PRESTATIEVERKLARING

DoP 0419

voor fischer Highbond-Anchor FHB II (Verbonden expansiebevestiging voor gebruik in beton) NL

1. Unieke identificatiecode van het producttype: **DoP 0419**

2. Beoogd(e) gebruik(en): **Bevestigingen in gescheurd of ongescheurd beton, zie bijlage, met name de bijlagen B1 - B13.**

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

4. Gemachtigde: **–**

5. Het systeem of de systemen voor de beoordeling en verificatie van de prestatiebestendigheid: **1**

6. Europees beoordelingsdocument: **EAD 330499-02-0601; 2022-09 (Decision (EU) 2024/1944)**
   Europese technische beoordeling: **ETA-05/0164; 2026-03-23**
   Technische beoordelingsinstantie: **DIBt- Deutsches Institut für Bautechnik**
   Aangemelde instantie(s): **2873, Technische Universität Darmstadt, Institut für Stahlbau und Werkstoffmechanik**

7. Aangegeven prestatie(s):

Mechanische weerstand en stabiliteit (BWR 1)

Kenmerkende weerstand tegen trekbelasting (statische en quasi-statische belasting):

1) Weerstand tegen staalbreuk: zie bijlage, met name de bijlagen C1, C2
2) Weerstand tegen uittrekken: zie bijlage, met name bijlage C3-C8
3) Weerstand tegen betonnen kegelbreuk: zie bijlage, met name bijlage C3,C4
4) Randafstand om spleetbreuk onder belasting te voorkomen: zie bijlage, met name bijlage C3,C4
5) Robuustheid: zie bijlage, met name de bijlagen C3-C8
6) Montagekoppel: zie bijlage, met name de bijlagen B3-B6
7) Minimale rand- en hartafstand, Dikte van het onderdeel: zie bijlage, met name de bijlagen B3-B6

Kenmerkende weerstand tegen schuifbelasting (statische en quasi-statische belasting):

8) Weerstand tegen staalbreuk: zie bijlage, met name de bijlagen C1, C2
9) Weerstand tegen uitbreken (pryout): zie bijlage, met name de bijlagen C3, C4
10) Weerstand tegen bezwijken van betonranden: zie bijlage, met name de bijlagen C3, C4

Verplaatsingen onder korte- en langetermijnbelading:

11) Verplaatsingen onder korte- en langetermijnbelading: zie bijlage, met name de bijlagen C9-C11
12) Weerstand in staalvezelversterkt beton: NPD

Kenmerkende weerstand en verplaatsingen voor de seismische prestatiecategorieën C1 en C2:

13) Trekkrachtweerstand, categorie C1: NPD
14) Trekkrachtweerstand, categorie C2: NPD
15) Weerstands afschuifbelasting, categorie C1: NPD
16) Weerstands afschuifbelasting, categorie C2: NPD

Veiligheid in geval van brand (BWR 2)

17) Reactie op brand: Klasse (A1)

Weerstand tegen vuur:

18) Weerstand bij brand, staalbreuk (trekbelasting): NPD
19) Weerstand tegen hechting onder brandomstandigheden: NPD
20) Weerstand bij brand, staalbreuk (afschuifbelasting): NPD

Hygiëne, gezondheid en milieu (BWR 3)

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

8. Geëigende technische documentatie en/of specifieke technische documentatie: **–**

De prestaties van het hierboven omschreven product zijn conform de aangegeven prestaties. Deze prestatieverklaring wordt in overeenstemming met Verordening (EU) nr. 305/2011 onder de exclusieve verantwoordelijkheid van de hierboven vermelde fabrikant verstrekt.

Ondertekend voor en namens de fabrikant door:

i.V.

Dr. Christian Weber, Hoofd Ontwikkeling

Dieter Pfaff, Hoofd van de Internationale Productiefederatie en Kwaliteitsbeheer

Tumlingen, 2026-07-01

Deze DoP is opgesteld in meerdere talen. In het geval van geschillen over de interpretatie zal de Engelse tekst altijd prevaleren.
Het aanhangsel bevat vrijwillige en aanvullende informatie in het Engels die de (taal-neutraal gespecificeerde) wettelijke vereisten overschrijdt.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

Vertaal assistent van de essentiële kenmerken en eigenschappen voor bijlagen

Mechanical resistance and stability (BWR 1) **Mechanische weerstand en stabiliteit (BWR 1)**		
Characteristic resistance to tension load (static and quasi-static loading): **Kenmerkende weerstand tegen trekbelasting (statische en quasi-statische belasting):**		
1	Resistance to steel failure: **Weerstand tegen staalbreuk:**	$N_{Rk,s}$ [kN]
2	Resistance to combined pull- out and concrete cone failure: **Weerstand tegen uittrekken:**	τ_{Rk} and/or $\tau_{Rk,100}$ [N/mm^2], ψ_c, ψ^0_{sus},$\psi_{sus,100}$ [-] (BF)
	Resistance to pull-out failure: **Weerstand tegen uittrekken:**	$N_{Rk,p}$ and/or $N_{Rk,p,100}$ [kN], ψ_c [-] (BEF)
3	Resistance to concrete cone failure: **Weerstand tegen betonnen kegelbreuk:**	$c_{cr,N}$ [mm], $k_{cr,N}$, $k_{ucr,N}$ [-]
4	Edge distance to prevent splitting under load: **Randafstand om spleetbreuk onder belasting te voorkomen:**	$c_{cr,sp}$ [mm]
5	Robustness: **Robuustheid:**	γ_{inst} [-]
6	Maximum installation torque: **Montagekoppel:**	max T_{inst} [Nm] (BF)
	Installation torque: **Montagekoppel:**	T_{inst} [Nm] (BEF)
7	Minimum edge distance,spacing and member thickness: **Minimale rand- en hartafstand, Dikte van het onderdeel:**	c_{min}, s_{min}, h_{min} [mm]
Characteristic resistance to shear load (static and quasi-static loading): **Kenmerkende weerstand tegen schuifbelasting (statische en quasi-statische belasting):**		
8	Resistance to steel failure: **Weerstand tegen staalbreuk:**	$V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], k_7 [-]
9	Resistance to pry-out failure: **Weerstand tegen uitbreken (pryout):**	k_8 [-]
10	Resistance to concrete edge failure: **Weerstand tegen bezwijken van betonranden:**	d_{nom}, l_f [mm]
Displacements under short-term and long-term loading: **Verplaatsingen onder korte- en langetermijnbelading:**		
11	Displacements factors under short-term and long-term loading: **Verplaatsingen onder korte- en langetermijnbelading:**	δ_0, δ_∞ [mm/(N/mm^2)] or [mm/kN]
12	Resistance in steel fibre reinforced concrete: **Weerstand in staalvezelversterkt beton:**	Description
Characteristic resistance and displacements for seismic performance categories C1 and C2: **Kenmerkende weerstand en verplaatsingen voor de seismische prestatiecategorieën C1 en C2:**		
13	Resistance to tension for seismic performance category C1 **Trekkrachtweerstand, categorie C1:**	$N_{Rk,s,C1}$ [kN] (all) $\tau_{Rk,C1}$ [N/mm^2] (BF) $N_{Rk,p,C1}$ [kN] (BEF)
14	Resistance to tension and displacements for seismic performance category C2 **Trekkrachtweerstand, categorie C2:**	$N_{Rk,s,C2}$ [kN] (all) $\tau_{Rk,C2}$ [N/mm^2] (BF) $N_{Rk,p,C2}$ [kN] (BEF) $\delta_{N,C2(50\%)}$, $\delta_{N,C2(100\%)}$ [mm] (all)
15	Resistance to shear for seismic performance category C1 **Weerstands afschuifbelasting, categorie C1:**	$V_{Rk,s,C1}$ [kN] (all)
16	Resistance to shear load and displacements for seismic performance category C2 **Weerstands afschuifbelasting, categorie C2:**	$V_{Rk,s,C2}$ [kN] (all) $\delta_{V,C2(50\%)}$, $\delta_{V,C2(100\%)}$ [mm] (all)
Safety in case of fire (BWR 2) **Veiligheid in geval van brand (BWR 2)**		
17	Reaction to fire **Reactie op brand:**	Class Klasse (A1)
Resistance to fire **Weerstand tegen vuur:**		
18	Fire resistance to steel failure (tension load): **Weerstand bij brand, staalbreuk (trekbelasting):**	$N_{Rk,s,fi}$ [kN]
19	Bond resistance under fire conditions: **Weerstand tegen hechting onder brandomstandigheden:**	$k_{fi,p}$ (θ) [-], $\tau_{Rk,fi}$ (θ) [N/mm^2] (BF)
20	Fire resistance to steel failure under shear loading: **Weerstand bij brand, staalbreuk (afschuifbelasting):**	$V_{Rk,s,fi}$ [kN], $M^0_{Rk,s,fi}$ [Nm]
Hygiene, health and the environment (BWR 3) **Hygiëne, gezondheid en milieu (BWR 3)**		
21	Content, emission and/or release of dangerous substances: **Content, emission and/or release of dangerous substances:**	Description/Level

Specific Part

1 Technical description of the product

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

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

The product description is given in Annex A

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

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

3.2 Safety in case of fire (BWR 2)

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

3.3 Hygiene, health and the environment (BWR 3)

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

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

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

The system to be applied is: 1

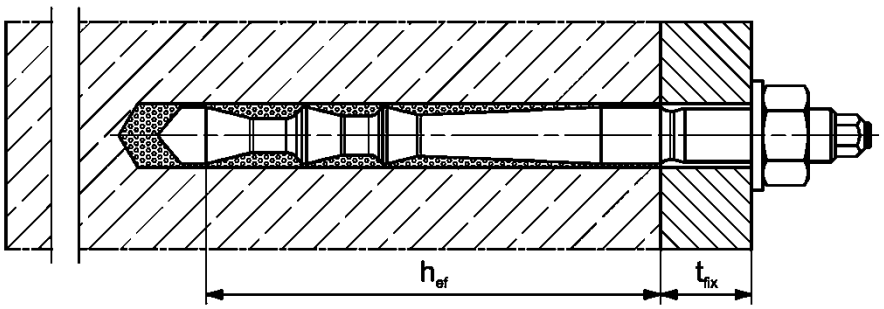
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

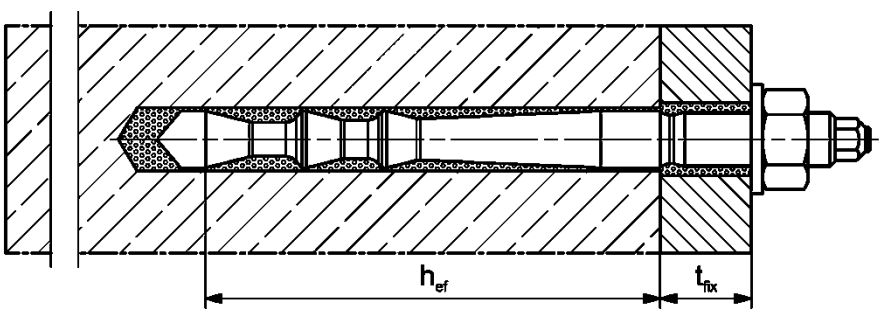
Installation conditions part 1

fischer Highbond - Anchor FHB II - A L

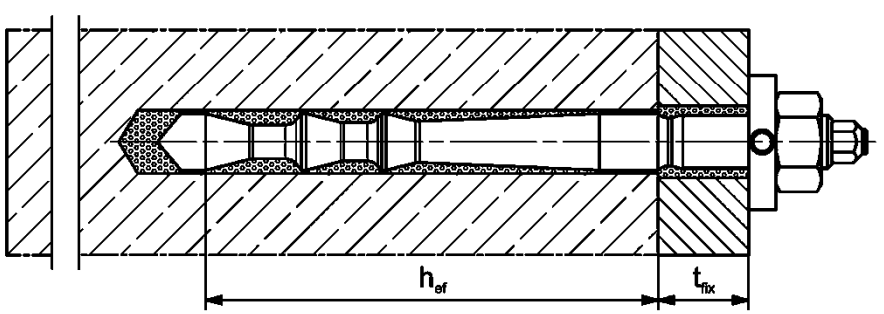
Pre-positioned installation



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



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



Figures not to scale

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

fischer Highbond-Anchor FHB II

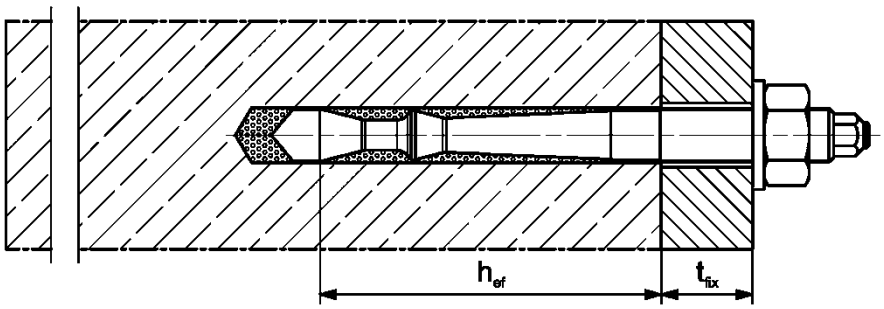
Product description
Installation conditions part 1; FHB II – A L

Annex A1
Appendix 3 / 34

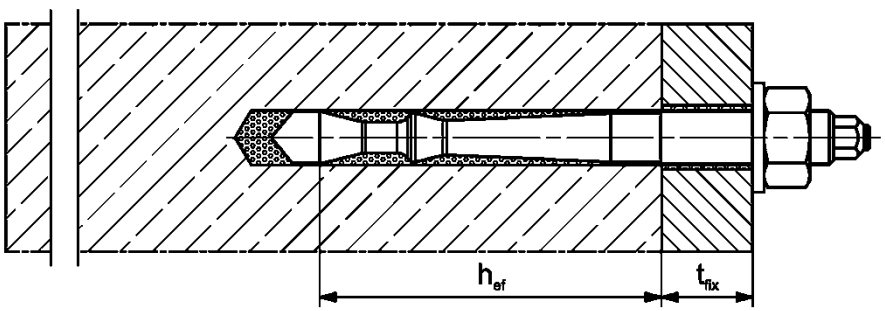
Installation conditions part 2

fischer Highbond - Anchor FHB II - A S

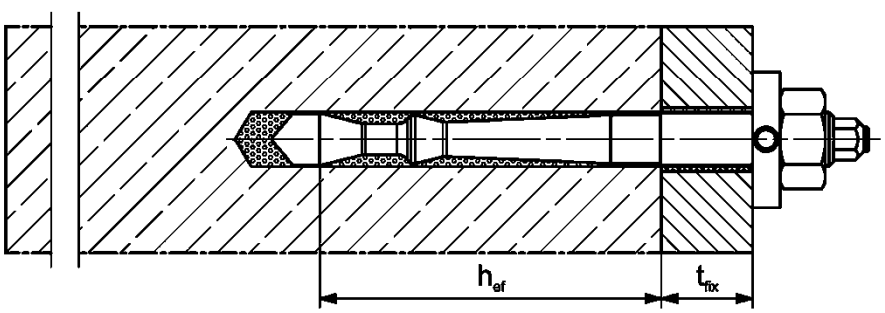
Pre-positioned installation



Push through installation



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



Figures not to scale

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

fischer Highbond-Anchor FHB II

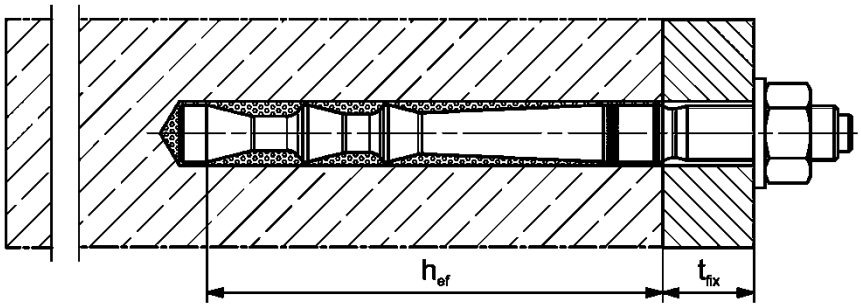
Product description
Installation conditions part 2; FHB II – A S

Annex A2
Appendix 4 / 34

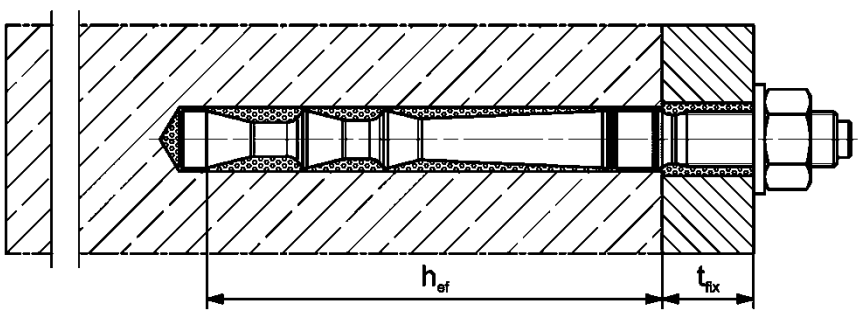
Installation conditions part 3

fischer Highbond - Anchor FHB II Inject - A L

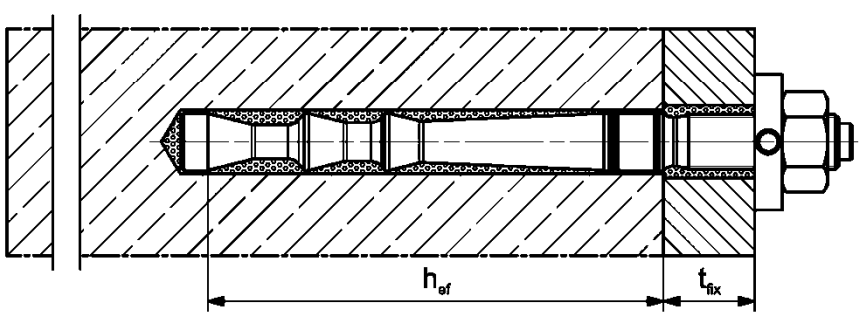
Pre-positioned installation



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



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



Figures not to scale

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

fischer Highbond-Anchor FHB II

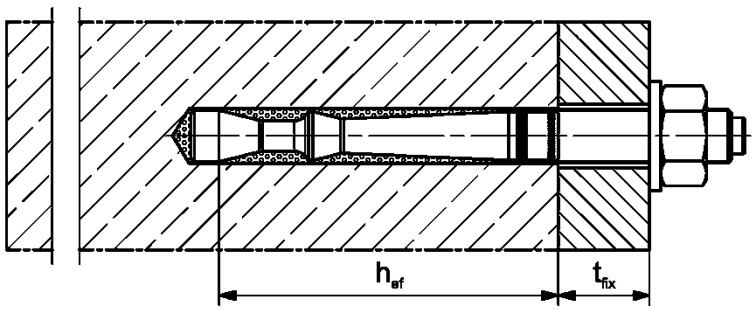
Product description
Installation conditions part 1; FHB II Inject – A L

Annex A3
Appendix 5 / 34

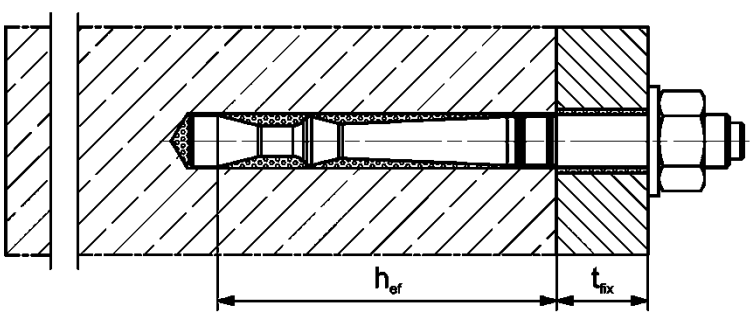
Installation conditions part 4

fischer Highbond - Anchor FHB II Inject - A S

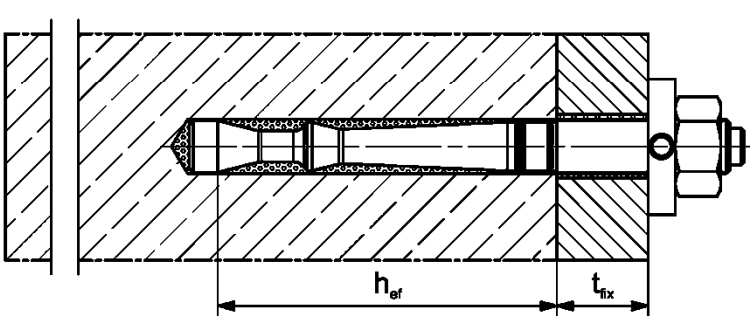
Pre-positioned installation



Push through installation



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



Figures not to scale

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

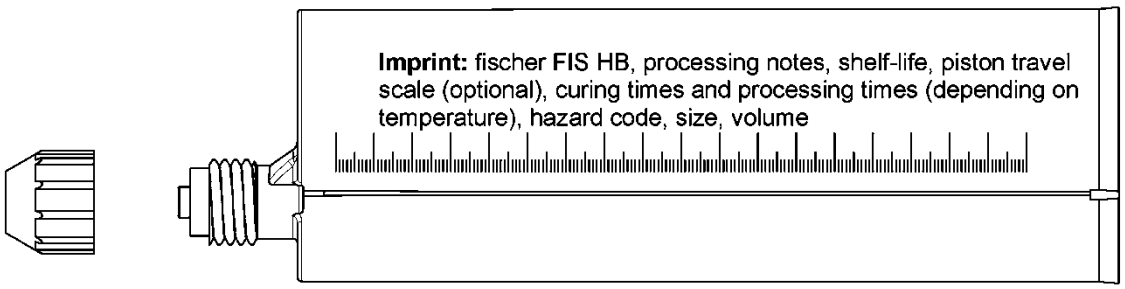
fischer Highbond-Anchor FHB II

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

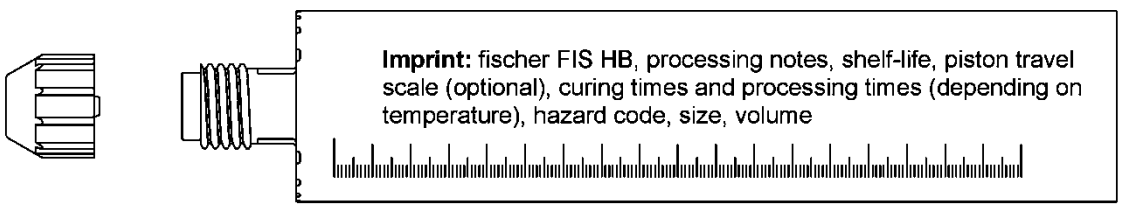
Annex A4
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Overview system components part 1

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



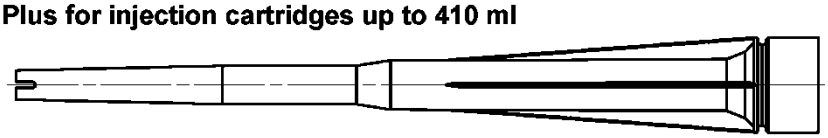
Mortar cartridge (coaxial cartridge) with sealing cap; Size: 150 ml, 300 ml, 380 ml, 400 ml, 410 ml



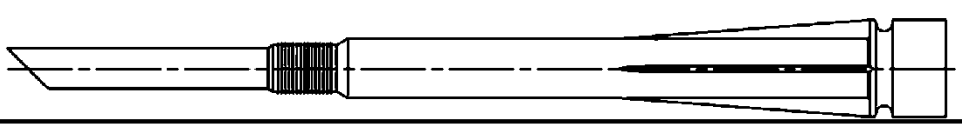
Mortar capsule



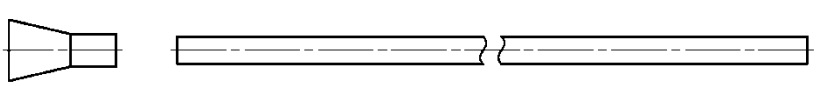
Static mixer FIS MR Plus for injection cartridges up to 410 ml



Static mixer FIS JMR for injection cartridges with 825 ml



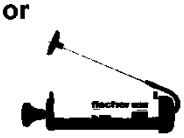
Injection adapter and extension tube Ø 9 for static mixer FIS MR Plus;
Injection adapter and extension tube Ø 9 or Ø 15 for static mixer FIS JMR



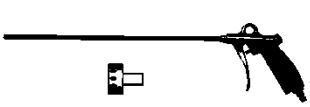
Cleaning brush BS



Blow-out pump ABG or



ABP with cleaning nozzle



Figures not to scale

fischer Highbond-Anchor FHB II

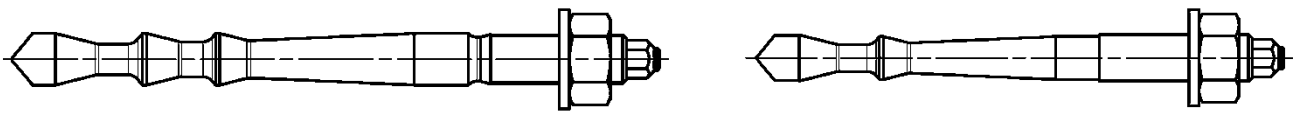
Product description
Overview system components part 1;
cartridges / static mixer / accessories

Annex A5
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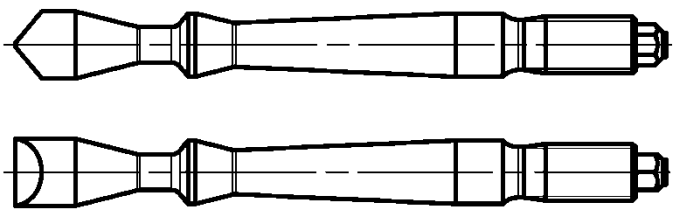
Overview system components part 2

fischer Highbond - Anchor rod; pre-assembled condition

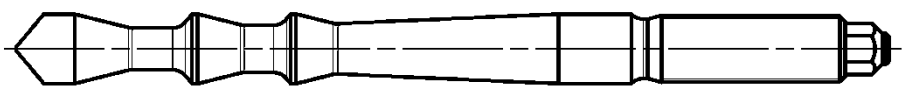
fischer Highbond - Anchor rod FHB II - A L **fischer Highbond - Anchor rod FHB II - A S**



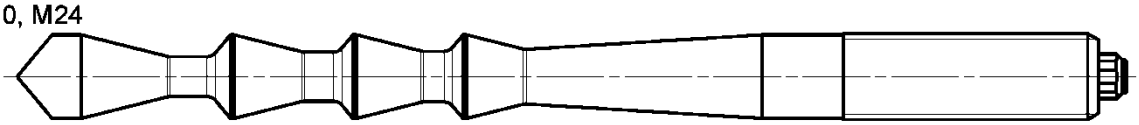
Anchor rod FHB II - A L
Size: M8



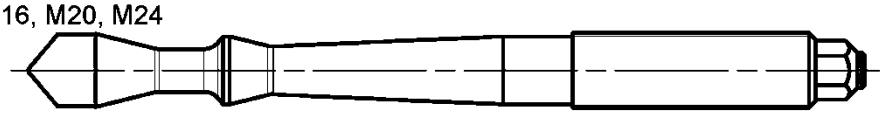
Anchor rod FHB II - A L
Size: M10, M12, M16



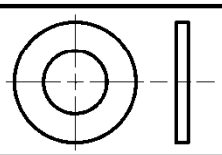
Anchor rod FHB II - A L
Size: M20, M24



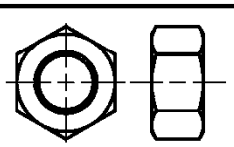
Anchor rod FHB II - A S
Size: M10, M12, M16, M20, M24



Washer

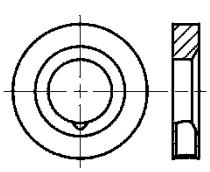


Hexagon nut

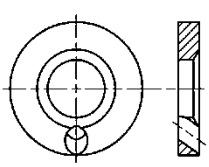


fischer filling disk FFD

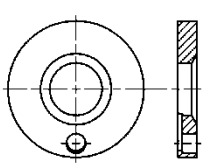
radial



angular



axial



Figures not to scale

fischer Highbond-Anchor FHB II

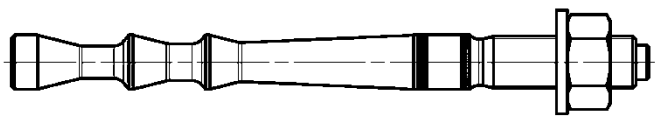
Product description
Overview system components part 2; steel components

Annex A6
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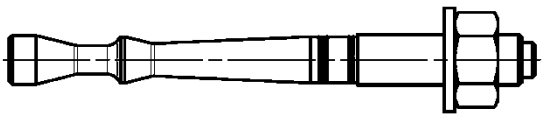
Overview system components part 3

fischer Highbond - Anchor rod; pre-assembled condition

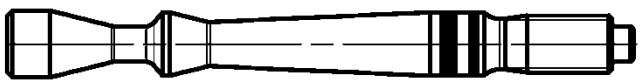
fischer Highbond - Anchor rod FHB II Inject - A L



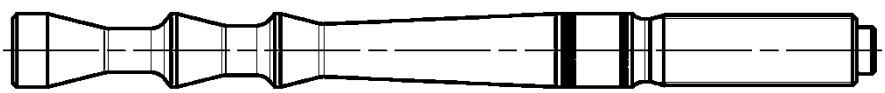
fischer Highbond - Anchor rod FHB II Inject - A S



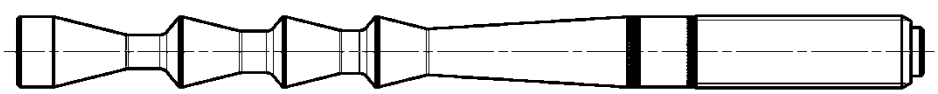
Anchor rod FHB II Inject - A L
Size: M8



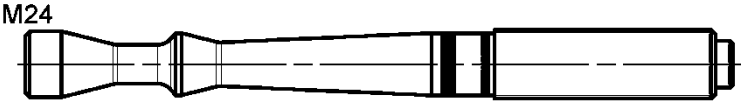
Anchor rod FHB II Inject - A L
Size: M10, M12, M16



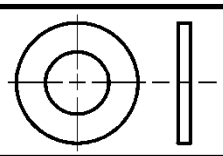
Anchor rod FHB II Inject - A L
Size: M20, M24



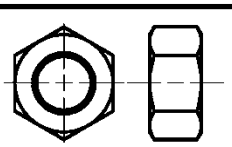
Anchor rod FHB II Inject - A S
Size: M10, M12, M16, M20, M24



Washer

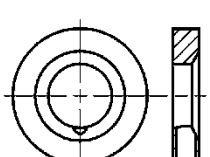


Hexagon nut

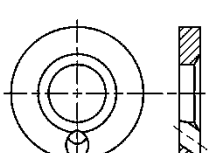


fischer filling disk FFD

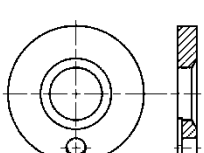
radial



angular



axial



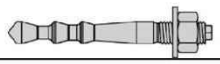
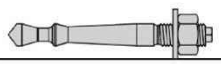
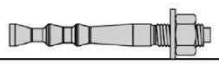
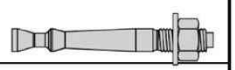
Figures not to scale

Table A8.1: Materials

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

Specifications of intended use part 1

Table B1.1: Overview use and performance categories

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

[1] no performance assessed

Specifications of intended use part 2

Base materials:

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

Use conditions (Environmental conditions):

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

Design:

- Fastenings are designed in accordance with:
  EN 1992-4 and TR 082 from April 2024.
- The structural design is conducted under responsibility of a designer experienced in the field of anchorages and concrete works.
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e. g. position of the fastener relative to reinforcement or to supports, etc.).

Installation:

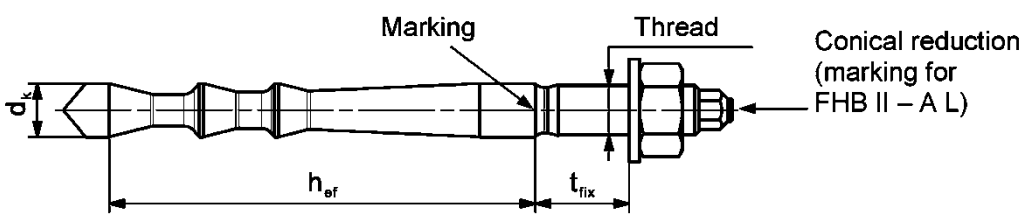
- Fastener installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Overhead installation is allowed (necessary equipment see installation instruction).

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

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

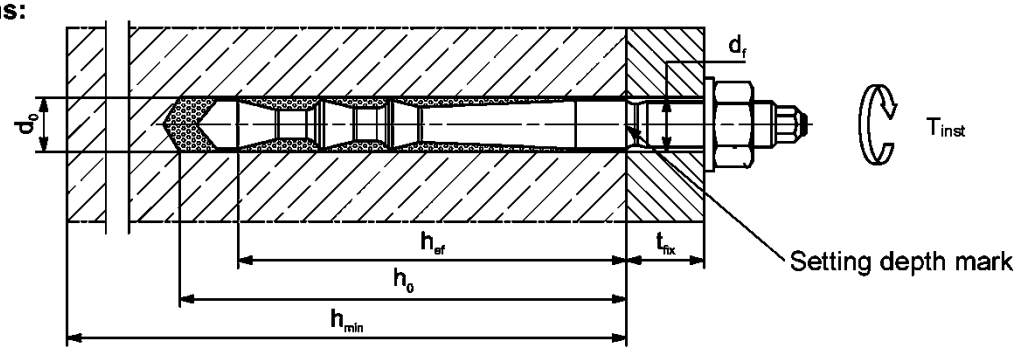
[1] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2] Only with mortar cartridge system FIS HB
[3] Using fischer filling disk FFD reduces t_{fix} (usable length of the anchor)

fischer Highbond – Anchor rod FHB II – A L



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

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB II

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

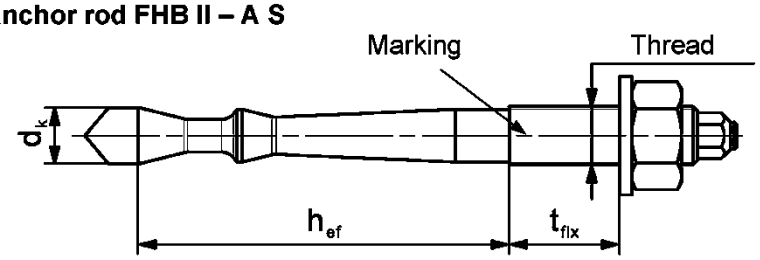
Annex B3
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Table B4.1: Installation parameters for Highbond – Anchor rods FHB II – A S

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

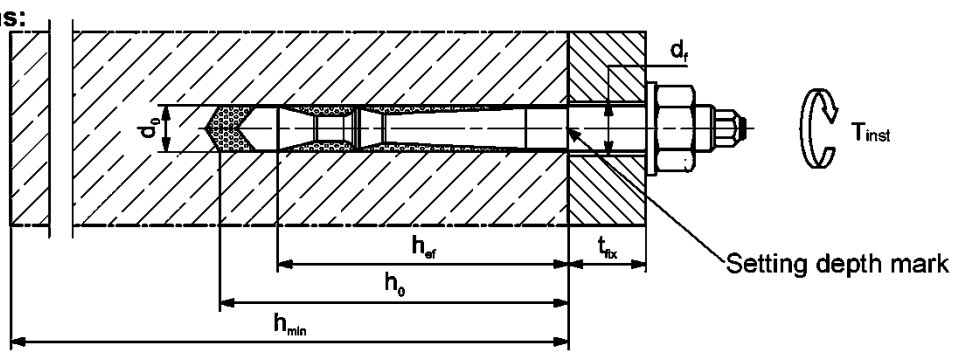
[1] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2] Using fischer filling disk FFD reduces t_{fix} (usable length of the anchor)

fischer Highbond – Anchor rod FHB II – A S



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

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB II

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

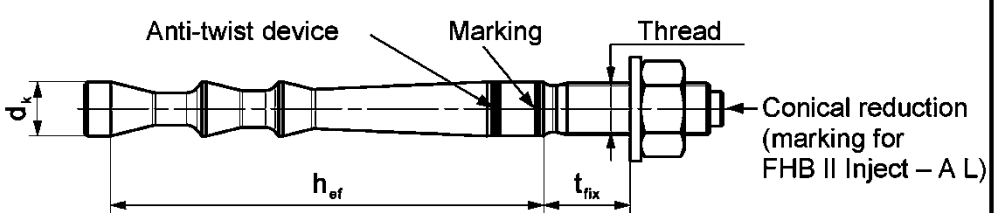
Annex B4
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Table B5.1: Installation parameters for Highbond – Anchor rods FHB II Inject – A L

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

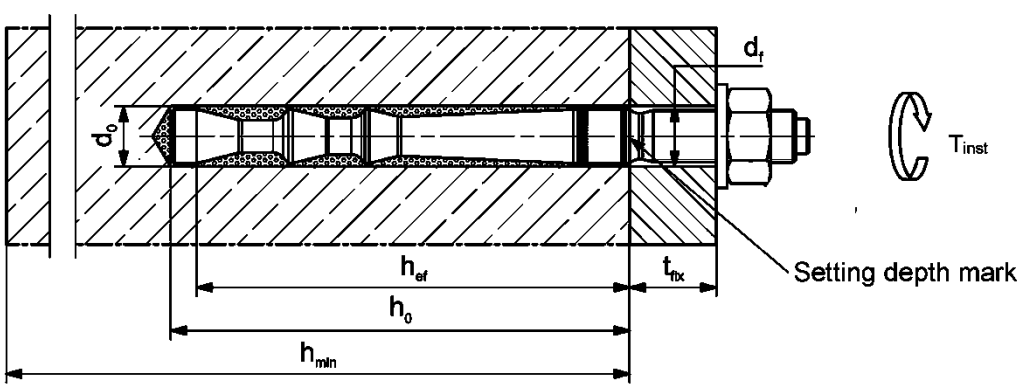
[1)] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2)] Using fischer filling disk FFD reduces t_{fix} (usable length of the anchor)

fischer Highbond – Anchor rod FHB II Inject – A L



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

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB II

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

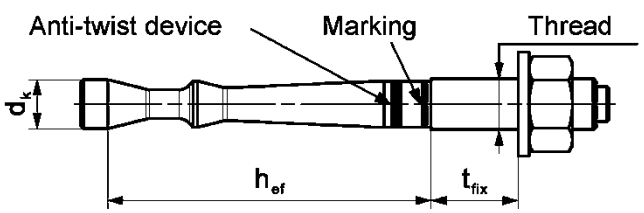
Annex B5
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Tabelle B6.1: Installation parameters for Highbond – Anchor rods FHB II Inject – A S

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

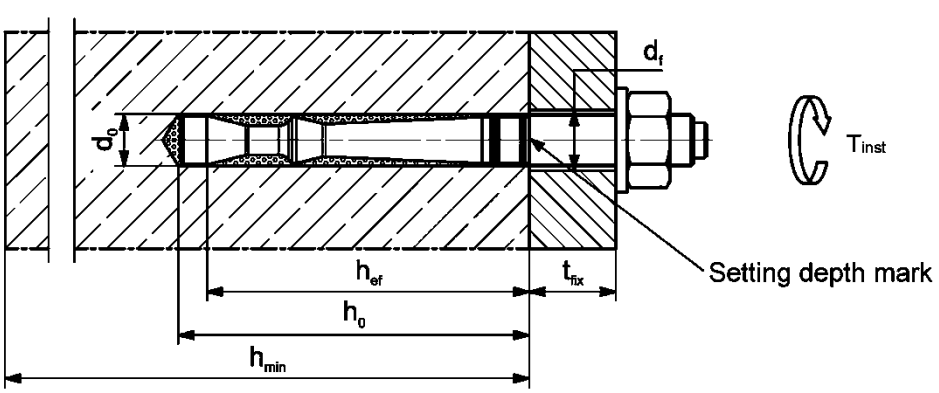
[1] For larger clearance holes in the fixture see EN1992-4; 6.2.2.2
[2] Using fischer filling disk FFD reduces t_{fix} (usable length of the anchor)

fischer Highbond – Anchor rod FHB II Inject – A S



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

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB II

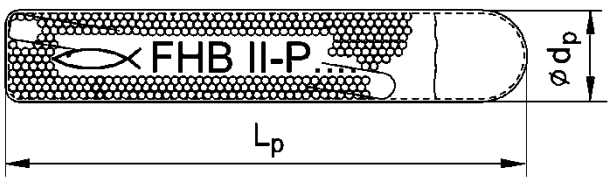
Intended use
Installation parameters for Highbond - Anchor rods FHB II Inject - A S

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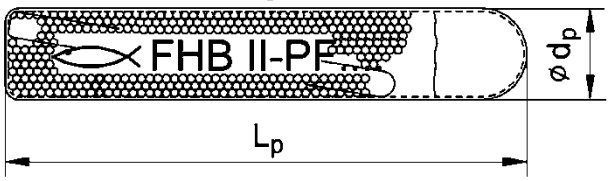
Table B7.1: Dimensions of mortar capsules FHB II-P and FHB II-PF

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

FHB II-P (standard)



FHB II-PF (fast curing)



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

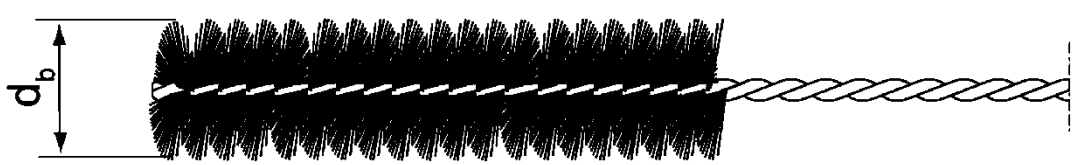
e.g.: FHB II-P 12x100 or

FHB II-PF 12x100

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

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

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



Figures not to scale

fischer Highbond-Anchor FHB II

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

Annex B7
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Table B8.1: Maximum processing time of the mortar **FIS HB** and **minimum curing time**

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

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

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

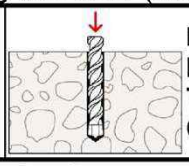
Resin capsule FHB II-P (standard)	
Temperature at anchoring base [1] [°C]	Minimum curing time [2] t_{cure}
-5 to 0	4 h
> 0 to 10	45 min
> 10 to 20	20 min
> 20	10 min

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

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

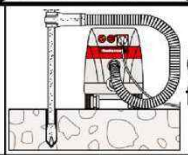
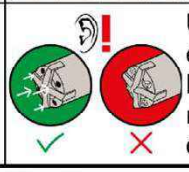
Installation instructions part 1; Installation with mortar capsule FHB II-P or FHB II-PF

Drilling the hole (hammer drilling with standard drill bit)

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

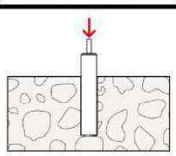
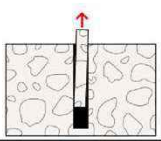
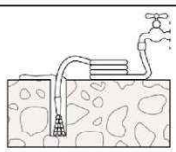
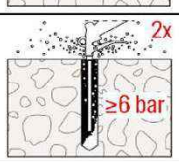
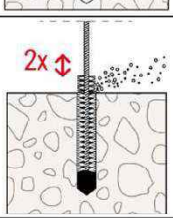
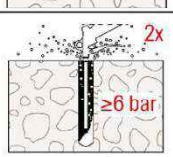
Go to step 6

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

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

Go to step 6

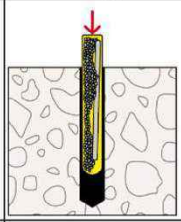
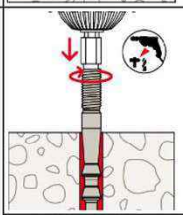
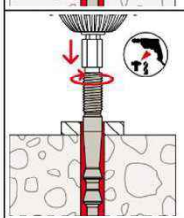
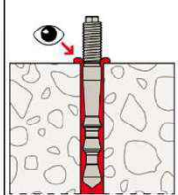
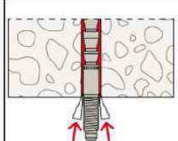
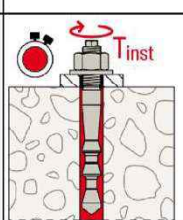
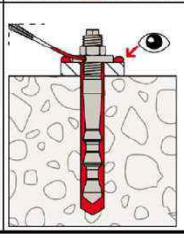
Drilling and cleaning the drill hole (wet drilling with diamond drill bit)

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

Go to step 6

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

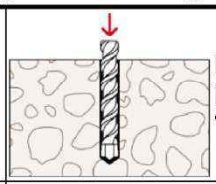
Installation Highbond-Anchor rod FHB II – A L and FHB II – A S

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

Installation instructions part 3; Installation with injection mortar FIS HB

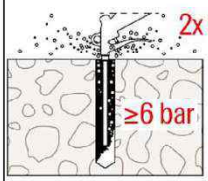
Drilling and cleaning the hole (hammer drilling with standard drill bit)

1

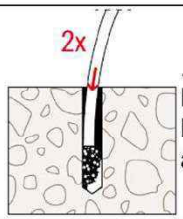


Drill the hole with hammer drill.
Drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$ see **Tables B3.1, B4.1, B5.1, B6.1.**

2



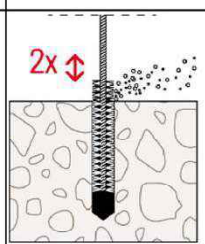
Blow out the drill hole twice.
For drill hole diameter $\mathbf{d_0}$ = 25 mm with oil-free compressed air (p ≥ 6 bar)
Use a cleaning nozzle.



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

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

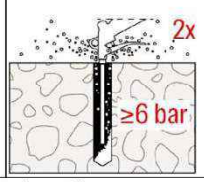
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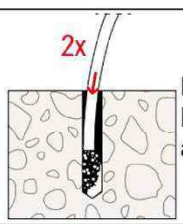
Brush the bore hole twice.
Corresponding brushes see **Table B7.2.**



4



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

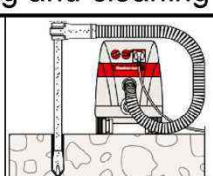


For drill hole diameter $\mathbf{d_0}$ < 25 mm with hand- blowout or oil-free compressed air. (p ≥ 6 bar)

Go to step 5

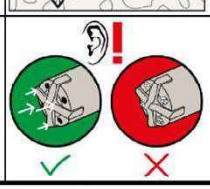
Drilling and cleaning the hole (hammer drilling with hollow drill bit)

1



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

2

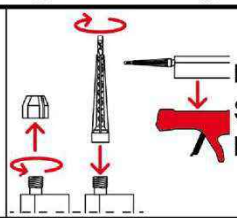
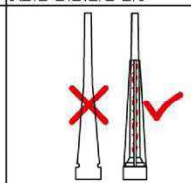
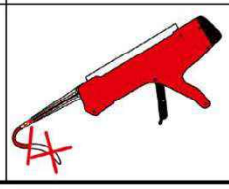


Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.
Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power.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

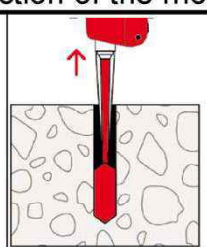
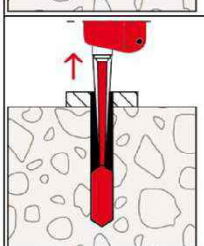
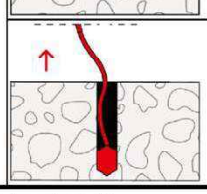
Go to step 5

Installation instruction part 4; Installation with injection mortar FIS HB

Preparing the cartridge

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

Injection of the mortar

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

Go to step 9

Installation instruction part 5; Installation with injection mortar FIS HB

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

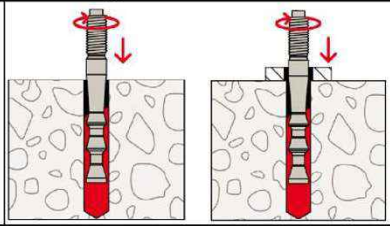
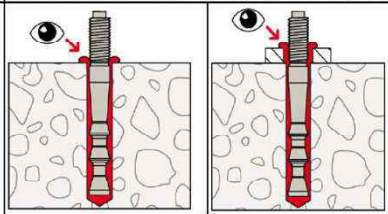
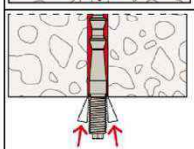
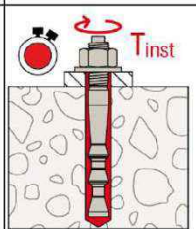
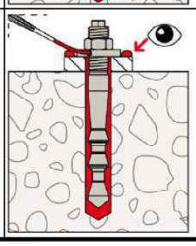
9		Only use clean and oil-free anchor rods. Push the anchor rod down to the bottom of the hole, turning it slightly while doing so.
10		**Pre-positioned anchor**: After inserting the anchor rod, surplus mortar must be escaped from the fixture. **Push through anchor:** After inserting the anchor rod,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

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

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

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

[1)] In absence of other national regulations

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

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

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

[1)] In absence of other national regulations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1) Calculation of effective displacement:

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

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

N = acting tension loading

2) Calculation of effective displacement:

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

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

V = acting shear loading

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

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

1) Calculation of effective displacement:

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

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

N = acting tension loading

2) Calculation of effective displacement:

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

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

V = acting shear loading

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

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

[1)] Calculation of effective displacement:

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

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

N = acting tension loading

[2)] Calculation of effective displacement:

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

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

V = acting shear loading

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

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

[1)] Calculation of effective displacement:

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

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

N = acting tension loading

[2)] Calculation of effective displacement:

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

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

V = acting shear loading