         |      |      |     |                         |      |    |      |                 |    |      |
| Charakt. resistance for splitting $N^0_{Rk,sp}$ [kN]                                        |           |                 | $\min(N^0_{Rk,c^{(1)}}; N_{Rk,p})$ |      |      |     |                         |      |    |      |                 |    |      |
| 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                                  |      |      |     |                         |      |    |      |                 |    |      |
| 1) $N^0_{Rk,c}$ according EN 1992-4:2018                                                    |           |                 |                                    |      |      |     |                         |      |    |      |                 |    |      |
| fischer concrete screw ULTRACUT FBS II                                                      |           |                 |                                    |      |      |     |                         |      |    |      | Annex C 2       |    |      |
| Performances<br>Characteristic values for static and quasi-static action with FBS II 8 - 14 |           |                 |                                    |      |      |     |                         |      |    |      |                 |    |      |
|                                                                                             |           |                 |                                    |      |      |     |                         |      |    |      | Appendix 14/ 19 |    |      |

**Table C3.1:** Characteristic values for seismic performance category C1 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                        | $\frac{N_{Rk,s,C1}}{V_{Rk,s,C1}}$ | [kN] | 21           |     |     |     |
|                                                  |                                   |      | 6,3          |     |     |     |
| Without filling of the annular gap <sup>1)</sup> | $\alpha_{gap}$                    | [-]  | 0,5          |     |     |     |
| With filling of the annular gap <sup>1)</sup>    |                                   |      | 1,0          |     |     |     |
| Pullout failure                                  |                                   |      |              |     |     |     |
| Characteristic resistance in cracked concrete    | $N_{Rk,p,C1}$                     | [kN] | 2,5          | 3,5 | 4,0 | 5,0 |
| Concrete cone failure                            |                                   |      |              |     |     |     |
| 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          |     |     |     |
| Concrete pryout failure                          |                                   |      |              |     |     |     |
| Factor for pryout failure                        | $k_8$                             | [-]  | 2,0          |     |     |     |
| Concrete edge failure                            |                                   |      |              |     |     |     |
| 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

| Size                                             |                                   | FBS II |              |                         |      |      |
|--------------------------------------------------|-----------------------------------|--------|--------------|-------------------------|------|------|
|                                                  |                                   | 8      | 10           | 12                      | 14   |      |
| Nominal embedment depth                          | $h_{nom}$                         | [mm]   | 65           | 85                      | 100  | 115  |
| Steel failure for tension load and shear load    |                                   |        |              |                         |      |      |
| Characteristic resistance                        | $\frac{N_{Rk,s,C1}}{V_{Rk,s,C1}}$ | [kN]   | 35           | 55                      | 76   | 103  |
|                                                  |                                   |        | 11,4         | 22,3                    | 26,9 | 38,3 |
| Without filling of the annular gap <sup>1)</sup> | $\alpha_{gap}$                    | [-]    | 0,5          |                         |      |      |
| With filling of the annular gap <sup>1)</sup>    |                                   |        | 1,0          |                         |      |      |
| Pullout failure                                  |                                   |        |              |                         |      |      |
| Characteristic resistance in cracked concrete    | $N_{Rk,p,C1}$                     | [kN]   | 12           | $\geq N^0_{Rk,c^{(2)}}$ |      |      |
| Concrete cone failure                            |                                   |        |              |                         |      |      |
| Effective embedment depth                        | $h_{ef}$                          | [mm]   | 52           | 68                      | 81   | 93   |
| Characteristic edge distance                     | $c_{cr,N}$                        |        | $1,5 h_{ef}$ |                         |      |      |
| Characteristic spacing                           | $s_{cr,N}$                        |        | $3 h_{ef}$   |                         |      |      |
| Installation factor                              | $\gamma_{inst}$                   | [-]    | 1,0          |                         |      |      |
| Concrete pryout failure                          |                                   |        |              |                         |      |      |
| Factor for pryout failure                        | $k_8$                             | [-]    | 2,0          |                         |      |      |
| Concrete edge failure                            |                                   |        |              |                         |      |      |
| Effective length in concrete                     | $l_f$                             | [mm]   | 65           | 85                      | 100  | 115  |
| Nominal diameter of screw                        | $d_{nom}$                         |        | 8            | 10                      | 12   | 14   |

<sup>1)</sup> Filling of the annular gap according annex B 5.

<sup>2)</sup>  $N^0_{Rk,c}$  according EN 1992-4:2018

fischer concrete screw ULTRACUT FBS II

#### Performances

Characteristic values for seismic performance category C1

#### Annex C 3

Appendix 15/ 19



**Table C4.1:** Characteristic values for seismic performance category C2

| Size                                          |                 |      | FBS II       |      |      |      |
|-----------------------------------------------|-----------------|------|--------------|------|------|------|
|                                               |                 |      | 8            | 10   | 12   | 14   |
| Nominal embedment depth                       | $h_{nom}$       | [mm] | 65           | 85   | 100  | 115  |
| Steel failure for tension load and shear load |                 |      |              |      |      |      |
| Characteristic resistance                     | $N_{Rk,s,C2}$   | [kN] | 35,0         | 55   | 76,0 | 103  |
|                                               | $V_{Rk,s,C2}$   |      | 13,3         | 20,4 | 29,9 | 35,2 |
| With filling of the annular gap <sup>1)</sup> | $\alpha_{gap}$  | [-]  | 1,0          |      |      |      |
| Pullout failure                               |                 |      |              |      |      |      |
| Characteristic resistance in cracked concrete | $N_{Rk,p,C2}$   | [kN] | 2,1          | 6,0  | 8,9  | 17,1 |
| Concrete cone failure                         |                 |      |              |      |      |      |
| Effective embedment depth                     | $h_{ef}$        | [mm] | 52           | 68   | 81   | 93   |
| Characteristic edge distance                  | $c_{cr,N}$      |      | 1,5 $h_{ef}$ |      |      |      |
| Characteristic spacing                        | $s_{cr,N}$      |      | 3 $h_{ef}$   |      |      |      |
| Installation factor                           | $\gamma_{inst}$ | [-]  | 1,0          |      |      |      |
| Concrete pryout failure                       |                 |      |              |      |      |      |
| Factor for pryout failure                     | $k_8$           | [-]  | 2,0          |      |      |      |
| Concrete edge failure                         |                 |      |              |      |      |      |
| Effective length in concrete                  | $l_f$           | [mm] | 65           | 85   | 100  | 115  |
| Nominal diameter of screw                     | $d_{nom}$       |      | 8            | 10   | 12   | 14   |

<sup>1)</sup> Filling of the annular gap according annex B 5. Application without filling of the annular gap not allowed.

fischer concrete screw ULTRACUT FBS II

#### Performances

Characteristic values for seismic performance category C2 with FBS II 8 - 14

#### Annex C 4

Appendix 16/ 19

**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                                                                         |                 |             |      |               |     |     |                                  |
| Characteristic resistance for all head shapes                                                                         | $N_{Rk,s,fi}$   | R30         | [kN] | 1,00          |     |     |                                  |
|                                                                                                                       |                 | R60         |      | 0,60          |     |     |                                  |
|                                                                                                                       |                 | R90         |      | 0,50          |     |     |                                  |
|                                                                                                                       |                 | R120        |      | 0,40          |     |     |                                  |
|                                                                                                                       | $V_{Rk,s,fi}$   | R30         |      | 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          |     |     |                                  |
| Pullout failure                                                                                                       |                 |             |      |               |     |     |                                  |
| Characteristic resistance                                                                                             | $N_{Rk,p,fi}$   | R30         | [kN] | 0,6           | 0,9 | 1,0 | 1,2                              |
|                                                                                                                       |                 | R60         |      |               |     |     |                                  |
|                                                                                                                       |                 | R90         |      |               |     |     |                                  |
|                                                                                                                       |                 | R120        |      |               |     |     |                                  |
| 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<br><br>Appendix 17/ 19 |
| 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 $h_{nom}$ [mm]                                                                     |                 |                 |      | 50          | 65   | 55            | 65   | 85  | 60                      | 75   | 100 | 65              | 85    | 115 |  |
| Steel failure for tension load and shear load                                                              |                 |                 |      |             |      |               |      |     |                         |      |     |                 |       |     |  |
| Characteristic resistance for the head shapes                                                              | US, S           | 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            |       |     |  |
|                                                                                                            |                 | R30             |      | 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 | R30             | [kN] | 2,12        |      | 2,96          |      |     | No performance declared |      |     |                 |       |     |  |
|                                                                                                            |                 | R60             |      | 1,67        |      | 2,26          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R90             |      | 1,21        |      | 1,56          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R120            |      | 0,99        |      | 1,21          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R30             |      | 2,12        |      | 2,96          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R60             |      | 1,67        |      | 2,26          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R90             |      | 1,21        |      | 1,56          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R120            |      | 0,99        |      | 1,21          |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            | All head shapes | $M_{Rk,s,fi}^0$ | [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                                                                                  | $N_{Rk,p,fi}$   | R30             | [kN] |             |      |               |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R60             |      |             |      |               |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R90             |      |             |      |               |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 | R120            |      |             |      |               |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 |                 |      | 1,5         | 3,0  | 2,3           | 3,0  | 5,0 | 2,9                     | 4,2  | 6,6 | 3,2             | 4,9   | 8,1 |  |
|                                                                                                            |                 |                 |      | 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                                                                                                |                 |                 |      | $c_{cr,fi}$ | [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 $c_{cr,fi}$ |      |     |                         |      |     |                 |       |     |  |
| 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                            |                 |                 |      |             |      |               |      |     |                         |      |     |                 |       |     |  |
|                                                                                                            |                 |                 |      |             |      |               |      |     |                         |      |     | Appendix 18/ 19 |       |     |  |



**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                       | $\delta_{N0}$      | [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  |
|                                    | $\delta_{N\infty}$ |      | 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                       | $\delta_{N0}$      | [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  |
|                                    | $\delta_{N\infty}$ |      | 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        | $\delta_{N,C2}$ (DLS) | [mm] | 0,5    | 0,8 | 0,9 | 1,3 |
| Displacement ULS        | $\delta_{N,C2}$ (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        | $\delta_{V,C2}$ (DLS) | [mm] | 1,6    | 2,7 | 3,1 | 4,1 |
| Displacement ULS        | $\delta_{V,C2}$ (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