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Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-16/0637 of 14 December 2017

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	fischer Highbond-Anchor FHB II Inject
Product family to which the construction product belongs	Torque controlled bonded anchor for use in concrete
Manufacturer	fischerwerke GmbH & Co. KG Otto-Hahn-Straße 15 79211 Denzlingen DEUTSCHLAND
Manufacturing plant	fischerwerke
This European Technical Assessment contains	22 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	ETAG 001 Part 5: "Bonded anchors", April 2013, used as EAD according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.
This version replaces	ETA-16/0637 issued on 24 January 2017

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Specific Part

1 Technical description of the product

The fischer Highbond-Anchor FHB II is a torque controlled bonded anchor consisting of a mortar cartridge with mortar fischer FIS HB and an anchor rod FHB II - A L or FHB II - A S with hexagon nut and washer.

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 anchor of at least 50 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 values under tension and shear load	See Annex C 1 to C 4
Displacements under tension and shear loads	See Annex C 5 and C 6

3.2 Safety in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 001, April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, 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.

Issued in Berlin on 14 December 2017 by Deutsches Institut für Bautechnik

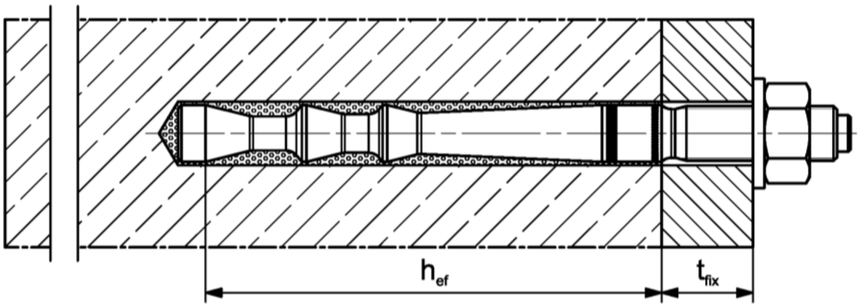
BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Lange

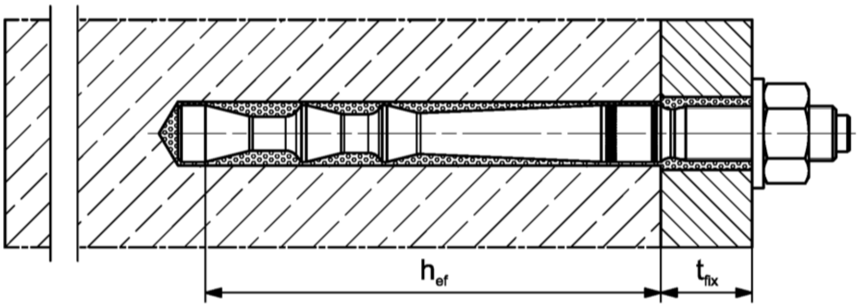
Installation conditions part 1

fischer Highbond - Anchor FHB II Inject - A L

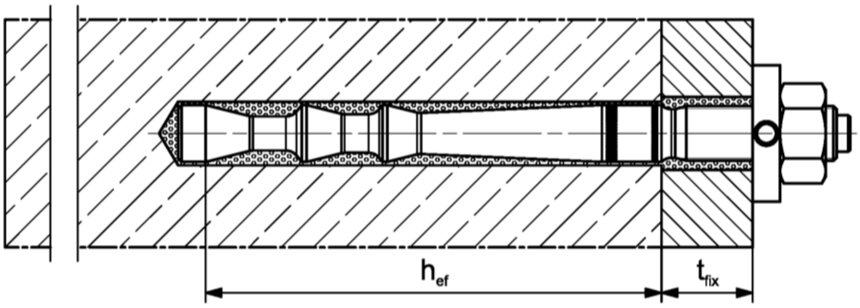
Pre-positioned installation



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



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



Pictures not to scale

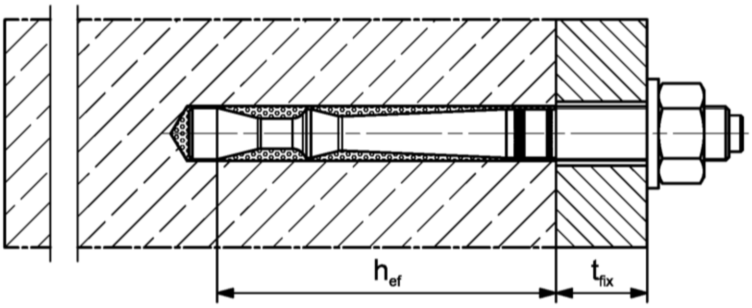
h_{ef} = effective anchorage depth t_{fix} = thickness of fixture

fischer Highbond-Anchor FHB II Inject	**Annex A 1**
Product description Installation conditions part 1; FHB II Inject – A L	

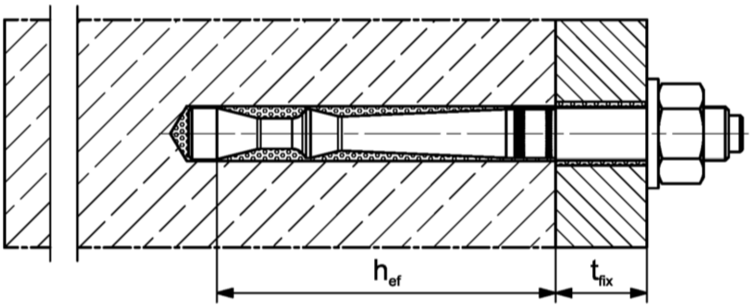
Installation conditions part 2

fischer Highbond - Anchor FHB II Inject - A S

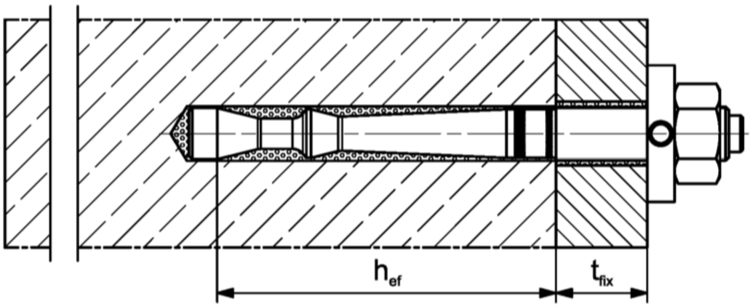
Pre-positioned installation



Push through installation



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



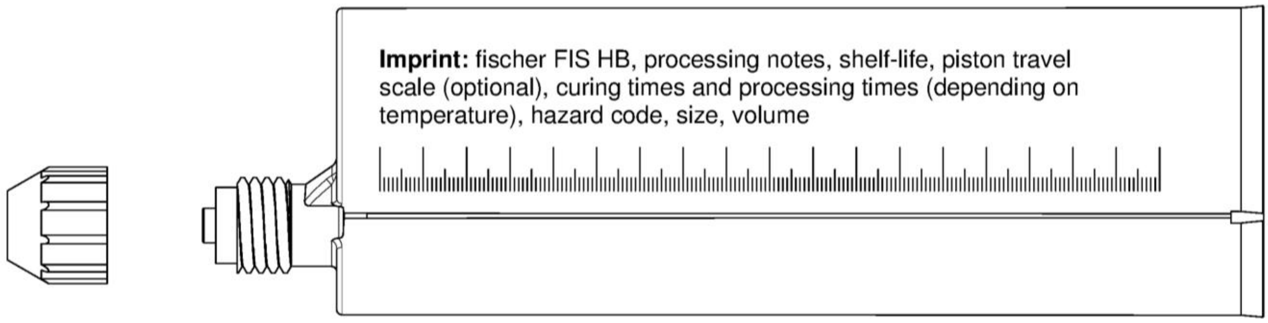
Pictures not to scale

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

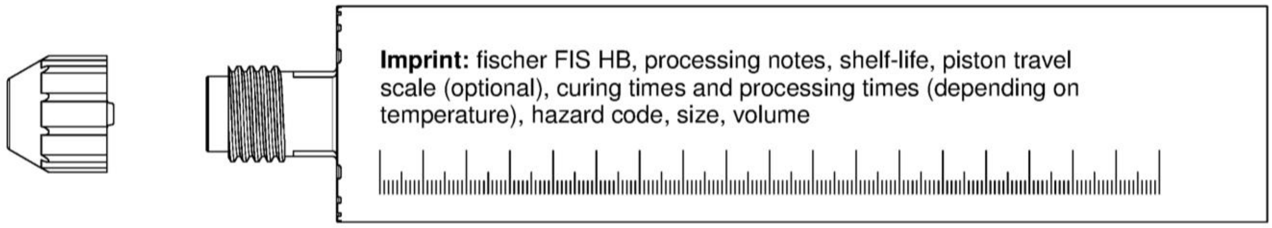
fischer Highbond-Anchor FHB II Inject	**Annex A 2**
Product description Installation conditions part 2; FHB II Inject – A S	

Overview system components part 1

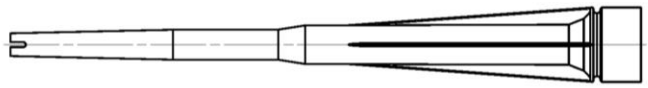
Mortar cartridge (shuttle cartridge) with sealing cap; Size: 360 ml, 950 ml



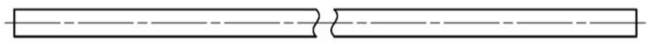
Mortar cartridge (coaxial cartridge) with sealing cap; Size: 150 ml, 300 ml



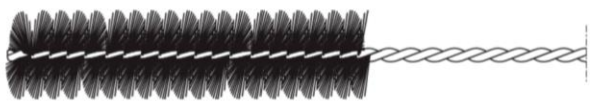
Static mixer MR or UMR



Extension tube for static mixer



Cleaning brush BS



Blow-out pump ABG or ABP with cleaning nozzle

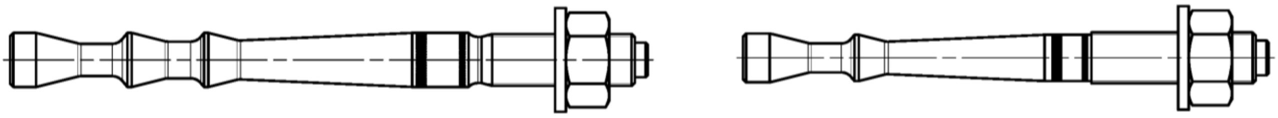
Pictures not to scale

fischer Highbond-Anchor FHB II Inject	**Annex A 3**
System description Overview system components part 1; cartridges / mortar capsule / accessories	

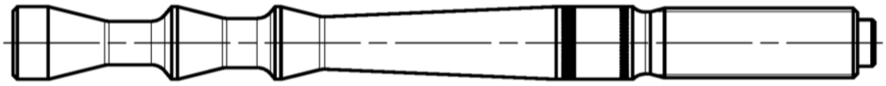
Overview system components part 2

fischer Highbond - Anchor rod; pre-assembled condition

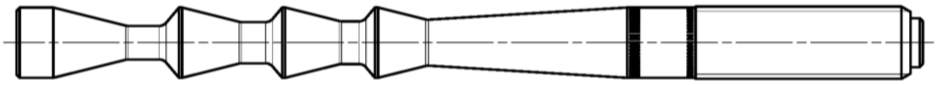
fischer Highbond - Anchor rod FHB II Inject - A L | **fischer Highbond - Anchor rod FHB II Inject - A S**



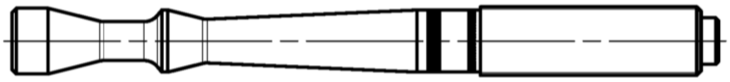
Anchor rod FHB II Inject - A L
Size: M8, M10, M12, M16, M20



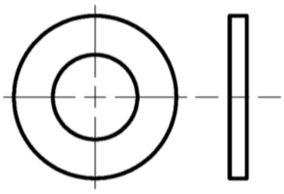
Anchor rod FHB II Inject - A L
Size: M24



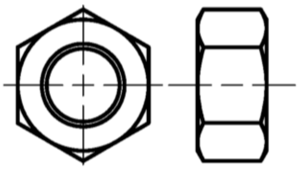
Anchor rod FHB II Inject - A S
Size: M10, M12, M16, M20, M24



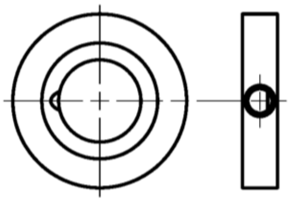
Washer



Hexagon nut



fischer filling disk FFD



Pictures not to scale

fischer Highbond-Anchor FHB II Inject

System description
Overview system components part 2;
Anchor rod / washer / hexagon nut / fischer filling disk FFD

Annex A 4

Table A5.1: Materials

Part	Designation	Material		
1	Mortar cartridge	Mortar, hardener, filler		
	Steel grade	Steel, zinc plated	Stainless steel A4	High corrosion resistant steel C
2	Fischer Highbond-Anchor rod FHB II - A L or FHB II - A S	Property class 8.8; EN ISO 898-1:2013 zinc plated ≥ 5 µm, EN ISO 4042:1999 A2K f_{uk} ≤ 1000 N/mm^2 A_5 > 12 % fracture elongation	Property class 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462 EN 10088-1:2014 f_{uk} ≤ 1000 N/mm^2 A_5 > 12 % fracture elongation	Property class 80 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014 f_{uk} ≤ 1000 N/mm^2 A_5 > 12 % fracture elongation
3	Washer ISO 7089:2000	zinc plated ≥ 5 µm EN ISO 4042:1999 A2K	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565;1.4529 EN 10088-1:2014
4	Hexagon nut	Property class 8; EN ISO 898-2:2012 zinc plated ≥ 5 µm, ISO 4042:1999 A2K	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014
5	fischer filling disk FFD similar to DIN 6319-G	zinc plated ≥ 5 µm, EN ISO 4042:1999 A2K	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565;1.4529 EN 10088-1:2014

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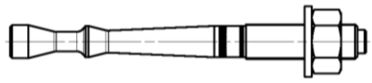
Specifications of intended use (part 1)

Table B1.1: Overview use and performance categories

Anchorages subject to		**fischer injection mortar FIS HB with …**			
		FHB II Inject – A L 		**FHB II Inject – A S** 	
Hammer drilling with standard drill bit		all sizes			
Hammer drilling with hollow drill bit (Heller "Duster Expert" or Hilti "TE-CD, TE-YD")		Nominal drill bit diameter (d_0) ≥ 12 mm			
Static or quasi static load, in	uncracked concrete	all sizes	Tables: C1.1, C3.1, C5.1	all Sizes	Tables: C2.1, C4.1, C6.1
	cracked concrete				
Use category	dry or wet concrete	all sizes			
Kind of installation	Pre-positioned anchor	all sizes			
	Push through anchor	all sizes			
Installation temperature		-5 C to +40 C			
In-service temperature		-40°C to +80°C	(max. short term temperature +80 °C and max. long term temperature +50 °C)		

fischer Highbond-Anchor FHB II Inject

Intended use
Specifications (part 1)

Annex B 1

Specifications of intended use (part 2)

Base materials:

- Reinforced or unreinforced normal weight concrete Strength classes C20/25 to C50/60 according to EN 206-1:2000

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc coated steel, stainless steel or high corrosion resistant steel)
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel)
- Structures subject to external atmospheric exposure, to permanently damp internal conditions or in other particular aggressive conditions (high corrosion resistant steel)

  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used)

Design:

- Anchorages have to be designed by a responsible engineer with experience of concrete anchor design
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.)
- Anchorages under static or quasi-static actions are designed in accordance with:
  EOTA ETAG 001 Annex C, 08/2010 or CEN/TS 1992-4:2009

Installation:

- Anchor installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- In case of aborted hole: The hole shall be filled with mortar
- Observe the effective anchorage depth
- Overhead installation is allowed

fischer Highbond-Anchor FHB II Inject	**Annex B 2**
Intended Use Specifications (part 2)	

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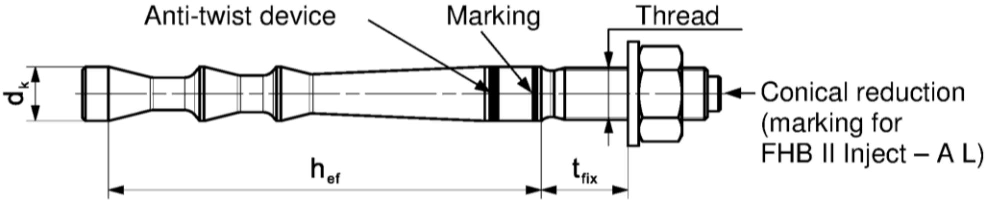
Table B3.1: Installation parameters for fischer Highbond – Anchor rods FHB II Inject – A L

Anchor rod FHB II Inject– A L		Thread	M8x 60	M10x 95	M12x 100	M12x 120	M16x 125	M16x 145	M16x 160	M20x 210	M24x 210
Cone diameter	d_k	[mm]	9,4	10,7	12,5		16,8			23,0	
Width across flats	SW	[mm]	13	17	19		24			30	36
Nominal drill hole diameter	d_0	[mm]	10	12	14		18			25	
Drill hole depth	h_0	[mm]	66	101	106	126	131	151	166	216	
Effective anchorage depth	h_{ef}	[mm]	60	95	100	120	125	145	160	210	
Minimum spacing and minimum edge distance	$s_{min} = c_{min}$	[mm]	40		50		55	60	70	90	
Diameter of clearance hole in the fixture[1)] pre-positioned anchorage	$d_f \leq$	[mm]	9	12	14		18			22	26
Diameter of clearance hole in the fixture[1)] push through anchorage	$d_f \leq$	[mm]	11	14	16		20			26	
Min. thickness of concrete member	h_{min}	[mm]	100	140		170		190	220	280	
Installation torque	T_{inst}	[Nm]	15	20	40		60			100	
Thickness of fixure	$t_{fix} \leq$	[mm]	1500								
fischer filling disk FFD[2)]	$\geq d_a$	[mm]	-	26	30		38			46	54
fischer filling disk FFD[2)]	t_s	[mm]	-	6	6		7			8	10

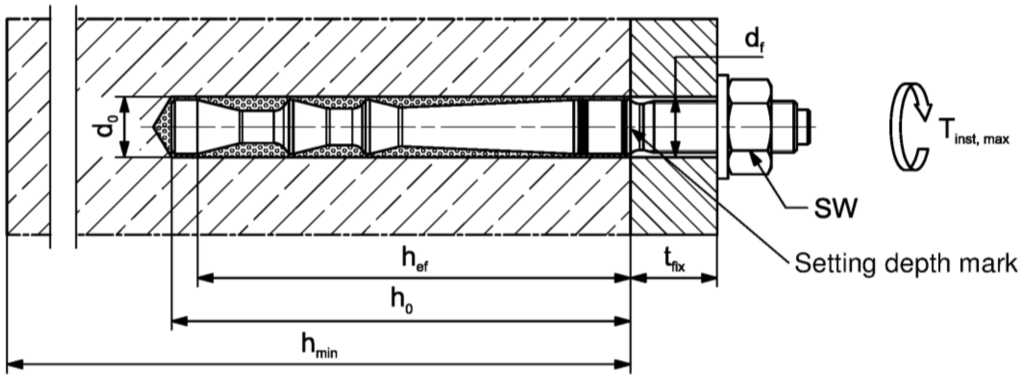
[1)] For larger clearance holes in the fixture see EOTA ETAG 001 Annex C, 08/2010 or CEN/TS 1992-4-:2009
[2)] Using fischer filling disk FFD reduces t_{fix} (usable length of the anchor)

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**. For high corrosion resistant steel additional **C.**
For high corrosion resistant steel additional marking **C** also on the face side

Installation conditions:



Pictures not to scale

fischer Highbond-Anchor FHB II Inject

Intended Use
Installation parameters fischer Highbond-Anchor rod FHB II Inject – A L

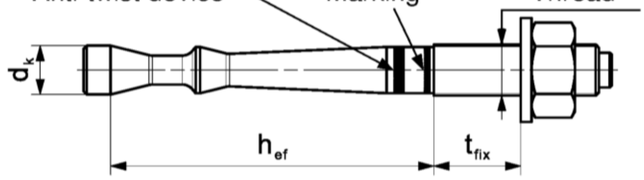
Annex B 3

Tabelle B4.1: Installation parameters for fischer 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	
Width across flats	SW	[mm]	17		19	24	30	36
Nominal drill hole diameter	d_0	[mm]	10		12	16	25	
Drill hole depth	h_0	[mm]	66	81	81	101	176	
Effective anchorage depth	h_{ef}	[mm]	60	75	75	95	170	
Minimum spacing and minimum edge distance	$s_{min} = c_{min}$	[mm]	40			50	80	
Diameter of clearance hole in the fixture[1)] – pre-positioned anchorage	$d_f \leq$	[mm]	12		14	18	22	26
Diameter of clearance hole in the fixture[1)] – push through anchorage	$d_f \leq$	[mm]	12		14	18	26	
Min. thickness of concrete member	h_{min}	[mm]	100	120		150	240	
Installation torque	T_{inst}	[Nm]	15		30	50	100	
Thickness of fixure	$t_{fix} \leq$	[mm]	1500					
fischer filling disk FFD[2)]	$\geq d_a$	[mm]	26		30	38	46	54
fischer filling disk FFD[2)]	t_s	[mm]	6		6	7	8	10

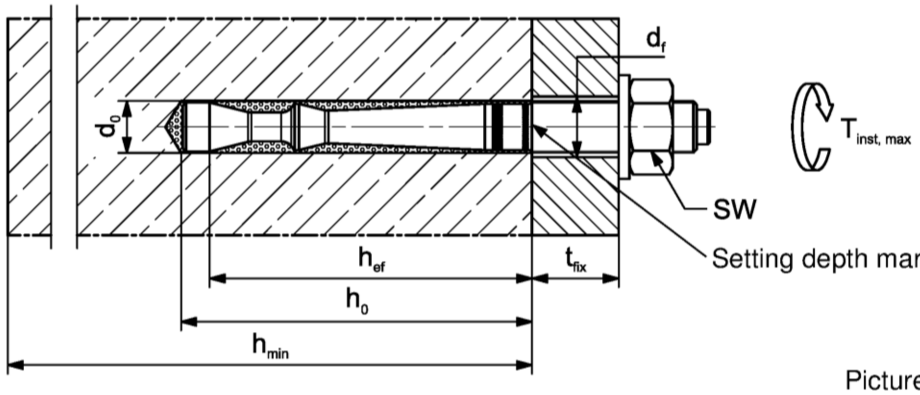
[1)] For larger clearance holes in the fixture see EOTA ETAG 001 Annex C, 08/2010 or CEN/TS 1992-4-:2009
[2)] Using fischer filling disk FFD reduces t_{fix} (usable length of the anchor)

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**. For high corrosion resistant steel additional **C.**
For high corrosion resistant steel additional marking **C** also on the face side

Installation conditions:



Pictures not to scale

fischer Highbond-Anchor FHB II Inject	**Annex B 4**
Intended Use Installation parameters fischer Highbond-Anchor rod FHB II Inject– A S	

Table B5.1: Parameters of the cleaning brush BS (steel brush)

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	13	16	20		27

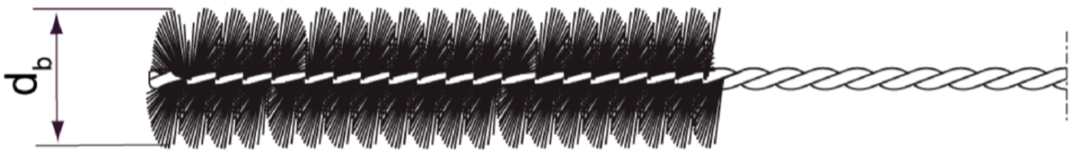


Table B5.2: Maximum processing time of the mortar **FIS HB** and minimum curing time (During the curing time of the mortar the concrete temperature may not fall below the listed minimum temperature)

System temperature [°C]	Maximum processing time t_{work}	Minimum curing time[1)] t_{cure}
-5 to -1	---	6 h
0 to +4	---	3 h
> +5 to +9	15 min	90 min
> +10 to +19	6 min	35 min
> +20 to +29	4 min	20 min
> +30 to +40	2 min	12 min

1) In wet concrete the curing times must be doubled

Pictures not to scale

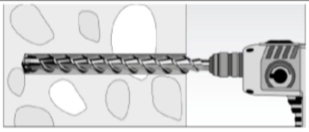
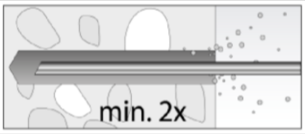
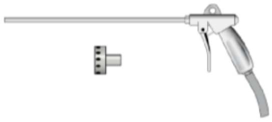
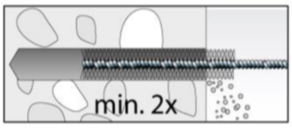
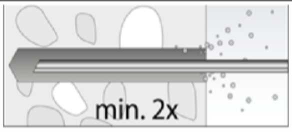
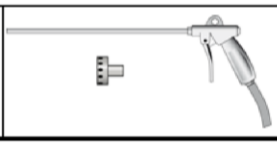
fischer Highbond-Anchor FHB II Inject

Intended Use
Parameters of the cleaning brush; Processing times and curing times

Annex B 5

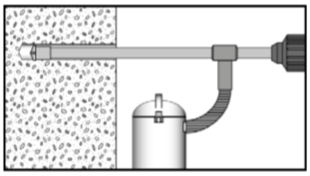
Installation instructions part 1; Installation with injection mortar FIS HB

Bohrlocherstellung und Bohrlochreinigung (Hammerbohren mit Standardbohrer)

Step				
1		Drill the hole with hammer drill. Drill hole diameter **d_0** and drill hole depth **h_0** see **Tables B3.1, B4.1**		
2		Blow out the drill hole twice. If necessary, remove standing water out of the bore hole		
		For drill hole diameter **d_0** < 25 mm with hand-blowout or oil-free compressed air		For drill hole diameter **d_0** = 25 mm with oil-free compressed air (p ≥ 6 bar) Use a cleaning nozzle.
3		Brush the bore hole twice. Corresponding brushes see **Table B5.1**		
4		Blow out the drill hole twice		
		For drill hole diameter **d_0** < 25 mm with hand-blowout or oil-free compressed air		For drill hole diameter **d_0** = 25 mm with oil-free compressed air (p ≥ 6 bar) Use a cleaning nozzle.

Go to step 5

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

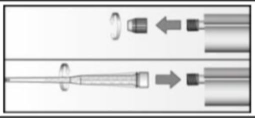
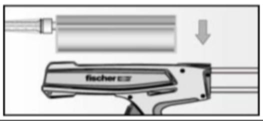
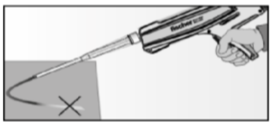
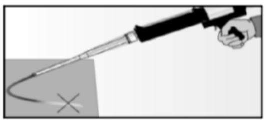
Step		
1		Check a suitable hollow drill (see **Table B1.1**) for correct operation of the dust extraction
2		Use a suitable dust extraction system, e. g.Bosch GAS 35 M AFC or a comparable dust extraction system with equivalent performance data Drill the hole with hollow drill bit. The dust extraction 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 5

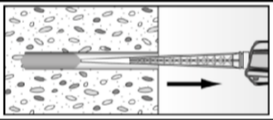
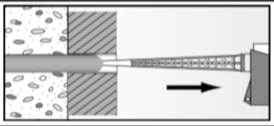
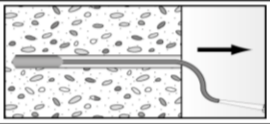
fischer Highbond-Anchor FHB II Inject	**Annex B 6**
Intended use Installation instructions part 1; Installation with injection mortar	

Installation instructions part 2; Installation with injection mortar FIS HB

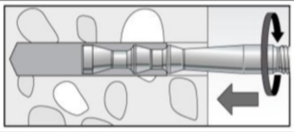
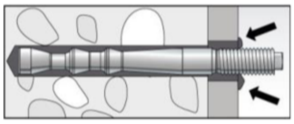
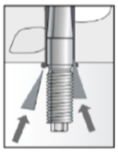
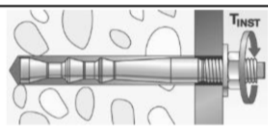
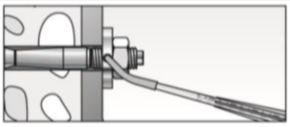
Preparing the cartridge

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 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 Inject - AL** the drill hole in the fixture must be also filled with mortar. By using Highbond-Anchor rods **FHB II Inject - AS** is this not necessary.
		For drill hole depth ≥ 170 mm use an extension tube

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		After inserting the anchor rod **FHB II Inject - AL**, surplus mortar must be escaped from the fixture. After inserting the anchor rod **FHB II Inject - AS**, 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 B5.2**
12		Mounting the fixture 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)

fischer Highbond-Anchor FHB II Inject	**Annex B 7**
Intended use Installation instructions part 2; Installation with injection mortar	

Table C1.1: Characteristic values under static and quasi-static **tension load** for **fischer Highbond-Anchors FHB II Inject - A L**

Anchor rod FHB II Inject – A L			**M8x**	**M10x**	**M12x**		**M16x**			**M20x**	**M24x**
			60	**95**	**100**	**120**	**125**	**145**	**160**	**210**	**210**
Bearing capacity under tensile load, steel failure											
Characteristic resistance $N_{Rk,s}$	Steel, zinc plated	[kN]	25,1	34,4	49,8		96,6			137,6	
	Stainless steel A4 / High corrosion resistant steel C	[kN]	25,1	34,4	49,8		96,6			137,6	
Partial safety factors[1)]											
Partial safety factor $\gamma_{Ms,N}$	Steel, zinc plated	[-]	1,5[1)]								
	Stainless steel A4	[-]	1,5[1)]								
	High corrosion resistant steel C	[-]	1,5[1)]								
Pullout failure in cracked concrete C20/25											
Characteristic resistance	$N_{Rk,p}$	[kN]	---[2)]								
Pullout and splitting failure in uncracked concrete C20/25											
Characteristic resistance	$N_{Rk,p}$	[kN]	---[2)]								
Edge distance	$c_{cr,sp}$	[mm]	300	476	380	600	375	500	580	630	
Spacing	$s_{cr,sp}$	[mm]	150	238	190	300	188	250	290	315	
Pullout and splitting failure in uncracked concrete C20/25											
Characteristic resistance	$N_{Rk,p}$[3)]	[kN]	20	35	40	50	---[2)]	75	95	---[2)]	
Edge distance	$c_{cr,sp}$	[mm]	$1{,}5h_{ef}$								
Spacing	$s_{cr,sp}$	[mm]	$3{,}0h_{ef}$								
Factors for the compressive strength of concrete > C20/25											
Increasing factor for $N_{Rk,p}$	C25/30 Ψ_c	[-]	1,10								
	C30/37	[-]	1,22								
	C35/45	[-]	1,34								
	C40/50	[-]	1,41								
	C45/55	[-]	1,48								
	C50/60	[-]	1,55								
Factors acc. to CEN/TS 1992-4:2009 Section 6.2.2.3											
Uncracked concrete	k_{ucr}	[-]	10,1								
Cracked concrete	k_{cr}	[-]	7,2								
Concrete cone failure											
Effective anchorage depth	h_{ef}	[mm]	60	95	100	120	125	145	160	210	
Partial safety factor[1) 4)]	γ_{Mc}	[-]	1,5	1,5							

1) In absence of other national regulations
2) Not decisive (proof of splitting failure acc. ETAG 001, Annex C)
3) Proof of splitting failure acc. ETAG 001, Annex C, (Section 5.3). Instead of $N^0_{Rk,c}$ use $N_{Rk,p}$.
4) γ_2 = 1,0 is included

fischer Highbond-Anchor FHB II Inject	**Annex C 1**
Performances Characteristic values under static and quasi-static tension load for fischer Highbond-Anchor FHB II Inject – A L	

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Table C2.1: Characteristic values under static and quasi-static **tension load** for **fischer Highbond-Anchor FHB II Inject – A S**

Anchor rod FHB II Inject – A S			**M10x 60**	**M10x 75**	**M12x 75**	**M16x 95**	**M20x 170**	**M24x 170**
Bearing capacity under tensile load, steel failure								
Characteristic resistance $N_{Rk,s}$	Steel, zinc plated	[kN]	25,1		34,4	61,6	128,5	
	Stainless steel A4	[kN]	25,1		34,4	61,6	128,5	
	High corrosion resistant steel C	[kN]	25,1		34,4	61,6	128,5	
Partial safety factors[1)]								
Partial safety factor $\gamma_{Ms,N}$	Steel, zinc plated	[-]	1,5[1)]					
	Stainless steel A4	[-]	1,5[1)]					
	High corrosion resistant steel C	[-]	1,5[1)]					
Pullout failure in cracked concrete C20/25								
Characteristic resistance	$N_{Rk,p}$	[kN]	---[2)]					
Pullout and splitting failure in uncracked concrete C20/25								
Characteristic resistance	$N_{Rk,p}$	[kN]	---[2)]					
Edge distance	$c_{cr,sp}$	[mm]	300			340	510	
Spacing	$s_{cr,sp}$	[mm]	150			170	255	
Pullout and splitting failure in uncracked concrete C20/25								
Characteristic resistance	$N_{Rk,p}$ [3)]	[kN]	20	25		40	---[2)]	
Edge distance	$c_{cr,sp}$	[mm]	$1{,}5h_{ef}$					
Spacing	$s_{cr,sp}$	[mm]	$3{,}0h_{ef}$					
Factors for the compressive strength of concrete > C20/25								
Increasing factor for $N_{Rk,p}$	C25/30 Ψ_c	[-]	1,10					
	C30/37	[-]	1,22					
	C35/45	[-]	1,34					
	C40/50	[-]	1,41					
	C45/55	[-]	1,48					
	C50/60	[-]	1,55					
Factors acc. to CEN/TS 1992-4:2009 Section 6.2.2.3								
Uncracked concrete	k_{ucr}	[-]	10,1					
Cracked concrete	k_{cr}	[-]	7,2					
Concrete cone failure								
Effective anchorage depth	h_{ef}	[mm]	60	75		95	170	
Partial safety factor [1) 4)]	γ_{Mc}	[-]	1,5	1,5				

1) In absence of other national regulations
2) Not decisive (proof of splitting failure acc. ETAG 001, Annex C)
3) Proof of splitting failure acc. ETAG 001, Annex C, (Section 5.3). Instead of $N^0_{Rk,c}$ use $N_{Rk,p}$.
4) γ_2 = 1,0 is included

fischer Highbond-Anchor FHB II Inject

Performances
Characteristic values under static and quasi-static tension load for fischer Highbond-Anchor FHB II Inject – A S

Annex C 2

Table C3.1: Characteristic values under static and quasi-static **shear load** for **fischer Highbond-Anchor FHB II Inject – A L**

Anchor rod FHB II Inject – A L				M8x 60	M10x 95	M12x 100	M12x 120	M16x 125	M16x 145	M16x 160	M20x 210	M24x 210
Bearing capacity under shear load, steel failure												
without lever arm												
Characteristic resistance	Steel, zinc plated	$V_{Rk,s}$	[kN]	13,7	20,8	30,3		56,3			87,9	126,9
	Stainless steel A4 and High corrosion resistant steel C			15,2	23,2	33,7		62,7			97,9	141
with lever arm												
Characteristic bending moment	Steel, zinc plated	$M^0_{Rk,s}$	[Nm]	31	62	105		266			519	896
	Stainless steel A4 and High corrosion resistant steel C			31	62	105		266			519	896
Partial safety factors												
Partial safety factor [1]		$\gamma_{Ms,V}$	[-]	1,25								
Ductility factor acc. to CEN/TS 1992-4-5:2009 Section 6.3.2.1		k_2	[-]	1,0								
Concrete pry-out failure												
Factor k acc. TR029 Section 5.2.3.3 or k_3 acc.CEN/TS 1992-4-5:2009 Section 6.3.3		$k_{(3)}$	[-]	2,0								
Partial safety factors[1]		γ_{Mcp}	[-]	1,5								
Concrete edge failure												
Effective length of anchor		l_f	[mm]	60	95	100	112	125	144		200	
Calculation diameter		d	[mm]	10	12	14		18			25	
Partial safety factor[1]		γ_{Mc}	[-]	1,5								

[1] In absence of other national regulations

fischer Highbond-Anchor FHB II Inject

Performances
Characteristic values under static and quasi-static shear load for fischer Highbond-Anchor FHB II Inject – A L

Annex C 3

Table C4.1: Characteristic values under static and quasi-static **shear load** for **fischer Highbond-Anchor FHB II Inject – A S**

Anchor rod FHB II Inject – A S				**M10x 60**	**M10x 75**	**M12x 75**	**M16x 95**	**M20x 170**	**M24x 170**
Bearing capacity under shear load, steel failure									
without lever arm									
Characteristic resistance	Steel, zinc plated	$V_{Rk,s}$	[kN]	19,7		27,3	50,8	80,3	114,2
	Stainless steel A4			24,1		33,7	62,7	97,9	124,5
	High corrosion resistant steel C			24,1		33,7	62,7	97,9	141
with lever arm									
Characteristic bending moment	Steel, zinc plated	$M^0_{Rk,s}$	[Nm]	62		105	266	519	896
	Stainless steel A4 and High corrosion resistant steel C			62		105	266	519	896
Partial safety factors									
Partial safety factor [1)]		$\gamma_{Ms,V}$	[-]	1,25					
Ductility factor acc. to CEN/TS 1992-4-5:2009 Section 6.3.2.1		k_2	[-]	1,0					
Concrete pry-out failure									
Factor k acc. TR029 Section 5.2.3.3 or k_3 acc.CEN/TS 1992-4-5:2009 Section 6.3.3		$k_{(3)}$	[-]	2,0					
Partial safety factors [1)]		γ_{Mcp}	[-]	1,5					
Concrete edge failure									
Effective length of anchor		l_f	[mm]	60	75		95	170	
Calculation diameter		d	[mm]	10		12	16	25	
Partial safety factor [1)]		γ_{Mc}	[-]	1,5					

[1)] In absence of other national regulations

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Table C5.1: Displacement for fischer **Highbond-Anchor FHB II Inject – A L**

Anchor rod FHB II Inject – A L		M8x 60	M10x 95	M12x 100	M12x 120	M16x 125	M16x 145	M16x 160	M20x 210	M24x 210
Displacement under tension load										
Cracked concrete										
Tension load	[kN]	6,6	15,9	17,1	22,5	24,0	30,0	34,7	52,2	52,2
δ_{N0}	[mm]	0,8				0,6				
$\delta_{N\infty}$	[mm]	1,7								
Uncracked concrete										
Tension load	[kN]	9,3	22,3	24,0	31,6	33,6	42,0	48,7	73,2	73,2
δ_{N0}	[mm]	0,2	0,4						0,6	
$\delta_{N\infty}$	[mm]	1,7								
Displacement under shear load										
Uncracked or cracked concrete										
Steel zinc plated										
Shear load	[kN]	7,8	11,9	17,3		32,2			50,2	72,5
δ_{V0}	[mm]	1,2		1,3					3,5	
$\delta_{V\infty}$	[mm]	1,8		2,0					5,3	
Stainless steel A4										
Shear load	[kN]	8,7	13,3	19,3		35,8			55,9	80,6
δ_{V0}	[mm]	1,0		1,1		2,2			3,5	
$\delta_{V\infty}$	[mm]	1,5		1,7		3,3			5,3	
High corrosion resistant steel C										
Shear load	[kN]	8,7	13,3	19,3		35,8			55,9	80,6
δ_{V0}	[mm]	1,2		1,3		2,4			3,7	5,0
$\delta_{V\infty}$	[mm]	1,8		2,0		3,6			5,6	7,5

Table C6.1: Displacement for **fischer Highbond-Anchor FHB II Inject – A S**

Anchor rod FHB II Inject – A S		M10x 60	M10x 75	M12x 75	M16x 95	M20x 170	M24x 170
Displacement under tension load							
Cracked concrete							
Tension load	[kN]	6,6	11,1		15,9	38,0	
δ_{N0}	[mm]	0,8	0,3		0,4	0,6	
$\delta_{N\infty}$	[mm]	1,7					
Uncracked concrete							
Tension load	[kN]	9,3	15,6		22,3	53,3	
δ_{N0}	[mm]	0,2				0,5	
$\delta_{N\infty}$	[mm]	1,7					
Displacement under shear load							
Cracked or uncracked concrete							
Steel zinc plated							
Shear load	[kN]	11,3		12,7	29,0	45,9	65,3
δ_{V0}	[mm]	1,2		1,5		2,8	
$\delta_{V\infty}$	[mm]	1,8		2,3		4,2	
Stainless steel A4							
Shear load	[kN]	13,8		19,3	35,8	55,9	71,1
δ_{V0}	[mm]	1,0		1,1	2,2	3,5	
$\delta_{V\infty}$	[mm]	1,5		1,7	3,3	5,3	
High corrosion resistant steel C							
Shear load	[kN]	13,8		19,3	35,8	55,9	80,6
δ_{V0}	[mm]	1,2		1,3	2,4	3,7	5,0
$\delta_{V\infty}$	[mm]	1,8		2,0	3,6	5,6	7,5

fischer Highbond-Anchor FHB II Inject

Performances
Displacement for fischer Highbond-Anchor FHB II Inject - A S

Annex C 6