Deutsches Institut für Bautechnik

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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-06/0171 of 20 April 2016

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
Product family to which the construction product belongs	Torque controlled bonded anchor for use in concrete
Manufacturer	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND
Manufacturing plant	fischerwerke
This European Technical Assessment contains	13 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	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 5: "Bonded anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The fischer Highbond-anchor FHB is a torque controlled bonded anchor consisting of a mortar cartridge with FIS HB and an anchor rod with hexagon nut and washer. The anchor rod (including nut and washer) is made of galvanised steel.

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 resistance	See Annex C 1 to C 3
Displacements under tension and shear loads	See Annex C 3

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 20 April 2016 by Deutsches Institut für Bautechnik

Andreas Kummerow
p.p. Head of Department

beglaubigt:
Baderschneider

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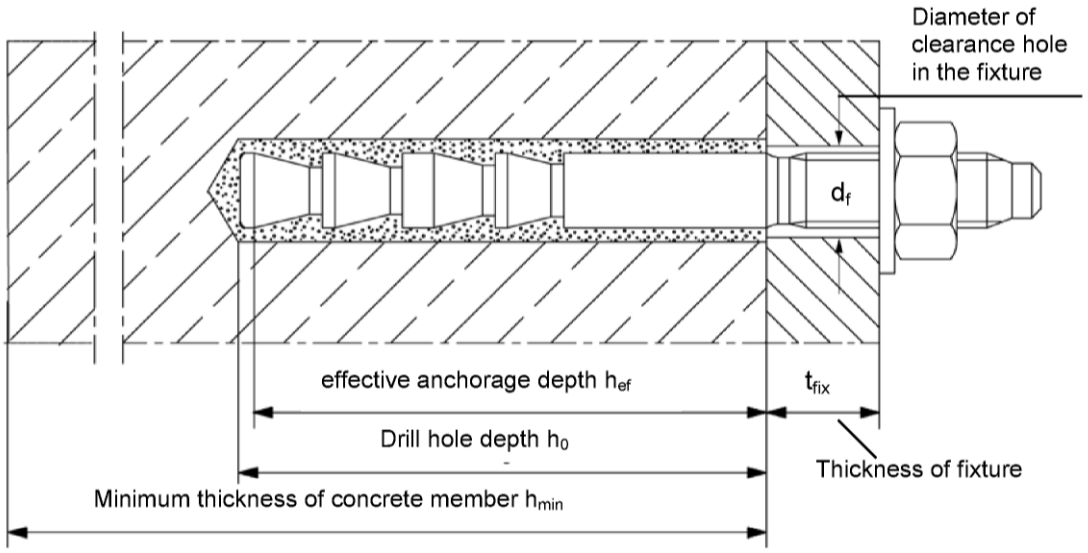
Installation conditions



fischer Highbond-anchor FHB	**Annex A 1**
Product description Installation conditions	

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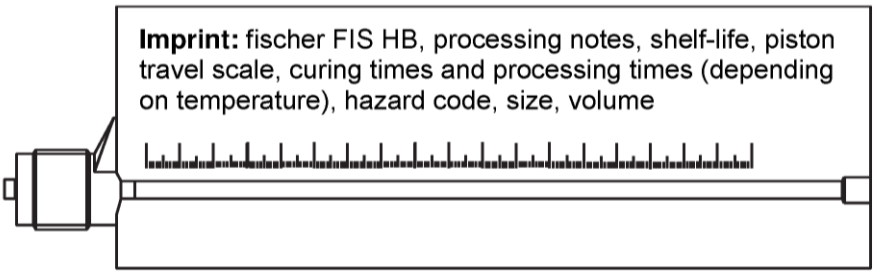
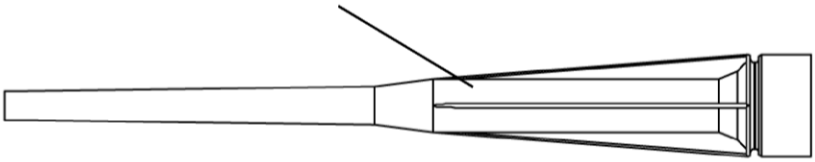
Mortar cartridge sizes FIS HB (360 ml or 150 ml)

Sealing cap



Static mixer FIS MR or UMR



Highbond-anchor FHB

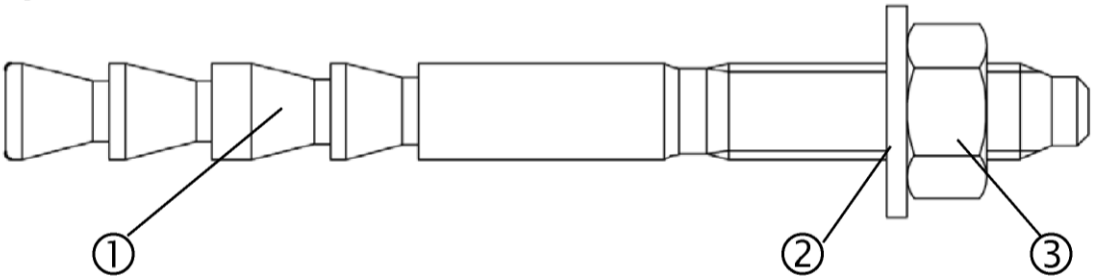


Table A1: Materials

Part	Designation	M10 to M16	M20 to M24
1	Anchor rod FHB-A	Steel f_{uk} = 800 N/mm² f_{yk} = 640 N/mm² (ISO 898-1: 2013) zinc plated ≥ 5µm, (EN ISO 4042:1999 A2K) f_{uk} ≤ 1000 N/mm² A_5 > 12% fracture elongation coated	Steel f_{uk} = 550 N/mm² f_{yk} = 440 N/mm² (ISO 898-1: 2013) zinc plated ≥ 5µm, (EN ISO 4042:1999 A2K) f_{uk} ≤ 1000 N/mm² A_5 > 12% fracture elongation coated
2	Washer ISO 7089:2000	zinc plated ≥ 5µm, EN ISO 4042:1999 A2K	
3	Hexagon nut	Property class 8;(EN ISO 898-2:2013), zinc plated ≥ 5µm,(ISO 4042:1999 A2K)	

fischer Highbond-anchor FHB	**Annex A 2**
Product description Cartridge/ static mixer/ anchor rod with hexagon nut and washer Materials	

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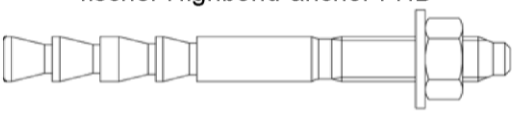
Specifications of intended use

Table B1: Overview use categories and performance categories

Anchorages subject to		FIS HB with fischer Highbond-anchor FHB 	
Hammer drilling		all sizes	
Static and quasi static load, in	uncracked concrete	all sizes	Tables:C1; C2; C3; C4
	cracked concrete		
Use category	dry and wet concrete	all sizes	
	flooded hole	all sizes	
Installation temperature		-5°C to +40°C	
In-service temperature	Temperature range	-40°C to +80°C	(Maximum short term temperature +80°C and maximum long term temperature +50°C)

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

Design:

- Anchorages have to be designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are 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 are designed in accordance with:
  - EOTA ETAG 001, Annex C, Design method A 08/2010

Installation:

- Anchor installation 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
- Keeping the effective anchorage depth
- Overhead installation is allowed

fischer Highbond-anchor FHB	**Annex B 1**
Intended Use Specifications	

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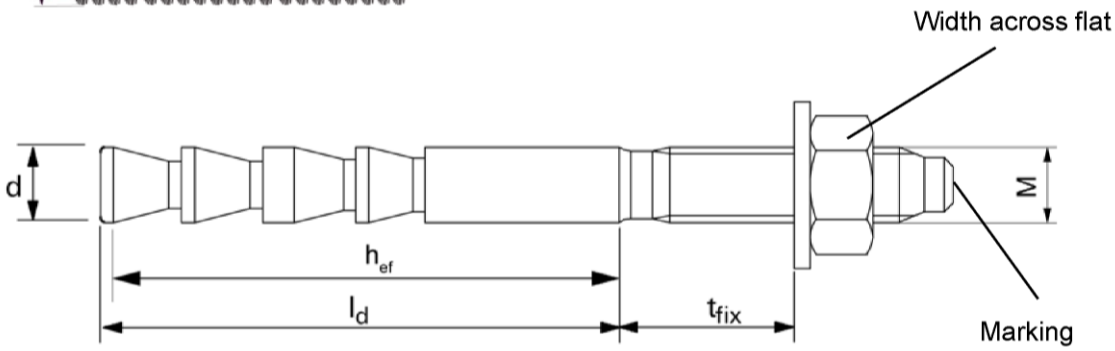
Table B2: Installation parameters for anchor rods FHB - A

Size			FHB – A 10x60	FHB – A 12x80	FHB – A 12x100	FHB – A 16x125	FHB – A 20x170	FHB – A 24x220
Width across flat	SW	[mm]	17	19		24	30	36
Nominal drill bit diameter	d_0		12	14		18	24	28
Drill hole depth	h_0		65	85	105	130	175	225
Embedment depth of anchor	l_d		62	82	102	128	175	225
Effective anchorage depth	$h_{ef,}$		60	80	100	125	170	220
Minimum spacing and minimum edge distance	s_{min} = c_{min}		60	80	100	100	150	180
Diameter of clearance hole in the fixture[1)]	d_f		12	14		18	22	26
Minimum thickness of concrete member	h_{min}		120	160	200	250	340	440
Maximum installation torque	$T_{inst,max}$	[Nm]	20	40		60	100	120
Corresponding steel brush	d_b	[mm]	13	16		20	26	30

[1)] For larger clearance holes in the fixture see EOTA ETAG 001, Annex C, 08/2010

Steel brush BS



Marking: Work symbol; size, anchorage depth h_{ef};

e.g.:  16 x 125

fischer Highbond-anchor FHB

Intended Use
Installation parameters for anchor rods FHB - A

Annex B 2

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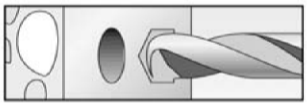
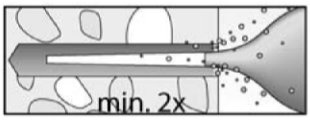
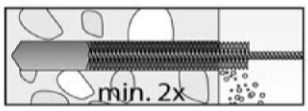
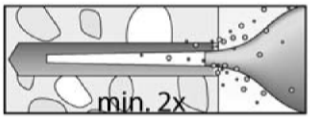
Table B3: Maximum processing times and minimum curing times

Concrete temperature[3] [°C]	Maximum processing times t_{work}[2] [minutes]	Minimum curing times t_{cure}[1] [minutes]
-5 to 0	--	360
>+1 to +5	--	180
>+6 to +10	15	90
>+11 to +20	6	35
>+21 to +30	4	20
>+31 to +40	2	12

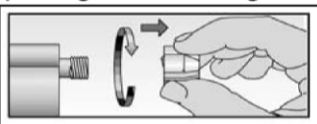
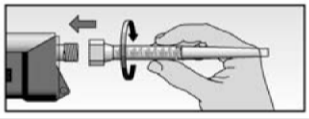
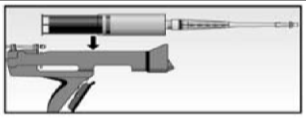
[1] In wet concrete or flooded hole the curing times must be doubled.
[2] The temperature of the mortar may not fall below +5°C.
[3] During the curing of the mortar the temperature of the concrete may not fall below -5°C.

Installation instructions (Part 1)

Drilling and cleaning the hole

1		Drill the hole. Drill hole diameter $\mathbf{d_0}$ and drill hole depth $\mathbf{h_0}$ see **Table B2.**
2		Blow out the drill hole twice. For anchor size ≥ M20 use oil free compressed air (≥ 6bar). For this use a pressure nozzle Ø 19 mm.
3		Brush the hole twice using a steel brush. Corresponding steel brushes see **Table B2**
4		Blow out the drill hole twice. For anchor size ≥ M20 use oil free compressed air (≥ 6bar). For this use a pressure nozzle Ø 19 mm.

Preparing the cartridge

5		Remove the sealing cap (do not use the sealing cap again)
6		Screw on the static mixer (the spiral in the static mixer must be clearly visible). Never use the mortar cartridge without a static mixer.
7		Place the cartridge into the dispenser
8		Extrude approximately 10 cm of material until the resin is evenly grey in colour. Do not use mortar that is not uniformly grey

fischer Highbond-anchor FHB	**Annex B 3**
Intended Use Working times and curing times Installation instructions (Part 1)	

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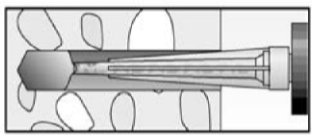
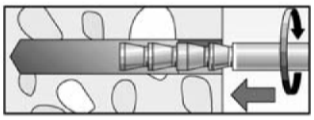
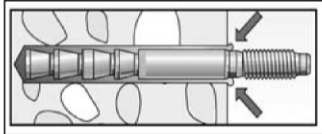
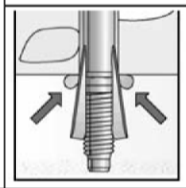
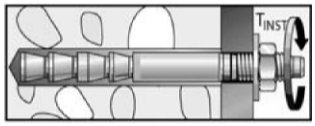
Installation instructions (Part 2)

Installation of anchor rods FHB-A

9		Observe the working time (t_{work}) of the mortar[1)] (see **Table B3**). Fill approx. 2/3 of the drill hole with mortar FIS HB. Always begin from the bottom of the hole and avoid bubbles (exact quantity of the mortar see installation instruction of the manufacturer).
10		Insert the Highbond- anchor rod FHB-A to the bottom of the mortar- filled bore hole (setting depth), turning it slightly while doing so.
		After inserting the anchor element, excess mortar must emerge around the anchor element
		For overhead installations support the anchor rod with wedges. (e.g. fischer centering wedges)
11		Observe the curing time (t_{cure}) of the mortar (see **Table B3**). Screw on the fixture and for installation check generate the correct torque moment ($t_{inst,max}$) (see **Table B2**)

[1)] If the working time has elapsed (work stoppage), use a new static mixer and, if necessary, remove crusted material on the mouth of the cartridge.

fischer Highbond-anchor FHB	**Annex B 4**
Intended Use Installation instructions (Part 2)	

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Table C1: Characteristic values of **steel bearing capacity** under **tensile / shear load**

Size FHB- A			**10x60**	**12x80**	**12x100**	**16x125**	**20x170**	**24x220**
Tensile load, steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	44	44	82	131	180
Partial safety factor[1)]								
Partial safety factor	$\gamma_{Ms,N}$	[-]	1,50					
Shear load, steel failure								
Without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	16	30	30	55	60	85
With lever arm								
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	60	105	105	266	357	617
Concrete edge failure								
Partial safety factor[1)]								
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,25					

[1)] In absence of other national regulations

fischer Highbond-anchor FHB

Performances
Steel bearing capacity

Annex C 1

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Table C2: General design factors for the bearing capacity under tensile / shear load; **uncracked or cracked concrete**

Size				All Sizes					
Bearing capacity under tensile load									
Factors for the compressive strength of concrete > C20/25									
Increasing factor for τ_{Rk}	C30/37	Ψ_c	[-]	1,22					
	C40/50			1,41					
	C50/60			1,55					
Splitting failure or concrete cone failure									
Edge distance	$c_{cr,sp} = c_{cr,N}$		[mm]	1,5 h_{ef}					
Spacing	$s_{cr,sp} = s_{cr,N}$		[mm]	3,0 h_{ef}					
Bearing capacity under shear load									
Concrete pry-out failure									
Factor k acc. to ETAG 001, Annex C, Section 5.2.3.3		k	[-]	2,0					
Concrete edge failure									
The value of h_{ef} (= l_f) under shear load			[mm]	60	80	100	125	170	220
Calculation diameters									
Size FHB- A				10x60	12x80	12x100	16x125	20x170	24x220
		d	[mm]	10	12	12	16	20	24

fischer Highbond-anchor FHB

Performances
Characteristic values of resistance under static or quasi-static action under shear load

Annex C 2

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Table C3: Characteristic **values** under tension load; **uncracked or cracked concrete**

Size FHB-A			**10x60**	**12x80**	**12x100**	**16x125**	**20x170**	**24x220**
Combined pullout and concrete cone failure								
Calculation diameter	d	[mm]	10	12		16	20	24
Uncracked concrete								
Characteristic resistance in uncracked concrete C20/25								
Temperature range 50 °C / 80 °C	$N_{Rk,p}$	[N/mm²]	20	25	35	50	60	115
Cracked concrete								
Characteristic resistance in cracked concrete C20/25								
Temperature range 50 °C / 80 °C	$N_{Rk,p}$	[N/mm²]	1)	1)	30	1)	60	95
Installation safety factors								
All installation conditions	$\gamma_2 = \gamma_{inst}$	[-]	1,0					

1) Pullout not decisive

Table C4: Displacements

Size FHB-A			**10x60**	**12x80**	**12x100**	**16x125**	**20x170**	**24x220**
Displacements under tension load								
Uncracked concrete								
Tension load	N	[kN]	9,5	11,9	16,7	23,8	28,6	54,8
Displacements	δ_{N0}	[mm]	0,2	0,2		0,3	0,3	0,5
	$\delta_{N\infty}$		0,8	0,7		0,7	0,7	1,1
Cracked concrete								
Tension load	N	[kN]	7,8	12,0	14,3	23,4	28,6	45,2
Displacements	δ_{N0}	[mm]	0,5	0,5		0,6	0,6	0,9
	$\delta_{N\infty}$		0,8	0,7		0,7	0,7	1,1
Displacements under shear load								
Uncracked or cracked concrete								
Shear load	V	[kN]	9,3	17,0		31,6	33,9	48,8
Displacements	δ_{V0}	[mm]	1,3					
	$\delta_{V\infty}$		2,0					

fischer Highbond-anchor FHB

Performances
Characteristic values under tension load
Displacements

Annex C 3