

## PROHLÁŠENÍ O VLASTNOSTECH

### DoP 0379

pro svorníková kotva fischer FWA Plus (Kovové kotvy do betonu)

CS

- |                                                     |                                                                                            |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1. <u>Jedinečný identifikační kód typu výrobku:</u> | <b>DoP 0379</b>                                                                            |
| 2. <u>Zamýšlené/zamýšlená použití:</u>              | <b>Dodatečné upevnění v tlačené zóně betonu., viz. dodatek, obzvláště Přílohy B1 - B3.</b> |
| 3. <u>Výrobce:</u>                                  | <b>fischerwerke GmbH &amp; Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Německo</b>     |
| 4. <u>Zplnomocněný zástupce:</u>                    | <b>–</b>                                                                                   |
| 5. <u>Systém/systémy POSV:</u>                      | <b>1</b>                                                                                   |
| 6. <u>Evropský dokument pro posuzování:</u>         | <b>EAD 330232-01-0601</b>                                                                  |
| Evropské technické posouzení:                       | <b>ETA-24/0714; 2025-04-22</b>                                                             |
| Subjekt pro technické posuzování:                   | <b>ETA-Danmark A/S</b>                                                                     |
| Oznámený subjekt/oznámené subjekty:                 | <b>2873 TU Darmstadt</b>                                                                   |

### 7. Deklarovaná vlastnost/Deklarované vlastnosti:

#### **Mechanická odolnost a stabilita (BWR 1)**

**Charakteristická únosnost v tahu (pro statickou a kvazistatickou akci) Metoda A:**

Odolnost proti selhání oceli: Přílohy C1

Odolnost proti selhání vytažením: Přílohy C1

Odolnost proti selhání betonu: Přílohy C1

Pevnost: Přílohy C1

Minimální vzdálenost od okraje a rozteč: Přílohy C2

Okrajová vzdálenost bránící rozštěpení při zatížení: Přílohy C1

**Charakteristická únosnost ve smyku (pro statickou a kvazistatickou akci):**

Odolnost proti selhání oceli (smykové zatížení): Přílohy C2

Odolnost proti selhání rozštěpením: Přílohy C2

**Charakteristická odolnost pro zjednodušený design:**

Metoda B: NPD

Metoda C: NPD

**Posuny:**

Posuny při statickém a kvazistatickém zatížení: Přílohy C2

**Charakteristická únosnost a posuny pro seismické kategorie C1 a C2:**

Odolnost proti tahovému zatížení, posuny, kategorie C1: NPD

Odolnost proti tahovému zatížení, posuny, kategorie C2: NPD

Odolnost proti smykovému zatížení, posuny, kategorie C1: NPD

Odolnost proti smykovému zatížení, posuny, kategorie C2: NPD

Koeficient prstencové mezery: NPD

#### **Bezpečnost v případě požáru (BWR 2)**

Reakce na oheň: Třída (A1)

**Odolnost proti požáru:**

Požární odolnost proti selhání oceli (tahové zatížení): NPD

Požární odolnost proti selhání vytažením (tahové zatížení): NPD

Požární odolnost proti selhání oceli (smykové zatížení): NPD

#### **Životnost:**

Životnost: Přílohy A3, B1

8. Příslušná technická dokumentace a/nebo specifická technická dokumentace: –

Vlastnosti výše uvedeného výrobku jsou ve shodě se souborem deklarovaných vlastností. Toto prohlášení o vlastnostech se v souladu s nařízením (EU) č. 305/2011 vydává na výhradní odpovědnost výrobce uvedeného výše.

Podepsáno za výrobce a jeho jménem:



Dr. Ronald Mihala, Vedoucí oddělení vývoje a řízení výroby  
Tumlingen, 2025-05-02



Dieter Pfaff, Vedoucí Mezinárodní produkční federace a řízení kvality

Toto PoV bylo připraveno v různých jazykových mutacích. V případě rozporu vždy rozhoduje interpretace verze v anglickém jazyce.

Příloha obsahuje nepovinné a doplňkové informace v anglickém jazyce nad rámec zákonných požadavků.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

**Pokyny pro překlad Základní charakteristiky a výkonnostní parametry příloh**

|                                                                                          |                                                                                                                           |                                                                                                                      |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Mechanical resistance and stability (BWR 1)                                              |                                                                                                                           |                                                                                                                      |
| <b>Mechanická odolnost a stabilita (BWR 1)</b>                                           |                                                                                                                           |                                                                                                                      |
| Characteristic resistance under static and quasi-static loading, Method A                |                                                                                                                           |                                                                                                                      |
| <b>Charakteristická únosnost v tahu (pro statickou a kvazistatickou akci) Metoda A:</b>  |                                                                                                                           |                                                                                                                      |
| 1                                                                                        | Resistance to steel failure:<br><b>Odolnost proti selhání oceli:</b>                                                      | $N_{Rk,s}$ [kN], $E_s$ [N/mm <sup>2</sup> ]                                                                          |
| 2                                                                                        | Resistance to pull-out failure:<br><b>Odolnost proti selhání vytažením:</b>                                               | $N_{Rk,p}$ [kN], $\psi_c$                                                                                            |
| 3                                                                                        | Resistance to concrete cone failure:<br><b>Odolnost proti selhání betonu:</b>                                             | $k_{cr,N}$ , $k_{ucr,N}$ [-], $h_{ef}$ , $c_{cr,N}$ [mm]                                                             |
| 4                                                                                        | Robustness:<br><b>Pevnost:</b>                                                                                            | $\gamma_{inst}$ [-]                                                                                                  |
| 5                                                                                        | Minimum edge distance and spacing:<br><b>Minimální vzdálenost od okraje a rozteč:</b>                                     | $c_{min}$ , $s_{min}$ , $h_{min}$ [mm]                                                                               |
| 6                                                                                        | Edge distance to prevent splitting under load:<br><b>Okrajová vzdálenost bránící rozštěpení při zatížení:</b>             | $N^0_{Rk,sp}$ [kN], $c_{cr,sp}$ [mm]                                                                                 |
| Characteristic resistance to shear load (static and quasi-static loading), Method A      |                                                                                                                           |                                                                                                                      |
| <b>Charakteristická únosnost ve smyku (pro statickou a kvazistatickou akci):</b>         |                                                                                                                           |                                                                                                                      |
| 7                                                                                        | Resistance to steel failure under shear load:<br><b>Odolnost proti selhání oceli (smykové zatížení):</b>                  | $V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], $k_7$ [-]                                                                      |
| 8                                                                                        | Resistance to pry-out failure:<br><b>Odolnost proti selhání rozštěpením:</b>                                              | $k_9$ [-]                                                                                                            |
| Characteristic Resistance for simplified design                                          |                                                                                                                           |                                                                                                                      |
| <b>Charakteristická odolnost pro zjednodušený design:</b>                                |                                                                                                                           |                                                                                                                      |
| 9                                                                                        | Method B:<br><b>Metoda B:</b>                                                                                             | $F^0_{Rk}$ [kN], $c_{cr}$ , $s_{cr}$ [mm]                                                                            |
| 10                                                                                       | Method C:<br><b>Metoda C:</b>                                                                                             | $F_{Rk}$ [kN]                                                                                                        |
| Displacements                                                                            |                                                                                                                           |                                                                                                                      |
| <b>Posuny:</b>                                                                           |                                                                                                                           |                                                                                                                      |
| 11                                                                                       | Displacements under static and quasi-static loading:<br><b>Posuny při statickém a kvazistatickém zatížení:</b>            | $\delta_{N0}$ , $\delta_{N\infty}$ , $\delta_{V0}$ , $\delta_{V\infty}$ [mm]                                         |
| 12                                                                                       | Stiffness characteristics for tension loading for non-linear spring models:                                               | $k_{1,ucr}$ , $k_{2,ucr}$ , $k_{3,ucr}$ , $k_{4,ucr}$ ,<br>$k_{1,cr}$ , $k_{2,cr}$ , $k_{3,cr}$ , $k_{4,cr}$ [kN/mm] |
| Characteristic resistance and displacements for seismic performance categories C1 and C2 |                                                                                                                           |                                                                                                                      |
| <b>Charakteristická únosnost a posuny pro seismické kategorie C1 a C2:</b>               |                                                                                                                           |                                                                                                                      |
| 13                                                                                       | Resistance to tension load, displacements, category C1:<br><b>Odolnost proti tahovému zatížení, posuny, kategorie C1:</b> | $N_{Rk,s,C1}$ [kN], $N_{Rk,p,C1}$ [kN]                                                                               |
|                                                                                          | Resistance to tension load, displacements, category C2:<br><b>Odolnost proti tahovému zatížení, posuny, kategorie C2:</b> | $N_{Rk,s,C2}$ [kN], $N_{Rk,p,C2}$ [kN], $\delta_{N,C2}$ [mm]                                                         |
| 14                                                                                       | Resistance to shear load, displacements, category C1:<br><b>Odolnost proti smykovému zatížení, posuny, kategorie C1:</b>  | $V_{Rk,s,C1}$ [kN]                                                                                                   |
|                                                                                          | Resistance to shear load, displacements, category C2:<br><b>Odolnost proti smykovému zatížení, posuny, kategorie C2:</b>  | $V_{Rk,s,C2}$ [kN], $\delta_{V,C2}$ [mm]                                                                             |
| 15                                                                                       | Factor for annular gap<br><b>Koeficient prstencové mezery:</b>                                                            | $\alpha_{gap}$ [-]                                                                                                   |
| Safety in case of fire (BWR 2)                                                           |                                                                                                                           |                                                                                                                      |
| <b>Bezpečnost v případě požáru (BWR 2)</b>                                               |                                                                                                                           |                                                                                                                      |
| 16                                                                                       | Reaction to fire:<br><b>Reakce na oheň:</b>                                                                               | Class                                                                                                                |
| Resistance to fire:                                                                      |                                                                                                                           |                                                                                                                      |
| <b>Odolnost proti požáru:</b>                                                            |                                                                                                                           |                                                                                                                      |
| 17                                                                                       | Fire resistance to steel failure (tension load):<br><b>Požární odolnost proti selhání oceli (tahové zatížení):</b>        | $N_{Rk,s,fi}$ [kN]                                                                                                   |
| 18                                                                                       | Fire resistance to pull-out failure (tension load):<br><b>Požární odolnost proti selhání vytažením (tahové zatížení):</b> | $N_{Rk,p,fi}$ [kN]                                                                                                   |
| 19                                                                                       | Fire resistance to steel failure (shear load):<br><b>Požární odolnost proti selhání oceli (smykové zatížení):</b>         | $V_{Rk,s,fi}$ [kN], $M^0_{Rk,s,fi}$ [Nm]                                                                             |
| Aspects of durability                                                                    |                                                                                                                           |                                                                                                                      |
| <b>Životnost:</b>                                                                        |                                                                                                                           |                                                                                                                      |
| 20                                                                                       | Durability:<br><b>Životnost:</b>                                                                                          | Class                                                                                                                |

## **II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of product**

The FWA Plus is a torque-controlled expansion anchor made of galvanised steel. It is available in the sizes M8, M10, M12 and M16. The expansion is achieved by torque acting on the bolt. As the anchor is prestressed, the cone is pulled into the expansion sleeve and the load applied to the anchor is transferred to the concrete mainly by friction. The anchor body of sizes M8 to M16 is cold-formed. The FWA Plus is suitable for use in uncracked concrete of strength classes C20/25 to C50/60

The product description is given in Annex A and the intended use specifications of the product are detailed in Annex B.

### **2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)**

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

The provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

| <b>Characteristic</b> | <b>Assessment of characteristic</b> |
|-----------------------|-------------------------------------|
|-----------------------|-------------------------------------|

#### **3.1 Mechanical resistance and stability (BWR1)**

##### **Characteristic resistance to tension load (static and quasi-static loading) Method A**

|                                               |                 |
|-----------------------------------------------|-----------------|
| Resistance to steel failure                   | <b>Annex C1</b> |
| Resistance to pull-out failure                | <b>Annex C1</b> |
| Resistance to concrete cone failure           | <b>Annex C1</b> |
| Robustness                                    | <b>Annex B</b>  |
| Minimum edge distance and spacing             | <b>Annex C2</b> |
| Edge distance to prevent splitting under load | <b>Annex C1</b> |

##### **Characteristic resistance to shear load (static and quasi-static loading)**

|                                              |                 |
|----------------------------------------------|-----------------|
| Resistance to steel failure under shear load | <b>Annex C2</b> |
| Resistance to pry-out failure                | <b>Annex C2</b> |

##### **Characteristic resistance for simplified design**

|          |                     |
|----------|---------------------|
| Method B | <b>Not relevant</b> |
| Method C | <b>Not relevant</b> |

##### **Displacements**

|                                                     |                 |
|-----------------------------------------------------|-----------------|
| Displacements under static and quasi-static loading | <b>Annex C2</b> |
|-----------------------------------------------------|-----------------|

##### **Characteristic resistance and displacements for seismic performance categories C1 and C2**

|                                           |                                |
|-------------------------------------------|--------------------------------|
| Resistance to tension load, displacements | <b>No performance assessed</b> |
| Resistance to shear load, displacements   | <b>No performance assessed</b> |
| Factor for annual gap                     | <b>No performance assessed</b> |

| Characteristic                                     | Assessment of characteristic                                                                                                                                                                                      |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>3.2 Safety in case of fire (BWR2)</b>           |                                                                                                                                                                                                                   |
| Reaction to fire                                   | The anchors are made from steel classified as performance <b>class A1</b> of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC, amended by EC Decision 2000/605/EC. |
| <b>Resistance to fire</b>                          |                                                                                                                                                                                                                   |
| Fire resistance to steel failure (tension load)    | <b>No performance assessed</b>                                                                                                                                                                                    |
| Fire resistance to pull-out failure (tension load) | <b>No performance assessed</b>                                                                                                                                                                                    |
| Fire resistance to steel failure (shear load)      | <b>No performance assessed</b>                                                                                                                                                                                    |

### 3.3 Aspects of durability

|            |                |
|------------|----------------|
| Durability | <b>Annex B</b> |
|------------|----------------|

See additional information in section 3.9

### 3.9 General aspects related to the performance of the product

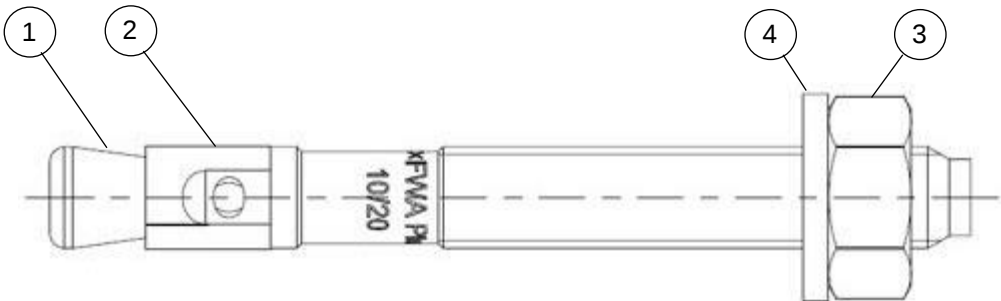
The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

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

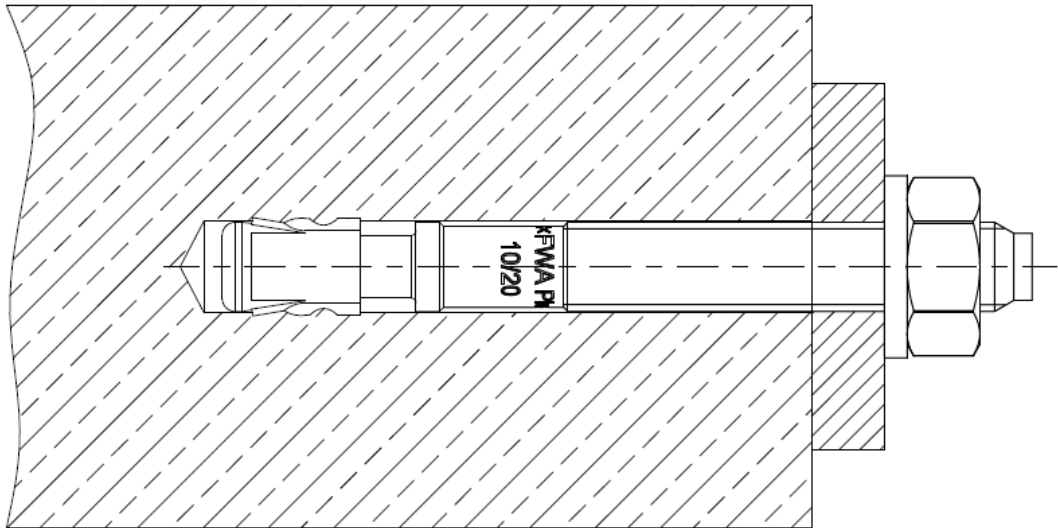
### **4.1 AVCP system**

According to the decision 1996/582/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No. 305/2011) is 1.

Cone bolt manufactured by cold - forming:



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

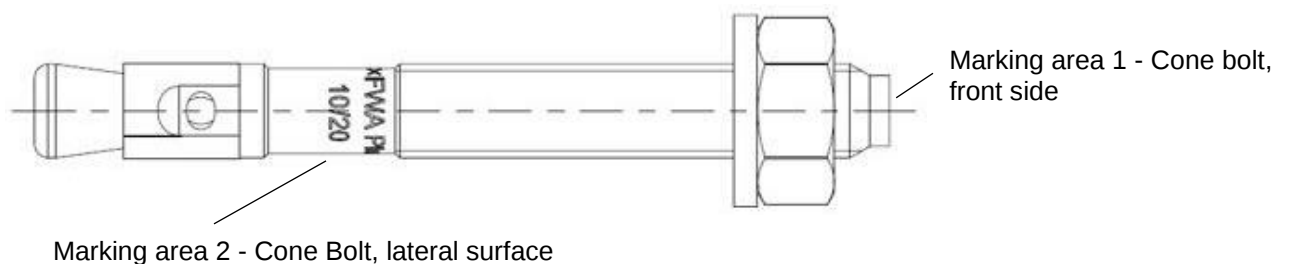


(Fig. not to scale)

fischer Bolt Anchor FWA Plus

**Product description**  
Installed condition

**Annex A1**



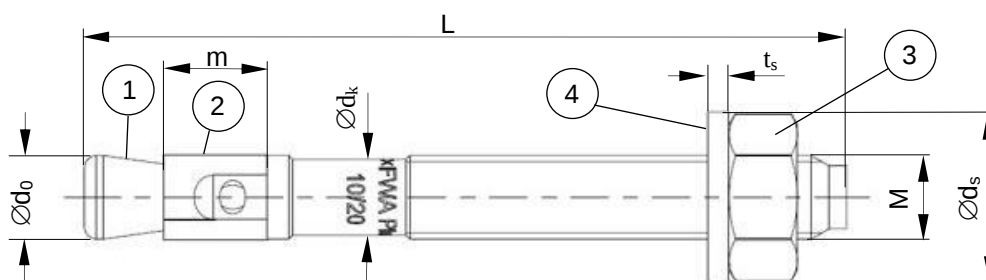
Product marking, example: FWA Plus 10/20x94

Brand | type of fastener placed at marking area 2

Thread size / max. thickness of fixture ( $t_{fix}$ ) x fastener length (L) placed at marking area 2

**Table A2.1:** 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. $t_{fix}$ | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |



**Table A2.2:** Fastener dimensions [mm]

| Part                 | Designation      |                  | FWA Plus |      |      |      |
|----------------------|------------------|------------------|----------|------|------|------|
|                      |                  |                  | M8       | M10  | M12  | M16  |
| 1                    | Cone bolt        | M                | 8        | 10   | 12   | 16   |
|                      |                  | Ø d <sub>0</sub> | 7,8      | 9,8  | 11,8 | 15   |
|                      |                  | Ø d <sub>k</sub> | 7,1      | 8,9  | 10,7 | 14,6 |
| 2                    | Expansion sleeve | m                | 10,0     | 12,0 | 14,0 | 20,0 |
| 3                    | Hexagon nut      | SW               | 13       | 17   | 19   | 24   |
| 4                    | Washer           | t <sub>s</sub>   | 1,6      | 2,0  | 2,5  | 3,0  |
|                      |                  | Ø d <sub>s</sub> | 16       | 20   | 24   | 30   |
| Thickness of fixture |                  | t <sub>fix</sub> | 0        |      |      |      |
|                      |                  |                  | 100      | 200  | 200  | 300  |
| Length of fastener   |                  | L <sub>min</sub> | 71       | 84   | 108  | 144  |
|                      |                  | L <sub>max</sub> | 166      | 274  | 202  | 421  |

(Fig. not to scale)

fischer Bolt Anchor FWA Plus

**Product description**  
Product marking, letter code and fastener dimensions

**Annex A2**

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**Table A3.1:** Materials FWA Plus (zinc plated  $\geq 5\mu\text{m}$ , ISO 4042:2022)

| Part | Designation      | Material                     |
|------|------------------|------------------------------|
| 1    | Cone bolt        | Cold form steel              |
| 2    | Expansion sleeve | Cold strip                   |
| 3    | Hexagon nut      | Steel, property class min. 8 |
| 4    | Washer           | Cold strip                   |

fischer Bolt Anchor FWA Plus

**Product description**  
Materials

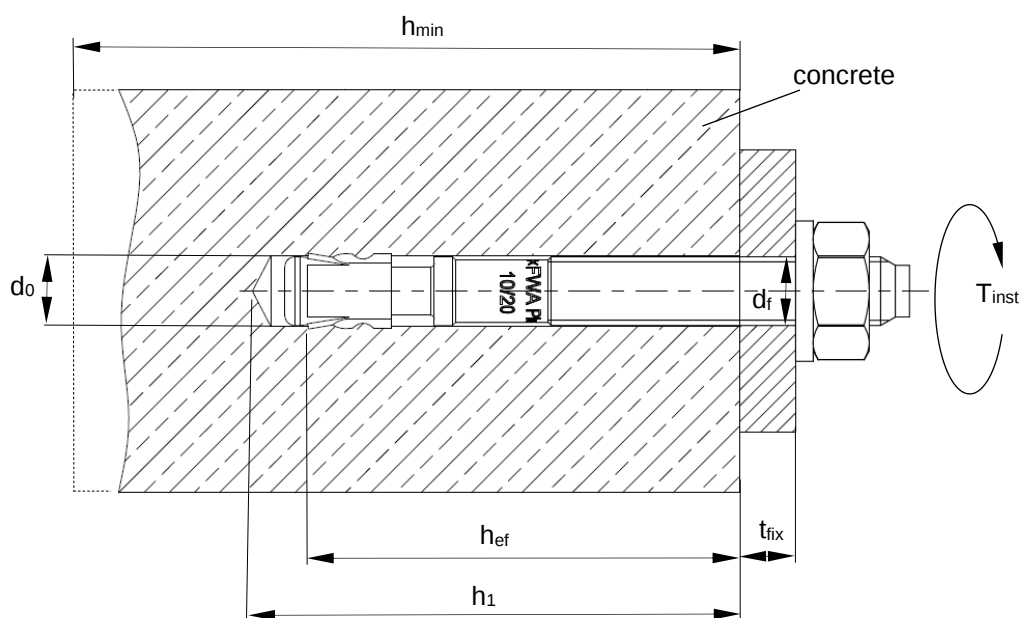
**Annex A3**

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| Specifications of intended use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |     |     |                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|-----|----------------------------------------|
| fischer Bolt Anchor FWA Plus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | M8 | M10 | M12 | M16                                    |
| Material: steel, zinc plated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ✓  |     |     |                                        |
| Static and quasi-static loads                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |     |     |                                        |
| Uncracked concrete                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |     |     |                                        |
| <p><b>Base materials:</b></p> <ul style="list-style-type: none"><li>Reinforced or unreinforced normal concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A2:2021</li></ul> <p><b>Use conditions (Environmental conditions):</b></p> <ul style="list-style-type: none"><li>Structures subject to dry internal conditions.</li></ul> <p><b>Design:</b></p> <ul style="list-style-type: none"><li>The structural design is conducted under responsibility of a designer experienced in the field of fastenings and concrete works.</li><li>Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.)</li><li>Design of fastenings according to EN 1992-4:2018 and TR 055:2018.</li></ul> |    |     |     |                                        |
| fischer Bolt Anchor FWA Plus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |     |     | <b>Annex B1</b><br><br>Appendix 8 / 12 |
| Intended Use Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |     |     |                                        |

**Table B2.1:** Installation parameters

| Type of fastener / size                   |                    | FWA Plus |       |      |      |
|-------------------------------------------|--------------------|----------|-------|------|------|
|                                           |                    | M8       | M10   | M12  | M16  |
| Nominal drill hole diameter               | $d_0 =$            | 8        | 10    | 12   | 16   |
| Cutting diameter of drill bit             | $d_{cut} \leq$     | 8,45     | 10,45 | 12,5 | 16,5 |
| Effective embedment depth                 | $h_{ef} \geq$ [mm] | 48       | 50    | 70   | 84   |
| Depth of drill hole in concrete           | $h_1 \geq$         | 65       | 75    | 100  | 120  |
| Diameter of clearance hole in the fixture | $d_f \leq$         | 9        | 12    | 14   | 18   |
| Required setting torque                   | $T_{inst} =$ [Nm]  | 10       | 15    | 35   | 110  |



$h_{ef}$  = Effective embedment depth  
 $t_{fix}$  = Thickness of the fixture  
 $h_1$  = Depth of drill hole to deepest point  
 $h_{min}$  = Minimum thickness of concrete member  
 $T_{inst}$  = Required setting torque

(Fig. not to scale)

fischer Bolt Anchor FWA Plus

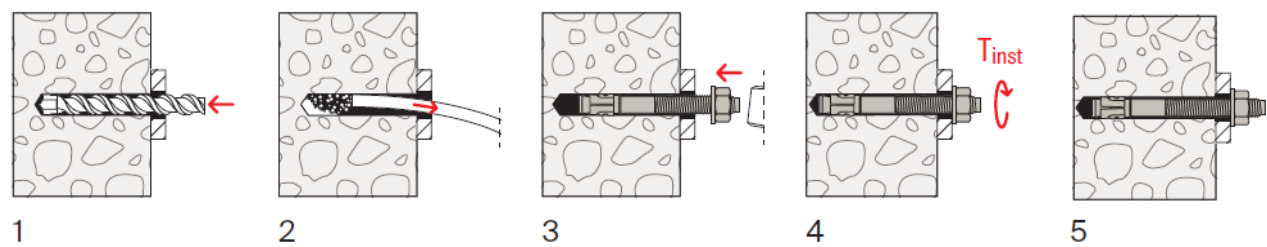
**Intended Use**  
Installation parameters

**Annex B2**

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Installation instructions

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Use of the fastener only as supplied by the manufacturer without exchanging the components of the fastener
- Hammer drilling
- Drill hole created perpendicular +/- 5° to concrete surface, positioning without damaging the reinforcement
- In case of aborted hole: new drilling at a minimum distance twice the depth of the aborted drill hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or combined shear/tension load it is not in the direction of load application



| No. | Description                              |
|-----|------------------------------------------|
| 1   | Drill the hole by hammer drilling.       |
| 2   | Clean the hole.                          |
| 3   | Set the fastener.                        |
| 4   | Apply required setting torque $T_{inst}$ |
| 5   | Installed fastener                       |

(Fig. not to scale)

|                                                  |                                         |
|--------------------------------------------------|-----------------------------------------|
| fischer Bolt Anchor FWA Plus                     | <b>Annex B3</b><br><br>Appendix 10 / 12 |
| <b>Intended Use</b><br>Installation instructions |                                         |

**Table C1.1:** Characteristic values of **tension** resistance under static and quasi-static action

| Type of fastener / size                                                                                                                                                                                                               |                                 |        | FWA Plus            |                                                                         |                  |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------|---------------------|-------------------------------------------------------------------------|------------------|------|
|                                                                                                                                                                                                                                       |                                 |        | M8                  | M10                                                                     | M12              | M16  |
| Steel failure                                                                                                                                                                                                                         |                                 |        |                     |                                                                         |                  |      |
| Characteristic resistance                                                                                                                                                                                                             | N <sub>Rk,s</sub>               | [kN]   | 15,5                | 22,0                                                                    | 35,0             | 46,0 |
| Partial factor                                                                                                                                                                                                                        | γ <sub>Ms</sub> <sup>1)</sup>   | [-]    | 1,50                |                                                                         |                  |      |
| Pullout failure                                                                                                                                                                                                                       |                                 |        |                     |                                                                         |                  |      |
| Characteristic resistance in uncracked concrete C20/25                                                                                                                                                                                | N <sub>Rk,p</sub>               | [kN]   | 10,4                | 13,8                                                                    | 22,8             | 29,0 |
| Increasing factors ψ <sub>c</sub> for N <sub>Rk,p</sub><br><br>N <sub>Rk,p</sub> = ψ <sub>c</sub> · N <sub>Rk,p</sub> (C20/25)                                                                                                        | ψ <sub>c</sub>                  | C25/30 | 1,12                |                                                                         |                  |      |
|                                                                                                                                                                                                                                       |                                 | C30/37 | 1,22                |                                                                         |                  |      |
|                                                                                                                                                                                                                                       |                                 | C35/45 | 1,32                |                                                                         |                  |      |
|                                                                                                                                                                                                                                       |                                 | C40/50 | 1,41                |                                                                         |                  |      |
|                                                                                                                                                                                                                                       |                                 | C45/55 | 1,50                |                                                                         |                  |      |
|                                                                                                                                                                                                                                       |                                 | C50/60 | 1,58                |                                                                         |                  |      |
| Partial installation factor                                                                                                                                                                                                           | γ <sub>inst</sub>               | [-]    | 1,0                 |                                                                         |                  |      |
| Concrete cone and splitting failure                                                                                                                                                                                                   |                                 |        |                     |                                                                         |                  |      |
| Effective embedment depth                                                                                                                                                                                                             | h <sub>ef</sub>                 | [mm]   | 48                  | 50                                                                      | 70               | 84   |
| Factor for uncracked concrete                                                                                                                                                                                                         | k <sub>ucr,N</sub>              | [-]    | 11,0 <sup>2)</sup>  |                                                                         |                  |      |
| Characteristic spacing                                                                                                                                                                                                                | s <sub>cr,N</sub>               | [mm]   | 3 h <sub>ef</sub>   |                                                                         |                  |      |
| Characteristic edge distance                                                                                                                                                                                                          | c <sub>cr,N</sub>               |        | 1,5 h <sub>ef</sub> |                                                                         |                  |      |
| Characteristic spacing for splitting failure                                                                                                                                                                                          | s <sub>cr,sp</sub>              |        | 192                 | 250                                                                     | 350              | 504  |
| Characteristic distance for splitting failure                                                                                                                                                                                         | c <sub>cr,sp</sub>              |        | 96                  | 125                                                                     | 175              | 252  |
| Characteristic resistance to splitting                                                                                                                                                                                                | N <sup>0</sup> <sub>Rk,sp</sub> |        | [kN]                | min {N <sup>0</sup> <sub>Rk,c</sub> , N <sub>Rk,p</sub> } <sup>3)</sup> |                  |      |
| <div><div><sup>1)</sup> In absence of other national regulations</div><div><sup>2)</sup> Based on concrete strength as cylinder strength</div><div><sup>3)</sup> N<sup>0</sup><sub>Rk,c</sub> according to EN 1992-4:2018</div></div> |                                 |        |                     |                                                                         |                  |      |
| fischer Bolt Anchor FWA Plus                                                                                                                                                                                                          |                                 |        |                     |                                                                         | Annex C1         |      |
| Performance<br>Characteristic values of tension resistance under static and quasi-static action                                                                                                                                       |                                 |        |                     |                                                                         |                  |      |
|                                                                                                                                                                                                                                       |                                 |        |                     |                                                                         | Appendix 11 / 12 |      |

**Table C2.1:** Characteristic values of **shear** resistance under static and quasi-static action

| Type of fastener / size                                  |  |  | FWA Plus |      |      |       |
|----------------------------------------------------------|--|--|----------|------|------|-------|
|                                                          |  |  | M8       | M10  | M12  | M16   |
| Installation factor $\gamma_{inst}$ [-]                  |  |  | 1,0      |      |      |       |
| Steel failure without lever arm                          |  |  |          |      |      |       |
| Characteristic resistance $V^0_{Rk,s}$ [kN]              |  |  | 11,0     | 17,0 | 25,3 | 30,0  |
| Partial factor for steel failure $\gamma_{Ms}^{1)}$ [-]  |  |  | 1,25     |      |      |       |
| Steel failure with lever arm and concrete pryout failure |  |  |          |      |      |       |
| Characteristic bending moment $M^0_{Rk,s}$ [Nm]          |  |  | 22,5     | 44,8 | 78,6 | 199,0 |
| Partial factor for steel failure $\gamma_{Ms}^{1)}$      |  |  | 1,25     |      |      |       |
| Factor for ductility $k_7$ [-]                           |  |  | 0,8      |      |      |       |
| Factor for pryout $k_8$                                  |  |  | 1        |      | 2    |       |
| Concrete edge failure                                    |  |  |          |      |      |       |
| Effective length of fastener $l_f$ [mm]                  |  |  | 48       | 50   | 70   | 84    |
| Effective diameter of fastener $d_{nom}$                 |  |  | 8        | 10   | 12   | 16    |

<sup>1)</sup> In absence of other national regulations

**Table C2.2:** Minimum thickness of concrete members, minimum spacing and minimum edge distances

| Type of fastener / size     |                | FWA Plus |     |     |     |
|-----------------------------|----------------|----------|-----|-----|-----|
|                             |                | M8       | M10 | M12 | M16 |
| Minimum thickness of member | $h_{min}$      | 100      | 120 | 140 | 170 |
| Minimum spacing             | $s_{min}$ [mm] | 65       | 95  | 100 | 115 |
| Minimum edge distance       | $c_{min}$      | 65       | 95  | 100 | 115 |

**Table C2.3:** Displacements under static and quasi static **tension** action

| Type of fastener / size |                         | FWA Plus |     |      |      |
|-------------------------|-------------------------|----------|-----|------|------|
|                         |                         | M8       | M10 | M12  | M16  |
| Tension load            | N [kN]                  | 4,9      | 6,5 | 10,8 | 13,8 |
| Displacements           | $\delta_{N0}$           | 0,8      | 1,0 | 1,2  | 1,3  |
|                         | $\delta_{N\infty}$ [mm] | 1,2      | 1,5 | 1,8  | 2,0  |

**Table C2.4:** Displacements under static and quasi static **shear** action

| Type of fastener / size |                         | FWA Plus |     |      |      |
|-------------------------|-------------------------|----------|-----|------|------|
|                         |                         | M8       | M10 | M12  | M16  |
| Shear load              | V [kN]                  | 6,3      | 9,7 | 14,5 | 17,1 |
| Displacements           | $\delta_{V0}$           | 1,9      | 2,7 | 3,5  | 3,5  |
|                         | $\delta_{V\infty}$ [mm] | 2,9      | 4,1 | 5,3  | 3,5  |

fischer Bolt Anchor FWA Plus

#### Performance

Characteristic values of shear resistance, minimum thickness of concrete members, minimum spacing and edge distances, displacements due to tension and shear action

**Annex C2**

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