



### **DECLARATION OF PERFORMANCE**

#### DoP 0327

for fischer Highbond-Anchor FHB II for diamond drilling / extended working life (Bonded expansion fastener for use in concrete)

ΕN

1. Unique identification code of the product-type: DoP 0327

2. Intended use/es: Post-installed fastening for use in cracked or uncracked concrete, see appendix,

especially annexes B1 - B11.

3. Manufacturer: fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Germany

4. Authorised representative:

5. System/s of AVCP: 1

6. European Assessment Document: EAD 330499-01-0601
European Technical Assessment: ETA-21/0948; 2022-09-09

Technical Assessment Body: DIBt- Deutsches Institut für Bautechnik

Notified body/ies: 2873 TU Darmstadt

### 7. Declared performance/s:

### Mechanical resistance and stability (BWR 1)

### Characteristic resistance to tension load (static and quasi-static loading):

Resistance to steel failure: Annex C1

Resistance to combined pull- out and concrete cone failure: Annexes C2-C4

Resistance to concrete cone failure: Annex C2

Edge distance to prevent splitting under load: Annex C2

Robustness: Annexes C2-C4 Installation torque: Annexes B3, B4

Minimum edge distance and spacing: Annexes B3, B4

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

Resistance to steel failure: Annex C1
Resistance to pry-out failure: Annex C2
Resistance to concrete edge failure: Annex C2

### Displacements under short-term and long-term loading:

Displacements under short-term and long-term loading: Annexes C5

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

Resistance to tension load, displacements, category C1: NPD Resistance to tension load, displacements, category C2: NPD Resistance to shear load, displacements, category C1: NPD Resistance to shear load, displacements, category C2: NPD

Factor annular gap: NPD

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

Content, emission and/or release of dangerous substances: NPD

### 8. Appropriate Technical Documentation and/or Specific

Technical Documentation:

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

Signed for and on behalf of the manufacturer by:

Dr.-Ing. Oliver Geibig, Managing Director Business Units & Engineering

Tumlingen, 2022-09-16

Jürgen Grün, Managing Director Chemistry & Quality

This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.

The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

Fischer DATA DOP\_ECs\_V84.xlsm 1/1



Translation guidance Essential Characteristics and Performance Parameters for Annexes

Me	Mechanical resistance and stability (BWR 1)							
Ch	Characteristic resistance to tension load (static and quasi-static loading):							
1	Resistance to steel failure:	N <sub>Rk,s</sub> [kN]						
2	Resistance to combined pull- out and concrete cone failure:		$\begin{aligned} &T_{Rk} \text{ and/or } T_{Rk,100} \left[\text{N/mm}^2\right], \psi^0_{\text{sus}} \left[\text{-}\right] (\text{BF}) \\ &N_{Rk,p} \text{ and/or } N_{Rk,p,100} \left[\text{kN}\right] (\text{BEF}) \end{aligned}$					
3	Resistance to concrete cone failure:		c <sub>cr,N</sub> [mm], k <sub>cr,N</sub> , k <sub>ucr,N</sub> [-]					
4	Edge distance to prevent splitting under load:		c <sub>cr,sp</sub> [mm]					
5	Robustness:		Vinst [-]					
6	Maximum installation torque:		max T <sub>inst</sub> [Nm] (BF)					
	Installation torque:		T <sub>inst</sub> [Nm] (BEF)					
7	Minimum edge distance and spacing:		c <sub>min</sub> , s <sub>min</sub> , h <sub>min</sub> [mm]					
Ch	aracteristic resistance to shear load (static and quasi-static loading):							
8	Resistance to steel failure:		V <sup>0</sup> <sub>Rk,s</sub> [kN], M <sup>0</sup> <sub>Rk,s</sub> [Nm], k <sub>7</sub> [-]					
9	Resistance to pry-out failure:		k <sub>8</sub> [-]					
10	Resistance to concrete edge failure:		d <sub>nom</sub> , I <sub>f</sub> [mm]					
Dis	splacements under short-term and long-term loading:							
11	Displacements under short-term and long-term loading:		$\delta_0$ , $\delta_\infty$ [mm or mm/(N/mm <sup>2</sup> )]					
Ch	aracteristic resistance and displacements for seismic performance categories C1 ar	nd C2:	-					
12	Resistance to tension load, displacements:							
		C1	N <sub>Rk,S,C1</sub> [kN] (all) τ <sub>Rk,C1</sub> [N/mm <sup>2</sup> ] (BF) N <sub>Rk,p,C1</sub> [kN] (BEF)					
		C2	$\begin{split} &N_{Rk,s,C2} [kN] \text{ (all)} \\ &T_{Rk,C2} [N/mm^2] \text{ (BF)} \\ &N_{Rk,p,C2} [kN] \text{ (BEF)} \\ &\delta_{N,C2} [mm] \text{ (all)} \end{split}$					
13	Resistance to shear load, displacements:	C1						
			V <sub>Rk,s,C1</sub> [kN] (all)					
		C2	$V_{Rk,s,C2}$ [kN] (all) $\delta_{V,C2}$ [mm] (all)					
	Factor annular gap:		α <sub>gap</sub> [-]					
Hy	giene, health and the environment (BWR 3)							
15 Content, emission and/or release of dangerous substances:								

Fischer DATA DOP\_ECs\_V84.xlsm Appendix 0

### **Specific Part**

### 1 Technical description of the product

The "fischer Highbond-Anchor FHB II for diamond drilling / extended working life" consisting of a mortar cartridge with mortar fischer FIS HB or fischer mortar capsule FHB II–P(F) and an anchor rod FHB II - A S 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 realized 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 anchor 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	See Annex C 1 to C 4, B 3 to B 4	
(static and quasi-static loading)		
Characteristic resistance to shear load	See Annex C 1 to C 2	
(static and quasi-static loading)		
Displacements under short-term and long-term loading	See Annex C 5	
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed	

### 3.2 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

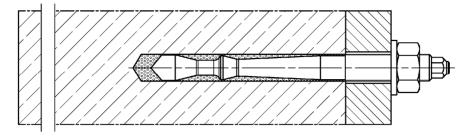
In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

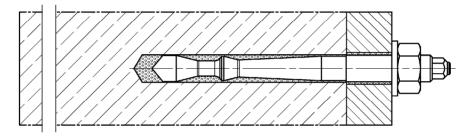
## Installation conditions part 1

## Highbond - Anchor FHB II - A S

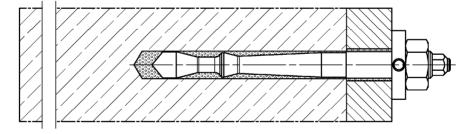
### Pre-positioned installation



### Push through installation



**Pre-positioned or push through installation** with subsequently injected fischer filling disc (annular gap filled with mortar)



Figures not to scale

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

**Product description** 

Installation conditions part 1; FHB II - A S

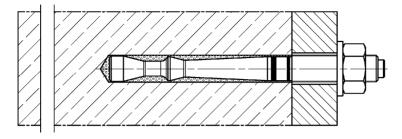
Annex A 1

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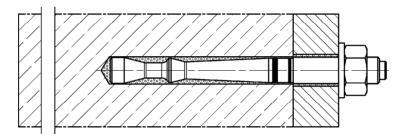
## Installation conditions part 2

**Highbond - Anchor FHB II Inject - A S** (only with injection mortar FIS HB)

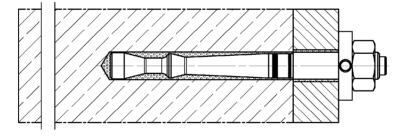
### **Pre-positioned installation**



### Push through installation



**Pre-positioned or push through installation** with subsequently injected fischer filling disc (annular gap filled with mortar)



Figures not to scale

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

**Product description** 

Installation conditions part 2; FHB II Inject - A S

Annex A 2

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# Overview system components part 1 Injection cartridge (shuttle cartridge) with sealing cap; Size: 360 ml. 825 ml **Imprint:** fischer FIS HB, processing notes, shelf-life, piston travel scale (optional), curing times and processing times (depending on temperature), hazard code, size, volume Injection cartridge (coaxial cartridge) with sealing cap; Size: 150 ml, 300 ml, 380 ml, 400 ml, 410 ml Imprint: fischer FIS HB, processing notes, shelf-life, piston travel scale (optional), curing times and processing times (depending on temperature), hazard code, size, volume Resin capsule ≺FHB II-.. Static mixer FIS MR Plus for injection cartridges up to 410 ml Static mixer FIS JMR for injection cartridge 825 ml Extension tube Ø 9 for static mixer FIS MR Plus: Extension tube Ø 9 or Ø 15 for static mixer FIS JMR Injection adapter Figures not to scale fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex A 3 **Product description** Overview system components part 1 Appendix 5 / 24

cartridges / resin capsule / static mixer / accessories

# Overview system components part 2 fischer Highbond - Anchor FHB II and FHB II Inject; pre-assembled condition Highbond - Anchor FHB II - A S Highbond - Anchor FHB II Inject - A S alternative version alternative version Highbond anchor rod FHB II - A S Size: M16, M20, M24 Highbond anchor rod FHB II Inject - A S Size: M16, M20, M24 Figures not to scale fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex A 4 **Product description** Overview system components part 2

anchor rod

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# Overview system components part 3 fischer filling disc (various versions) radial angular axial conical washer washer hexagon nut Cleaning brush BS Compressed-air cleaning tool ABP with compressed-air nozzle: or blow-out pump ABG: Figures not to scale fischer Highbond-Anchor FHB II for diamond drilling / extended working life

Product description
Overview system components part 3

Overview system components part 3 metal parts / cleaning brush / blow-out pump

Annex A 5

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Tabl	Table A6.1: Materials							
Part	Designation	Material						
1	Injection cartridge		Mortar, hardener, filler					
2	Resin capsule		Mortar, hardener, filler					
		Steel	Stainless steel A4	High corrosion resistant steel C				
	Steel grade	zink plated	acc. to EN 10088-1:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015	acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006+A1:2015				
		Property class 8.8 EN ISO 898-1:2013	Property class 80 EN ISO 3506-1:2020	Property class 80 EN ISO 3506-1:2020				
3	Highbond-Anchor rod FHB II - A S or FHB II Inject - A S	electroplated $\geq$ 5 $\mu$ m ISO 4042:2018/Zn5/An(A2K) acc. to EN ISO 4042:2018 $A_5 > 12~\%$ fracture elongation	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462; EN 10088-1:2014 A <sub>5</sub> > 12 % fracture elongation	1.4565; 1.4529; EN 10088-1:2014 A <sub>5</sub> > 12 % fracture elongation				
4	Washer ISO 7089:2000	electroplated ≥ 5 µm ISO 4042:2018/Zn5/An(A2K) acc. toEN ISO 4042:2018	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565; 1.4529; EN 10088-1:2014				
5	Hexagon nut	Property class 8	Property class 70 or 80 EN ISO 3506-2:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 70 or 80 EN ISO 3506-2:2020 1.4565; 1.4529; EN 10088-1:2014				
6 Conical washer or fischer filling disc electroplated ≥ 5 μm, ISO 4042:2018/Zn5/An(A2K) acc. toEN ISO 4042:2018		1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565; 1.4529; EN 10088-1:2014					

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

### Specifications of intended use part 1 **Table B1.1:** Overview installation und use fischer Highbond-Anchor FHB II with injection mortar FIS HB or resin capsule FHB II-P / FHB II-PF FHB II - A S FHB II Inject - A S injection mortar FIS HB or injection mortar FIS HB resin capsule FHB II-P / FHB II-PF Hammer drilling with standard all sizes drill bit all sizes Hammer drilling with hollow drill (Heller "Duster Expert"; bit Bosch "Speed Clean"; Hilti "TE-CD, TE-YD") all sizes Diamond drilling no performance assessed (only with resin capsule allowed) uncracked all sizes all sizes concrete Static or quasi static load, in Tables: C1.1, C2.1, C3.1, C3.2, Tables: C1.1, C2.1, C4.1, C5.2 cracked C4.1, C5.1, C5.2 concrete dry or wet 11 all sizes Installation concrete and use water-filled all sizes condition 12 no performance assessed hole (only with resin capsule allowed) seismic performance no performance assessed

Installation	Pre-positioned		all sizes			
IIIStallation	Push through		all sizes			
Installation to	mporatura 1)	FIS HB:	$T_{i,min}$ = -5 °C to $T_{i,max}$ = +40 °C			
Installation te	inperature 7	FHB II-P / PF:	$T_{i,min}$ = -5 °C to $T_{i,max}$ = +40 °C			
Service temperature	Temperature range T2	-40 °C to +80 °C	(max. short term temperature +80 °C; max. long term temperature +50 °C)			
1) For the	1) For the standard variation of temperature after installation					

D3 (downwards, horizontal and upwards (overhead) installation)

fischer Highbond-Anchor FHB II for diamond drilling / extended working life
Intended use

Intended use
Specifications part 1

category C1 and C2

Installation direction

Annex B 1

Figures not to scale

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## Specifications of intended use part 2

### Base materials:

 Compacted reinforced or unreinforced normal weight concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

### **Use conditions (Environmental conditions):**

- Structures subject to dry internal conditions
   (zinc plated steel, stainless steel or high corrosion resistant steel)
- For all other conditions according to EN1993-1-4: 2006+A1:2015 corresponding to corrosion resistance classes to Annex A 6 table 6.1.

### Design

- Fastenings are designed under the responsibility of an engineer experienced in fastenings and concrete work
- 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.)
- Fastenings are designed in accordance with:
   EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018

### 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)

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

Specifications part 2

Annex B 2

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Table B3.1: Installation parameters for Highbond – Anchor rod FHB II - A S					
Anchor rod FHB II - A S Thread			M16x95	M20x170	M24x170
Correspondending resin capsules FHB II-P or FHB II-PF		[-]	16x95	20x170	24x170
Cone diameter	dk		14,5	23	3,0
Width across flats	SW		24	30	36
Nominal drill hole diameter d <sub>0</sub>			16	25	
Drill hole depth h <sub>0</sub>			110	1:	90
Effective embedment depth hef			95	1	70
Minimum spacing and s <sub>min</sub> = c <sub>min</sub>		[mm]	50	8	0
pre-position Diameter of installation	U < 1		18	22	26

18

150

50

38

d₁≤

 $h_{min}$ 

 $\mathsf{T}_{\mathsf{inst}}$ 

t<sub>fix</sub> ≤

≥ d<sub>a</sub>

[Nm]

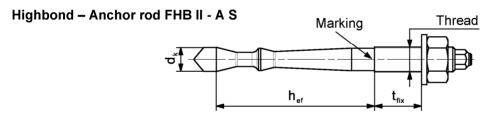
[mm]

installation

push through

installation

Min. thickness of concrete member



Marking: work symbol, thread diameter, embedment depth e.g.: ✓ M16x95 For stainless steel additional A4. For high corrosion resistant steel additional C. For high corrosion resistant steel additional marking "(" also on the face side

### Installation conditions:

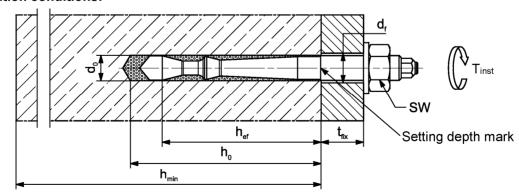
of the fixture

clearance hole

Installation torque

Thickness of fixture

fischer filling disc 1)



Figures not to scale

26

240

100

54

10

1500

46

8

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

### Intended use

Installation parameters for Highbond - Anchor FHB II - A S

Annex B 3

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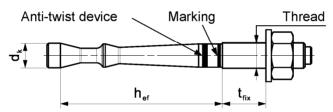
ts 1) Using fischer filling disc reduces t<sub>fix</sub> (usable length of the anchor)

Table B4.1: Installation parameters for Highbond - Anchor rod FHB II Inject - A S with injectionmortar FIS HB

Anchor rod FHE	B II Inject - A S	•	Thread	M16x95	M20x170	M24x170
Cone diameter		dk		14,5	23	3,0
Width across flats	S	SW		24	30	36
Nominal drill hole	diameter	<b>d</b> <sub>0</sub>		16	2	5
Drill hole depth		h <sub>0</sub>		101	17	76
Effective embedr	ment depth	hef		95	170	
Minimum spacing and smin = c		= C <sub>min</sub>	[mm]	50	80	
Diameter of clearance hole	pre-positioned installation	d <sub>f</sub> ≤		18	22	26
of the fixture	push through installation	d <sub>f</sub> ≤		20	2	6
Min. thickness of concrete member h		h <sub>min</sub>		150	240	
Installation torque T <sub>inst</sub>		T <sub>inst</sub>	[Nm]	50	100	
Thickness of fixture t <sub>fix</sub> ≤			1500			
ficebor filling dies	. 1)	≥ da	[mm]	38	46	54
	fischer filling disc 1)			7	8	10

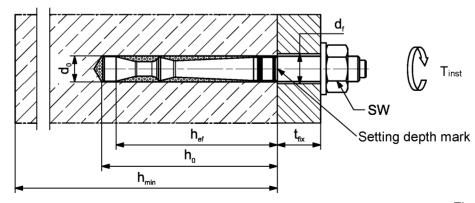
<sup>1)</sup> Using fischer filling disc reduces t<sub>fix</sub> (usable length of the fastener)

### Highbond - Anchor rod FHB II Inject - A S



**Marking:** work symbol, thread diameter, embedment depth e.g.: M16x95 For stainless steel additional "**A4**". For high corrosion resistant steel additional "**C**". For high corrosion resistant steel additional marking "(" also on the face side

### Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

### Intended use

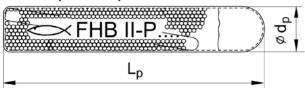
Installation parameters for Highbond - Anchor FHB II Inject - A  ${\sf S}$ 

Annex B 4

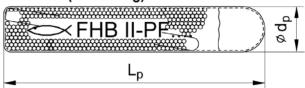
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Table B5.1:	e B5.1: Dimensions of resin capsule FHB II-P and FHB II-PF						
Resin capsule			16x95	20x170	24x170		
Capsule length Lp [mm]		120	185	185			
Capsule diameter	Ø d <sub>p</sub>	[mm]	14,5	21	,5		

### FHB II-P (standard)



### FHB II-PF (fast curing)



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

e.g.: FHB II-P 16x95 or

FHB II-PF 16x95

**Table B5.2:** Parameters of the cleaning brush BS (steel brush with steel bristles; only when using injection mortar or resin capsule with diamond drill bit)

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

Nominal drill hole diameter	$d_0$	[mm]	16	25
Steel brush diameter BS	d₀	[mm]	20	27



Figures not to scale

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

Intended use

Dimensions resin capsule Parameters cleaning brush (steel brush) Annex B 5

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Table B6.1: Processing t	<b>:ime</b> and <b>curing time</b> of the injection	on mortar <b>FIS HB</b>
Temperature at anchoring base 1) [°C]	Maximum processing time twork	Minimum curing time <sup>2)</sup>
-5 to 0 <sup>3)</sup>	-	6 h
> 0 to 5 <sup>3)</sup>	-	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

<sup>&</sup>lt;sup>1)</sup> During the curing time of the mortar the temperature of the anchoring base may not fall below the listed minimum temperature

Table B6.2: Curing time of the resin capsule FHB II-P and FHB II-PF

Resin capsule FHB II-P (standard)						
Temperature at anchoring base <sup>1)</sup> [°C]	Minimum curing time <sup>2)</sup>					
-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 <sup>1)</sup> [°C]	Minimum curing time 2) t <sub>cure</sub>					
-5 to 0	8 min					
> 0 to 10	6 min					
> 10 to 20	4 min					
> 20	2 min					

<sup>&</sup>lt;sup>1)</sup> During the curing time of the mortar the temperature of the anchoring base may not fall below the listed minimum temperature.

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

Processing time and curing time

Annex B 6

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<sup>2)</sup> In wet concrete the curing time must be doubled

<sup>3)</sup> Minimal cartridge temperature +5 °C

<sup>2)</sup> In wet concrete or water-filled holes the curing times must be doubled

# Installation instructions part 1; Installation with resin capsule FHB II-P or FHB II-PF Drilling the drill hole (hammer drilling with standard drill bit) Drill the hole. 1 Nominal drill hole diameter do and drill hole depth ho see table B3.1 Cleaning of the drill hole is not necessary Go to step 6 (Annex B 8) Drilling and cleaning the drill hole (hammer drilling with hollow drill bit) Check a suitable hollow drill (see table B1.1) 1 for correct operation of the dust extraction 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 2 drill dust nonstop during the drilling process and must be adjusted to maximum power. Nominal drill hole diameter do and drill hole depth ho see table B3.1 Go to step 6 (Annex B 8) Drilling and cleaning the drill hole (wet drilling with diamond drill bit) Drill the hole. Drill hole diameter do and Break the drill core 1 nominal drill hole depth ho and remove it see table B3.1 Flush the drill hole, until clear water emerges from the drill hole. 2 Blow out the drill hole twice, using oil-free compressed air ( $p \ge 6$ bar) 3 Brush the drill hole twice. 4 Corresponding cleaning brush BS see table B5.2 5 Blow out the drill hole twice, using oil-free compressed air ( $p \ge 6$ bar) Go to step 6 (Annex B 8) fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex B 7 Intended use

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Installation instructions part 1

Installation with resin capsule FHB II-P or FHB II-PF

# Installation instructions part 2; Installation with resin capsule FHB II-P or FHB II-PF Installation Highbond-Anchor rod FHB II - A S 6 Insert the resin capsule FHB II-P or FHB II-PF into the drill hole by hand. Pre-positioned installation: 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. 7 Push through installation: 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. Pre-positioned installation: After inserting the anchor rod, excess mortar must be emerged around the anchor. 8 Push through installation: After inserting the anchor rod, excess mortar must be emerged from the drill hole and must be visible in the fixture. For overhead installations support the anchor rod with wedges. 8a (e.g. fischer centering wedges) 9 Wait for the specified curing time tcure see table B6.2 10 Installation torque for the hexagon nut Tinst see table B3.1, B4.1 The gap between metal parts and fixture (annular gap) may be filled with mortar via the fischer filling disc. Compressive strength ≥ 50 N/mm<sup>2</sup> Option (e.g. FIS HB, FIS SB, FIS V, FIS V Plus, FIS EM Plus). ATTENTION: Using fischer filling disc reduces t<sub>fix</sub> (usable length of the anchor) fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex B 8 Intended use Installation instructions part 2 Appendix 16 / 24 Installation with resin capsule FHB II-P or FHB II-PF

# Installation instructions part 3; Installation with injection mortar FIS HB Drilling and cleaning the drill hole (hammer drilling with standard drill bit) Drill the hole 1 Nominal drill hole diameter d₀ and drill hole depth h₀ see tables B3.1, B4.1 Clean the drill hole. Blow out the drill hole twice. If necessary, remove standing water out of the bore hole For drill hole diameter $d_0 = 16 \text{ mm}$ blow out the 2 hole by hand or oil-free compressed air (≥ 6 bar). For drill hole diameter $d_0 = 25 \text{ mm}$ blow out the hole with oil-free compressed air (≥ 6 bar). Use a compressed-air nozzle. Brush the bore hole twice. Corresponding 3 cleaning brush BS see table B5.2 Clean the drill hole. Blow out the drill hole twice. For drill hole diameter $d_0 = 16 \text{ mm}$ blow out the hole by hand or oil-free compressed air (≥ 6 bar). 4 For drill hole diameter $d_0 = 25 \text{ mm}$ blow out the hole with oil-free compressed air (≥ 6 bar). Use a compressed-air nozzle. Go to step 5 (Annex B 10) Drilling and cleaning the drill hole (hammer drilling with hollow drill bit) Check a suitable hollow drill (see table B1.1) 1 for correct operation of the dust extraction 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 2 drill dust nonstop during the drilling process and must be adjusted to maximum power. Nominal drill hole diameter do and drill hole depth ho see tables B3.1, B4.1 Go to step 5 (Annex B 10)

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Intended use

Installation instructions part 3
Installation with injection mortar FIS HB

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

### Preparing the cartridge

5

Remove the sealing cap Screw on the static mixer (the spiral in the static mixer must be clearly visible)





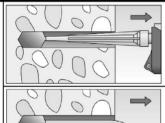
Place the cartridge into the dispenser





Extrude approximately 10 cm of material out until the resin is evenly grey in colour. Do not use mortar that is not uniformly grey

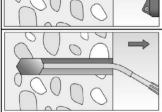
## Injection of the mortar



Fill approximately 2/3 of the drill hole with mortar. Always begin from the bottom of the hole and avoid bubbles

8

7



For drill hole depth ≥ 170 mm use an extension tube

Go to step 9 (Annex B 11)

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

Intended use

Installation instructions part 4 Installation with injection mortar Annex B 10

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# Installation instruction part 5; Installation with injection mortar FIS HB Installation Highbond-Anchor rod FHB II - A S or FHB II Inject - A S Pre-positioned or push through installation: 9 Push the anchor rod down to the bottom of the hole. turning it slightly while doing so. Only use clean and oil-free metal parts. Pre-positioned installation: After inserting the anchor rod, excess mortar must be emerged around the anchor. 10 Push through installation: After inserting the anchor rod, excess mortar must be emerged from the drill hole and must be visible in the fixture. For overhead installations support the 10a anchor rod with wedges. (e.g. fischer centering wedges) 11 Wait for the specified curing time tcure see table B6.1 12 Installation torque for the hexagon nut Tinst see table B3.1, B4.1 The gap between metal parts and fixture (annular gap) may be filled with mortar via the fischer filling disc. Compressive strength ≥ 50 N/mm<sup>2</sup> (e.g. FIS Option 4 HB, FIS SB, FIS V, FIS V Plus, FIS EM Plus). ATTENTION: Using fischer filling disc reduces t<sub>fix</sub> (usable length of the anchor) fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex B 11 Intended use Installation instructions part 5 Appendix 19 / 24 Installation with injection mortar

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

Ancher rod FHB II	- A S / FHB II Inject - A	s	M16x95	M20x170	M24x170
Characteristic res	sistance to steel failur	e und	er tension loading		
01	Steel, zinc plated		61,6	128	3,5
Characteristic — resistance —	Stainless steel A4	[kN]			
N <sub>Rk,s</sub>	High corrosion resistant steel C	[[(, 1]	61,6	128	3,5
Partial factors 1)					
	Steel, zinc plated			1,5 <sup>1)</sup>	
Partial factor	Stainless steel A4	[-]		1,5 <sup>1)</sup>	
γMs,N	High corrosion resistant steel C	. 1		1,5 1)	
Characteristic res	sistance to steel failur	e und	er shear loading		
without lever arm					
Charactaristic —	Steel, zinc plated		50,8	80,3	114,2
Characteristic — resistance —	Stainless steel A4	[kN]	62,7	97,9	124,5
V <sup>0</sup> Rk,s	High corrosion resistant steel C	[ •]	62,7	97,9	141
Ductility factor	<b>k</b> 7	[-]		1,0	
with lever arm					
Ob anastanistis	Steel, zinc plated		266	519	896
Characteristic — resistance —	Stainless steel A4	[Nm]			
M <sup>0</sup> Rk,s	High corrosion resistant steel C	[]	266	519	896
Partial factors 1)					
Partial factor	γMs,V	[-]		1,25	

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

fischer Highbond-Anchor FHB II for diamond drilling / extended working life

### **Performance**

Characteristic resistance to steel failure under tension / shear loading of Highbond-Anchor rods FHB II - A S and FHB II Inject - A S

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eristic resis	tance	to concrete failu	re under tension /	shear loading
B II Inject - A	S		All sizes	
concrete fa	ilure u	nder tension loading	9	
γinst	[-]		See annex C 3 to C 4	
e strength o	fconci	rete > C20/25		
C25/30			1,12	
C30/37			1,22	
C35/45	.,		1,32	
C40/50	[-]		1,41	
C45/55			1,50	
C50/60			1,58	
<b>C</b> cr,sp	[]		2 h <sub>ef</sub>	
<b>S</b> cr,sp	fmm)		4 h <sub>ef</sub>	
<b>k</b> ucr,N	r 1		11,0 <sup>1)</sup>	
<b>k</b> cr,N	[-]		7,7 1)	
C <sub>cr,N</sub>	[		1,5 h <sub>ef</sub>	
S <sub>cr,N</sub>	[mm]		3 h <sub>ef</sub>	
concrete fa	ilure u	nder shear loading		
γinst	[-]		1,0	
<b>k</b> <sub>8</sub>	[-]		2,0	
t		M16x95	M20x170	M24x170
lf	[mm]	95	17	70
d <sub>nom</sub>	Ī	16	2	5
der compress	sive str	ength		
	B II Inject - A  concrete fa  γinst e strength of  C25/30  C30/37  C35/45  C40/50  C45/55  C50/60  Ccr,sp  Scr,sp  Kucr,N  Kor,N  Cor,N  Sor,N  Concrete fa  γinst  k <sub>8</sub> If  dnom	B   I   Inject - A   S   D   Concrete failure   U   γinst   [-]   e   strength of concrete failure   C25/30   C35/45   C40/50   C45/55   C50/60     Ccr,sp   scr,sp   [mm]   Ccr,N   scr,N   Scr,N   Concrete failure   U   γinst   [-]     k <sub>8</sub>   [-]	B	Concrete failure under tension loading   See annex C 3 to C 4

Performance

Characteristic resistance to concrete failure under tension / shear loading

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holes; <b>50 years</b>		to pull-out failure apsule FHB II-P o		
Highbond-Anchor rod FHB II - A S 1)		M16x95	M20x170	M24x170
Characteristic resistance to pull-out f	ailure			
Calculation diameter d	[mm]	16	2	5
Uncracked concrete				
Characteristic resistance in uncracke	d concr	ete C20/25		
<u>Diamond-drilling (dry or wet concrete / w</u>	<u>/ater-fille</u>	<u>d hole)</u>		
Temperature 50 °C / 80 °C N <sub>Rk,p,ucr</sub>	[kN]	51,5	118	3,5
Cracked concrete				
Characteristic resistance in cracked o	concrete	C20/25		
<u> Diamond-drilling (dry or wet concrete / w</u>	<u>/ater-fille</u>	d hole)		
Temperature 50 °C / 80 °C N <sub>Rk,p,cr</sub>	[kN]	42,8	101	1,4
Installation factors				
Dry or wet concrete	F 1		1,2	
Water-filled hole γinst	[-]		1,2	
1) Highbond-Anchor rod FHB II - A S	with resi	in capsule FHB II-P / F	HB II-PF	
Highbord Anghor and EUD II A C 1)				
nighbond-Anchor rod FRB II - A 5 17		M16x95	M20x170	M24×170
_	ailure	M16x95	M20x170	M24x170
Characteristic resistance to pull-out f	ailure	<b>M16x95</b> 16	<b>M20x170</b>	
Characteristic resistance to pull-out f Calculation diameter d	1			
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete	[mm]	16		
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke	[mm]	16 ete C20/25		
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke Diamond-drilling (dry or wet concrete / w Temperature 50 °C / 80 °C Nowards	[mm]	16 ete C20/25		5
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke Diamond-drilling (dry or wet concrete / w Temperature range T2  50 °C / 80 °C  NRk,p,ucr,100	[mm]	16 ete C20/25 d hole)	2	5
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke Diamond-drilling (dry or wet concrete / w Temperature range T2  50 °C / 80 °C  NRk,p,ucr,100  Cracked concrete	d concr vater-fille	16  ete C20/25 d hole) 51,5	2	5
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke Diamond-drilling (dry or wet concrete / w Temperature range T2  Cracked concrete Characteristic resistance in cracked concrete	d concrete	16 ete C20/25 ed hole) 51,5	2	5
Characteristic resistance to pull-out for Calculation diameter duncracked concrete  Characteristic resistance in uncracked Diamond-drilling (dry or wet concrete / was Temperature range T2 50 °C / 80 °C NRk,p,ucr,100  Cracked concrete  Characteristic resistance in cracked concrete / was Temperature concrete / was Temperature 50 °C / 80 °C NRL 100	d concrete	16 ete C20/25 ed hole) 51,5	2	5 3,5
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke Diamond-drilling (dry or wet concrete / w Temperature range T2 Cracked concrete Characteristic resistance in cracked of Diamond-drilling (dry or wet concrete / w Temperature concrete Characteristic resistance in cracked of Diamond-drilling (dry or wet concrete / w Temperature range T2  50 °C / 80 °C  NRk,p,cr,100	d concrete vater-fille	16  ete C20/25 d hole)  51,5 e C20/25 d hole)	118	5 3,5
Characteristic resistance to pull-out for Calculation diameter during Characteristic resistance in uncracked Characteristic resistance in uncracked Characteristic resistance in uncracked Characteristic resistance in Cha	[mm]  d concrete [kN]  concrete [kN]	16  ete C20/25 d hole)  51,5 e C20/25 d hole)	118	5 3,5
Characteristic resistance to pull-out for Calculation diameter description of Calculation diameter dia	d concrete vater-fille	16  ete C20/25 d hole)  51,5 e C20/25 d hole)	118	5 3,5
Characteristic resistance to pull-out f Calculation diameter d Uncracked concrete Characteristic resistance in uncracke Diamond-drilling (dry or wet concrete / w Temperature range T2  Cracked concrete Characteristic resistance in cracked concrete Characteristic resistance in cracked concrete Diamond-drilling (dry or wet concrete / w Temperature range T2  Temperature range T2  To °C / 80 °C  NRk,p,cr,100  Temperature range T2  Installation factors  Dry or wet concrete	[mm]  d concrete [kN]  concrete (ater-fille) [kN]	16  ete C20/25 d hole)  51,5  e C20/25 d hole)  36,0	118 86 1,2 1,2	5 3,5
Uncracked concrete Characteristic resistance in uncracket Diamond-drilling (dry or wet concrete / w Temperature range T2  Cracked concrete Characteristic resistance in cracked concrete Diamond-drilling (dry or wet concrete / w Temperature range T2  50 °C / 80 °C  NRk,p,cr,100  NRk,p,cr,100  Installation factors Dry or wet concrete Water-filled hole	[mm]  d concrete (kN]  concrete (ater-fille) [kN]  [-]  with resi	16  ete C20/25 d hole)  51,5 e C20/25 d hole)  36,0	118 86 1,2 1,2 1,2 THB II-PF	5 3,5

Table C4.1:	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; 100 years

Anchor rod F				M16x95	M20x170	M24x170
Characterist	ic resistance to	pull-out fa	ailure			
Calculation di	ameter	d	[mm]	16	2	5
Uncracked c	oncrete					
Characterist	ic resistance ir	uncracked	d concr	ete C20/25		
Hammer-drilli	ng with standar	d or hollow	drill bit (	dry or wet concrete / w	vater-filled hole)	
Temperature range T2	50 °C / 80 °C	N <sub>Rk,p,ucr,100</sub>	[kN]	52,4	11	8,5
Cracked con	crete	-				
Characterist	ic resistance ir	n cracked c	oncrete	C20/25		
Hammer-drilli	ng with standar	d or hollow	drill bit (	dry or wet concrete / w	vater-filled hole)	
Temperature range T2	50 °C / 80 °C	N <sub>Rk,p,cr,100</sub>	[kN]	36,0	86	5,0
Installation f	actors					
Dry or wet cor	ncrete				1,0	
Water-filled ho (only with resi		γinst	[-]		1,0	

<sup>1)</sup> Highbond-Anchor rod FHB II - A S with resin capsule FHB II-P / FHB II-PF or injection mortar FIS HB

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Characteristic resistance to pull-out failure for Highbond-Anchor rods FHB II - A S  $\!\!/$  FHB II Inject - A S in hammer drilled holes; 100 years

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<sup>&</sup>lt;sup>2)</sup> Highbond-Anchor rod FHB II Inject - A S with injection mortar FIS HB

Displacement-Factors for tension loading   1	Uncracked concrete; Temperature range T2	Uncracked concrete; Temperature range T2         δNO-Factor       [mm/kN]       0,030         δNo-Factor       [mm/kN]       0,030         Cracked concrete; Temperature range T2       0,030       0,020         δNω-Factor       [mm/kN]       0,020         Displacement-Factors for shear loading 2)       0,02         Uncracked or cracked concrete; Temperature range T2       0,02         δνω-Factor       [mm/kN]       0,02         1) Calculation of effective displacement:       2) 0         δNω = δNω-Factor · N       N       N = acting tension loading         Table C5.2:       Displacements for Highbond-An FHB II nject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S       M16x95         Displacement-Factors for tension loading 1)       Uncracked concrete; Temperature range T2         δNυ-Factor       [mm/kN]       0,030	0,045  0,020 0,045  0,02 0,03  Calculation of effective dissipation of	0,045  0,016  0,02  0,03  splacement:  M24x170  0,016	
SNo-Factor   [mm/kN]	SNo-Factor   [mm/kN]	Imm/kN    0,030   0,120     Cracked concrete; Temperature range T2   0,030   0,120     O,030   O,120     O,030   O,120     O,020   O,030   O	0,045  0,020 0,045  0,02 0,03  Calculation of effective dissipation of	0,045  0,016 0,045  0,02 0,03  splacement:  M24x170  0,016	
Dougle-Factor   Cracked concrete; Temperature range T2	Dote-Factor		0,045  0,020 0,045  0,02 0,03  Calculation of effective dissipation of	0,045  0,016 0,045  0,02 0,03  splacement:  M24x170  0,016	
δNo-Factor         0,120         0,045         0,045           Cracked concrete; Temperature range T2         0,030         0,020         0,016           δNo-Factor         [mm/kN]         0,030         0,020         0,045           Displacement-Factors for shear loading <sup>2)</sup> Uncracked or cracked concrete; Temperature range T2           δνυ-Factor         [mm/kN]         0,02         0,02         0,02           δνυ-Factor         [mm/kN]         0,03         0,03         0,03           1) Calculation of effective displacement:         2) Calculation of effective displacement:         δνυ = δνυ-Factor · V         δνω = δνυ-Factor · V           δνω = δνυ-Factor · N         δνω = δνυ-Factor · V         δνω = δνυ-Factor · V         V = acting shear loading           Table C5.2:         Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years         M20x170         M24x170           Machor rod FHB II - A S / FHB II Inject - A S; 100 years           Anchor rod FHB II - A S / FHB II Inject - A S; 100 years           Displacement-Factors for tension loading <sup>1)</sup> Uncracked concrete; Temperature range T2           δνιο-Factor         [mm/kN]         0,030         0,020         0,016           δνιο-Factor <td< td=""><td>  One-pactor   O</td><td>δN∞-Factor       0,120         Cracked concrete; Temperature range T2         δN0-Factor       [mm/kN]       0,030         δN∞-Factor       [mm/kN]       0,120         Displacement-Factors for shear loading ²)         Uncracked or cracked concrete; Temperature range T2         δV0-Factor       [mm/kN]       0,02         1) Calculation of effective displacement:       2) €         δN0 = δN0-Factor · N       N       N = acting tension loading         Table C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S         M16x95         Displacement-Factors for tension loading ¹)         Uncracked concrete; Temperature range T2         δN0-Factor       [mm/kN]       0,030         δN2-Factor       [mm/kN]       0,030         Cracked concrete; Temperature range T2         δN0-Factor       [mm/kN]       0,030         δN2-Factor       [mm/kN]       0,030         δN2-Factor       [mm/kN]       0,030</td><td>0,020 <math>0,045</math> <math>0,02</math> <math>0,03</math>  Calculation of effective discovered by <math>0.00</math> by <math>0.0</math></td><td>0,016 0,045 0,02 0,03 splacement: S and M24x170</td></td<>	One-pactor   O	δN∞-Factor       0,120         Cracked concrete; Temperature range T2         δN0-Factor       [mm/kN]       0,030         δN∞-Factor       [mm/kN]       0,120         Displacement-Factors for shear loading ²)         Uncracked or cracked concrete; Temperature range T2         δV0-Factor       [mm/kN]       0,02         1) Calculation of effective displacement:       2) €         δN0 = δN0-Factor · N       N       N = acting tension loading         Table C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S         M16x95         Displacement-Factors for tension loading ¹)         Uncracked concrete; Temperature range T2         δN0-Factor       [mm/kN]       0,030         δN2-Factor       [mm/kN]       0,030         Cracked concrete; Temperature range T2         δN0-Factor       [mm/kN]       0,030         δN2-Factor       [mm/kN]       0,030         δN2-Factor       [mm/kN]       0,030	0,020 $0,045$ $0,02$ $0,03$ Calculation of effective discovered by $0.00$ by $0.0$	0,016 0,045 0,02 0,03 splacement: S and M24x170	
δNo-Factor         [mm/kN]         0,030         0,020         0,016           δNo-Factor         [mm/kN]         0,120         0,045         0,045           Displacement-Factors for shear loading 2)           Uncracked or cracked concrete; Temperature range T2         0,02         0,02         0,02           δνο-Factor         [mm/kN]         0,02         0,03         0,03           1) Calculation of effective displacement:         2) Calculation of effective displacement:         δνο = δνο-Factor · V         δνο = δνο-Factor · V           δνω = δνο-Factor · N         δνω = δνο-Factor · V         V = acting shear loading           Table C5.2:         Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years           Anchor rod FHB II - A S / FHB II Inject - A S; 100 years         M20x170         M24x170           Displacement-Factors for tension loading ¹¹         Uncracked concrete; Temperature range T2           δνο-Factor         [mm/kN]         0,030         0,020         0,016           δνο-Factor         [mm/kN]         0,030         0,020         0,045           Cracked concrete; Temperature range T2         δνο-Factor         δνο-Factor         δνο-Factor         0,045           Displacement-Factors for shear loading ²¹         Uncracked or cracked concrete; Temperature range T2<	δNo-Factor         [mm/kN]         0,030         0,020         0,016           δNo-Factor         [mm/kN]         0,120         0,045         0,045           Displacement-Factors for shear loading <sup>2)</sup> Uncracked or cracked concrete; Temperature range T2           δνυ-Factor         [mm/kN]         0,02         0,02         0,03           1) Calculation of effective displacement:         2) Calculation of effective displacement:         δνο = δνυ-Factor · N         δνο = δνυ-Factor · V           δνω = δνυ-Factor · N         δνω = δνυ-Factor · V         δνω = δνυ-Factor · V         Ν           N = acting tension loading         N = acting shear loading         N = acting shear loading           Table C5.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years           Anchor rod FHB II - A S / FHB II Inject - A S; 100 years         M20x170         M24x170           Displacement-Factors for tension loading <sup>1)</sup> Uncracked concrete; Temperature range T2           δνυ-Factor         [mm/kN]         0,030         0,020         0,016           δνυ-Factor         [mm/kN]         0,030         0,020         0,016           δνυ-Factor         [mm/kN]         0,030         0,02         0,045 <td col<="" td=""><td>δNo-Factor       [mm/kN]       0,030         δN∞-Factor       [mm/kN]       0,030         Displacement-Factors for shear loading ²)         Uncracked or cracked concrete; Temperature range T2         δνυ-Factor       [mm/kN]       0,02         δνυ-Factor       0,03       0         1) Calculation of effective displacement:       2) 0         δνω = δνω-Factor · N       N       δνω = δνω-Factor · N         N = acting tension loading       Table C5.2:       Displacements for Highbond-An FHB II nject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S       M16x95         Displacement-Factors for tension loading ¹¹       Uncracked concrete; Temperature range T2         δνυ-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         Cracked concrete; Temperature range T2       δνυ-Factor       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030</td><td>0,045 <math>0,02</math> <math>0,03</math>  Calculation of effective discovered by <math>0.00</math> <math>0.00</math>  Chor rod FHB II - A S  M20x170</td><td>0,045  0,02 0,03  splacement:  M24x170  0,016</td></td>	<td>δNo-Factor       [mm/kN]       0,030         δN∞-Factor       [mm/kN]       0,030         Displacement-Factors for shear loading ²)         Uncracked or cracked concrete; Temperature range T2         δνυ-Factor       [mm/kN]       0,02         δνυ-Factor       0,03       0         1) Calculation of effective displacement:       2) 0         δνω = δνω-Factor · N       N       δνω = δνω-Factor · N         N = acting tension loading       Table C5.2:       Displacements for Highbond-An FHB II nject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S       M16x95         Displacement-Factors for tension loading ¹¹       Uncracked concrete; Temperature range T2         δνυ-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         Cracked concrete; Temperature range T2       δνυ-Factor       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030</td> <td>0,045 <math>0,02</math> <math>0,03</math>  Calculation of effective discovered by <math>0.00</math> <math>0.00</math>  Chor rod FHB II - A S  M20x170</td> <td>0,045  0,02 0,03  splacement:  M24x170  0,016</td>	δNo-Factor       [mm/kN]       0,030         δN∞-Factor       [mm/kN]       0,030         Displacement-Factors for shear loading ²)         Uncracked or cracked concrete; Temperature range T2         δνυ-Factor       [mm/kN]       0,02         δνυ-Factor       0,03       0         1) Calculation of effective displacement:       2) 0         δνω = δνω-Factor · N       N       δνω = δνω-Factor · N         N = acting tension loading       Table C5.2:       Displacements for Highbond-An FHB II nject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S       M16x95         Displacement-Factors for tension loading ¹¹       Uncracked concrete; Temperature range T2         δνυ-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         Cracked concrete; Temperature range T2       δνυ-Factor       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030         δνν-Factor       [mm/kN]       0,030	0,045 $0,02$ $0,03$ Calculation of effective discovered by $0.00$ $0.00$ Chor rod FHB II - A S  M20x170	0,045  0,02 0,03  splacement:  M24x170  0,016
Displacement-Factors for shear loading 2)   Uncracked or cracked concrete; Temperature range T2   Displacement   Displacem	Displacement-Factors for shear loading 2)   Uncracked or cracked concrete; Temperature range T2   Displacement   Displacem	Displacement-Factors for shear loading 2)   Uncracked or cracked concrete; Temperature range T2   δνο-Factor	0,045 $0,02$ $0,03$ Calculation of effective discovered by $0.00$ $0.00$ Chor rod FHB II - A S  M20x170	0,045  0,02 0,03  splacement:  M24x170  0,016	
Displacement-Factors for shear loading 20	Displacement-Factors for shear loading 2	δΝ∞-Factor       0,120         Displacement-Factors for shear loading 2)         Uncracked or cracked concrete; Temperature range T2         δνυ-Factor       0,02         δνω-Factor       0,03         1) Calculation of effective displacement:       2) 0         δνω = δνυ-Factor · N       N         N = acting tension loading       N = acting tension loading         Table C5.2:       Displacements for Highbond-An FHB II nject - A S; 100 years         Anchor rod FHB II - A S / FHB II lnject - A S       M16x95         Displacement-Factors for tension loading 1)       Uncracked concrete; Temperature range T2         δνω-Factor       [mm/kN]       0,030	0,02 0,03  Calculation of effective dis Sivo = δvo-Factor · V Sivω = δv∞-Factor · V Sivo = acting shear loading  Chor rod FHB II - A S  M20x170	0,02 0,03 splacement: S and M24x170	
Uncracked or cracked concrete; Temperature range T2	Uncracked or cracked concrete; Temperature range T2	Uncracked or cracked concrete; Temperature range T2         δνο-Factor       [mm/kN]       0,02         δνω-Factor       0,03       0,03         1) Calculation of effective displacement:       2) 0         δνο = δνο-Factor · N       N       N = acting tension loading         Table C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years         Anchor rod FHB II - A S / FHB II Inject - A S         M16x95       M16x95         Displacement-Factors for tension loading 1)         Uncracked concrete; Temperature range T2         δνο-Factor       [mm/kN]       0,030         δνω-Factor       [mm/kN]       0,030	$0,03$ Calculation of effective disciple $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$ $V = \text{acting shear loading}$ Chor rod FHB II - A S  M20x170	0,03 splacement:  S and  M24x170  0,016	
Sou-Factor   S	Sout-Factor	Sivo-Factor   [mm/kN]   0,02   0,03   1) Calculation of effective displacement:   2) (Sivo-Factor · N   δivo = δivo-Factor · N   N = acting tension loading   Sivo-Factor · A   A   Sivo-Factor · A   Sivo-Fact	$0,03$ Calculation of effective discovered by $0 = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$ $\delta_{V} = \text{acting shear loading}$ Chor rod FHB II - A S  M20x170	0,03 splacement:  S and  M24x170  0,016	
Marchaetor   Ma	Machor rod FHB II - A S / State   Imm/kN   Machor rod FHB II - A S   Machor rod FHB II - A S   Machor rod FHB II nject - A S   Nachor rod FHB II nject - A	Single Procession   Sin	$0,03$ Calculation of effective discovered by $0 = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$ $\delta_{V} = \text{acting shear loading}$ Chor rod FHB II - A S  M20x170	0,03 splacement:  S and  M24x170  0,016	
1	Oyos	No = δNo-Factor N  δNo = δNo-Factor · N  δNo = δNo-Factor · N  N = acting tension loading  Table C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years  Anchor rod FHB II - A S / FHB II Inject - A S  Displacement-Factors for tension loading 1)  Uncracked concrete; Temperature range T2  δNo-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  δNo-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  δNo-Factor [mm/kN] 0,030  δNo-Factor 0,030  δνο-Factor 0,030  δνο-Factor 0,030  δνο-Factor 0,030  δνο-Factor 0,030	Calculation of effective dis S <sub>V0</sub> = δ <sub>V0-Factor</sub> · V S <sub>V∞</sub> = δ <sub>V∞-Factor</sub> · V / = acting shear loading Chor rod FHB II - A S M20x170	M24x170 0,016	
δN0 = δN0-Factor · N         δν0 = δν0-Factor · V           δNc = δNx-Factor · N         δνc = δνx-Factor · V           N = acting tension loading         V = acting shear loading           Fable C5.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 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 T2         M16x95         M20x170         M24x170           Objector         [mm/kN]         0,030         0,020         0,016           Objector         [mm/kN]         0,030         0,020         0,045           Cracked concrete; Temperature range T2         Non-Factor         Imm/kN]         0,030         0,020         0,016           Objector         [mm/kN]         0,030         0,020         0,045         0.045           Displacement-Factors for shear loading ²           Uncracked or cracked concrete; Temperature range T2         Non-Factor         Non-Factor         Non-Factor · N         Non-Factor · V           Non-Factor         Non-Factor · N         Non-Factor · V         Non-Factor · V           Non-Factor · N         Non-Factor · N         Non-Factor · V	δN0 = δN0-Factor · N         δy0 = δy0-Factor · V           δNc = δNx-Factor · N         δyc = δyx-Factor · V           N = acting tension loading         V = acting shear loading           Fable C5.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years           Anchor rod FHB II - A S / FHB II Inject - A S; 100 years         M16x95         M20x170         M24x170           Displacement-Factors for tension loading ¹)           Uncracked concrete; Temperature range T2         M16x95         M20x170         M24x170           Displacement-Factors for tension loading ¹)         Uncracked concrete; Temperature range T2         O,030         0,020         0,016           Sin0-Factor         [mm/kN]         0,030         0,020         0,045           Cracked concrete; Temperature range T2         O,045         0,045           Displacement-Factor for shear loading ²)         Uncracked or cracked concrete; Temperature range T2           Oyo-Factor         [mm/kN]         0,02         0,02         0,02           Oyo-Factor         [mm/kN]         0,02         0,02         0,02           Oyo-Factor         [mm/kN]         0,02         0,02         0,02           Oyo-Factor         N         0,02         0,03         0,03           Oyo-Fact	δ <sub>N0</sub> = δ <sub>N0-Factor</sub> · N  δ <sub>N∞</sub> = δ <sub>N∞-Factor</sub> · N  N = acting tension loading  Table C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years  Anchor rod FHB II - A S / M16x95  Displacement-Factors for tension loading ¹)  Uncracked concrete; Temperature range T2  S <sub>N0-Factor</sub> [mm/kN] 0,030  Cracked concrete; Temperature range T2  S <sub>N0-Factor</sub> [mm/kN] 0,030  Cracked concrete; Temperature range T2  S <sub>N0-Factor</sub> [mm/kN] 0,030  S <sub>N∞-Factor</sub> 0,030	$\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$ / = acting shear loading <b>Chor rod FHB II - A S M20x170</b> 0,020	M24x170	
δNo. = δNoFactor · N         δV.∞ = δV.∞-Factor · V         V = acting shear loading           Table C5.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years           Anchor rod FHB II - A S / FHB II Inject - A S         M16x95         M20x170         M24x170           Displacement-Factors for tension loading ¹¹⟩           Uncracked concrete; Temperature range T2           δNoFactor         [mm/kN]         0,030         0,020         0,016           δNoFactor         [mm/kN]         0,030         0,020         0,045           Cracked concrete; Temperature range T2           δNoFactor         [mm/kN]         0,030         0,020         0,016           δNoFactor         [mm/kN]         0,030         0,020         0,016           Displacement-Factors for shear loading ²⟩         Uncracked or cracked concrete; Temperature range T2         0,02         0,045           Displacement-Factors         [mm/kN]         0,02         0,02         0,02           Displacement-Factor         [mm/kN]         0,02         0,02         0,02           Displacement-Factor         [mm/kN]         0,02         0,02         0,02           Displacement-Factor         [mm/kN]         0,03         0,03         0	N = SNoc-Factor · N   N = acting tension loading   N = acting tension loading   N = acting tension loading   N = acting shear	N = acting tension loading  Fable C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years  Anchor rod FHB II - A S / M16x95  PHB II Inject - A S  Displacement-Factors for tension loading ¹¹⟩  Uncracked concrete; Temperature range T2  No-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  No-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  No-Factor [mm/kN] 0,030  No-Factor 0,	S <sub>IV∞</sub> = δ <sub>IV∞-Factor</sub> · V / = acting shear loading Chor rod FHB II - A S M20x170	<b>M24x170</b> 0,016	
N = acting tension loading   V = acting shear loading	N = acting tension loading   V = acting shear loading	N = acting tension loading  Fable C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years  Anchor rod FHB II - A S / M16x95  Displacement-Factors for tension loading 1)  Uncracked concrete; Temperature range T2  SNO-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  SNO-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  SNO-Factor [mm/kN] 0,030  SNo-Factor 0,030  Cracked concrete; Temperature range T2	/ = acting shear loading  chor rod FHB II - A \$  M20x170  0,020	<b>M24x170</b> 0,016	
Table C5.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years	Table C5.2: Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 100 years	Table C5.2: Displacements for Highbond-An FHB II Inject - A S; 100 years  Anchor rod FHB II - A S / M16x95  Phisplacement-Factors for tension loading 1)  Uncracked concrete; Temperature range T2  Non-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  Non-Factor [mm/kN] 0,030  Cracked concrete; Temperature range T2  Non-Factor [mm/kN] 0,030  Non-Factor 0,030  Non-Factor 0,030  Non-Factor 0,030  Non-Factor 0,030	M20x170	<b>M24x170</b> 0,016	
The first of t	The first of t	FHB II Inject - A S; 100 years  Anchor rod FHB II - A S / FHB II Inject - A S  Displacement-Factors for tension loading 1) Uncracked concrete; Temperature range T2  SNO-Factor [mm/kN] 0,030 0,120  Cracked concrete; Temperature range T2  SNO-Factor [mm/kN] 0,030 0,120  Cracked concrete; Temperature range T2  SNO-Factor [mm/kN] 0,030 0,120	<b>M20x170</b> 0,020	<b>M24x170</b> 0,016	
Uncracked concrete; Temperature range T2 $ \frac{\delta_{NO-Factor}}{\delta_{No-Factor}} = \frac{0,030}{0,120} = \frac{0,020}{0,045} = \frac{0,016}{0,045} $ $\frac{\delta_{No-Factor}}{\delta_{No-Factor}} = \frac{0,030}{0,045} = \frac{0,045}{0,045} = \frac{0,045}{0,045} = \frac{0,045}{0,045} = \frac{0,030}{0,045} = \frac{0,020}{0,045} = \frac{0,016}{0,045} = \frac{0,045}{0,045} = \frac{0,045}{0,045} = \frac{0,045}{0,045} = \frac{0,045}{0,045} = \frac{0,02}{0,045} = \frac{0,02}{0,02} = \frac{0,02}{0,03} = \frac{0,02}{0,03} = \frac{0,02}{0,03} = \frac{0,03}{0,03} = $	Uncracked concrete; Temperature range T2 $ \frac{\delta_{NO-Factor}}{\delta_{No-Factor}} = \frac{0,030}{0,120} = \frac{0,020}{0,045} = \frac{0,016}{0,045} $ $\frac{\delta_{No-Factor}}{\delta_{No-Factor}} = \frac{0,030}{0,020} = \frac{0,045}{0,045} = \frac{0,016}{0,045} = \frac{0,020}{0,045} = \frac{0,016}{0,045} = \frac{0,016}{0,045} = \frac{0,020}{0,045} = \frac{0,045}{0,045} = \frac{0,045}{0,045} = \frac{0,020}{0,045} = 0,020$	Uncracked concrete; Temperature range T2           SN0-Factor         [mm/kN]         0,030           SN∞-Factor         0,120           Cracked concrete; Temperature range T2           SN0-Factor         0,030           SN∞-Factor         0,030           0,120	·	· · · · · · · · · · · · · · · · · · ·	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \frac{\delta_{\text{N0-Factor}}}{\delta_{\text{No-Factor}}} \text{ [mm/kN]}                                    $		·	· · · · · · · · · · · · · · · · · · ·	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c c} \hline \delta_{\text{N}\infty\text{-Factor}} & [\text{mm/kN}] & 0,120 \\ \hline \textbf{Cracked concrete; Temperature range T2} \\ \hline \delta_{\text{N}0\text{-Factor}} & [\text{mm/kN}] & 0,030 \\ \hline \delta_{\text{N}\infty\text{-Factor}} & 0,030 \\ \hline \end{array} $	·	· · · · · · · · · · · · · · · · · · ·	
$ \frac{\delta_{\text{No-Factor}}}{\text{Cracked concrete; Temperature range T2} }                                 $	$ \frac{\delta_{\text{No-Factor}}}{\text{Cracked concrete; Temperature range T2} }                                 $		0,045	0,045	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	SN0-Factor         [mm/kN]         0,030           SN∞-Factor         0,120			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	δ <sub>N∞-Factor</sub> [mm/kN] 0,120		1	
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		<u> </u>	· · · · · · · · · · · · · · · · · · ·	
		Displacement-Factors for shear loading 4)	0,045	0,045	
		·			
			0.02	0.02	
1) Calculation of effective displacement: 2) Calculation of effective displacement: $\delta_{N0} = \delta_{N0\text{-Factor}} \cdot N$ $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$	1) Calculation of effective displacement: 2) Calculation of effective displacement: $\delta_{N0} = \delta_{N0\text{-Factor}} \cdot N \qquad \qquad \delta_{V0} = \delta_{V0\text{-Factor}} \cdot V \\ \delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N \qquad \qquad \delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$	[mm/kN]	·	· ·	
$\delta_{\text{N0}} = \delta_{\text{N0-Factor}} \cdot \text{N}$ $\delta_{\text{V0}} = \delta_{\text{V0-Factor}} \cdot \text{V}$ $\delta_{\text{V}\infty} = \delta_{\text{V}\infty\text{-Factor}} \cdot \text{V}$	$\delta_{\text{N0}} = \delta_{\text{N0-Factor}} \cdot \text{N}$ $\delta_{\text{V0}} = \delta_{\text{V0-Factor}} \cdot \text{V}$ $\delta_{\text{V}\infty} = \delta_{\text{V}\infty\text{-Factor}} \cdot \text{V}$	,	·	·	
$\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$	$\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot N$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$	·		splacement:	
	in – acting tension loading v = acting snear loading				
N – acting tension loading		iv – acting tension loading	r – acting snear loading		

Appendix 24 / 24

Displacements for Highbond-Anchor rod FHB II - A S and FHB II Inject - A S; 50 or 100 years