# EKSPLOATACINIŲ SAVYBIŲ DEKLARACIJA

## DoP 0419

fischer injekcinės sistemos FHB II tvirtinimui (klijuojamas tvirtinimo elementas naudojimui betone) LT

1. Unikalus produkto tipo identifikacinis kodas: **DoP 0419**

2. Naudojimo paskirtis (-ys): **Po įrengimo montuojami tvirtinimai įtrūkusiame arba neįtrūkusiame betone, Žr. priedėlį, ypač priedus B1 - B13.**

3. Gamintojas: **fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Vokietija**

4. Įgaliotasis atstovas: **–**

5. Eksploatacinių savybių pastovumo vertinimo ir tikrinimo sistema (-os): **1**

6. Europos vertinimo dokumentas: **EAD 330499-02-0601; 2022-09 (Decision (EU) 2024/1944 )**
   Europos techninis įvertinimas: **ETA-05/0164; 2026-03-23**
   Techninio vertinimo įstaiga: **DIBt- Deutsches Institut für Bautechnik**
   Notifikuotoji (-osios) įstaiga (-os): **2873, Technische Universität Darmstadt, Institut für Stahlbau und Werkstoffmechanik**

7. Deklaruojama (-os) eksploatacinė (-ės) savybė (-ės):

**Mechaninis atsparumas ir stabilumas (BWR 1)**

**Charakteringas atsparumas tempimo apkrovai (statinė ir kvazistatinė apkrova):**

1) Atsparumas plieno lūžiui: Žr. priedėlį, ypač priedus C1, C2
2) Atsparumas ištraukimo jėgai: Žr. priedėlį, ypač priedą C3-C8
3) Atsparumas betono kūgio lūžiui Žr. priedėlį, ypač priedą C3,C4
4) Atstumas iki krašto, kad būtų išvengta skilimo apkrovos metu Žr. priedėlį, ypač priedą C3,C4
5) Montavimo proceso patikimumas Žr. priedėlį, ypač priedus C3-C8
6) Montavimo sukimo momentas: Žr. priedėlį, ypač priedus B3-B6
7) Minimalus atstumas iki krašto, tarpai ir elemento storis: Žr. priedėlį, ypač priedus B3-B6

**Charakteringas atsparumas kirpimo apkrovai (statinė ir kvazistatinė apkrova)**

8) Atsparumas plieno lūžiui: Žr. priedėlį, ypač priedus C1, C2
9) Atsparumas išplėšimo lūžiui: Žr. priedėlį, ypač priedus C3, C4
10) Atsparumas betono krašto lūžiui: Žr. priedėlį, ypač priedus C3, C4

**Poslinkio koeficientai trumpalaikėms ir ilgalaikėms apkrovoms:**

11) Poslinkio koeficientai trumpalaikėms ir ilgalaikėms apkrovoms: Žr. priedėlį, ypač priedus C9-C11
12) Atsparumas plieninėmis skaidulomis armuotame betone: NPD

**Charakteringas atsparumas ir poslinkiai seisminio veikimo kategorijoms C1 ir C2:**

13) Atsparumas tempimui seisminėje kategorijoje C1 NPD
14) Atsparumas tempimui, C2 kategorija NPD
15) Atsparumas kirpimo apkrovai seisminėje kategorijoje C1 NPD
16) Atsparumas kirpimo apkrovai ir poslinkiams seisminėje kategorijoje C2 NPD

**Sauga gaisro atveju (BWR 2)**

17) Reakcija į ugnį Klasė (A1)

**Atsparumas ugniai:**

18) Atsparumas ugniai plienui tempiant: NPD
19) Atsparumas ugniai sukibio lūžiui tempiant NPD
20) Atsparumas ugniai iki plieno gedimo (kirpimo apkrova): NPD

**Higiena, sveikata ir aplinka (BWR 3)**

21) Pavojingų medžiagų kiekis, emisija ir išsiskyrimas NPD

8. Atitinkami techniniai dokumentai ir (arba) specifiniai techniniai dokumentai: **–**

Nurodyto produkto eksploatacinės savybės atitinka visas deklaruotas eksploatacines savybes. Ši eksploatacinių savybių deklaracija pateikiama vadovaujantis Reglamentu (ES) Nr. 305/2011, atsakomybė už jos turinį tenka tik joje nurodytam gamintojui.

Pasirašyta (gamintojo ir jo vardu):

i.V.

Dr. Christian Weber, Plėtros vadovas

Dieter Pfaff, Tarptautinės gamybos federacijos ir kokybės valdymo vadovas

Tumlingen, 2026-07-01

Ši eksploatacinių savybių deklaracija paruošta įvairiomis kalbomis. Jei kyla ginčų dėl teksto aiškinimo, viršenybė teikiama angliškai versijai.
Priedas, kuriame yra savanoriška ir papildoma informacija anglų kalba (kalba neutrali) ir viršija teisinius reikalavimus.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

**Vertimo rekomendacijos Priedų esminės charakteristikos ir eksploataciniai parametrai**

| | | |
|---|---|---|
| Mechanical resistance and stability (BWR 1)<br>**Mechaninis atsparumas ir stabilumas (BWR 1)** | | |
| Characteristic resistance to tension load (static and quasi-static loading):<br>**Charakteringas atsparumas tempimo apkrovai (statinė ir kvazistatinė apkrova):** | | |
| 1 | Resistance to steel failure:<br>**Atsparumas plieno lūžiui:** | $N_{Rk,s}$ [kN] |
| 2 | Resistance to combined pull- out and concrete cone failure:<br>**Atsparumas ištraukimo jėgai:** | $\tau_{Rk}$ and/or $\tau_{Rk,100}$ [N/mm$^2$],<br>$\psi_c$, $\psi^0_{sus}$,$\psi_{sus,100}$ [-] (BF) |
| | Resistance to pull-out failure:<br>**Atsparumas ištraukimo jėgai:** | $N_{Rk,p}$ and/or $N_{Rk,p,100}$ [kN], $\psi_c$ [-] (BEF) |
| 3 | Resistance to concrete cone failure:<br>**Atsparumas betono kūgio lūžiui** | $c_{cr,N}$ [mm], $k_{cr,N}$, $k_{ucr,N}$ [-] |
| 4 | Edge distance to prevent splitting under load:<br>**Atstumas iki krašto, kad būtų išvengta skilimo apkrovos metu** | $c_{cr,sp}$ [mm] |
| 5 | Robustness:<br>**Montavimo proceso patikimumas** | $\gamma_{inst}$ [-] |
| 6 | Maximum installation torque:<br>**Montavimo sukimo momentas:** | max $T_{inst}$ [Nm] (BF) |
| | Installation torque:<br>**Montavimo sukimo momentas:** | $T_{inst}$ [Nm] (BEF) |
| 7 | Minimum edge distance,spacing and member thickness:<br>**Minimalus atstumas iki krašto, tarpai ir elemento storis:** | $c_{min}$, $s_{min}$, $h_{min}$ [mm] |
| Characteristic resistance to shear load (static and quasi-static loading):<br>**Charakteringas atsparumas kirpimo apkrovai (statinė ir kvazistatinė apkrova)** | | |
| 8 | Resistance to steel failure:<br>**Atsparumas plieno lūžiui:** | $V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], $k_7$ [-] |
| 9 | Resistance to pry-out failure:<br>**Atsparumas išplėšimo lūžiui:** | $k_8$ [-] |
| 10 | Resistance to concrete edge failure:<br>**Atsparumas betono krašto lūžiui:** | $d_{nom}$, $l_f$ [mm] |
| Displacements under short-term and long-term loading:<br>**Poslinkio koeficientai trumpalaikėms ir ilgalaikėms apkrovoms:** | | |
| 11 | Displacements factors under short-term and long-term loading:<br>**Poslinkio koeficientai trumpalaikėms ir ilgalaikėms apkrovoms:** | $\delta_0$, $\delta_\infty$ [mm/(N/mm$^2$)] or [mm/kN] |
| 12 | Resistance in steel fibre reinforced concrete:<br>**Atsparumas plieninėmis skaidulomis armuotame betone:** | Description |
| Characteristic resistance and displacements for seismic performance categories C1 and C2:<br>**Charakteringas atsparumas ir poslinkiai seisminio veikimo kategorijoms C1 ir C2:** | | |
| 13 | Resistance to tension for seismic performance category C1<br>**Atsparumas tempimui seisminėje kategorijoje C1** | $N_{Rk,s,C1}$ [kN] (all)<br>$\tau_{Rk,C1}$ [N/mm$^2$] (BF)<br>$N_{Rk,p,C1}$ [kN] (BEF) |
| 14 | Resistance to tension and displacements for seismic performance category C2<br>**Atsparumas tempimui, C2 kategorija** | $N_{Rk,s,C2}$ [kN] (all)<br>$\tau_{Rk,C2}$ [N/mm$^2$] (BF)<br>$N_{Rk,p,C2}$ [kN] (BEF)<br>$\delta_{N,C2(50\%)}$, $\delta_{N,C2(100\%)}$ [mm] (all) |
| 15 | Resistance to shear for seismic performance category C1<br>**Atsparumas kirpimo apkrovai seisminėje kategorijoje C1** | $V_{Rk,s,C1}$ [kN] (all) |
| 16 | Resistance to shear load and displacements for seismic performance category C2<br>**Atsparumas kirpimo apkrovai ir poslinkiams seisminėje kategorijoje C2** | $V_{Rk,s,C2}$ [kN] (all)<br>$\delta_{V,C2(50\%)}$, $\delta_{V,C2(100\%)}$ [mm] (all) |
| Safety in case of fire (BWR 2)<br>**Sauga gaisro atveju (BWR 2)** | | |
| 17 | Reaction to fire<br>**Reakcija į ugnį** | Class<br>Klasė (A1) |
| Resistance to fire<br>**Atsparumas ugniai:** | | |
| 18 | Fire resistance to steel failure (tension load):<br>**Atsparumas ugniai plienui tempiant:** | $N_{Rk,s,fi}$ [kN] |
| 19 | Bond resistance under fire conditions:<br>**Atsparumas ugniai sukibio lūžiui tempiant** | $k_{fi,p}$ (θ) [-],<br>$\tau_{Rk,fi}$ (θ) [N/mm$^2$] (BF) |
| 20 | Fire resistance to steel failure under shear loading:<br>**Atsparumas ugniai iki plieno gedimo (kirpimo apkrova):** | $V_{Rk,s,fi}$ [kN], $M^0_{Rk,s,fi}$ [Nm] |
| Hygiene, health and the environment (BWR 3)<br>**Higiena, sveikata ir aplinka (BWR 3)** | | |
| 21 | Content, emission and/or release of dangerous substances:<br>**Pavojingų medžiagų kiekis, emisija ir išsiskyrimas** | Description/Level |

**Specific Part**

## 1 Technical description of the product

The fischer Highbond-Anchor FHB II is a torque controlled bonded fastener consisting of a mortar cartridge with mortar fischer FIS HB or fischer mortar capsule FHB II–P(F) and an anchor rod FHB II (Inject) – A L or FHB II (Inject) – A S with hexagon nut and washer.

The glass capsule is set into a drilled hole in the concrete. The special formed anchor rod is driven into the glass capsule by machine with simultaneous hammering and turning. For the injection system the anchor rod is placed into a drilled hole filled with injection mortar. The load transfer is realised by mechanical interlock of several cones in the bonding mortar and then via a combination of bonding and friction forces in the anchorage ground (concrete).

The product description is given in Annex A

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

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

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastener of at least 50 and / or 100 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

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

| Essential characteristic | Performance |
|---|---|
| Characteristic resistance to tension load (static and quasi-static loading) | See Annex C1 to C8 |
| Characteristic resistance to shear load (static and quasi-static loading) | See Annex C1 to C4 |
| Displacements under short-term and long-term loading | See Annex C9 to C11 |
| Characteristic resistance and displacements for seismic performance categories C1 and C2 | No performance assessed |

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

| Essential characteristic | Performance |
|---|---|
| Reaction to fire | Class A1 |
| Resistance to fire | No performance assessed |

### 3.3 Hygiene, health and the environment (BWR 3)

| Essential characteristic | Performance |
|---|---|
| Content, emission and/or release of dangerous substances | No performance assessed |

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

In accordance with the European Assessment Document EAD 330499-02-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

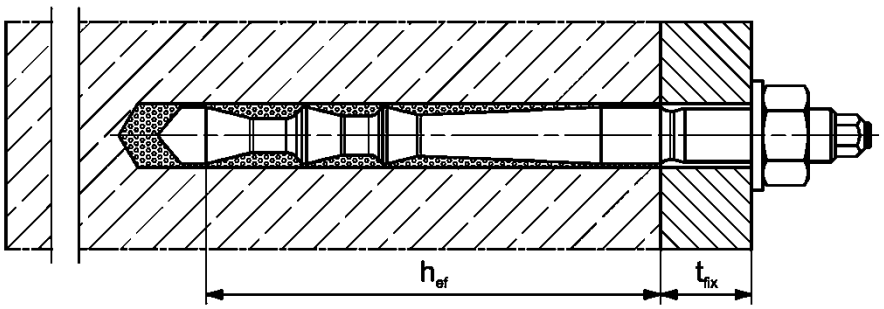
## 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

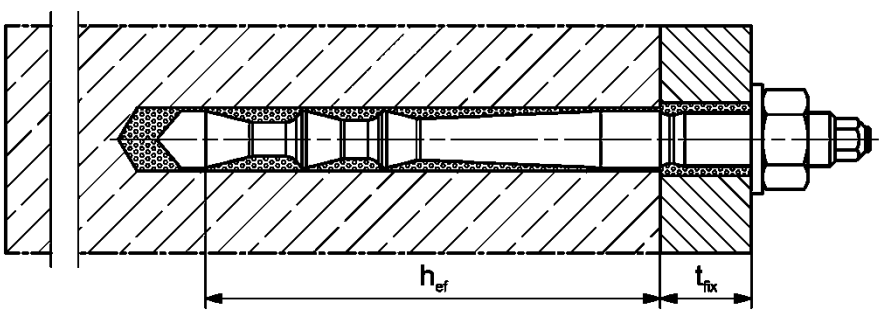
## Installation conditions part 1

**fischer Highbond - Anchor FHB II - A L**

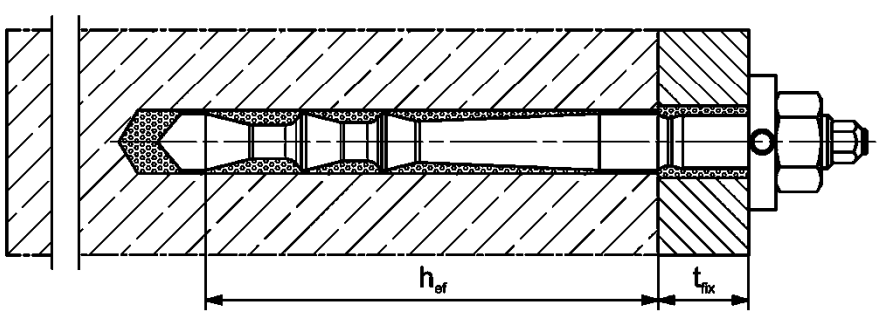
**Pre-positioned installation**




**Push through installation** not with mortar capsule (annular gap filled with mortar)




**Pre-positioned or push through installation** with subsequently pressed filling disk (annular gap filled with mortar)




Figures not to scale

$h_{ef}$ = effective anchorage depth $t_{fix}$ = thickness of fixture

fischer Highbond-Anchor FHB II

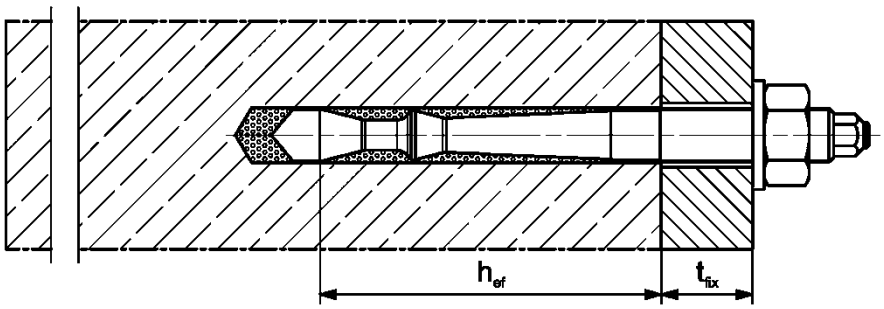
**Product description**
Installation conditions part 1; FHB II – A L

**Annex A1**
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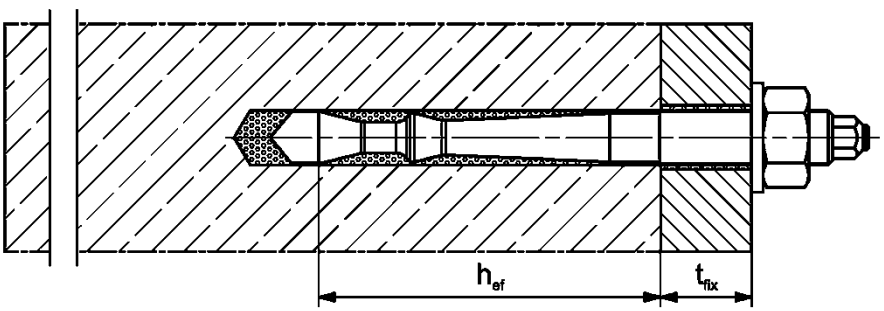
# Installation conditions part 2

**fischer Highbond - Anchor FHB II - A S**

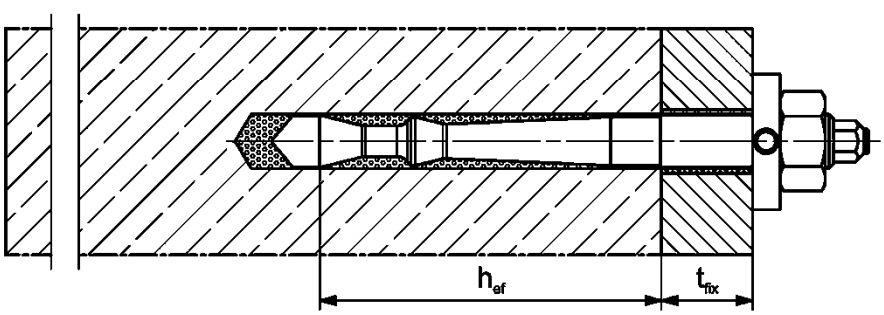
**Pre-positioned installation**




**Push through installation**




**Pre-positioned or push through installation** with subsequently pressed filling disk
(annular gap filled with mortar)




Figures not to scale

$h_{ef}$ = effective anchorage depth $t_{fix}$ = thickness of fixture

fischer Highbond-Anchor FHB II

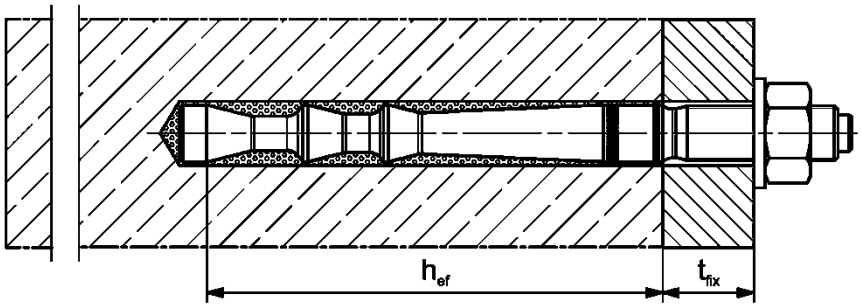
**Product description**
Installation conditions part 2; FHB II – A S

**Annex A2**
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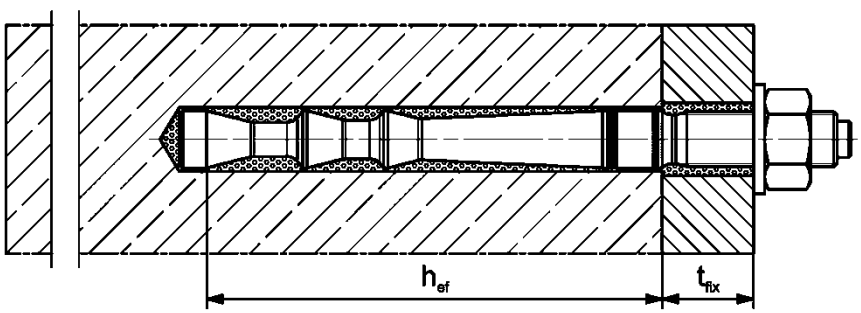
## Installation conditions part 3

**fischer Highbond - Anchor FHB II Inject - A L**

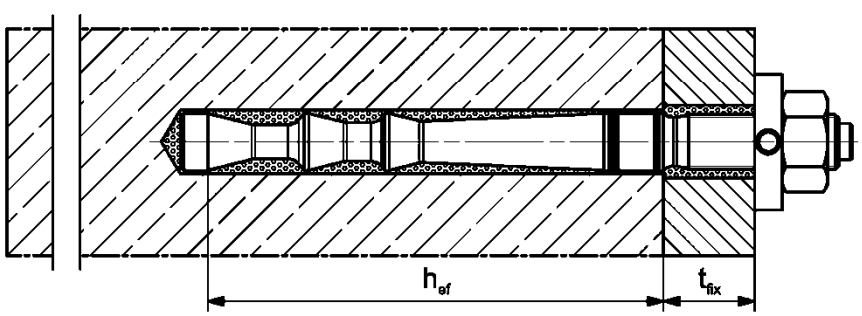
**Pre-positioned installation**




**Push through installation** not with mortar capsule (annular gap filled with mortar)




**Pre-positioned or push through installation with subsequently pressed fischer filling disk FFD**
(annular gap filled with mortar)




Figures not to scale

$h_{ef}$ = effective anchorage depth $t_{fix}$ = thickness of fixture

fischer Highbond-Anchor FHB II

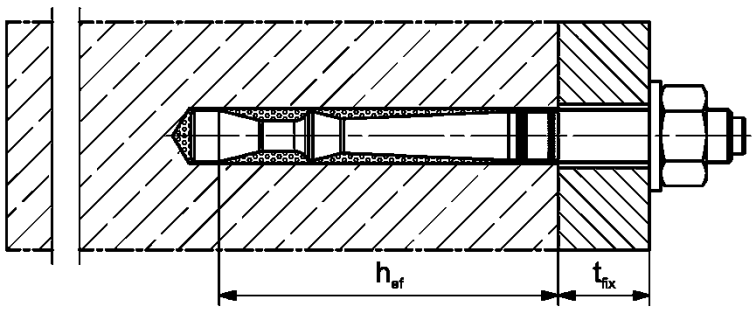
**Product description**
Installation conditions part 1; FHB II Inject – A L

**Annex A3**
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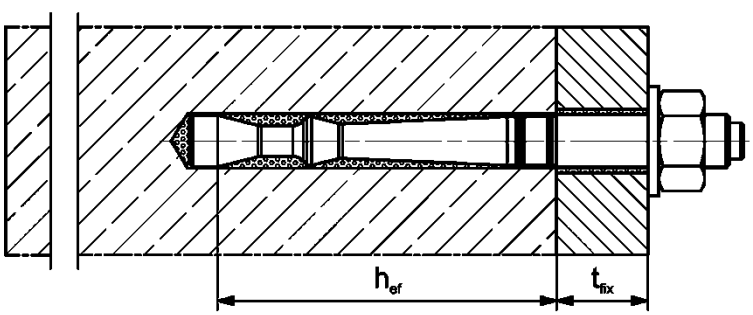
## Installation conditions part 4

**fischer Highbond - Anchor FHB II Inject - A S**

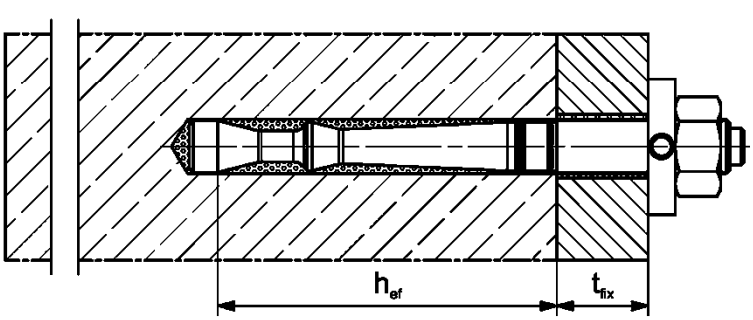
**Pre-positioned installation**




**Push through installation**




**Pre-positioned or push through installation with subsequently pressed fischer filling disk FFD**
(annular gap filled with mortar)




Figures not to scale

$h_{ef}$ = effective anchorage depth $t_{fix}$ = thickness of fixture

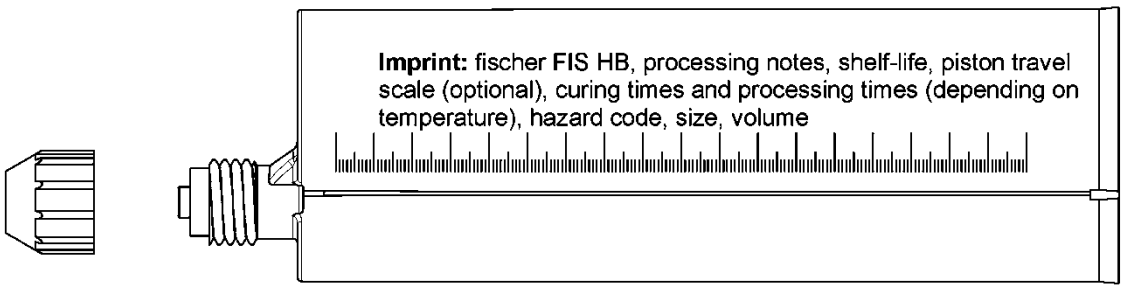
fischer Highbond-Anchor FHB II

**Product description**
Installation conditions part 2; FHB II Inject – A S

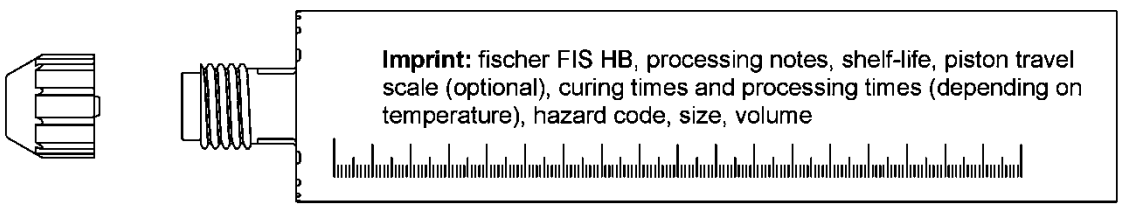
**Annex A4**
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## Overview system components part 1

**Mortar cartridge (shuttle cartridge) with sealing cap; Size: 360 ml, 825 ml**



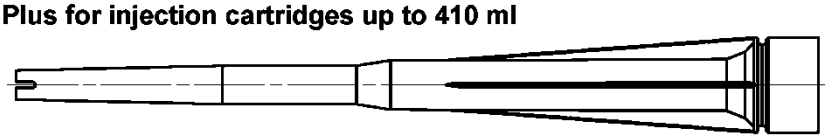

**Mortar cartridge (coaxial cartridge) with sealing cap; Size: 150 ml, 300 ml, 380 ml, 400 ml, 410 ml**



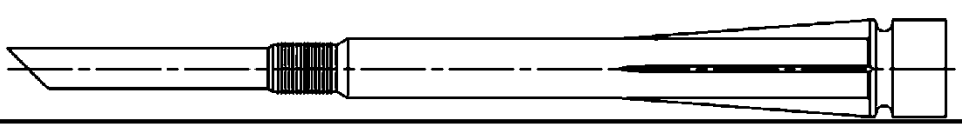

**Mortar capsule**



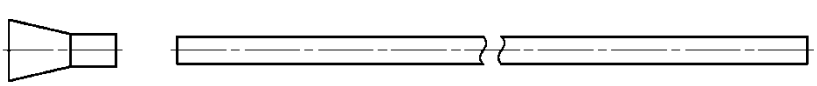

**Static mixer FIS MR Plus for injection cartridges up to 410 ml**



**Static mixer FIS JMR for injection cartridges with 825 ml**



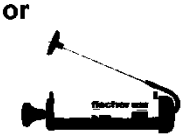
**Injection adapter and extension tube Ø 9 for static mixer FIS MR Plus;**
**Injection adapter and extension tube Ø 9 or Ø 15 for static mixer FIS JMR**



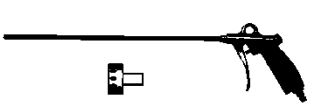
**Cleaning brush BS**



**Blow-out pump ABG or**



**ABP with cleaning nozzle**



Figures not to scale

fischer Highbond-Anchor FHB II

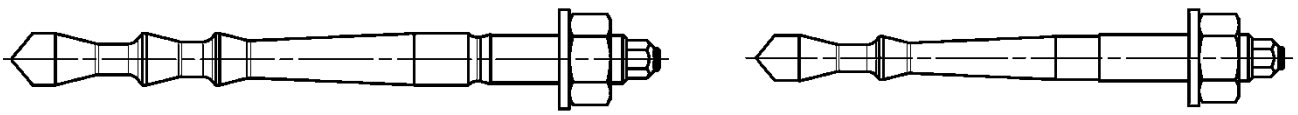
**Product description**
Overview system components part 1;
cartridges / static mixer / accessories

**Annex A5**
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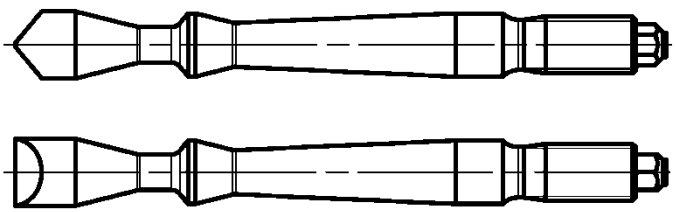
## Overview system components part 2

**fischer Highbond - Anchor rod; pre-assembled condition**

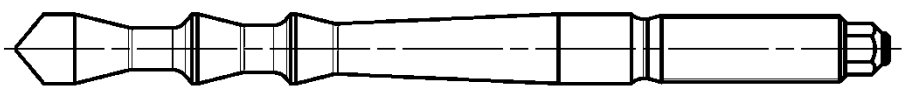
**fischer Highbond - Anchor rod FHB II - A L** **fischer Highbond - Anchor rod FHB II - A S**



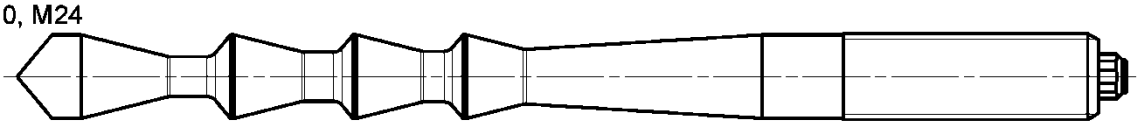
**Anchor rod FHB II - A L**
Size: M8



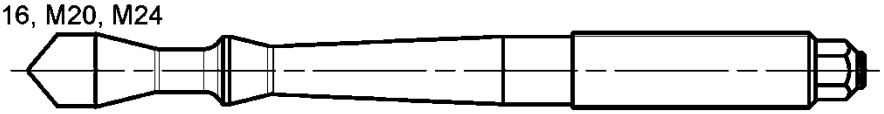
**Anchor rod FHB II - A L**
Size: M10, M12, M16



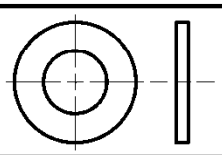
**Anchor rod FHB II - A L**
Size: M20, M24



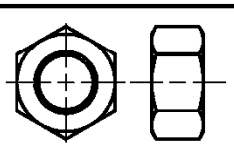
**Anchor rod FHB II - A S**
Size: M10, M12, M16, M20, M24



**Washer**

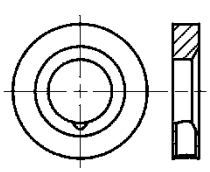


**Hexagon nut**

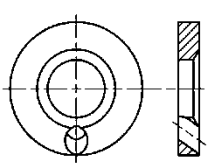


**fischer filling disk FFD**

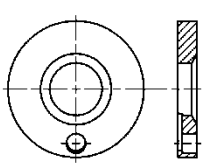
radial



angular



axial



Figures not to scale

fischer Highbond-Anchor FHB II

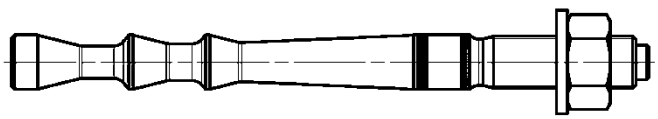
**Product description**
Overview system components part 2; steel components

**Annex A6**
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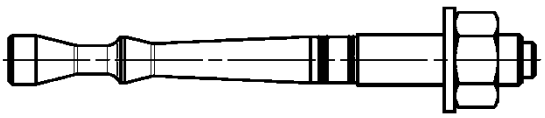
## Overview system components part 3

**fischer Highbond - Anchor rod; pre-assembled condition**

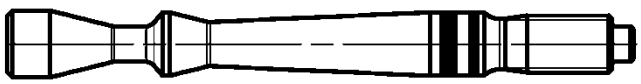
**fischer Highbond - Anchor rod FHB II Inject - A L**



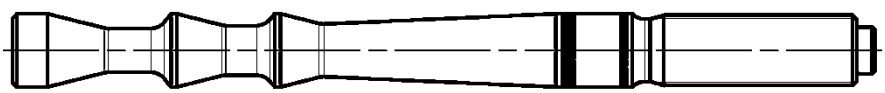
**fischer Highbond - Anchor rod FHB II Inject - A S**



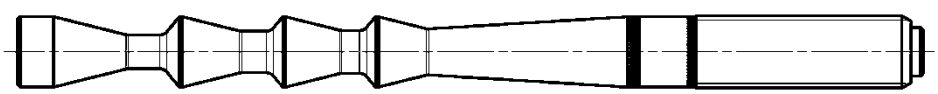
**Anchor rod FHB II Inject - A L**
Size: M8



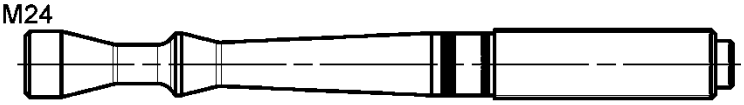
**Anchor rod FHB II Inject - A L**
Size: M10, M12, M16



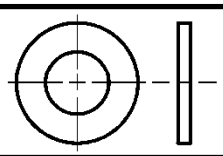
**Anchor rod FHB II Inject - A L**
Size: M20, M24



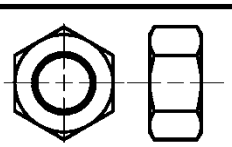
**Anchor rod FHB II Inject - A S**
Size: M10, M12, M16, M20, M24



**Washer**

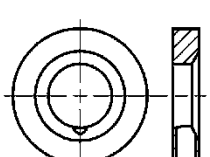


**Hexagon nut**

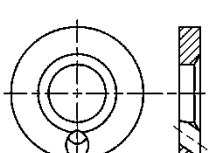


**fischer filling disk FFD**

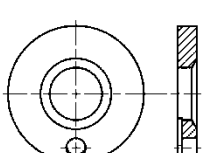
radial



angular



axial



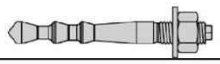
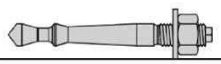
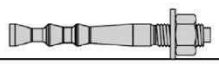
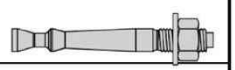
Figures not to scale

**Table A8.1:** Materials

| Part | Designation | Material | | |
|---|---|---|---|---|
| 1 | Mortar cartridge | Mortar, hardener, filler | | |
| 2 | Mortar capsule | Mortar, hardener, filler | | |
| | Steel grade | Steel | Stainless steel R | High corrosion resistant steel HCR |
| | | zinc plated | acc. to EN 10088-1 Corrosion resistance class CRC III acc. to EN 1993-1-4 | acc. to EN 10088-1 Corrosion resistance class CRC V acc. to EN 1993-1-4 |
| 3 | fischer Highbond-Anchor rod FHB II - A L or FHB II - A S FHB II - A L Inject or FHB II - A S Inject | Property class 8.8; EN ISO 898-1 zinc plated ≥ 5 µm, EN ISO 4042 $f_{uk} \leq 1000$ N/mm² $A_5 > 12$ % fracture elongation | Property class 80 EN ISO 3506-1 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462 EN 10088-1 $f_{uk} \leq 1000$ N/mm² $A_5 > 12$ % fracture elongation | Property class 80 EN ISO 3506-1 1.4565; 1.4529 EN 10088-1 $f_{uk} \leq 1000$ N/mm² $A_5 > 12$ % fracture elongation |
| 4 | Washer ISO 7089:2000 | zinc plated ≥ 5 µm EN ISO 4042 | 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014 | 1.4565; 1.4529 EN 10088-1 |
| 5 | Hexagon nut | Property class 8; EN ISO 898-2 zinc plated ≥ 5 µm, ISO 4042 | Property class 70 or 80 EN ISO 3506-2 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1 | Property class 70 or 80 EN ISO 3506-2 1.4565; 1.4529 EN 10088-1 |
| 6 | fischer filling disk FFD | zinc plated ≥ 5 µm, EN ISO 4042 | 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1 | 1.4565; 1.4529 EN 10088-1 |

## Specifications of intended use part 1

**Table B1.1:** Overview use and performance categories

| Anchorages subject to | | | **fischer injection mortar FIS HB or capsule FHB II-P or FHB II-PF with …** | | | **fischer injection mortar FIS HB with …** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | **FHB II– A L** | | **FHB II – A S** | **FHB II Inject – A L** | | **FHB II Inject – A S** | |
| | | |  | |  |  | |  | |
| Hammer drilling with standard drill bit |  | | all sizes | | | | | | |
| Hammer drilling with hollow drill bit |  | | all sizes (fischer “FHD”, Heller "Duster Expert", Bosch “Speed-Clean” or Hilti "TE-CD, TE-YD") | | | | | | |
| Diamond drilling |  | | -[1] | | M16x95, M20x170, M24x170 (only with resin capsule allowed) | -[1] | | -[1] | |
| Static or quasi static load, in | uncracked concrete | | all sizes | Tables: C1.1, C3.1, C5.1 C9.1 | all sizes | Tables: C2.1, C3.1, C6.1, C7.1, C7.2, C8.1, C9.2, C10.1, C11.1, | all sizes | Tables: C1.1, C3.1, C5.1 C9.1 | all sizes | Tables: C2.1, C4.1, C6.1 C9.2 C11.1 |
| | cracked concrete | | | | | | | | |
| Installation and use condition | I1 | dry or wet concrete | all sizes | | | | | | |
| | I2 | flooded hole | all sizes (only with resin capsule allowed) | | | -[1] | | | |
| Seismic performance C1 and C2 | | | -[1] | | | -[1] | | | |
| Installation direction | | | D3 (downwards, horizontal, and upwards (overhead) installation) | | | | | | |
| Kind of installation | Pre-positioned anchor | | all sizes | | | all sizes | | | |
| | Push through anchor | | all sizes (only with injection mortar FIS HB allowed) | | all sizes | all sizes | | | |
| Installation temperature | | | -5 C to +40 °C for the standard variation of temperature after installation | | | | | | |
| Service temperature | Temperature range I | | -40°C to +40°C | (max. short term temperature +40 °C and max. long term temperature +24 °C) | | | | | |
| | Temperature range II | | -40°C to +80°C | (max. short term temperature +80 °C and max. long term temperature +50 °C) | | | | | |

[1] no performance assessed

## Specifications of intended use part 2

**Base materials:**

- Compacted reinforced or unreinforced normal weight concrete without fibre of strength classes C20/25 to C50/60 according to EN 206.

**Use conditions (Environmental conditions):**

- Fastener intended for use in structures subject to dry, internal conditions (all materials).
- For all other conditions according to EN 1993-1-4 corresponding to corrosion resistance classes to **Annex A8 Table A8.1**.

**Design:**

- Fastenings are designed in accordance with:
  EN 1992-4 and TR 082 from April 2024.
- The structural design is conducted under responsibility of a designer experienced in the field of anchorages and concrete works.
- 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.).

**Installation:**

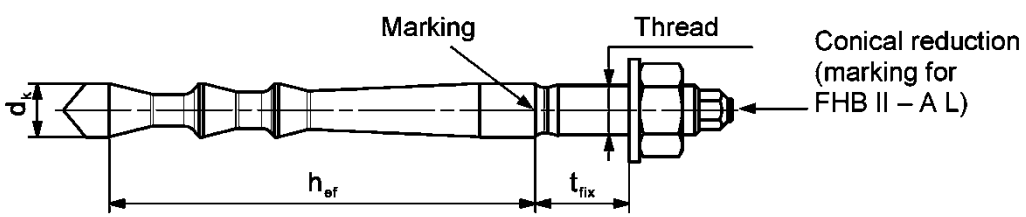
- Fastener installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Overhead installation is allowed (necessary equipment see installation instruction).

**Table B3.1:** Installation parameters for Highbond - Anchor rods FHB II – A L

| Anchor rod FHB II – A L | | Thread | M8x | M10x | M12x | | M16x | | | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | 210 |
| Correspondending mortar capsules **FHB II-P** or **FHB II-PF** | | [-] | 8x 60 | 10x 95 | 12x 100 | 12x 120 | 16x 125 | 16x 145 | 16x 160 | 20x 210 | 24x 210 |
| Cone diameter | $d_k$ | [mm] | 9,4 | 10,7 | 12,5 | | 16,8 | | | 23,0 | |
| Nominal drill hole diameter | $d_0$ | | 10 | 12 | 14 | | 18 | | | 25 | |
| Drill hole depth | $h_0$ | | 75 | 110 | 115 | 135 | 140 | 160 | 175 | 235 | |
| Effective anchorage depth | $h_{ef}$ | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | |
| Minimum spacing and minimum edge distance | $s_{min} = c_{min}$ | | 40 | | 50 | | 55 | 60 | 70 | 90 | |
| Diameter of clearance hole in the fixture[1] – pre-positioned anchorage | $d_f \leq$ | | 9 | 12 | 14 | | 18 | | | 22 | 26 |
| Diameter of clearance hole in the fixture[1] – push through anchorage[2] | $d_f \leq$ | | 11 | 14 | 16 | | 20 | | | 26 | |
| Min. thickness of concrete member | $h_{min}$ | | 100 | 140 | | 170 | | 190 | 220 | 280 | |
| Installation torque moment | $T_{inst}$ | [Nm] | 15 | 20 | 40 | | 60 | | | 100 | |
| Thickness of fixure | $t_{fix} \leq$ | [mm] | 1500 | | | | | | | | |
| fischer filling disk FFD[3] | $\geq d_a$ | | - | 26 | 30 | | 38 | | | 46 | 54 |
| | $t_s$ | | - | 6 | 6 | | 7 | | | 8 | 10 |

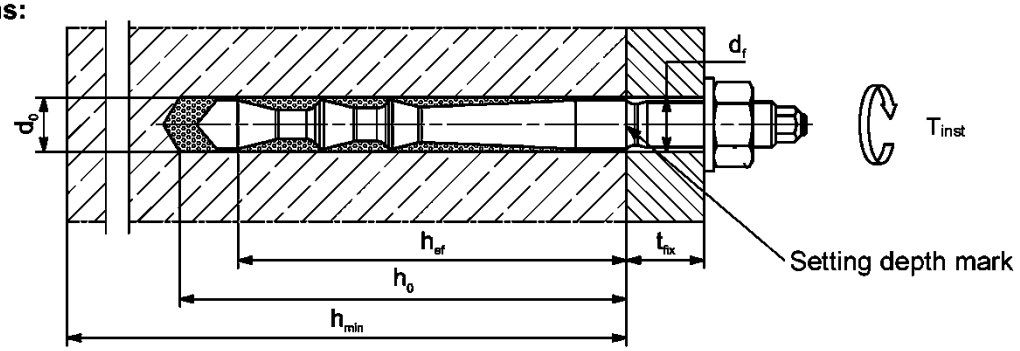
[1] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2] Only with mortar cartridge system FIS HB
[3] Using fischer filling disk FFD reduces $t_{fix}$ (usable length of the anchor)

**fischer Highbond – Anchor rod FHB II – A L**




**Marking:** work symbol, size of anchor, setting depth. e.g.: M10x95
For stainless steel additional **A4 or R**. For high corrosion resistant steel additional **C or HCR.**
For high corrosion resistant steel additional marking **C or HCR** also on the face side

**Installation conditions:**




Figures not to scale

fischer Highbond-Anchor FHB II

**Intended use**
Installation parameters for Highbond-Anchor rods FHB II-A L

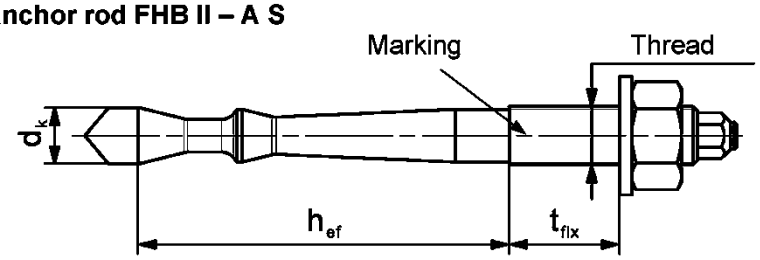
**Annex B3**
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**Table B4.1:** Installation parameters for Highbond – Anchor rods FHB II – A S

| Anchor rod FHB II – A S | | Thread | | M10x | | M12x | M16x | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 60 | 75 | 75 | 95 | 170 | 170 |
| Correspondending mortar capsules FHB II-P or FHB II-PF | | [-] | | 10x 60 | 10x 75 | 12x 75 | 16x 95 | 20x 170 | 24x 170 |
| Cone diameter | | $d_k$ | [mm] | 9,4 | | 11,3 | 14,5 | 23,0 | |
| Nominal drill hole diameter | | $d_0$ | | 10 | | 12 | 16 | 25 | |
| Drill hole depth | | $h_0$ | | 75 | 90 | 90 | 110 | 190 | |
| Effective anchorage depth | | $h_{ef}$ | | 60 | 75 | 75 | 95 | 170 | |
| Minimum spacing and minimum edge distance | $s_{min} = c_{min}$ | | | 40 | | | 50 | 80 | |
| Diameter of clearance hole in the fixture[1] | pre-positioned anchorage | $d_f \leq$ | | 12 | | 14 | 18 | 22 | 26 |
| | push through anchorage | $d_f \leq$ | | 12 | | 14 | 18 | 26 | |
| Min. thickness of concrete member | | $h_{min}$ | | 100 | 120 | | 150 | 240 | |
| Installation torque moment | | $T_{inst}$ | [Nm] | 15 | | 30 | 50 | 100 | |
| Thickness of fixure | | $t_{fix} \leq$ | [mm] | 1500 | | | | | |
| fischer filling disk FFD[2] | | $\geq d_a$ | | 26 | | 30 | 38 | 46 | 54 |
| | | $t_s$ | | 6 | | 6 | 7 | 8 | 10 |

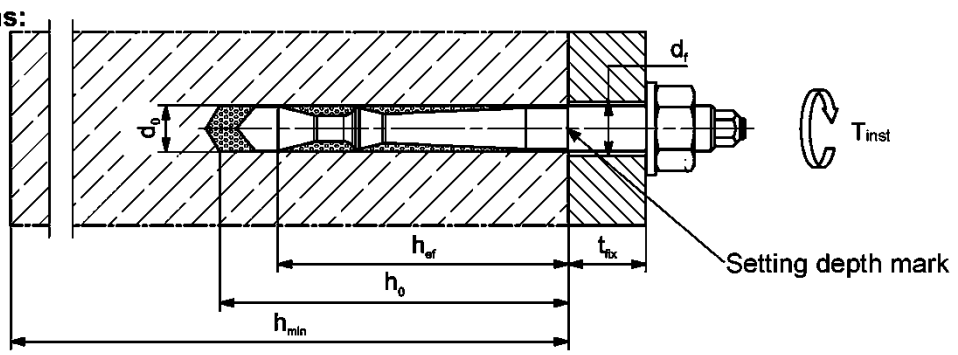
[1] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2] Using fischer filling disk FFD reduces $t_{fix}$ (usable length of the anchor)

**fischer Highbond – Anchor rod FHB II – A S**




**Marking:** work symbol, size of anchor, setting depth. e.g.: M10x75
For stainless steel additional **A4 or R**. For high corrosion resistant steel additional **C or HCR.**
For high corrosion resistant steel additional marking **C or HCR** also on the face side

**Installation conditions:**




Figures not to scale

fischer Highbond-Anchor FHB II

**Intended use**
Installation parameters for Highbond-Anchor rods FHB II-A S

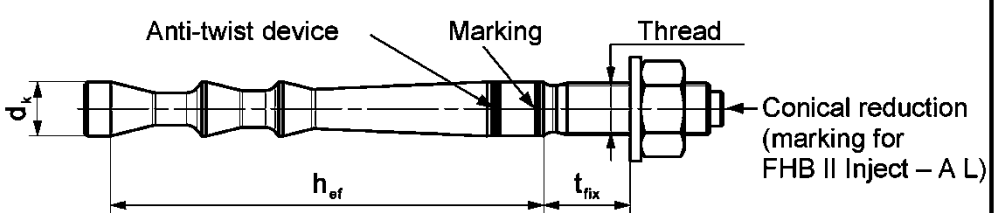
**Annex B4**
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**Table B5.1:** Installation parameters for Highbond – Anchor rods FHB II Inject – A L

| Anchor rod FHB II Inject– A L | | Thread | | M8x | M10x | M12x | | M16x | | | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | 210 |
| Cone diameter | | $d_k$ | [mm] | 9,4 | 10,7 | 12,5 | | 16,8 | | | 23,0 | |
| Nominal drill hole diameter | | $d_0$ | | 10 | 12 | 14 | | 18 | | | 25 | |
| Drill hole depth | | $h_0$ | | 66 | 101 | 106 | 126 | 131 | 151 | 166 | 216 | |
| Effective anchorage depth | | $h_{ef}$ | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | |
| Minimum spacing and minimum edge distance | | $s_{min} = c_{min}$ | | 40 | | 50 | | 55 | 60 | 70 | 90 | |
| Diameter of clearance hole in the fixture[1)] | pre-positioned anchorage | $d_f \leq$ | | 9 | 12 | 14 | | 18 | | | 22 | 26 |
| | push through anchorage | $d_f \leq$ | | 11 | 14 | 16 | | 20 | | | 26 | |
| Min. thickness of concrete member | | $h_{min}$ | | 100 | 140 | | 170 | | 190 | 220 | 280 | |
| Installation torque moment | | $T_{inst}$ | [Nm] | 15 | 20 | 40 | | 60 | | | 100 | |
| Thickness of fixure | | $t_{fix} \leq$ | | 1500 | | | | | | | | |
| fischer filling disk FFD[2)] | | $\geq d_a$ | [mm] | - | 26 | 30 | | 38 | | | 46 | 54 |
| | | $t_s$ | | - | 6 | 6 | | 7 | | | 8 | 10 |

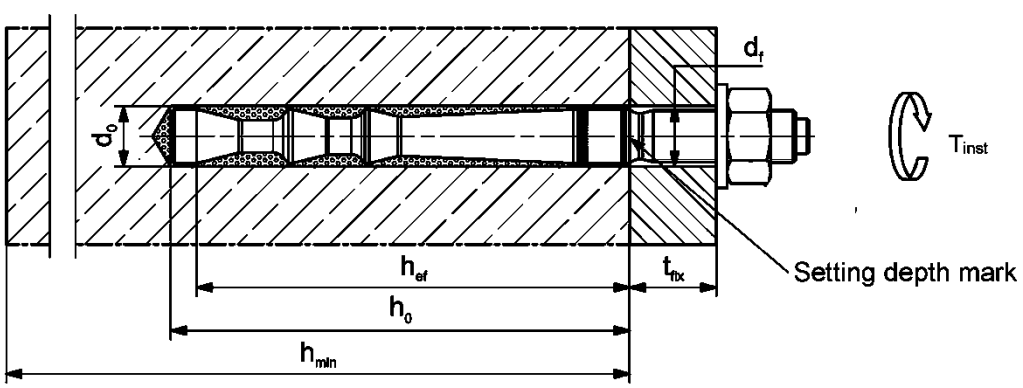
[1)] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2)] Using fischer filling disk FFD reduces $t_{fix}$ (usable length of the anchor)

**fischer Highbond – Anchor rod FHB II Inject – A L**




**Marking:** work symbol, size of anchor, setting depth. e.g.: M10x95
For stainless steel additional **A4 or R**. For high corrosion resistant steel additional **C or HCR.**
For high corrosion resistant steel additional marking **C or HCR** also on the face side.

**Installation conditions:**




Figures not to scale

fischer Highbond-Anchor FHB II

**Intended use**
Installation parameters for Highbond-Anchor rods FHB II Inject - A L

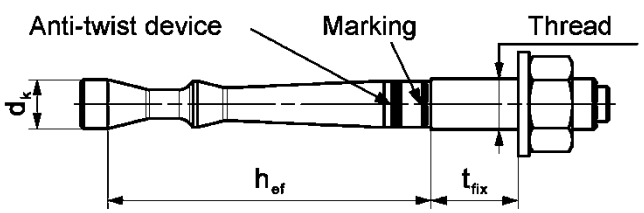
**Annex B5**
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**Tabelle B6.1:** Installation parameters for Highbond – Anchor rods FHB II Inject – A S

| Anchor rod FHB II Inject – A S | | Thread | | M10x | | M12x | M16x | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 60 | 75 | 75 | 95 | 170 | 170 |
| Cone diameter | $d_k$ | [mm] | | 9,4 | | 11,3 | 14,5 | 23,0 | |
| Nominal drill hole diameter | $d_0$ | | | 10 | | 12 | 16 | 25 | |
| Drill hole depth | $h_0$ | | | 66 | 81 | 81 | 101 | 176 | |
| Effective anchorage depth | $h_{ef}$ | | | 60 | 75 | 75 | 95 | 170 | |
| Minimum spacing and minimum edge distance | $s_{min} = c_{min}$ | | | 40 | | | 50 | 80 | |
| Diameter of clearance hole in the fixture[1] pre-positioned anchorage | $d_f \leq$ | | | 12 | | 14 | 18 | 22 | 26 |
| Diameter of clearance hole in the fixture[1] push through anchorage | $d_f \leq$ | | | 12 | | 14 | 18 | 26 | |
| Min. thickness of concrete member | $h_{min}$ | | | 100 | 120 | | 150 | 240 | |
| Installation torque moment | $T_{inst}$ | [Nm] | | 15 | | 30 | 50 | 100 | |
| Thickness of fixure | $t_{fix} \leq$ | [mm] | | 1500 | | | | | |
| fischer filling disk FFD[2] | $\geq d_a$ | | | 26 | | 30 | 38 | 46 | 54 |
| | $t_s$ | | | 6 | | 6 | 7 | 8 | 10 |

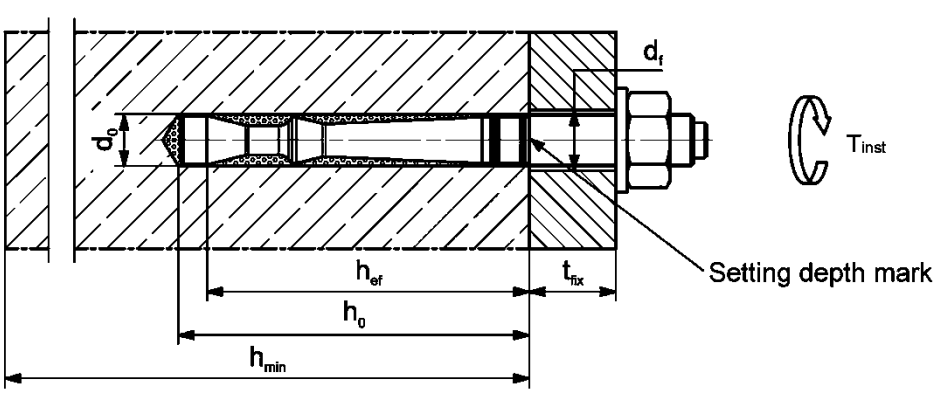
[1] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2] Using fischer filling disk FFD reduces $t_{fix}$ (usable length of the anchor)

**fischer Highbond – Anchor rod FHB II Inject – A S**




**Marking:** work symbol, size of anchor, setting depth. e.g.: M10x75
For stainless steel additional **A4 or R**. For high corrosion resistant steel additional **C or HCR.**
For high corrosion resistant steel additional marking **C or HCR** also on the face side

**Installation conditions:**




Figures not to scale

fischer Highbond-Anchor FHB II

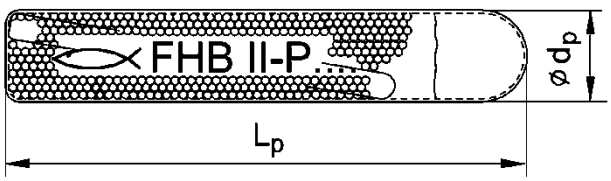
**Intended use**
Installation parameters for Highbond - Anchor rods FHB II Inject - A S

**Annex B6**
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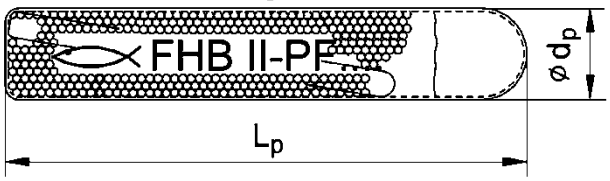
**Table B7.1:** Dimensions of mortar capsules FHB II-P and FHB II-PF

| Mortar capsule | | | 8x | 10x | | | 12x | | | 16x | | | | 20x | | 24x | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 60 | 75 | 95 | 75 | 100 | 120 | 95 | 125 | 145 | 160 | 170 | 210 | 170 | 210 |
| Length of capsule | $L_p$ | [mm] | 85 | | 90 | 115 | 95 | 120 | | | 150 | 155 | | 185 | 210 | 185 | 210 |
| Diameter of capsule | Ø $d_p$ | | 9 | | | 11 | | 12,5 | | 14,5 | 17 | | | 21,5 | | | |

**FHB II-P (standard)**




**FHB II-PF (fast curing)**




**Imprint:** work symbol, marking, anchor size and effective anchorage depth.

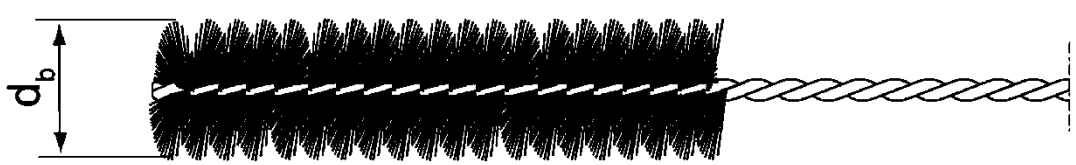
e.g.: FHB II-P 12x100 or

FHB II-PF 12x100

**Table B7.2:** Parameters of the cleaning brush BS (steel brush; when using injection mortar or when using martar capsules in diamond drilled holes)

The size of the steel brush refers to the nominal drill hole diameter

| Drill hole diameter | $d_0$ | [mm] | 10 | 12 | 14 | 16 | 18 | 25 |
|---|---|---|---|---|---|---|---|---|
| Brush diameter | $d_b$ | | 11 | 14 | 16 | 20 | | 27 |




Figures not to scale

fischer Highbond-Anchor FHB II

**Intended use**
Dimensions of mortar capsules; parameters of the cleaning brush

**Annex B7**
Appendix 17 / 34

**Table B8.1: Maximum processing time** of the mortar **FIS HB** and **minimum curing time**

| Temperature at anchoring base [1] [°C] | Maximum processing time $t_{work}$ | Minimum curing time [2] $t_{cure}$ |
|---|---|---|
| -5 to 0 [3] | - | 6 h |
| > 0 to 5 [3] | - | 3 h |
| > 5 to 10 | 15 min | 90 min |
| > 10 to 20 | 6 min | 35 min |
| > 20 to 30 | 4 min | 20 min |
| > 30 to 40 | 2 min | 12 min |

[1] During the curing time of the mortar the temperature of the anchoring base may not fall below the listed minimum temperature
[2] In wet concrete the curing time must be doubled
[3] Minimal cartridge temperature +5 °C

**Table B8.2: Minimum curing time** for mortar capsules **FHB II-P** and **FHB II-PF**

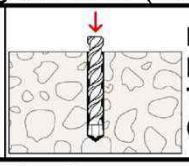
| **Resin capsule FHB II-P** (standard) | |
|---|---|
| Temperature at anchoring base [1] [°C] | Minimum curing time [2] $t_{cure}$ |
| -5 to 0 | 4 h |
| > 0 to 10 | 45 min |
| > 10 to 20 | 20 min |
| > 20 | 10 min |

| **Resin capsule FHB II-PF** (fast curing) | |
|---|---|
| Temperature at anchoring base [1] [°C] | Minimum curing time [2] $t_{cure}$ |
| -5 to 0 | 8 min |
| > 0 to 10 | 6 min |
| > 10 to 20 | 4 min |
| > 20 | 2 min |

[1] During the curing time of the mortar the temperature of the anchoring base may not fall below the listed minimum temperature.
[2] In wet concrete or water-filled holes the curing times must be doubled

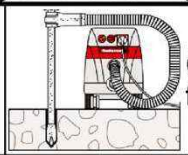
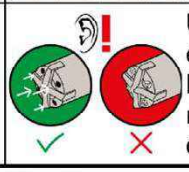
## Installation instructions part 1; Installation with mortar capsule FHB II-P or FHB II-PF

### Drilling the hole (hammer drilling with standard drill bit)

| | | |
|---|---|---|
| 1 |  | Drill the hole with hammer drill.<br>Drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$ see **Tables B3.1, B4.1.**<br>Cleaning of the bore hole is not necessary. |

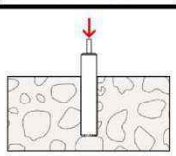
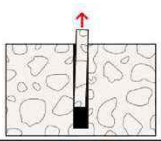
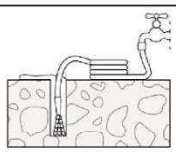
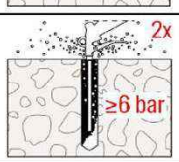
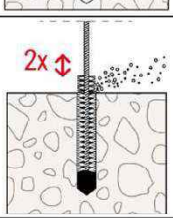
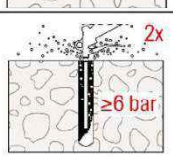
Go to step 6

### Drilling and cleaning the hole (hammer drilling with hollow drill bit)

| | | |
|---|---|---|
| 1 |  | Check a suitable hollow drill (see **Table B1.1**) for correct operation of the dust extraction. |
| 2 |  | Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.<br>Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. Diameter of drill hole $d_0$ and drill hole depth $h_0$ see **Tables B3.1, B4.1.** |

Go to step 6

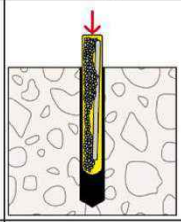
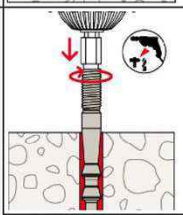
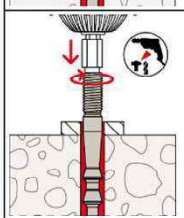
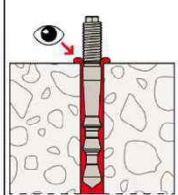
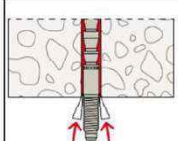
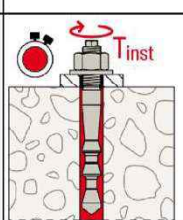
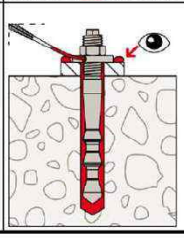
### Drilling and cleaning the drill hole (wet drilling with diamond drill bit)

| | | | | |
|---|---|---|---|---|
| 1 |  | Drill the hole.<br>Drill hole diameter $\mathbf{d_0}$ and nominal drill hole depth $\mathbf{h_0}$<br>see **Table B3.1, B4.1.** |  | Break the drill core and remove it |
| 2 |  | Flush the drill hole, until clear water emerges from the drill hole. | | |
| 3 |  | Blow out the drill hole twice, using oil-free compressed air ($p \geq 6$ bar). | | |
| 4 |  | Brush the drill hole twice.<br>Corresponding cleaning brush BS see **Table B7.2.** |  | |
| 5 |  | Blow out the drill hole twice, using oil-free compressed air ($p \geq 6$ bar). | | |

Go to step 6

**Installation instruction part 2; Installation with mortar capsule FHB II-P or FHB II-PF**

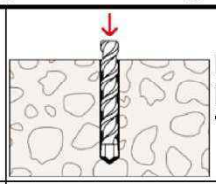
Installation Highbond-Anchor rod FHB II – A L and FHB II – A S

| | | |
|---|---|---|
| **6** |  | Put the mortar capsule FHB II-P or FHB II-PF into the bore hole. |
| **7** |  | **Pre-positioned anchor:**<br>Only use Highbond-Anchor rods **FHB II - A L** or<br>**FHB II – A S** with **roof-shaped point.** Drive in the Anchor rod using a hammer drill or impact drill. When reaching the setting depth mark stop the drill immediately. |
| |  | **Push through anchor**:<br>Only use Highbond-Anchor rods **FHB II – A S** with **roof-shaped point.** Drive in the anchor rod using a hammer drill or impact drill. When reaching the setting depth mark stop the drill immediately. |
| **8** |  | After inserting the anchor, excess mortar must be emerged around the anchor (pre-positioned installation)<br>or in the attached part (push-through installation). |
| **8a** |  | For overhead installations support the anchor rod with wedges.<br>(e.g. fischer centering wedges)  |
| **9** |  | Wait for the specified curing time $t_{cure}$ see **Table B8.2.**<br><br>Mounting the fixture with $T_{inst}$ see**Tables B3.1, B4.1.** |
| **Option** |  | After the minimum curing time is reached, the gap between anchor and fixture (annular clearance) may be filled with mortar via the fischer filling disc FFD.<br>compressive strength ≥ 50 N/mm² (e.g. FIS HB). ATTENTION: Using fischer filling disk FFD reduces $t_{fix}$ (usable length of the anchor). |

## Installation instructions part 3; Installation with injection mortar FIS HB

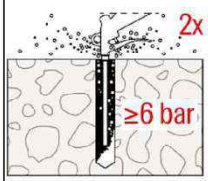
### Drilling and cleaning the hole (hammer drilling with standard drill bit)

**1**

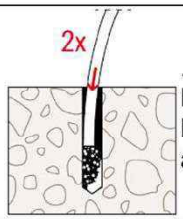


Drill the hole with hammer drill.
Drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$ see **Tables B3.1, B4.1, B5.1, B6.1.**

**2**



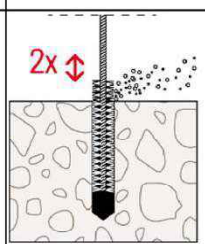

Blow out the drill hole twice.
For drill hole diameter $\mathbf{d_0}$ = 25 mm with oil-free compressed air (p ≥ 6 bar)
Use a cleaning nozzle.




For drill hole diameter $\mathbf{d_0}$ < 25 mm with hand- blowout or oil-free compressed air. (p ≥ 6 bar)

If necessary, remove standing water out of the bore hole.

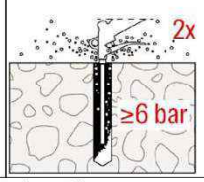
**3**



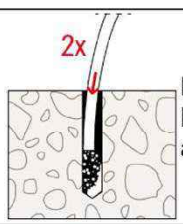

Brush the bore hole twice.
Corresponding brushes see **Table B7.2.**



**4**




Blow out the drill hole twice.
For drill hole diameter $\mathbf{d_0}$ = 25 mm with oil-free compressed air (p ≥ 6 bar)
Use a cleaning nozzle.

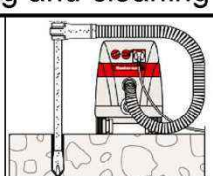



For drill hole diameter $\mathbf{d_0}$ < 25 mm with hand- blowout or oil-free compressed air. (p ≥ 6 bar)

Go to step 5

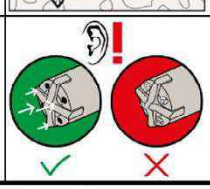
### Drilling and cleaning the hole (hammer drilling with hollow drill bit)

**1**



Check a suitable hollow drill (see **Table B1.1**) for correct operation of the dust extraction.

**2**

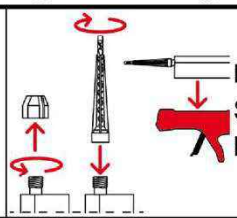
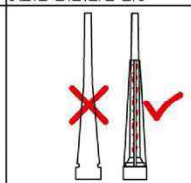
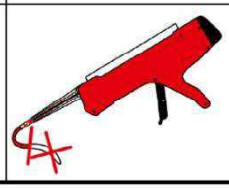


Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.
Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. Diameter of drill hole $d_0$ and drill hole depth $h_0$ see **Tables B3.1, B4.1, B5.1, B6.1.**

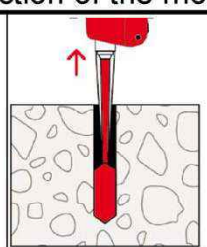
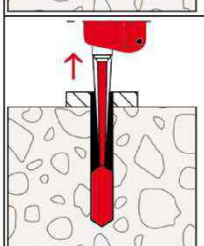
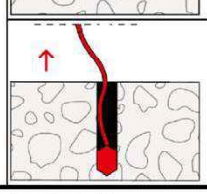
Go to step 5

## Installation instruction part 4; Installation with injection mortar FIS HB

### Preparing the cartridge

| | | |
|---|---|---|
| **5** |  | Remove the sealing cap<br>Screw on the static mixer<br>Place the cartridge into the dispenser |
| **6** |  | Ensuring that the spiral inside the mixer is clearly visible. |
| **7** |  | Extrude approximately 10 cm of material until the resin is evenly grey in colour. Do not use mortar that is not uniformly grey. |

### Injection of the mortar

| | | |
|---|---|---|
| **8** |  | Fill approximately 2/3 of the drill hole with mortar. Exact quantity of mortar (travel scale on the cartridge) see instruction sheet. Fill the drill hole with mortar, always begin from the bottom of the hole to avoid bubbles. |
| |  | **Push-through installation:**<br>By using Highbond-Anchor rods **FHB II - AL** or **FHB II Inject - AL** the drill hole in the fixture must be also filled with mortar.<br>By using Highbond-Anchor rods **FHB II - AS** or **FHB II Inject - AS** is this not necessary. |
| |  | For drill hole depth ≥ 170 mm use an extension tube. |

Go to step 9

## Installation instruction part 5; Installation with injection mortar FIS HB

Installation Highbond-Anchor rod **FHB II (Inject) – A L** and **FHB II (Inject) – A S**

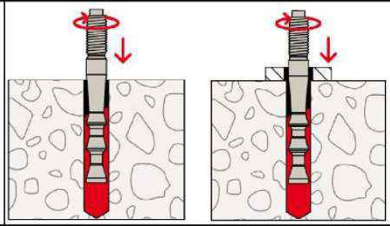
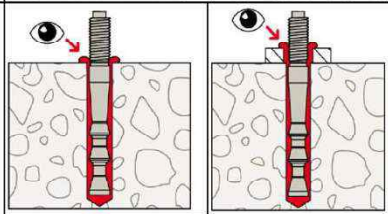
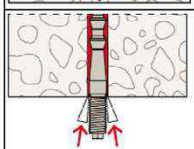
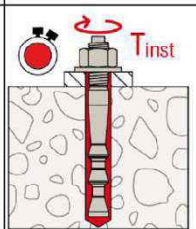
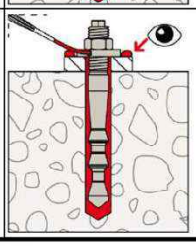
| | | |
|---|---|---|
| **9** |  | Only use clean and oil-free anchor rods.<br>Push the anchor rod down to the bottom of the hole, turning it slightly while doing so. |
| **10** |  | **Pre-positioned anchor**:<br>After inserting the anchor rod, surplus mortar must be escaped from the fixture.<br>**Push through anchor:**<br>After inserting the anchor rod, surplus mortar must be escaped from the bore hole or must be visible in the fixture. |
| |  | For overhead installations support the anchor rod with wedges.<br>(e.g. fischer centering wedges)  |
| **11** |  | Wait for the specified curing time $t_{cure}$ see **Table B8.1.**<br>Mounting the fixture with $T_{inst}$ see **Tables B3.1, B4.1, B5.1, B6.1.** |
| **Option** |  | After the minimum curing time is reached, the gap between anchor and fixture (annular clearance) may be filled with mortar by using the fischer filling disc FFD.<br>compressive strength ≥ 50 N/mm² (e.g. FIS HB). ATTENTION: Using fischer filling disk FFD reduces $t_{fix}$ (usable length of the anchor). |

**Table C1.1: Characteristic resistance to steel failure under tension / shear loading of Highbond-Anchor FHB II – A L and FHB II Inject – A L**

| Ancher rod FHB II – A L and FHB II Inject – A L | | | M8x | M10x | M12x | | M16x | | | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | 210 |
| **Characteristic resistance to steel failure under tension loading** | | | | | | | | | | | |
| Characteristic resistance $N_{Rk,s}$ | Steel, zinc plated | [kN] | 24,2 | 34,4 | 49,8 | | 96,6 | | | 137,6 | |
| | Stainless steel R | | 24,2 | 34,4 | 49,8 | | 96,6 | | | 137,6 | |
| | High corrosion resistant steel HCR | | | | | | | | | | |
| **Partial factors**[1)] | | | | | | | | | | | |
| Partial factor $\gamma_{Ms,N}$ | Steel, zinc plated | [-] | 1,5 [1)] | | | | | | | | |
| | Stainless steel R | | 1,5 [1)] | | | | | | | | |
| | High corrosion resistant steel HCR | | 1,5 [1)] | | | | | | | | |

| Anchor rod FHB II – A L and FHB II Inject – A L | | | M8x | M10x | M12x | | M16x | | | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | 210 |
| **Characteristic resistance to steel failure under shear loading** | | | | | | | | | | | |
| **without lever arm** | | | | | | | | | | | |
| Characteristic Resistance $V^0_{Rk,s}$ | Steel, zinc plated | [kN] | 13,7 | 20,8 | 30,3 | | 56,3 | | | 87,9 | 126,9 |
| | Stainless steel R | | 15,2 | 23,2 | 33,7 | | 62,7 | | | 97,9 | 141,0 |
| | High corrosion resistant steel HCR | | | | | | | | | | |
| **with lever arm** | | | | | | | | | | | |
| Characteristic resistance $M^0_{Rk,s}$ | Steel, zinc plated | [Nm] | 31,0 | 62,0 | 105,0 | | 266,0 | | | 519,0 | 896,0 |
| | Stainless steel R | | 31,0 | 62,0 | 105,0 | | 266,0 | | | 519,0 | 896,0 |
| | High corrosion resistant steel HCR | | | | | | | | | | |
| **Partial factors** | | | | | | | | | | | |
| Partial factor[1)] | $\gamma_{Ms,V}$ | [-] | 1,25[1)] | | | | | | | | |

[1)] In absence of other national regulations

**Table C2.1: Characteristic resistance to steel failure under tension / shear loading of Highbond-Anchor FHB II – A S and FHB II Inject – A S**

| Anchor rod FHB II – A S / FHB II Inject – A S | | | M10x 60 | M10x 75 | M12x 75 | M16x 95 | M20x 170 | M24x 170 |
|---|---|---|---|---|---|---|---|---|
| **Characteristic resistance to steel failure under tension loading** | | | | | | | | |
| Characteristic resistance $N_{Rk,s}$ | Steel, zinc plated | [kN] | 24,2 | | 34,4 | 61,6 | 128,5 | |
| | Stainless steel R | | 24,2 | | 34,4 | 61,6 | 128,5 | |
| | High corrosion resistant steel HCR | | | | | | | |
| **Partial factors**[1)] | | | | | | | | |
| Partial factor $\gamma_{Ms,N}$ | Steel, zinc plated | [-] | 1,5 [1)] | | | | | |
| | Stainless steel R | | 1,5 [1)] | | | | | |
| | High corrosion resistant steel HCR | | 1,5 [1)] | | | | | |

| Anchor rod FHB II – A S / FHB II Inject – A S | | | M10x 60 | M10x 75 | M12x 75 | M16x 95 | M20x 170 | M24x 170 |
|---|---|---|---|---|---|---|---|---|
| **Characteristic resistance to steel failure under shear loading** | | | | | | | | |
| **Without lever arm** | | | | | | | | |
| Characteristic Resistance $V^0_{Rk,s}$ | Steel, zinc plated | [kN] | 19,7 | | 27,3 | 50,8 | 80,3 | 114,2 |
| | Stainless steel R | | 24,1 | | 33,7 | 62,7 | 97,9 | 124,5 |
| | High corrosion resistant steel HCR | | 24,1 | | 33,7 | 62,7 | 97,9 | 141 |
| **With lever arm** | | | | | | | | |
| Characteristic resistance $M^0_{Rk,s}$ | Steel, zinc plated | [Nm] | 62,0 | | 105,0 | 266,0 | 519,0 | 896,0 |
| | Stainless steel R | | 62,0 | | 105,0 | 266,0 | 519,0 | 896,0 |
| | High corrosion resistant steel HCR | | | | | | | |
| **Partial factors**[1)] | | | | | | | | |
| Partial factor | $\gamma_{Ms,V}$ | [-] | 1,25[1)] | | | | | |

[1)] In absence of other national regulations

**Table C3.1: Characteristic resistance to concrete failure under tension / shear loading for Highbond-Anchor FHB II – A L and FHB II Inject – A L**

| Size | | | All sizes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tension loading** | | | | | | | | | | | |
| Installation factor | $\gamma_{inst}$ | [-] | See Annex C5 to C8 | | | | | | | | |
| **Factors for the compressive strength of concrete > C20/25** | | | | | | | | | | | |
| Increasing factor $\psi_c$ for cracked or uncracked concrete<br>$N_{Rk,p} = \psi_c \cdot N_{Rk,p\ (C20/25)}$ | C25/30 | $\Psi_c$ | [-] | 1,12 | | | | | | | |
| | C30/37 | | | 1,22 | | | | | | | |
| | C35/45 | | | 1,32 | | | | | | | |
| | C40/50 | | | 1,41 | | | | | | | |
| | C45/55 | | | 1,50 | | | | | | | |
| | C50/60 | | | 1,58 | | | | | | | |
| **Anchor rod FHB II - A L and FHB II Inject - A L** | | | **M8x** | **M10x** | **M12x** | | **M16x** | | | **M20x** | **M24x** |
| | | | **60** | **95** | **100** | **120** | **125** | **145** | **160** | **210** | **210** |
| **Splitting failure** | | | | | | | | | | | |
| Edge distance | $c_{cr,sp}$ | [mm] | 150 | 238 | 190 | 300 | 188 | 250 | 290 | 315 | |
| Spacing | $s_{cr,sp}$ | | 300 | 476 | 380 | 600 | 375 | 500 | 580 | 630 | |
| **Concrete cone failure** | | | | | | | | | | | |
| Uncracked concrete | $k_{ucr,N}$ | [-] | 11,0 | | | | | | | | |
| Cracked concrete | $k_{cr,N}$ | | 7,7 | | | | | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | 1,5 $h_{ef}$ | | | | | | | | |
| Spacing | $s_{cr,N}$ | | 3,0 $h_{ef}$ | | | | | | | | |
| **Shear loading** | | | | | | | | | | | |
| Installation factor | $\gamma_{inst}$ | [-] | 1,0 | | | | | | | | |
| **Concrete pry-out failure** | | | | | | | | | | | |
| Factor for pry-out failure | $k_8$ | [-] | 2,0 | | | | | | | | |
| **Concrete edge failure** | | | | | | | | | | | |
| **Anchor rod FHB II - A L and FHB II Inject - A L** | | | **M8x** | **M10x** | **M12x** | | **M16x** | | | **M20x** | **M24x** |
| | | | **60** | **95** | **100** | **120** | **125** | **145** | **160** | **210** | **210** |
| Effective length of fastener in shear loading | $l_f$ | [mm] | 60 | 95 | 100 | 120 | 125 | 144 | | 200 | |
| Calculation diameter | $d_{nom}$ | | 10 | 12 | 14 | | 18 | | | 25 | |

**Table C4.1: Characteristic resistance to concrete failure under tension / shear loading for fischer Highbond-Anchor FHB II – A S and FHB II Inject – A S**

| Size | | | All sizes | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Tension loading** | | | | | | | | |
| Installation factor | $\gamma_{inst}$ | [-] | See Annex C5 to C8 | | | | | |
| **Factors for the compressive strength of concrete > C20/25** | | | | | | | | |
| Increasing factor $\psi_c$ for cracked or uncracked concrete $N_{Rk,p} = \psi_c \cdot N_{Rk,p\,(C20/25)}$ | C25/30 | $\Psi_c$ [-] | 1,12 | | | | | |
| | C30/37 | | 1,22 | | | | | |
| | C35/45 | | 1,32 | | | | | |
| | C40/50 | | 1,41 | | | | | |
| | C45/55 | | 1,50 | | | | | |
| | C50/60 | | 1,58 | | | | | |
| **Anchor rod FHB II - A S and FHB II Inject - A S** | | | **M10x** | | **M12x** | **M16x** | **M20x** | **M24x** |
| | | | **60** | **75** | **75** | **95** | **170** | **170** |
| **Splitting failure** | | | | | | | | |
| Edge distance | $c_{cr,sp}$ | [mm] | 150 | | | 170 | 255 | |
| Spacing | $s_{cr,sp}$ | | 300 | | | 340 | 510 | |
| **Concrete cone failure** | | | | | | | | |
| Uncracked concrete | $k_{ucr,N}$ | [-] | 11,0 | | | | | |
| Cracked concrete | $k_{cr,N}$ | | 7,7 | | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | 1,5 $h_{ef}$ | | | | | |
| Spacing | $s_{cr,N}$ | | 3,0 $h_{ef}$ | | | | | |
| **Shear loading** | | | | | | | | |
| Installation factor | $\gamma_{inst}$ | [-] | 1,0 | | | | | |
| **Concrete pry-out failure** | | | | | | | | |
| Factor for pry-out failure | $k_8$ | [-] | 2,0 | | | | | |
| **Concrete edge failure** | | | | | | | | |
| **Anchor rod FHB II - A S and FHB II Inject - A S** | | | **M10x** | | **M12x** | **M16x** | **M20x** | **M24x** |
| | | | **60** | **75** | **75** | **95** | **170** | **170** |
| Effective length of fastener in shear loading | $l_f$ | [mm] | 60 | 75 | 75 | 95 | 170 | |
| Calculation diameter | $d_{nom}$ | | 10 | | 12 | 16 | 25 | |

**Table C5.1: Characteristic resistance to pull-out failure under tension loading in uncracked or cracked concrete C20/25 for Highbond-Anchor FHB II – A L and FHB II Inject – A L; working life 50 years**

| Anchor rod FHB II - A L [1] / FHB II Inject - A L [2] | | | M8 | M10 | M12 | | M16 | | | M20 | M24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | 210 |
| **Characteristic resistance for pull-out failure** | | | | | | | | | | | |
| Calculation diameter | d | [mm] | 8 | 10 | 12 | | 16 | | | 20 | 24 |
| **Uncracked concrete C20/25** | | | | | | | | | | | |
| Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete / water-filled hole) | | | | | | | | | | | |
| Temperature range I: 24 °C / 40 °C; II: 50 °C / 80 °C | $N_{Rk,p,ucr,50}$ | [kN] | 15,9 | 34,9 | 44,9 | 51,1 | 97,4 | 97,4 | 100,9 | 148,2 | 148,2 |
| **Installation factors** | | | | | | | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,0 [3] | 1,0 | | | | | | | |
| Water filled hole (only for resin capsule) | | | 1,2 | 1,0 | | | | | | | |
| **Cracked concrete C20/25** | | | | | | | | | | | |
| Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete / water-filled hole) | | | | | | | | | | | |
| Temperature range I: 24 °C / 40 °C; II: 50 °C / 80 °C | $N_{Rk,p,cr,50}$ | [kN] | 15,9 | 34,9 | 44,9 | 51,1 | 82,5 | 97,4 | 100,9 | 148,2 | 148,2 |
| **Installation factors** | | | | | | | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,0 [3] | 1,0 | | | | | | | |
| Water filled hole (only for resin capsule) | | | 1,2 | 1,0 | | | | | | | |

[1] Highbond-Anchor rod FHB II - A L with resin capsule FHB II-P / FHB II-PF or injection mortar FIS HB
[2] Highbond-Anchor rod FHB II Inject - A L with injection mortar FIS HB
[3] With mortar capsule $\gamma_{inst}$ = 1,2

**Table C6.1: Characteristic resistance to pull-out failure under tension loading in uncracked or cracked concrete C20/25 for fischer Highbond-Anchor FHB II – A S and FHB II Inject – A S; working life 50 years**

| Anchor rod FHB II - A S [1] / FHB II Inject - A S [2] | | | M10x 60 | M10x 75 | M12x 75 | M16x 95 | M20x 170 | M24x 170 |
|---|---|---|---|---|---|---|---|---|
| **Characteristic resistance for pull-out failure** | | | | | | | | |
| Calculation diameter | d | [mm] | 10 | | 12 | 16 | 20 | 24 |
| **Uncracked concrete C20/25** | | | | | | | | |
| Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete / water-filled hole) | | | | | | | | |
| Temperature range I: 24 °C / 40 °C; II: 50 °C / 80 °C | $N_{Rk,p,ucr,50}$ | [kN] | 15,9 | 21,4 | 27,1 | 57,9 | 135,7 | 135,7 |
| **Installation factors** | | | | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,0 [3] | 1,0 | | | | |
| Water filled hole (only for resin capsule) | $\gamma_{inst}$ | [-] | 1,2 | 1,0 | | | | |
| **Cracked concrete C20/25** | | | | | | | | |
| Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete) | | | | | | | | |
| Temperature range I: 24 °C / 40 °C; II: 50 °C / 80 °C | $N_{Rk,p,cr,50}$ | [kN] | 15,9 | 21,4 | 26,2 | 42,6 | 123,3 | 123,3 |
| **Installation factors** | | | | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,0 [3] | 1,0 | | | | |
| Water filled hole (only for resin capsule) | $\gamma_{inst}$ | [-] | 1,2 | 1,0 | | | | |

[1] Highbond-Anchor rod FHB II - A S with resin capsule FHB II-P / FHB II-PF or injection mortar FIS HB
[2] Highbond-Anchor rod FHB II Inject - A S with injection mortar FIS HB
[3] With mortar capsule $\gamma_{inst}$ = 1,2

**Table C7.1:** **Characteristic resistance** to **pull-out failure** under **tension loading** in **uncracked or cracked concrete C20/25** for **Highbond-Anchor rods FHB II - A S** with **resin capsule FHB II-P** or **FHB II-PF** in diamond drilled holes; **working life 50 years**

| **Highbond-Anchor rod FHB II - A S** [1] | | | **M16x95** | **M20x170** | **M24x170** |
|---|---|---|---|---|---|
| **Characteristic resistance to pull-out failure** | | | | | |
| Calculation diameter | d | [mm] | 16 | 25 | |
| **Uncracked concrete C20/25** | | | | | |
| Diamond-drilling (dry or wet concrete / water-filled hole) | | | | | |
| Temperature range I 24 °C / 40 °C; II 50 °C / 80 °C | $N_{Rk,p,ucr,50}$ | [kN] | 51,5 | 118,5 | |
| **Cracked concrete C20/25** | | | | | |
| Diamond-drilling (dry or wet concrete / water-filled hole) | | | | | |
| Temperature range I 24 °C / 40 °C; II 50 °C / 80 °C | $N_{Rk,p,cr,50}$ | [kN] | 42,8 | 101,4 | |
| **Installation factors** | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,2 | | |
| Water-filled hole | | | 1,2 | | |

[1] Highbond-Anchor rod FHB II - A S with resin capsule FHB II-P / FHB II-PF

**Table C7.2:** **Characteristic resistance** to **pull-out failure** under **tension loading** in **uncracked or cracked concrete C20/25** for **Highbond-Anchor rods FHB II - A S** with **resin capsule FHB II-P** or **FHB II-PF** in diamond drilled holes; **working life 100 years**

| **Highbond-Anchor rod FHB II - A S** [1] | | | **M16x95** | **M20x170** | **M24x170** |
|---|---|---|---|---|---|
| **Characteristic resistance to pull-out failure** | | | | | |
| Calculation diameter | d | [mm] | 16 | 25 | |
| **Uncracked concrete C20/25** | | | | | |
| Diamond-drilling (dry or wet concrete / water-filled hole) | | | | | |
| Temperature range I 24 °C / 40 °C; II 50 °C / 80 °C | $N_{Rk,p,ucr,100}$ | [kN] | 51,5 | 118,5 | |
| **Cracked concrete C20/25** | | | | | |
| Diamond-drilling (dry or wet concrete / water-filled hole) | | | | | |
| Temperature range I 24 °C / 40 °C; II 50 °C / 80 °C | $N_{Rk,p,cr,100}$ | [kN] | 36,0 | 86,0 | |
| **Installation factors** | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,2 | | |
| Water-filled hole | | | 1,2 | | |

[1] Highbond-Anchor rod FHB II - A S with resin capsule FHB II-P / FHB II-PF

**Table C8.1:** Characteristic resistance to **pull-out failure** for **Highbond-Anchor rods FHB II - A S** with **resin capsule FHB II-P / FHB II-PF** or **injection mortar FIS HB** and **FHB II Inject - A S with injection mortar FIS HB** in hammer drilled holes; **working life 100 years**

| **Anchor rod FHB II - A S** [1] **FHB II Inject - A S** [2] | | | **M16x95** | **M20x170** | **M24x170** |
|---|---|---|---|---|---|
| **Characteristic resistance to pull-out failure** | | | | | |
| Calculation diameter | d | [mm] | 16 | 25 | |
| **Uncracked concrete C20/25** | | | | | |
| Hammer-drilling with standard or hollow drill bit (dry or wet concrete / water-filled hole) | | | | | |
| Temperature range I 24 °C / 40 °C; II 50 °C / 80 °C | $N_{Rk,p,ucr,100}$ | [kN] | 52,4 | 118,5 | |
| **Cracked concrete C20/25** | | | | | |
| Hammer-drilling with standard or hollow drill bit (dry or wet concrete / water-filled hole) | | | | | |
| Temperature range I 24 °C / 40 °C; II 50 °C / 80 °C | $N_{Rk,p,cr,100}$ | [kN] | 36,0 | 86,0 | |
| **Installation factors** | | | | | |
| Dry or wet concrete | $\gamma_{inst}$ | [-] | 1,0 | | |
| Water-filled hole (only with resin capsule) | | | 1,0 | | |

[1] Highbond-Anchor rod FHB II - A S with resin capsule FHB II-P / FHB II-PF or injection mortar FIS HB
[2] Highbond-Anchor rod FHB II Inject - A S with injection mortar FIS HB

**Table C9.1: Displacements for Highbond-Anchor rod FHB II - A L and FHB II Inject - A L; working life 50 years**

| Anchor rod FHB II – A L and FHB II Inject -A L | | M8x | M10x | M12x | | M16x | | | M20x | M24x |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 60 | 95 | 100 | 120 | 125 | 145 | 160 | 210 | 210 |
| **Displacement-Factors for tension loading [1)]** | | | | | | | | | | |
| **Uncracked concrete; Temperature range I and II** | | | | | | | | | | |
| $\delta_{N0\text{-Factor}}$ | [mm/kN] | 0,026 | 0,024 | 0,019 | 0,016 | 0,012 | 0,010 | 0,008 | 0,008 | |
| $\delta_{N\infty\text{-Factor}}$ | | 0,224 | 0,102 | 0,079 | 0,070 | 0,052 | 0,042 | 0,036 | 0,024 | |
| **Cracked concrete; Temperature range I and II** | | | | | | | | | | |
| $\delta_{N0\text{-Factor}}$ | [mm/kN] | 0,105 | 0,053 | 0,049 | 0,037 | 0,026 | 0,021 | 0,018 | 0,012 | |
| $\delta_{N\infty\text{-Factor}}$ | | 0,224 | 0,112 | 0,104 | 0,079 | 0,074 | 0,059 | 0,051 | 0,034 | |
| **Displacement-Factors for shear loading [2)]** | | | | | | | | | | |
| **Uncracked or cracked concrete; Temperature range I and II** | | | | | | | | | | |
| Steel, zinc plated | | | | | | | | | | |
| $\delta_{V0\text{-Factor}}$ | [mm/kN] | 0,185 | 0,101 | 0,075 | | 0,040 | | | 0,070 | 0,048 |
| $\delta_{V\infty\text{-Factor}}$ | | 0,277 | 0,151 | 0,116 | | 0,062 | | | 0,106 | 0,073 |
| Stainless steel R | | | | | | | | | | |
| $\delta_{V0\text{-Factor}}$ | [mm/kN] | 0,137 | 0,075 | 0,057 | | 0,061 | | | 0,063 | 0,043 |
| $\delta_{V\infty\text{-Factor}}$ | | 0,205 | 0,113 | 0,088 | | 0,092 | | | 0,095 | 0,066 |
| High corrosion resistant steel HCR | | | | | | | | | | |
| $\delta_{V0\text{-Factor}}$ | [mm/kN] | 0,164 | 0,090 | 0,067 | | 0,067 | | | 0,066 | 0,062 |
| $\delta_{V\infty\text{-Factor}}$ | | 0,247 | 0,135 | 0,104 | | 0,101 | | | 0,100 | 0,093 |

1) Calculation of effective displacement:

$\delta_{N0} = \delta_{N0\text{-Factor}} \cdot N$

$\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N$

N = acting tension loading

2) Calculation of effective displacement:

$\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$

$\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$

V = acting shear loading

**Table C10.1: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; working life 50 years**

| Anchor rod FHB II – A S and FHB II Inject -A S | | M10x | | M12x | M16x | M20x | M24x |
|---|---|---|---|---|---|---|---|
| | | 60 | 95 | 75 | 95 | 210 | 210 |
| **Displacement-Factors for tension loading [1)]** | | | | | | | |
| **Uncracked concrete; Temperature range I and II** | | | | | | | |
| $\delta_{N0\text{-Factor}}$ | [mm/kN] | 0,026 | 0,020 | 0,016 | 0,009 | 0,010 | |
| $\delta_{N\infty\text{-Factor}}$ | | 0,224 | 0,167 | 0,132 | 0,078 | 0,033 | |
| **Cracked concrete; Temperature range I and II** | | | | | | | |
| $\delta_{N0\text{-Factor}}$ | [mm/kN] | 0,105 | 0,029 | 0,028 | 0,026 | 0,017 | |
| $\delta_{N\infty\text{-Factor}}$ | | 0,224 | 0,167 | 0,159 | 0,112 | 0,047 | |
| **Displacement-Factors for shear loading [2)]** | | | | | | | |
| **Uncracked or cracked concrete; Temperature range I and II** | | | | | | | |
| Steel, zinc plated | | | | | | | |
| $\delta_{V0\text{-Factor}}$ | [mm/kN] | 0,128 | | 0,118 | 0,052 | 0,061 | 0,043 |
| $\delta_{V\infty\text{-Factor}}$ | | 0,191 | | 0,181 | 0,079 | 0,092 | 0,064 |
| Stainless steel R | | | | | | | |
| $\delta_{V0\text{-Factor}}$ | [mm/kN] | 0,087 | | 0,057 | 0,061 | 0,063 | 0,049 |
| $\delta_{V\infty\text{-Factor}}$ | | 0,130 | | 0,088 | 0,092 | 0,095 | 0,075 |
| High corrosion resistant steel HCR | | | | | | | |
| $\delta_{V0\text{-Factor}}$ | [mm/kN] | 0,104 | | 0,067 | 0,067 | 0,066 | 0,062 |
| $\delta_{V\infty\text{-Factor}}$ | | 0,157 | | 0,104 | 0,101 | 0,100 | 0,093 |

1) Calculation of effective displacement:

$\delta_{N0} = \delta_{N0\text{-Factor}} \cdot N$

$\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N$

N = acting tension loading

2) Calculation of effective displacement:

$\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$

$\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$

V = acting shear loading

**Table C11.1: Displacements for Highbond-Anchor rod FHB II - A S in diamond drilled holes; working life 50 years**

| Anchor rod FHB II – A S / FHB II Inject - A S | | M16x95 | M20x170 | M24x170 |
|---|---|---|---|---|
| **Displacement-Factors for tension loading [1)]** | | | | |
| **Uncracked concrete; Temperature range I and II** | | | | |
| $\delta_{N0}$-Factor | [mm/kN] | 0,030 | 0,020 | 0,016 |
| $\delta_{N\infty}$-Factor | | 0,120 | 0,045 | 0,045 |
| **Cracked concrete; Temperature range I and II** | | | | |
| $\delta_{N0}$-Factor | [mm/kN] | 0,030 | 0,020 | 0,016 |
| $\delta_{N\infty}$-Factor | | 0,120 | 0,045 | 0,045 |
| **Displacement-Factors for shear loading [2)]** | | | | |
| **Uncracked or cracked concrete; Temperature range I and II** | | | | |
| $\delta_{V0}$-Factor | [mm/kN] | 0,02 | 0,02 | 0,02 |
| $\delta_{V\infty}$-Factor | | 0,03 | 0,03 | 0,03 |

[1)] Calculation of effective displacement:

$\delta_{N0} = \delta_{N0\text{-Factor}} \cdot N$

$\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N$

N = acting tension loading

[2)] Calculation of effective displacement:

$\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$

$\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$

V = acting shear loading

**Table C11.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; working life 100 years**

| Anchor rod FHB II – A S / FHB II Inject - A S | | M16x95 | M20x170 | M24x170 |
|---|---|---|---|---|
| **Displacement-Factors for tension loading [1)]** | | | | |
| **Uncracked concrete; Temperature range I and II** | | | | |
| $\delta_{N0}$-Factor | [mm/kN] | 0,030 | 0,020 | 0,016 |
| $\delta_{N\infty}$-Factor | | 0,120 | 0,045 | 0,045 |
| **Cracked concrete; Temperature range I and II** | | | | |
| $\delta_{N0}$-Factor | [mm/kN] | 0,030 | 0,020 | 0,016 |
| $\delta_{N\infty}$-Factor | | 0,120 | 0,045 | 0,045 |
| **Displacement-Factors for shear loading [2)]** | | | | |
| **Uncracked or cracked concrete; Temperature range I and II** | | | | |
| $\delta_{V0}$-Factor | [mm/kN] | 0,02 | 0,02 | 0,02 |
| $\delta_{V\infty}$-Factor | | 0,03 | 0,03 | 0,03 |

[1)] Calculation of effective displacement:

$\delta_{N0} = \delta_{N0\text{-Factor}} \cdot N$

$\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N$

N = acting tension loading

[2)] Calculation of effective displacement:

$\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$

$\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$

V = acting shear loading