



## DÉCLARATION DES PERFORMANCES



No 0015 – FR

1. Code d'identification unique du produit type: **goujon d'ancrage fischer FBN II, FBN II A4**

2. Usage(s) prévu(s):

| Produit                                            | Usage(s) prévu(s)                                                                             |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Cheville à expansion par vissage à couple contrôlé | Cheville de fixation dans du béton non fissuré, voir annexe, en particulier annexes B 1 - B 3 |

3. Fabricant: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Straße 1, 72178 Waldachtal, Allemagne**

4. Mandataire: --

5. Système(s) d'évaluation et de vérification de la constance des performances: **1**

6a. Norme harmonisée: ---

Organisme(s) notifié(s): ---

6b. Document d'évaluation européen: **ETAG 001; 2013-04**

Évaluation technique européenne: **ETA-07/0211; 2016-05-19**

Organisme d'évaluation technique: **DIBt**

Organisme(s) notifié(s): **1343 – MPA Darmstadt**

7. Performance(s) déclarée(s):

### Résistance mécanique et stabilité (BWR 1)

| Caractéristique essentielle                                                  | Performance                                    |
|------------------------------------------------------------------------------|------------------------------------------------|
| Valeurs caractéristiques pour des sollicitations en traction et cisaillement | Voir annexe, en particulier annexes C 1 et C 2 |
| Distances au bord et entraxes                                                | Voir annexe, en particulier annexes C 1 et C 2 |
| Déplacements sous charges de traction et cisaillement                        | Voir annexe, en particulier annexe C 3         |

### Protection contre le feu (BWR 2)

| Caractéristique essentielle | Performance                                        |
|-----------------------------|----------------------------------------------------|
| Réaction au feu             | La cheville remplit les exigences de la classe A 1 |
| Résistance au feu           | NPD                                                |

8. Documentation technique appropriée et/ou documentation technique spécifique: ---

Les performances du produit identifié ci-dessus sont conformes aux performances déclarées. Conformément au règlement (UE) no 305/2011, la présente déclaration des performances est établie sous la seule responsabilité du fabricant mentionné ci-dessus.

Signé pour le fabricant et en son nom par:

Andreas Bucher, Dipl.-Ing.

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

*i.V. A. Bucher*

*i.V. W. Hengesbach*

Tumlingen, 2016-05-25

- Cette déclaration des performances a été émise en différentes langues. En cas de divergences d'interprétation, la version anglaise prévaut toujours.

- L'annexe contient des informations volontaires et complémentaires en langue anglaise dépassant les exigences légales (spécifiées en langage neutre).

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

The fischer Bolt anchor FBN II and FBN II A4 is an anchor made of zinc plated, hot-dip galvanised or stainless steel which is placed into a drilled hole and anchored by torque-controlled expansion.

Product and 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 for tension and shear loads in concrete | See Annex C 1 and C 2 |
| Edge distances and spacing                                        | See Annex C 1 and C 2 |
| Displacements under tension and shear loads                       | See Annex C 3         |

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

| Essential characteristic | Performance                                 |
|--------------------------|---------------------------------------------|
| Reaction to fire         | Anchorage satisfy requirements for Class A1 |
| Resistance to fire       | No performance determined (NPD)             |

**3.3 Safety in use (BWR 4)**

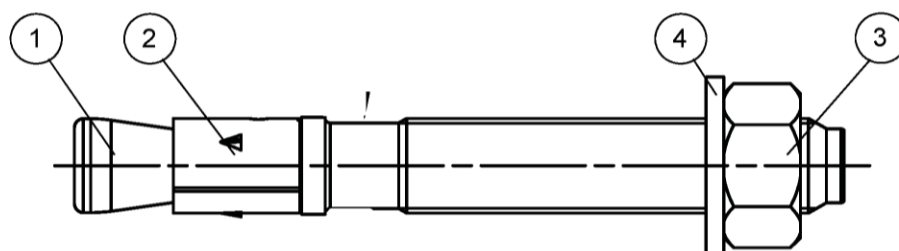
The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

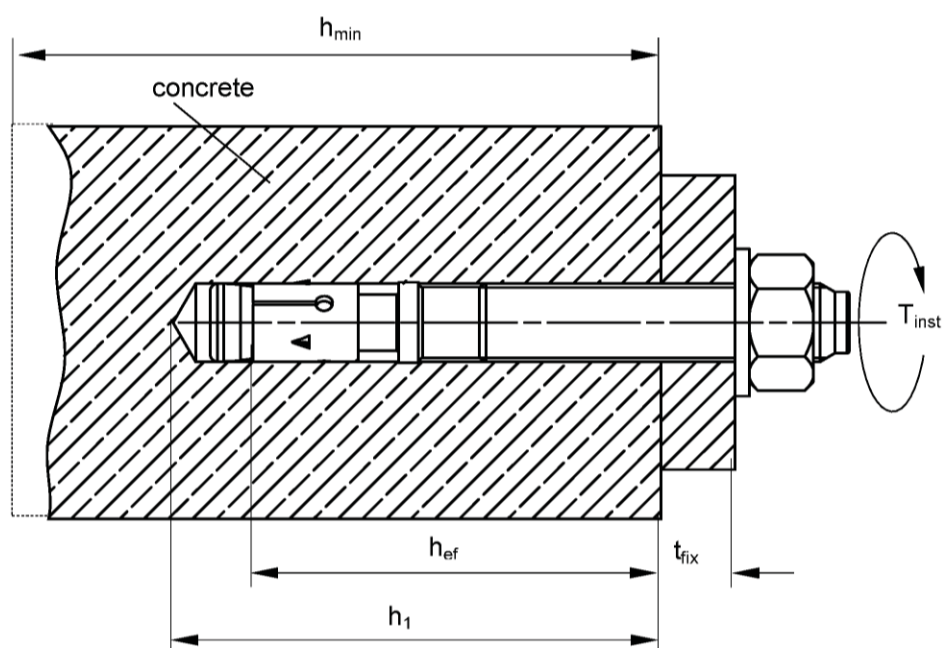
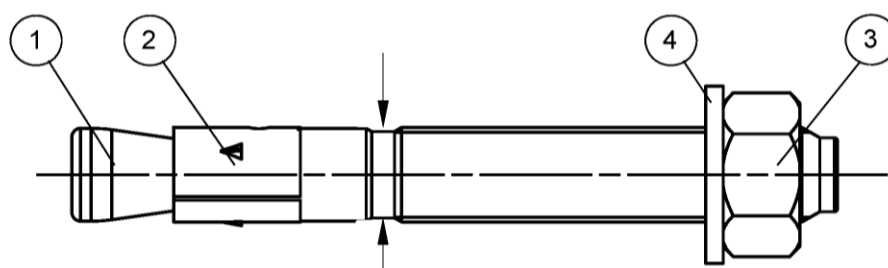
In accordance with guideline for European technical approval ETAG 001, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

Cone bolt manufactured by cold - forming:



Cone bolt manufactured by turning:



- ① Cone bolt (cold – formed or turned)
- ② Expansion sleeve
- ③ Hexagon nut
- ④ Washer

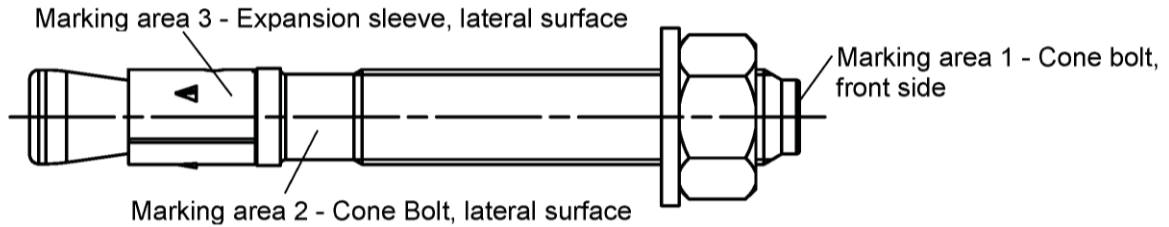
- $h_{ef}$  = Effective anchorage depth
- $t_{fix}$  = Thickness of fixture
- $h_1$  = Drill hole depth
- $h_{min}$  = Thickness of concrete member
- $T_{inst}$  = Required torque moment

fischer Bolt Anchor FBN II, FBN II A4

**Product description**  
Installed condition

**Annex A 1**

### FBN II for use with standard and reduced anchorage depth ( $h_{ef, sta}$ and $h_{ef, red}$ )



Product marking, example:  FBN II 12/10 A4

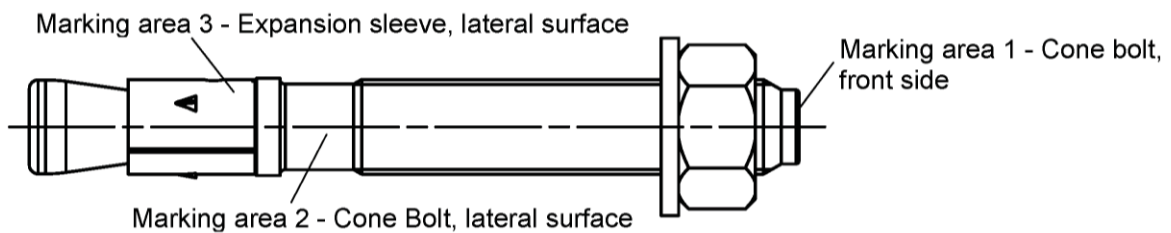
works symbol | type of anchor placed on marking area 2 or marking area 3

thread size / thickness of fixture ( $t_{fix}$ ) for  $h_{ef, sta}$  identification A4 placed on marking area 2

**Table A1:** Letter-code on marking area 1 and maximum thickness of fixture  $t_{fix}$ :

| marking                          |         | A  | B  | C  | D  | E  | F  | G  | H  | I  | K  | L  | M  | N   | O   | P   | R   | S   | T   | U   | V   | W   | X   | Y   | Z   |
|----------------------------------|---------|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| max. $t_{fix}$ for $h_{ef, sta}$ | M6-M20  | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80  | 90  | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |
| max. $t_{fix}$ for $h_{ef, red}$ | M8, M10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 70 | 80 | 90  | 100 | 110 | 130 | 150 | 170 | 190 | 210 | 260 | 310 | 360 | 410 |
|                                  | M12, 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 75 | 85 | 95  | 105 | 115 | 135 | 155 | 175 | 195 | 215 | 265 | 315 | 365 | 415 |
|                                  | M20     | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 85 | 95 | 105 | 115 | 125 | 145 | 165 | 185 | 205 | 225 | 275 | 325 | 375 | 425 |

### FBN II K for use with reduced anchorage depth only ( $h_{ef, red}$ ):



Product marking, example:  FBN II 12/10 K A4

works symbol | type of anchor placed on marking area 2 or marking area 3

thread size / thickness of fixture ( $t_{fix}$ ) identification K for  $h_{ef, red}$  | identification A4 placed on marking area 2

**Table A2:** Letter-code on marking area 1 and maximum thickness of fixture  $t_{fix}$ :

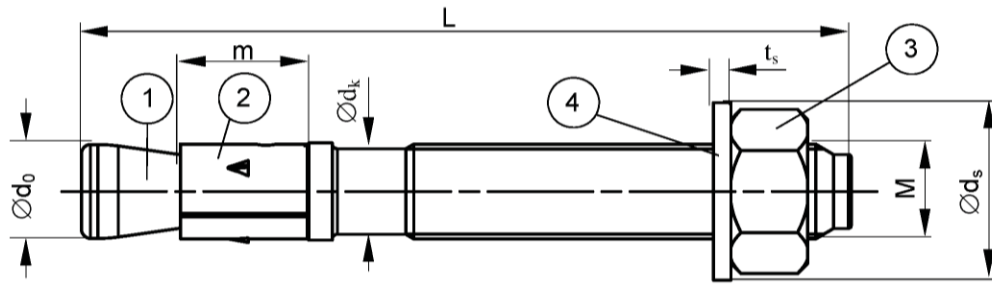
| marking                          |        | -A- | -B- | -C- | -D- | -E- | -F- | -G- | -H- | -I- | -K- | -L- | -M- | -N- | -O- | -P- | -R- | -S- | -T- | -U- | -V- | -W- | -X- | -Y- | -Z- |
|----------------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| max. $t_{fix}$ for $h_{ef, red}$ | M8-M20 | 5   | 10  | 15  | 20  | 25  | 30  | 35  | 40  | 45  | 50  | 60  | 70  | 80  | 90  | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |

Identification for  $h_{ef, red}$  is the letter-code between 2 hyphen

fischer Bolt Anchor FBN II, FBN II A4

**Product description**  
Anchor Types

**Annex A 2**



**Table A3:** Anchor dimensions [mm]

| Part                 | Designation      |                  |   | FBN II, FBN II A4 |      |      |      |      |      |
|----------------------|------------------|------------------|---|-------------------|------|------|------|------|------|
|                      |                  |                  |   | M6                | M8   | M10  | M12  | M16  | M20  |
| 1                    | Cone bolt        | M                | = | M6                | M8   | M10  | M12  | M16  | M20  |
|                      |                  | Ø d <sub>0</sub> | = | 5,9               | 7,9  | 9,9  | 11,9 | 15,9 | 19,6 |
|                      |                  | Ø d <sub>k</sub> | = | 5,2               | 7,1  | 8,9  | 10,8 | 14,5 | 18,2 |
| 2                    | Expansion sleeve | m                | = | 10                | 11,5 | 13,5 | 16,5 | 21,5 | 33,5 |
| 3                    | Hexagon nut      | SW               | = | 10                | 13   | 17   | 19   | 24   | 30   |
| 4                    | Washer           | t <sub>s</sub>   | ≥ | 1,0               | 1,4  | 1,8  | 2,3  | 2,7  | 2,7  |
|                      |                  | Ø d <sub>s</sub> | ≥ | 11,5              | 15   | 19   | 23   | 29   | 36   |
| Thickness of fixture |                  | t <sub>fix</sub> | ≥ | 0                 | 0    | 0    | 0    | 0    | 0    |
|                      |                  |                  | ≤ | 200               | 200  | 250  | 300  | 400  | 500  |
| Length of anchor     |                  | L <sub>min</sub> | - | 45                | 56   | 71   | 86   | 120  | 139  |
|                      |                  | L <sub>max</sub> | - | 245               | 261  | 316  | 396  | 520  | 654  |

fischer Bolt Anchor FBN II, FBN II A4

**Product description**  
Anchor dimensions

**Annex A 3**

**Table A4:** Materials FBN II (zinc plated  $\geq 5\mu\text{m}$ , DIN EN ISO 4042: 2001-01)

| Part | Designation      | Material                                                                                                                                                                                         |
|------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Cone bolt        | Cold form steel or free cutting steel<br>Nominal steel tensile strength $f_{uk} \leq 1000 \text{ N/mm}^2$<br>Nominal yield strength FBN II 8 - 16 $f_{yk} \geq 560 \text{ N/mm}^2$ <sup>1)</sup> |
| 2    | Expansion sleeve | Cold strip, EN 10139:2013 <sup>2)</sup>                                                                                                                                                          |
| 3    | Hexagon nut      | Steel, property class min. 8, EN ISO 898-2:2012                                                                                                                                                  |
| 4    | Washer           | Cold strip, EN 10139:2013                                                                                                                                                                        |

<sup>1)</sup> FBN II 6  $f_{yk} \geq 480 \text{ N/mm}^2$ , FBN II 20  $f_{yk} \geq 520 \text{ N/mm}^2$

<sup>2)</sup> Optional stainless steel EN 10088:2014

**Table A5:** Materials FBN II (hot-dip galvanized  $\geq 50\mu\text{m}$ , ISO 10684: 2004 <sup>2)</sup>)

| Part | Designation      | Material                                                                                                                                                                                         |
|------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Cone bolt        | Cold form steel or free cutting steel<br>Nominal steel tensile strength $f_{uk} \leq 1000 \text{ N/mm}^2$<br>Nominal yield strength FBN II 8 - 16 $f_{yk} \geq 560 \text{ N/mm}^2$ <sup>1)</sup> |
| 2    | Expansion sleeve | Stainless steel EN 10088:2014                                                                                                                                                                    |
| 3    | Hexagon nut      | Steel, property class min. 8, EN ISO 898-2:2012                                                                                                                                                  |
| 4    | Washer           | Cold strip, EN 10139:2013                                                                                                                                                                        |

<sup>1)</sup> FBN II 6  $f_{yk} \geq 480 \text{ N/mm}^2$ , FBN II 20  $f_{yk} \geq 520 \text{ N/mm}^2$

<sup>2)</sup> Alternative method sherardized  $\geq 50 \mu\text{m}$ , EN 13811:2003

**Table A6:** Materials FBN II A4

| Part | Designation      | Material                                                                                                                                                                                 |
|------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Cone bolt        | Stainless steel EN 10088:2014<br>Nominal steel tensile strength $f_{uk} \leq 1000 \text{ N/mm}^2$<br>Nominal yield strength FBN II 8 - 20 $f_{yk} \geq 560 \text{ N/mm}^2$ <sup>1)</sup> |
| 2    | Expansion sleeve | Stainless steel EN 10088:2014                                                                                                                                                            |
| 3    | Hexagon nut      | Stainless steel EN 10088:2014<br>ISO 3506-2: 2009; property class min. 70                                                                                                                |
| 4    | Washer           | Stainless steel EN 10088:2014                                                                                                                                                            |

<sup>1)</sup> FBN II 6  $f_{yk} \geq 480 \text{ N/mm}^2$

fischer Bolt Anchor FBN II, FBN II A4

**Product description**  
Materials

**Annex A 4**

### Specifications of intended use

| fischer Bolt Anchor FBN II, FBN II A4 |                 | M6                 | M8 | M10 | M12 | M16 | M20 |
|---------------------------------------|-----------------|--------------------|----|-----|-----|-----|-----|
| Material                              | Steel           | Zinc plated        | ✓  |     |     |     |     |
|                                       |                 | Hot-dip galvanized | -  | ✓   |     |     |     |
|                                       | Stainless steel | A4                 | ✓  |     |     |     |     |
| Static and quasi-static loads         |                 | ✓                  |    |     |     |     |     |
| Reduced anchorage depth               |                 | -                  | ✓  |     |     |     |     |
| Uncracked concrete                    |                 | ✓                  |    |     |     |     |     |

#### Base materials:

- Reinforced and unreinforced normal weight concrete according to EN 206-1:2000
- Strength classes C20/25 to C50/60 according to EN 206-1:2000

#### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (FBN II (zinc plated / hot-dip galvanized), FBN II A4)
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (FBN II A4). Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used)

#### 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 anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.)
- Anchorages under static or quasi-static actions are to be designed in accordance with:
  - ETAG 001, Annex C, design method A, Edition August 2010 or
  - CEN/TS 1992-4:2009, design method A

#### Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Hammer or hollow drilling according to Annex B3
- 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

fischer Bolt Anchor FBN II, FBN II A4

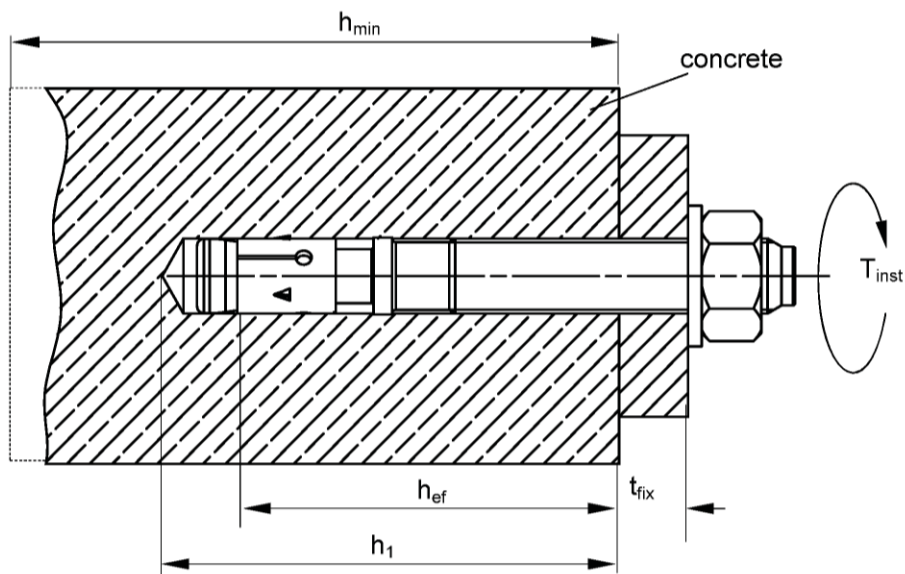
**Intended Use**  
Specifications

**Annex B 1**

**Table B1:** Installation parameters

| Type of anchor / size <b>FBN II, FBN II A4</b>     |                     | <b>M6</b>        | <b>M8</b>               | <b>M10</b>             | <b>M12</b>             | <b>M16</b>              | <b>M20</b>               |
|----------------------------------------------------|---------------------|------------------|-------------------------|------------------------|------------------------|-------------------------|--------------------------|
| Nominal drill hole diameter                        | $d_0 =$ [mm]        | 6                | 8                       | 10                     | 12                     | 16                      | 20                       |
| Cutting diameter of drill bit                      | $d_{cut} \leq$ [mm] | 6,45             | 8,45                    | 10,45                  | 12,5                   | 16,5                    | 20,55                    |
| Effective anchorage depth                          | $h_{ef} =$ [mm]     | 30 <sup>2)</sup> | 40 (30 <sup>1) 2)</sup> | 50 (40 <sup>1)</sup> ) | 65 (50 <sup>1)</sup> ) | 80 (65 <sup>1)</sup> )  | 105 (80 <sup>1)</sup> )  |
| Depth of drill hole in concrete                    | $h_1 \geq$ [mm]     | 40               | 56 (46 <sup>1) 2)</sup> | 68 (58 <sup>1)</sup> ) | 85 (70 <sup>1)</sup> ) | 104 (89 <sup>1)</sup> ) | 135 (110 <sup>1)</sup> ) |
| Diameter of clearance hole in the fixture          | $d_f \leq$ [mm]     | 7                | 9                       | 12                     | 14                     | 18                      | 22                       |
| Required torque moment FBN II (zinc plated)        | $T_{inst} =$ [Nm]   | 4                | 15                      | 30                     | 50                     | 100                     | 200                      |
| Required torque moment FBN II (hot-dip galvanized) | $T_{inst} =$ [Nm]   | -                | 15                      | 30                     | 40                     | 70                      | 200                      |
| Required torque moment FBN II A4                   | $T_{inst} =$ [Nm]   | 4                | 10                      | 20                     | 35                     | 80                      | 150                      |

<sup>1)</sup> Values for reduced anchorage depth

<sup>2)</sup> Use restricted to anchoring of structural components which are statically indeterminate


$h_{ef}$  = Effective anchorage depth  
 $t_{fix}$  = Thickness of fixture  
 $h_1$  = Drill hole depth  
 $h_{min}$  = Thickness of concrete member  
 $T_{inst}$  = Required torque moment

fischer Bolt Anchor FBN II, FBN II A4

**Intended Use**  
 Installation instructions

**Annex B 2**

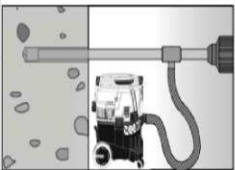
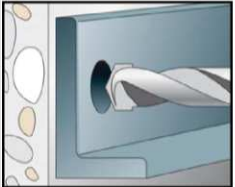
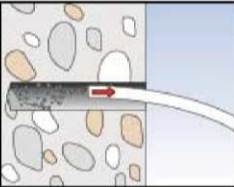
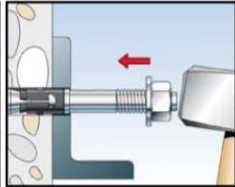
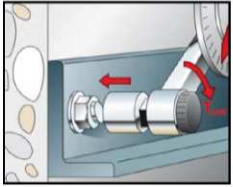
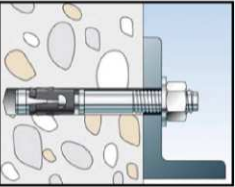
**Table B2:** Minimum thickness of concrete members, minimum spacing and minimum edge distance

| Type of anchor / size <b>FBN II, FBN II A4</b> |                             |                    | <b>M6</b>        | <b>M8</b>                 | <b>M10</b>                | <b>M12</b> | <b>M16</b>                 | <b>M20</b>                  |
|------------------------------------------------|-----------------------------|--------------------|------------------|---------------------------|---------------------------|------------|----------------------------|-----------------------------|
| <b>Standard<br/>anchorage<br/>depth</b>        | Effective anchorage depth   | $h_{ef, sta}$ [mm] | 30 <sup>2)</sup> | 40                        | 50                        | 65         | 80                         | 105                         |
|                                                | Minimum thickness of member | $h_{min}$ [mm]     | 100              | 100                       | 100                       | 120        | 160                        | 200                         |
|                                                | Minimum spacing             | $s_{min}$ [mm]     | 40               | 40                        | 50<br>(70 <sup>1)</sup> ) | 70         | 90<br>(120 <sup>1)</sup> ) | 120                         |
|                                                | Minimum edge distance       | $c_{min}$ [mm]     | 40               | 40<br>(45 <sup>1)</sup> ) | 50<br>(55 <sup>1)</sup> ) | 70         | 90<br>(80 <sup>1)</sup> )  | 120                         |
| <b>Reduced<br/>anchorage<br/>depth</b>         | Effective anchorage depth   | $h_{ef, red}$ [mm] | -                | 30 <sup>2)</sup>          | 40                        | 50         | 65                         | 80                          |
|                                                | Minimum thickness of member | $h_{min}$ [mm]     | -                | 100                       | 100                       | 100        | 120                        | 160                         |
|                                                | Minimum spacing             | $s_{min}$ [mm]     | -                | 40<br>(50 <sup>1)</sup> ) | 50                        | 70         | 90                         | 120<br>(140 <sup>1)</sup> ) |
|                                                | Minimum edge distance       | $c_{min}$ [mm]     | -                | 40<br>(45 <sup>1)</sup> ) | 80                        | 100        | 120                        | 120                         |

<sup>1)</sup> Values for FBN II A4

<sup>2)</sup> Use restricted to anchoring of structural components which are statically indeterminate

### Installation instructions

|                            |                                                                                          |                                                                                          |                                                                                          |                                                                                           |                                                                                            |                               |
|----------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------|
| <b>Hollow<br/>drilling</b> |       |                                                                                          |                                                                                          |                                                                                           |                                                                                            | Continue with step 3, 4 and 5 |
| <b>Hammer<br/>drilling</b> | <br>1 | <br>2 | <br>3 | <br>4 | <br>5 |                               |

| No. | Description                                                  |                                                        |
|-----|--------------------------------------------------------------|--------------------------------------------------------|
| 1   | Create drill hole with hammer drill                          | Create drill hole with hollow drill and vacuum cleaner |
| 2   | Clean bore hole                                              | -                                                      |
| 3   | Set anchor                                                   |                                                        |
| 4   | Expand anchor with prescribed installation torque $T_{inst}$ |                                                        |
| 5   | Finished installation                                        |                                                        |

| Types of drills |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| Hammer drill    |  |
| Hollow drill    |  |

fischer Bolt Anchor FBN II, FBN II A4

**Intended Use**  
Minimum spacing and edge distance  
Installation instructions

**Annex B 3**

**Table C1:** Characteristic values of **tension** resistance for **standard and reduced anchorage depth** under static and quasi-static action (Design method A, according to **ETAG 001, Annex C** or **CEN/TS 1992-4:2009**)

| Type of anchor / size                                                              |                                                                |        | M6                       | M8                | M10             | M12  | M16  | M20 |
|------------------------------------------------------------------------------------|----------------------------------------------------------------|--------|--------------------------|-------------------|-----------------|------|------|-----|
| Steel failure for standard and reduced anchorage depth FBN II                      |                                                                |        |                          |                   |                 |      |      |     |
| Characteristic resistance FBN II                                                   | N <sub>Rk,s</sub>                                              | [kN]   | 8,3                      | 16,5              | 27,2            | 41,6 | 77,9 | 107 |
| Partial safety factor                                                              | γ <sub>Ms</sub>                                                | [-]    | 1,5                      | 1,4               | 1,4             | 1,4  | 1,5  | 1,5 |
| Steel failure for standard and reduced anchorage depth FBN II A4                   |                                                                |        |                          |                   |                 |      |      |     |
| Characteristic resistance FBN II A4                                                | N <sub>Rk,s</sub>                                              | [kN]   | 10,6                     | 16,5              | 27,2            | 41,6 | 78   | 111 |
| Partial safety factor                                                              | γ <sub>Ms</sub>                                                | [-]    | 1,5                      | 1,4               | 1,4             | 1,4  | 1,4  | 1,5 |
| Pullout failure for standard anchorage depth FBN II, FBN II A4                     |                                                                |        |                          |                   |                 |      |      |     |
| Characteristic resistance C20/25                                                   | N <sub>Rk,p</sub>                                              | [kN]   | 6 <sup>4)</sup>          | - <sup>3)</sup>   |                 |      |      |     |
| Pullout failure for reduced anchorage depth FBN II, FBN II A4                      |                                                                |        |                          |                   |                 |      |      |     |
| Characteristic resistance C20/25                                                   | N <sub>Rk,p</sub>                                              | [kN]   | -                        | 6 <sup>4)</sup>   | - <sup>3)</sup> |      |      |     |
| Increasing factors for N <sub>Rk,p</sub>                                           | ψ <sub>c</sub>                                                 | C25/30 | 1,10                     |                   |                 |      |      |     |
|                                                                                    |                                                                | C30/37 | 1,22                     |                   |                 |      |      |     |
|                                                                                    |                                                                | C35/45 | 1,34                     |                   |                 |      |      |     |
|                                                                                    |                                                                | C40/50 | 1,41                     |                   |                 |      |      |     |
|                                                                                    |                                                                | C45/55 | 1,48                     |                   |                 |      |      |     |
|                                                                                    |                                                                | C50/60 | 1,55                     |                   |                 |      |      |     |
| Installation safety factor                                                         | γ <sub>2</sub> <sup>1)</sup> = γ <sub>inst</sub> <sup>2)</sup> | [-]    | 1,0                      |                   |                 |      |      |     |
| Concrete cone and splitting failure for standard anchorage depth FBN II, FBN II A4 |                                                                |        |                          |                   |                 |      |      |     |
| Effective anchorage depth                                                          | h <sub>ef, sta</sub>                                           | [mm]   | 30 <sup>4)</sup>         | 40                | 50              | 65   | 80   | 105 |
| Factor for uncracked concrete                                                      | k <sub>ucr</sub> <sup>2)</sup>                                 | [-]    | 10,1                     |                   |                 |      |      |     |
| Spacing                                                                            | s <sub>cr,N</sub>                                              | [mm]   | 3 h <sub>ef, sta</sub>   |                   |                 |      |      |     |
| Edge distance                                                                      | c <sub>cr,N</sub>                                              | [mm]   | 1,5 h <sub>ef, sta</sub> |                   |                 |      |      |     |
| Spacing (splitting failure)                                                        | s <sub>cr,sp</sub>                                             | [mm]   | 130 <sup>4)</sup>        | 190               | 200             | 290  | 350  | 370 |
| Edge distance (splitting failure)                                                  | c <sub>cr,sp</sub>                                             | [mm]   | 65 <sup>4)</sup>         | 95                | 100             | 145  | 175  | 185 |
| Concrete cone and splitting failure for reduced anchorage depth FBN II, FBN II A4  |                                                                |        |                          |                   |                 |      |      |     |
| Effective anchorage depth                                                          | h <sub>ef, red</sub>                                           | [mm]   | -                        | 30 <sup>4)</sup>  | 40              | 50   | 65   | 80  |
| Factor for uncracked concrete                                                      | k <sub>ucr</sub> <sup>2)</sup>                                 | [-]    | 10,1                     |                   |                 |      |      |     |
| Spacing                                                                            | s <sub>cr,N</sub>                                              | [mm]   | 3 h <sub>ef, red</sub>   |                   |                 |      |      |     |
| Edge distance                                                                      | c <sub>cr,N</sub>                                              | [mm]   | 1,5 h <sub>ef, red</sub> |                   |                 |      |      |     |
| Spacing (splitting failure)                                                        | s <sub>cr,sp</sub>                                             | [mm]   | -                        | 190 <sup>4)</sup> | 200             | 290  | 350  | 370 |
| Edge distance (splitting failure)                                                  | c <sub>cr,sp</sub>                                             | [mm]   | -                        | 95 <sup>4)</sup>  | 100             | 145  | 175  | 185 |

<sup>1)</sup> Parameter relevant for design according to ETAG 001, Annex C

<sup>2)</sup> Parameter relevant for design according to CEN/TS 1992-4:2009

<sup>3)</sup> Pullout failure not relevant

<sup>4)</sup> Use restricted to anchoring of structural components which are statically indeterminate

fischer Bolt Anchor FBN II, FBN II A4

#### Performances

Characteristic values of tension resistance for standard and reduced anchorage depth

**Annex C 1**

**Table C2:** Characteristic values of **shear** resistance for **standard and reduced anchorage depth** under static and quasi-static action (Design method A, according to **ETAG 001, Annex C** or **CEN/TS 1992-4:2009**)

| Type of anchor / size                                                       |                                      |      | M6                | M8                 | M10  | M12  | M16   | M20 |
|-----------------------------------------------------------------------------|--------------------------------------|------|-------------------|--------------------|------|------|-------|-----|
| Steel failure without lever arm for standard and reduced anchorage depth    |                                      |      |                   |                    |      |      |       |     |
| Charact. resistance <b>FBN II</b>                                           | $V_{Rk,s}$                           | [kN] | 6,0               | 13,3               | 21,0 | 31,3 | 55,1  | 67  |
| Steel failure without lever arm for standard and reduced anchorage depth    |                                      |      |                   |                    |      |      |       |     |
| Charact. resistance <b>FBN II A4</b>                                        | $V_{Rk,s}$                           | [kN] | 5,3               | 12,8               | 20,3 | 27,4 | 51    | 86  |
| Steel failure with lever arm for standard anchorage depth                   |                                      |      |                   |                    |      |      |       |     |
| Charact. bending moment <b>FBN II</b>                                       | $M^0_{Rk,s}$                         | [Nm] | 9,4 <sup>3)</sup> | 26,2               | 52,3 | 91,6 | 232,2 | 422 |
| Steel failure with lever arm for standard anchorage depth                   |                                      |      |                   |                    |      |      |       |     |
| Charact. bending moment <b>FBN II A4</b>                                    | $M^0_{Rk,s}$                         | [Nm] | 8 <sup>3)</sup>   | 26                 | 52   | 85   | 216   | 454 |
| Steel failure with lever arm for reduced anchorage depth                    |                                      |      |                   |                    |      |      |       |     |
| Charact. bending moment <b>FBN II</b>                                       | $M^0_{Rk,s}$                         | [Nm] | -                 | 19,9 <sup>3)</sup> | 45,9 | 90,0 | 226,9 | 349 |
| Steel failure with lever arm for reduced anchorage depth                    |                                      |      |                   |                    |      |      |       |     |
| Charact. bending moment <b>FBN II A4</b>                                    | $M^0_{Rk,s}$                         | [Nm] | -                 | 21 <sup>3)</sup>   | 47   | 85   | 216   | 353 |
| Partial safety factor steel failure                                         | $\gamma_{Ms}$                        | [-]  | 1,25              |                    |      |      |       |     |
| Factor for ductility                                                        | $k_2^{2)}$                           | [-]  | 1,0               |                    |      |      |       |     |
| Concrete pryout failure for standard anchorage depth FBN II, FBN II A4      |                                      |      |                   |                    |      |      |       |     |
| Factor k according to ETAG 001, Annex C or $k_3$ according to CEN/TS 1992-4 | $k^{1)}=k_{(3)}^{2)}$                | [-]  | 1,4 <sup>3)</sup> | 1,8                | 2,1  | 2,3  | 2,3   | 2,3 |
| Installation safety factor                                                  | $\gamma_2^{1)} = \gamma_{inst}^{2)}$ | [-]  | 1,0               |                    |      |      |       |     |
| Concrete pryout failure for reduced anchorage depth FBN II, FBN II A4       |                                      |      |                   |                    |      |      |       |     |
| Factor k according to ETAG 001, Annex C or $k_3$ according to CEN/TS 1992-4 | $k^{1)}=k_{(3)}^{2)}$                | [-]  | -                 | 1,8 <sup>3)</sup>  | 2,1  | 2,3  | 2,3   | 2,3 |
| Installation safety factor                                                  | $\gamma_2^{1)} = \gamma_{inst}^{2)}$ | [-]  | 1,0               |                    |      |      |       |     |
| Concrete edge failure for standard anchorage depth FBN II, FBN II A4        |                                      |      |                   |                    |      |      |       |     |
| Effective length of anchor                                                  | $l_{f,sta}$                          | [mm] | 30 <sup>3)</sup>  | 40                 | 50   | 65   | 80    | 105 |
| Effective diameter of anchor                                                | $d_{nom}$                            | [mm] | 6                 | 8                  | 10   | 12   | 16    | 20  |
| Installation safety factor                                                  | $\gamma_2^{1)} = \gamma_{inst}^{2)}$ | [-]  | 1,0               |                    |      |      |       |     |
| Concrete edge failure for reduced anchorage depth FBN II, FBN II A4         |                                      |      |                   |                    |      |      |       |     |
| Effective length of anchor                                                  | $l_{f,red}$                          | [mm] | -                 | 30 <sup>3)</sup>   | 40   | 50   | 65    | 80  |
| Effective diameter of anchor                                                | $d_{nom}$                            | [mm] | -                 | 8                  | 10   | 12   | 16    | 20  |
| Installation safety factor                                                  | $\gamma_2^{1)} = \gamma_{inst}^{2)}$ | [-]  | 1,0               |                    |      |      |       |     |

<sup>1)</sup> Parameter relevant for design according to ETAG 001, Annex C

<sup>2)</sup> Parameter relevant for design according to CEN/TS 1992-4:2009

<sup>3)</sup> Use restricted to anchoring of structural components which are statically indeterminate

fischer Bolt Anchor FBN II, FBN II A4

#### Performances

Characteristic values of shear resistance for standard and reduced anchorage depth

**Annex C 2**

**Table C3:** Displacements due to tension loads

| Type of anchor / size <b>FBN II, FBN II A4</b> |                    |      | <b>M6</b>                | <b>M8</b> | <b>M10</b> | <b>M12</b>               | <b>M16</b> | <b>M20</b>               |
|------------------------------------------------|--------------------|------|--------------------------|-----------|------------|--------------------------|------------|--------------------------|
| Standard anchorage depth                       | $h_{ef, sta}$      | [mm] | 30                       | 40        | 50         | 65                       | 80         | 105                      |
| Tension load C20/25                            | N                  | [kN] | 2,8                      | 6,1       | 8,5        | 12,6                     | 17,2       | 25,8                     |
| Displacements                                  | $\delta_{N0}$      | [mm] | 1,9                      | 0,6       | 0,9        | 1,5 (1,9 <sup>1)</sup> ) | 1,8        | 1,8 (2,0 <sup>1)</sup> ) |
|                                                | $\delta_{N\infty}$ | [mm] | 3,1 (2,7 <sup>1)</sup> ) |           |            |                          |            |                          |
| Reduced anchorage depth                        | $h_{ef, red}$      | [mm] | -                        | 30        | 40         | 50                       | 65         | 80                       |
| Tension load C20/25                            | N                  | [kN] |                          | 2,8       | 6,1        | 8,5                      | 12,6       | 17,2                     |
| Displacements                                  | $\delta_{N0}$      | [mm] |                          | 0,4       | 0,7        | 0,7                      | 0,9        | 1,0                      |
|                                                | $\delta_{N\infty}$ | [mm] | 1,6 (1,7 <sup>1)</sup> ) |           |            |                          |            |                          |

<sup>1)</sup> Values for FBN II A4

**Table C4:** Displacements due to shear loads

| Type of anchor / size <b>FBN II, FBN II A4</b> |                    |      | <b>M6</b> | <b>M8</b> | <b>M10</b> | <b>M12</b> | <b>M16</b> | <b>M20</b> |
|------------------------------------------------|--------------------|------|-----------|-----------|------------|------------|------------|------------|
| Shear load FBN II                              | V                  | [kN] | 3,4       | 7,6       | 12,0       | 17,9       | 31,5       | 38,2       |
| Displacements FBN II                           | $\delta_{V0}$      | [mm] | 0,7       | 1,5       | 1,6        | 2,0        | 3,0        | 2,6        |
|                                                | $\delta_{V\infty}$ | [mm] | 1,1       | 2,3       | 2,4        | 3,0        | 4,5        | 3,9        |
| Shear load FBN II A4                           | V                  | [kN] | 3,0       | 7,3       | 11,6       | 15,7       | 29,1       | 49,0       |
| Displacements FBN II A4                        | $\delta_{V0}$      | [mm] | 1,5       | 1,4       | 2,1        | 2,6        | 2,7        | 4,6        |
|                                                | $\delta_{V\infty}$ | [mm] | 2,3       | 2,2       | 3,2        | 3,9        | 4,1        | 7,0        |

fischer Bolt Anchor FBN II, FBN II A4

**Performances**  
Displacement under tension and shear loads

**Annex C 3**