



ΕN

DECLARATION OF PERFORMANCE

DoP 0293

for fischer Highbond-Anchor FHB II (Bonded expansion fastener for use in concrete)

1. Unique identification code of the product-type: DoP 0293

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; 2021-12-21

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. <u>Appropriate Technical Documentation and/or Specific Technical Documentation:</u>

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, 2022-01-03

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_V52.xlsm 1/1

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 (static and quasi-static loading)	See Annex C1 to C4, B3 to B4		
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1 to C2		
Displacements under short-term and long-term loading	See Annex C5		
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

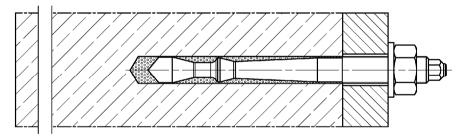
In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

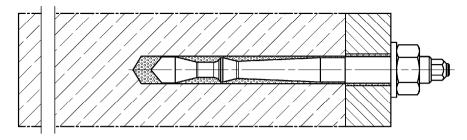
Installation conditions part 1

Highbond - Anchor FHB II - A S

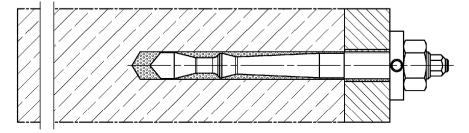
Pre-positioned installation



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

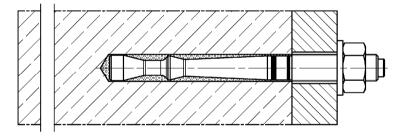
Installation conditions part 1; FHB II - A S

Annex A 1
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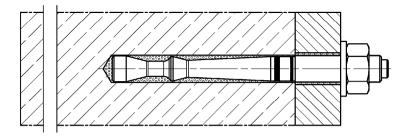
Installation conditions part 2

Highbond - Anchor FHB II Inject - A S (only with injection cartridge system FIS HB)

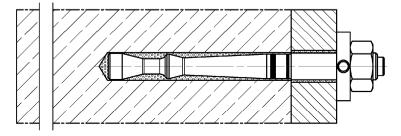
Pre-positioned installation



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

Product descriptionOverview 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 hexagon nut washer 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
metal parts / cleaning brush / blow-out pump

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Part	Designation	Material							
1	Injection cartridge		Mortar, hardener, filler						
2	Resin capsule		Mortar, hardener, filler						
		Steel	Stainless steel R	High corrosion resistant steel HCR					
	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 μm 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 ₅ > 12 % fracture elongation	1.4565; 1.4529; EN 10088-1:2014 A₅ > 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

Product description Materials

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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 (fischer "FHD": Heller "Duster Expert": with hollow drill Bosch "Speed Clean": Hilti "TE-CD. TE-YD": bit DreBo "D-Plus, D-Max") 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 (only with resin capsule allowed) hole seismic performance no performance assessed category C1 and C2 Installation direction D3 (downwards, horizontal and upwards (overhead) installation) all sizes Pre-positioned Installation Push through all sizes FIS HB: Timin = -5 °C to Timax = +40 °C Installation temperature 1) FHB II-P / PF: $T_{i,min} = -5$ °C to $T_{i,max} = +40$ °C (max. short term temperature +80 °C; Service Temperature -40 °C to +80 °C range T2 max. long term temperature +50 °C) temperature 1) For the standard variation of temperature after installation Figures not to scale fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex B 1 Intended use Appendix 9 / 24 Specifications part 1

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:

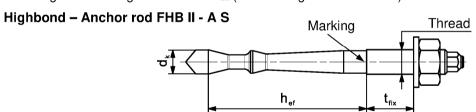
- Fastener installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Overhead installation is allowed (necessary equipment see installation instruction)

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

Table B3.1: Installation parameters for Highbond – Anchor rod FHB II - A S						
Anchor rod FHE	3 II - A S	Т	hread	M16x95	M20x170	M24x170
Correspondendir FHB II-P or FHB	ng resin capsules II-PF		[-]	16x95	20x170	24x170
Cone diameter		dk		14,5	23	,0
Width across flat	S	SW		24	30	36
Nominal drill hole	e diameter	d ₀		16	2	5
Drill hole depth		h ₀		110	19	90
Effective embedment depth hef		h _{ef}		95	170	
Minimum spacing and minimum edge distance Smin = Cmin		= Cmin	[mm]	50	8	0
pre-positioned Diameter of installation		d₁≤		18	22	26
clearance hole of the fixture	push through installation	d₁≤		18	2	6
Min. thickness of concrete member h _{min}		h _{min}		150	240	
Installation torque T _{inst}		Tinst	[Nm]	50	1(00
Thickness of fixture t _{fix} ≤		t _{fix} ≤			1500	
finaless filling at the	- 1)	≥ d _a	[mm]	38	46	54
I fischer filling disc 17		+		7	Ω	10

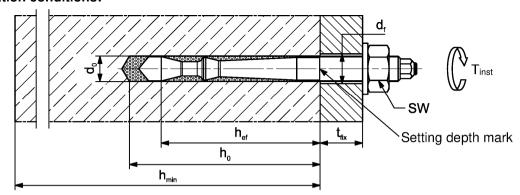
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¹⁾ Using fischer filling disc reduces t_{fix} (usable length of the anchor)



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

Installation conditions:



Figures not to scale

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

Intended use

Installation parameters for Highbond - Anchor FHB II - A S

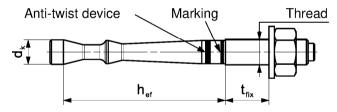
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Table B4.1: Installation parameters for Highbond - Anchor rod FHB II Inject - A S with injectionmortar FIS HB

Anchor rod FHB	II Inject - A S	-	Thread	M16x95	M20x170	M24x170
Cone diameter		dk		14,5	23	,0
Width across flats	S	SW		24	30	36
Nominal drill hole	diameter	d₀		16	2	5
Drill hole depth		h ₀		101	17	76
Effective embedr	nent depth	h _{ef}		95	17	70
Minimum spacing and smin = Cmin		[mm]	50	80		
Diameter of	pre-positioned installation	d₁≤		18	22	26
clearance hole - of the fixture	push through installation	d₁≤		20	2	6
Min. thickness of c	oncrete member	h _{min}		150	24	10
Installation torque T _{inst}		[Nm]	50	100		
Thickness of fixture t _{fix} ≤				1500		
fischer filling disc	. 1)	≥ da	[mm]	38	46	54
inscrier miling disc	. •/	ts		7	8	10

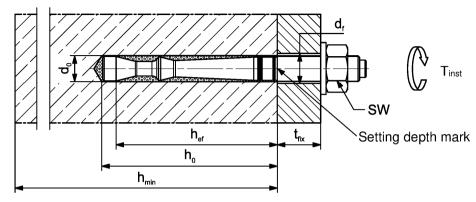
¹⁾ Using fischer filling disc reduces t_{fix} (usable length of the fastener)

Highbond - Anchor rod FHB II Inject - A S



Marking: work symbol, thread diameter, embedment depth e.g.: M16x95 For stainless steel additional **R**. For high corrosion resistant steel additional **HCR**. 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

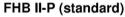
Intended use

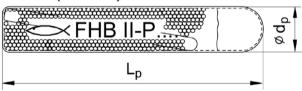
Installation parameters for Highbond - Anchor FHB II Inject - A S

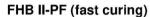
Annex B 4

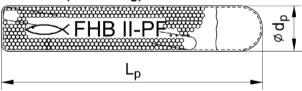
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Table B5.1:	Dimensions of resin capsule FHB II-P and FHB II-PF								
Resin capsule	16x95 20x170 24x170								
Capsule length	Lp	[mm]	120	185	185				
Capsule diameter	r Ø d₀	[mm]	14,5	21	,5				









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

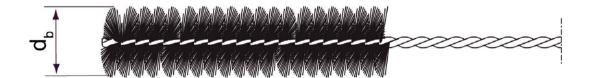
e.g.: FHB II-P 16x95 or

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	dь	[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 time and curing time of the injection mortar FIS HB										
Temperature at anchoring base 1) [°C]	Maximum processing time twork	Minimum curing time ²⁾								
-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

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 1) [°C]	Minimum curing time ²⁾					
-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⁾					
-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.

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

Processing time and curing time

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²⁾ In wet concrete the curing time must be doubled

³⁾ Minimal cartridge temperature +5 °C

²⁾ 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 d_n and drill hole depth h_n 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 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 ($p \ge 6$ bar) Brush the drill hole twice. Corresponding cleaning brush BS see 4 table B5.2 Blow out the drill hole twice, using oil-free compressed air ($p \ge 6$ bar) 5 Go to step 6 (Annex B 8) fischer Highbond-Anchor FHB II for diamond drilling / extended working life

Intended use

Installation instructions part 1 Installation with resin capsule FHB II-P or FHB II-PF

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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/mm² Option (e.g. FIS HB, FIS SB, FIS V, FIS V Plus, FIS EM Plus). ATTENTION: Using fischer filling disc reduces tfix (usable length of the anchor) fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex B 8 Intended use Appendix 16 / 24 Installation instructions part 2 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 do and drill hole depth ho 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)

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

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)

6





Place the cartridge into the dispenser

7

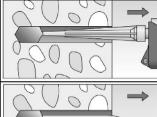




Extrude approximately 10 cm of material out until the resin is evenly grey in colour.

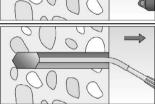
Do not use mortar that is not uniformly grey

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



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: Push the anchor rod down to the bottom of the hole. 9 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/mm² (e.g. FIS Option HB, FIS SB, FIS V, FIS V Plus, FIS EM Plus). ATTENTION: Using fischer filling disc reduces t_{fix} (usable length of the anchor) fischer Highbond-Anchor FHB II for diamond drilling / extended working life Annex B 11 Intended use Appendix 19 / 24 Installation instructions part 5

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 re	esistance to steel failure	e unde	er tension loading		
0	Steel, zinc plated		61,6	128	8,5
Characteristic resistance -	Stainless steel R	[kN]			
N _{Rk,s}	High corrosion resistant steel HCR	[KIV]	61,6	128	3,5
Partial factors 1)					
	Steel, zinc plated			1,5 1)	
Partial factor	Stainless steel R	[-]		1,5 ¹⁾	
γMs,N	High corrosion resistant steel HCR			1,5 1)	
Characteristic re	esistance to steel failure	e und	er shear loading		
without lever arr	m				
Observatariatia -	Steel, zinc plated		50,8	80,3	114,2
Characteristic - resistance -	Stainless steel R	[kN]	62,7	97,9	124,5
V ⁰ Rk,s	High corrosion resistant steel HCR	וואון	62,7	97,9	141
Ductility factor	k ₇	[-]	1,0		
with lever arm					
Ola	Steel, zinc plated		266	519	896
Characteristic – resistance – M ⁰ _{Rk,s}	Stainless steel R	[Nm]			
	High corrosion resistant steel HCR	[[, 4,,,]]	266	519	896

1,25

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

Performance

Partial factors 1) Partial factor

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

γMs,V

[-]

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¹⁾ In absence of other national regulations

Anchor rod FHB II - A S / FHB II Inject - A S All sizes	Table C2.1: Characteristic resistance to concrete failure under tension / shear loading							
Installation factor	Anchor rod FHB II - A S / FHB II Inject - A S All sizes							
Factors for the compressive strength of concrete Locating factor for uncracked or cracked concrete C35/35 (C30/37 (C								
C25/30 C30/37 C30/37 C35/45 C40/50 C45/55 C50/60	Installation factor	γinst	[-]		See annex C 3 to C 4			
Increasing factor for uncracked or cracked concrete	Factors for the compressive	strength o	f conc	rete > C20/25				
Increating late of the concrete conc		C25/30			1,12			
uncracked or cracked concrete concrete (C40/50) (C45/55) (C50/60) C35/45 (C45/55) (C50/60) (C50/60) (C50/60) (C50/6	Increasing factor for	C30/37			1,22			
NRik,p = Ψe NRik,p (C20/25) C45/55 C50/60 1,58		C35/45] ,		1,32			
C50/60 T,58 Splitting failure	concrete	C40/50	[-J		1,41			
Edge distance Ccr.sp Spacing Scr.sp Spacing Scr.sp Spacing Scr.sp Spacing Scr.sp	$N_{Rk,p} = \psi_c N_{Rk,p} (C20/25)$	C45/55			1,50			
Edge distance	<u> </u>	C50/60			1,58			
Mm 4 hef	Splitting failure							
Spacing Scr.sp 1	Edge distance	C _{cr,sp}	[resume]		2 h _{ef}			
Uncracked concrete K _{ucr,N} Cracked concrete K _{cr,N} K _{cr,N} Edge distance C _{cr,N} End Spacing S _{cr,N} mm] 1,5 h _{ef} Spacing S _{cr,N} mm] 3 h _{ef} Characteristic resistance to concrete failure under shear loading Installation factor γ _{inst} [-] 1,0 Concrete pry-out failure Factor for pry-out failure k ₈ [-] 2,0 Concrete edge failure	Spacing	S _{cr,sp}	[mm]		4 h _{ef}			
Cracked concrete k _{cr,N} [-] 7,7 ¹) Edge distance C _{cr,N} [mm] 1,5 h _{ef} Spacing S _{or,N} 3 h _{ef} Characteristic resistance to concrete failure under shear loading Installation factor γ _{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 lnject - A S M16x95 M20x170 M24x170 Effective length of fastener in shear loading I _f [mm] 95 170 Calculation diameter d _{nom} 16 25	Concrete cone failure							
Cracked concrete k _{cr,N} 7,7 % Edge distance c _{cr,N} [mm] 1,5 hef Spacing s _{cr,N} 3 hef Characteristic resistance to concrete failure under shear loading Installation factor γ _{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 lnject - A S M16x95 M20x170 M24x170 Effective length of fastener in shear loading I _f [mm] 95 170 Calculation diameter d _{nom} 16 25	Uncracked concrete	k _{ucr,N}			11,0 1)			
Spacing Scr,N [mm] 3 hef Characteristic resistance to concrete failure under shear loading Installation factor γinst [-] 1,0 Concrete pry-out failure Factor for pry-out failure k8 [-] 2,0 Concrete edge failure Anchor rod FHB II - A S and FHB II Inject - A S M16x95 M20x170 M24x170 Effective length of fastener in shear loading If [mm] 95 170 Calculation diameter dnom 16 25	Cracked concrete	k _{cr,N}	[-]		7,7 1)			
Spacing Scr,N S Scr,N Scr,N S Scr,N Scr,N Scr,N S Scr,N S	Edge distance	Ccr,N	[]		1,5 h _{ef}			
Installation factor γ_{inst} [-] 1,0 Concrete pry-out failure Factor for pry-out failure	Spacing	Scr,N	[mm]		3 h _{ef}			
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 nject - A S Effective length of fastener in shear loading Calculation diameter M16x95 M20x170 M24x170 M24x170 170 25	Characteristic resistance to	concrete fa	ilure u	inder shear loading				
Factor for pry-out failure	Installation factor	γinst	[-]		1,0			
Concrete edge failure Anchor rod FHB II - A S and FHB II Inject - A S Effective length of fastener in shear loading Calculation diameter M16x95 M20x170 M24x170 M24x170 170 25	Concrete pry-out failure							
Anchor rod FHB II - A S and FHB II Inject - A S Effective length of fastener in shear loading Calculation diameter M16x95 M20x170 M24x170 M24x170 170 170 170	Factor for pry-out failure	k ₈	[-]		2,0			
FHB II Inject - A S Effective length of fastener in shear loading Calculation diameter M16X95 M20X170 M24X170 M24X170 170 170 25	Concrete edge failure							
shear loading [mm] 95 170 Calculation diameter d _{nom} 16 25				M16x95	M20x170	M24x170		
		l _f	[mm]	95	1	70		
1) Related to concrete cylinder compressive strength	Calculation diameter	dnom		16	2	<u></u>		
	1) Related to concrete cylino	ler compress	sive str	ength				

Performance

Characteristic resistance to concrete failure under tension / shear loading

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Table C3.1: Characteristic re	eietance	to pull-out failur	e for Highbond-Ar	ochor rode
		-	or FHB II-PF in dia	
Highbond-Anchor rod FHB II - A S 1)		M16x95	M20x170	M24x170
Characteristic resistance to pull-out	failure			
Calculation diameter d	[mm]	16	2	5
Uncracked concrete				
Characteristic resistance in uncrack	ed concr	ete C20/25		
Diamond-drilling (dry or wet concrete /	water-fille	ed hole)		
Temperature range T2 50 °C / 80 °C NRk,p,uc	r [kN]	51,5	118	3,5
Cracked concrete				
Characteristic resistance in cracked	concrete	e C20/25		
Diamond-drilling (dry or wet concrete /	water-fille	ed hole)		
Temperature range T2 50 °C / 80 °C N _{Rk,p,cr}	[kN]	42,8	10	1,4
Installation factors				
Dry or wet concrete			1,2	
Water-filled hole γ _{inst}	[-]		1,2	
1) Highbond-Anchor rod FHB II - A S	S with res	in capsule FHB II-P /	FHB II-PF	
holes; 100 years		M16x95	or FHB II-PF in dia	
Highbond-Anchor rod FHB II - A S 1)		WITOX95	IVIZUX I / U	M04v170
Characteristic resistance to pull-out	failure	_		M24x170
Calculation diameter d	[40		
-	[mm]	16	2	
Uncracked concrete			2	
Uncracked concrete Characteristic resistance in uncrack	ed concr	ete C20/25	2	
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete /	ed concr	ete C20/25	2	
Uncracked concrete Characteristic resistance in uncrack	ed concr	ete C20/25	118	5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature 50 °C / 80 °C Novement	ed concr	ete C20/25		5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 50 °C / 80 °C NRk,p,ucr,10	ed concr water-fille	ete C20/25 ed hole) 51,5		5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 50 °C / 80 °C NRk,p,ucr,10 Cracked concrete	ed concrete	ete C20/25 ed hole) 51,5		5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 Cracked concrete Characteristic resistance in cracked	ed concrete	ete C20/25 ed hole) 51,5		5 8,5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 Cracked concrete Characteristic resistance in cracked Diamond-drilling (dry or wet concrete / Temperature 50 °C / 80 °C	ed concrete	ete C20/25 ed hole) 51,5 e C20/25 ed hole)	118	5 8,5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 Cracked concrete Characteristic resistance in cracked Diamond-drilling (dry or wet concrete / Temperature range T2 Temperature range T2 Installation factors Dry or wet concrete	ed concrete water-fille concrete water-fille [kN]	ete C20/25 ed hole) 51,5 e C20/25 ed hole)	118	5 8,5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 Cracked concrete Characteristic resistance in cracked Diamond-drilling (dry or wet concrete / Temperature range T2 50 °C / 80 °C NRk,p,cr,10 NRk,p,cr,10 Installation factors	ed concrete	ete C20/25 ed hole) 51,5 e C20/25 ed hole)	118	5 8,5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 Cracked concrete Characteristic resistance in cracked Diamond-drilling (dry or wet concrete / Temperature range T2 Temperature range T2 Installation factors Dry or wet concrete	ed concrete water-fille concrete water-fille [kN]	ete C20/25 ed hole) 51,5 e C20/25 ed hole) 36,0	118 86 1,2 1,2	5 8,5
Uncracked concrete Characteristic resistance in uncrack Diamond-drilling (dry or wet concrete / Temperature range T2 Cracked concrete Characteristic resistance in cracked Diamond-drilling (dry or wet concrete / Temperature range T2 Temperature range T2 To °C / 80 °C NRk,p,cr,10 NRk,p,cr,10 Installation factors Dry or wet concrete Water-filled hole	ed concrete water-fille concrete water-fille [kN] [kN] [-] S with res	ete C20/25 ed hole) 51,5 e C20/25 ed hole) 36,0 in capsule FHB II-P /	1,2 1,2 1,2 FHB II-PF	5 8,5

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 FHB II - A S 1) FHB II Inject - A S 2)			M16x95	M20x170	M24x170
Characteristic resistance	to pull-out fa	ailure			
Calculation diameter	d	[mm]	16	2	5
Uncracked concrete					
Characteristic resistance	in uncracke	d concr	ete C20/25		
Hammer-drilling with standa	rd or hollow	drill bit (dry or wet concrete / v	vater-filled hole)	
Temperature 50 °C / 80 °C range T2	N _{Rk,p,ucr,100}	[kN]	52,4	118	3,5
Cracked concrete					
Characteristic resistance	in cracked c	oncrete	e C20/25		
Hammer-drilling with standa	rd or hollow	drill bit (dry or wet concrete / v	vater-filled hole)	
Temperature 50 °C / 80 °C range T2	$N_{\text{Rk,p,cr,100}}$	[kN]	36,0	86	5,0
Installation factors					
Dry or wet concrete				1,0	
Water-filled hole (only with resin capsule)	γinst	[-]		1,0	

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

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

Performance

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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²⁾ Highbond-Anchor rod FHB II Inject - A S with injection mortar FIS HB

Anchor rod FHB	II – A S	M16x95	M20x170	M24x170	
Displacement-Fa	ctors for tens	ion loading 1)			
Uncracked conc					
δN0-Factor		0,030	0,020	0,016	
[δN∞-Factor	mm/kN]	0,120	0,045	0,045	
Cracked concret	e; Temperatui		-7	_,	
δN0-Factor	-	0,030	0,020	0,016	
δN∞-Factor	mm/kN]	0,120	0,045	0,045	
Displacement-Fa	ctors for shea	ar loading ²⁾	,	,	
-		e; Temperature rang	e T2		
δV0-Eactor		0,02	0,02	0,02	
[δ∨∞-Factor	mm/kN]	0,03	0,03	0,03	
1) Calculation of e	effective displac	•	2) Calculation of effective dis		
$\delta_{N0} = \delta_{N0}$ -Factor		Joinont.	$\delta v_0 = \delta v_0$ -Factor · V	placement.	
$\delta_{\text{N}\infty} = \delta_{\text{N}\infty\text{-Factor}}$			$\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$		
N = acting tens		$ov_{\infty} = ov_{\infty}$ -Factor · v V = acting shear loading			
Anchor rod FHB	II – A S /				
FHB II Inject - A S		M16x95	M20x170	M24x170	
FHB II Inject - A S Displacement-Fa	ctors for tens	ion loading 1)	M20x170	M24x170	
FHB II Inject - A S Displacement-Fa Uncracked conci	ctors for tens	ion loading ¹⁾ ture range T2			
FHB II Inject - A S Displacement-Fa Uncracked concl δN0-Factor	ctors for tens	ture range T2	0,020	0,016	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor δN∞-Factor	rete; Tempera	ture range T2 0,030 0,120			
δ _{N∞-Factor} Cracked concret	rete; Tempera	ture range T2 0,030 0,120 re range T2	0,020 0,045	0,016 0,045	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concrete δN0-Factor	rete; Tempera	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030	0,020 0,045 0,020	0,016 0,045 0,016	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concrete δN0-Factor δN0-Factor	mm/kN] e; Temperatur	ture range T2 0,030 0,120 re range T2 0,030 0,120	0,020 0,045	0,016 0,045	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concrete δN0-Factor δN0-Factor δN0-Factor Displacement-Fa	e; Temperatur	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2)	0,020 0,045 0,020 0,045	0,016 0,045 0,016	
FHB II Inject - A S Displacement-Fa Uncracked concret δN0-Factor Cracked concret δN0-Factor δN0-Factor δN0-Factor Displacement-Fa Uncracked or cra	e; Temperatur	ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature range	0,020 0,045 0,020 0,045	0,016 0,045 0,016 0,045	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concret δN0-Factor δNω-Factor Displacement-Fa Uncracked or cra δν0-Factor	e; Temperatur	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02	0,020 0,045 0,020 0,045	0,016 0,045 0,016 0,045	
FHB II Inject - A S Displacement-Fa Uncracked concret δN0-Factor Cracked concret δN0-Factor δN∞-Factor Displacement-Fa Uncracked or cra δ∨0-Factor δ∨0-Factor	e; Temperature mm/kN] ctors for shear	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03	0,020 0,045 0,020 0,045 e T2 0,02 0,03	0,016 0,045 0,016 0,045 0,02 0,03	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concrete δN0-Factor Displacement-Fa Uncracked or cracked or cra	e; Temperaturemm/kN] ctors for sheadcked concretemm/kN]	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03	0,020 0,045 0,020 0,045 e T2 0,02 0,03 2) Calculation of effective dis	0,016 0,045 0,016 0,045 0,02 0,03	
FHB II Inject - A S Displacement-Fa Uncracked concrete δN0-Factor Cracked concrete δN0-Factor Displacement-Fa Uncracked or cra δν0-Factor 1) Calculation of e δN0 = δN0-Factor ·	e; Temperature mm/kN] ctors for shear acked concrete mm/kN]	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03	0,020 0,045 0,020 0,045 0,020 0,045 1e T2 0,02 0,03 2) Calculation of effective dis δν0 = δν0-Factor · V	0,016 0,045 0,016 0,045 0,02 0,03	
FHB II Inject - A S Displacement-Fa Uncracked conci δNο-Factor Cracked concrete δΝο-Factor Displacement-Fa Uncracked or cra δνο-Factor 1) Calculation of e δΝο = δΝο-Factor δΝο = δΝο-Factor	e; Temperature mm/kN] ctors for shead concrete mm/kN] effective displace N	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03	0,020 0,045 0,020 0,045 0,025 0,02 0,03 2) Calculation of effective dis δν0 = δνο-Factor · V δν∞ = δν∞-Factor · V	0,016 0,045 0,016 0,045 0,02 0,03	
FHB II Inject - A S Displacement-Fa Uncracked concrete δN0-Factor Cracked concrete δN0-Factor Displacement-Fa Uncracked or cra δν0-Factor 1) Calculation of e δN0 = δN0-Factor ·	e; Temperature mm/kN] ctors for shead concrete mm/kN] effective displace N	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03	0,020 0,045 0,020 0,045 0,020 0,045 1e T2 0,02 0,03 2) Calculation of effective dis δν0 = δν0-Factor · V	0,016 0,045 0,016 0,045 0,02 0,03	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concret δN0-Factor Displacement-Fa Uncracked or cra δν0-Factor 1) Calculation of e δN0 = δN0-Factor δN0 = δΝ0-Factor	e; Temperature mm/kN] ctors for shead concrete mm/kN] effective displace N	sion loading 1) ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03	0,020 0,045 0,020 0,045 0,025 0,02 0,03 2) Calculation of effective dis δν0 = δνο-Factor · V δν∞ = δν∞-Factor · V	0,016 0,045 0,016 0,045 0,02 0,03	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concrete δN0-Factor Displacement-Fa Uncracked or cra δν0-Factor 1) Calculation of e δN0 = δN0-Factor δN∞ = δN∞-Factor N = acting tens	e; Temperature mm/kN] e; Temperature mm/kN] actors for sheatacked concrete mm/kN] effective displace N N sion loading	ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03 cement:	0,020 0,045 0,020 0,045 1e T2 0,02 0,03 2) Calculation of effective dis δν0 = δν0-Factor · V δν∞ = δν∞-Factor · V V = acting shear loading	0,016 0,045 0,016 0,045 0,02 0,03 eplacement:	
FHB II Inject - A S Displacement-Fa Uncracked conci δN0-Factor Cracked concret δN0-Factor Displacement-Fa Uncracked or cra δν0-Factor 1) Calculation of e δN0 = δN0-Factor δN∞ = δN∞-Factor N = acting tens	e; Temperature mm/kN] e; Temperature mm/kN] actors for sheatacked concrete mm/kN] effective displace N N sion loading	ture range T2 0,030 0,120 re range T2 0,030 0,120 ar loading 2) re; Temperature rang 0,02 0,03 cement:	0,020 0,045 0,020 0,045 0,025 0,02 0,03 2) Calculation of effective dis δν0 = δνο-Factor · V δν∞ = δν∞-Factor · V	0,016 0,045 0,016 0,045 0,02 0,03 eplacement:	