Deutsches Institut für Bautechnik

Anstalt des öffentlichen Rechts

Kolonnenstr. 30 L
10829 Berlin
Germany

Tel.: +49(0)30 787 30 0
Fax: +49(0)30 787 30 320
E-mail: dibt@dibt.de
Internet: www.dibt.de

Authorised and notified according to Article 10 of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products (89/106/EEC)

DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-05/0164

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung *Trade name*	fischer Highbond-Anker FHB II *fischer Highbond-Anchor FHB II*
Zulassungsinhaber *Holder of approval*	fischerwerke GmbH & Co. KG Otto-Hahn-Straße 15 79211 Denzlingen DEUTSCHLAND
Zulassungsgegenstand und Verwendungszweck *Generic type and use of construction product*	Kraftkontrolliert spreizender Verbunddübel in den Größen M8, M10, M12, M16, M20 und M24 zur Verankerung im Beton *Torque controlled bonded anchor of sizes M8, M10, M12, M16, M20 and M24 for use in concrete*
Geltungsdauer: vom *Validity: from*	29 April 2010
bis *to*	29 April 2015
Herstellwerk *Manufacturing plant*	fischerwerke

Diese Zulassung umfasst *This Approval contains*	17 Seiten einschließlich 9 Anhänge *17 pages including 9 annexes*
Diese Zulassung ersetzt *This Approval replaces*	ETA-05/0164 mit Geltungsdauer vom 08.09.2008 bis 07.09.2010 *ETA-05/0164 with validity from 08.09.2008 to 07.09.2010*

I LEGAL BASES AND GENERAL CONDITIONS

1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3];
- Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998[4], as amended by law of 31 October 2006[5];
- Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC[6];
- Guideline for European technical approval of "Metal anchors for use in concrete - Part 5: Bonded anchors", ETAG 001-05.

2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.

3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.

4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.

6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities L 40, 11 February 1989, p. 12
2 Official Journal of the European Communities L 220, 30 August 1993, p. 1
3 Official Journal of the European Union L 284, 31 October 2003, p. 25
4 *Bundesgesetzblatt Teil I 1998*, p. 812
5 *Bundesgesetzblatt Teil I 2006*, p. 2407, 2416
6 Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of construction product and intended use

1.1 Definition of the product

The fischer Highbond-Anchor FHB II in the range of M8, M10, M12, M16, M20 and M24 is a torque controlled bonded anchor consisting of a mortar cartridge with mortar fischer FIS HB or a glass capsule FHB II – P(F) and an anchor rod FHB II - A L or FHB II - 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).

An illustration of the product and intended use is given in Annex 1.

1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences. Safety in case of fire (Essential Requirement 2) is not covered in this European technical approval. The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at most according to EN 206:2000-12.

The anchor rod may be used in cracked and non-cracked concrete.

The capsule system may be used in dry or wet concrete or in flooded holes excepting sea water. The injection system may be used in dry or wet concrete; it must not be installed in flooded holes.

The anchor may be used in the following temperature range:

Temperature range:	-40 °C to +80 °C	(max short term temperature +80 °C and max long term temperature +50 °C)

Galvanised steel:

The anchor mad e of galvanised steel may only be used in structures subject to dry internal conditions.

Stainless steel (marking "A4"):

The anchor rod made of stainless steel with additional marking "A4" may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist. Such 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).

High corrosion resistant steel (marking "C"):

The anchor rod made of high corrosion resistant steel with additional marking "C" may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure, in permanently damp internal conditions or in other particular aggressive conditions. Such 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 chemical pollution (e. g. in desulphurization plants or road tunnels where de-icing materials are used).

The provisions made in this European technical approval are based on an assumed working life of the anchor of 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.

2 Characteristics of product and methods of verification

2.1 Characteristics of product

The anchor corresponds to the drawings and provisions given in Annexes 1 to 3. The values, dimensions and tolerances of the anchor not indicated in Annexes 1 to 3 shall correspond to the respective values laid down in the technical documentation[7] of this European technical approval.

The characteristic anchor values for the design of anchorages are given in Annexes 4 to 9.

Each anchor rod shall be marked with the identifying mark of the manufacturer (works symbol), with the anchor size and with the effective anchorage depth in accordance with Annex 2. Each anchor rod made of stainless steel is marked with the additional letter "A4" and each anchor rod made of stainless steel is marked with the additional letter "C".

Each glass capsule shall be marked with the identifying mark of the manufacturer and with the trade name in accordance with Annex 3.

Each mortar cartridge shall be marked with the identifying mark of the manufacturer and with the trade name in accordance with Annex 3.

The two components of the injection mortar fischer FIS HB are delivered in unmixed condition in mortar cartridges according to Annex 3.

2.2 Methods of verification

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Anchors for use in concrete", Part 1 "Anchors in general" and Part 5 "Bonded anchors" as well as the Technical Report TR 018 "Torque-controlled bonded anchors", on the basis of Option 1.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

7 The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the decision 96/582/EG of the European Commission[8] the system 2(i) (referred to as system 1) of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

(a) Tasks for the manufacturer:

(1) factory production control;

(2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed control plan;

(b) Tasks for the approved body:

(3) initial type-testing of the product;

(4) initial inspection of factory and of factory production control;

(5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan relating to this European technical approval which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik.[9]

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.3. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

---

8 Official Journal of the European Communities L 254 of 08.10.1996.

9 The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks of approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan relating to this European technical approval.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- the number of the guideline for European technical approval,
- use category (ETAG 001-1 Option 1),
- size.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the European technical approval and consequently the validity of the CE marking on the basis of the European technical approval and if so whether further assessment or alterations to the European technical approval shall be necessary.

4.2 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Annex C, Method A, 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.).

4.3 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site,
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor,
- Anchor installation in accordance with the manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European technical approval,
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply,
- Check of concrete being well compacted, e.g. without significant voids,
- Edge distance and spacing not less than the specified values without minus tolerances,
- Positioning of the drill holes without damaging the reinforcement,
- Drill holes must be made by hammer drilling only,
- In case of aborted hole: The hole shall be filled with mortar,
- The injection system must not be installed in flooded holes,
- Anchor installation acc. to the manufacturer's installation instructions,
- If the anchor is proper installed mortar must be visible at the member surface.
- The anchor component installation temperature shall be at least +5 °C.
- During curing of the mortar the temperature of the concrete must not fall below -5 °C.
- The curing time until the anchor may be loaded as given in Annex 3, Table 3 and 5 has to be observed.
- After the curing time the member to be anchored shall be fixed by using the torque wrench by not exceeding the torque moment given in Annex 4, Table 6 for FHB II – A L and Annex 5, Table 8 for FHB II - A S, respectively.

5 Indications to the manufacturer

5.1 Responsibility of the manufacturer

The manufacturer is responsible to ensure that the information on the specific conditions according to section 1 and 2 including Annexes referred to and 4.2 and 4.3 as well as 5.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- Diameter of drill bit,
- Hole depth,
- Diameter of anchor rod,
- Minimum effective anchorage depth,
- Maximum thickness of the fixture,
- Information on the installation procedure, including cleaning of the hole with the cleaning equipments, preferably by means of an illustration,
- Temperature of anchor components while installation,
- Ambient temperature of the concrete during installation of the anchor,
- Admissible processing time (open time) of a cartridge,
- Curing time until the anchor may be loaded as a function of the ambient temperature in the concrete during installation,
- Installation torque moment,
- Identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

5.2 Packaging, transport and storage

The mortar cartridges and the glass capsules shall be protected against sun radiation and shall be stored according to the manufacturer instructions in dry condition at temperatures of at least +5 °C to not more than +25 °C (Short time storage up to +35 °C is admissible).

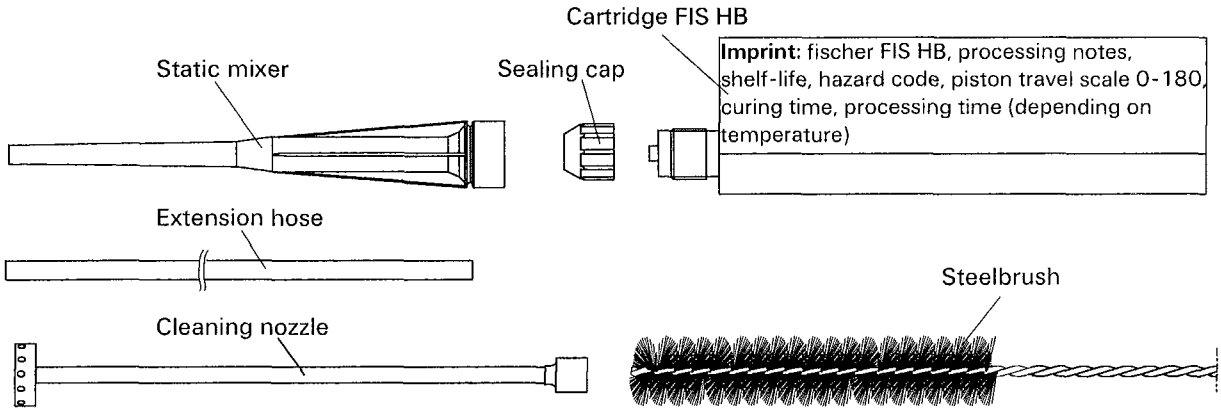
Mortar cartridges and glass capsules with expired shelf life must no longer be used.

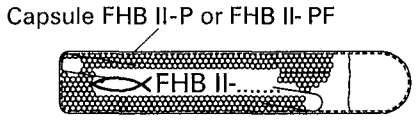
The anchor shall only be packaged and supplied as a complete unit. The mortar cartridges and glass capsules may be packed separately from anchor rods (including nut, washer and element for in-place anchorage).

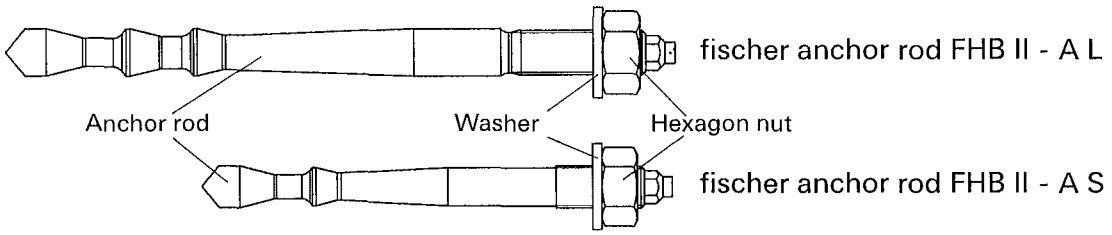
The manufacturer's installation instruction shall indicate that the mortar cartridges and glass capsules can be used only with the corresponding anchor rods of the manufacturer.

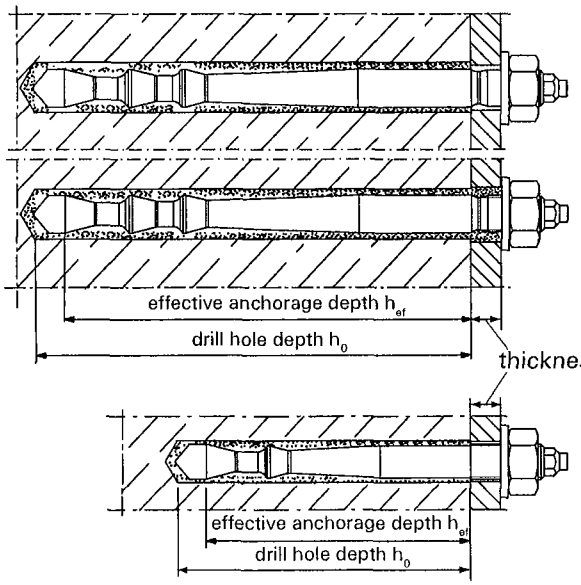
Dipl.-Ing. Georg Feistel
Head of Division Construction Engineering
of Deutsches Institut für Bautechnik
Berlin, 29 April 2010

beglaubigt
Lange









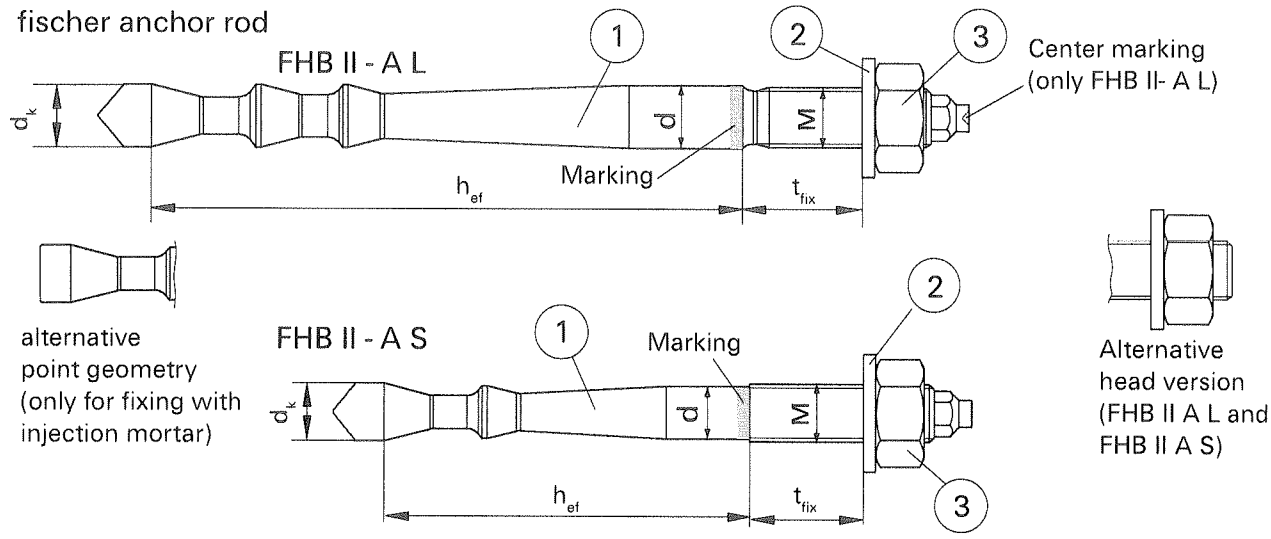
Temperature range: -40° C to +80°C (max. short temp. +80° C/max. long temp. +50° C)

	dry concrete	wet concrete	flooded hole
Cartridge system	x	x	-
Capsule system	x	x	x

fischer Highbond-Anchor FHB II	**Annex 1** of European Technical Approval ETA-05/0164
Product and intented use	

Doc: FHB II-03-10

fischer anchor rod



Marking: Works symbol, anchor size, effective anchorage depth h_{ef}. For stainless steel additional **A4**. For high corrosion-resistant steel additional **C**, e.g.: M12x75, or M12x75 A4, or M12x75 C. For high corrosion-resistant steel head marking **C** also frontal.

Table 1: Anchor dimensions

Size	**FHB II - A L**	M8	M10	M12	M16	M20	M24
Shank diameter	d [mm]	8,9	10,7	12,5	17,0	23,0	23,0
Cone diameter	d_k [mm]	9,4	10,7	12,5	16,8	23,0	23,0
Effective anchorage depth	$h_{ef,1}$ [mm]	60	95	100	125	210	210
	$h_{ef,2}$ [mm]	—	—	120	145	—	—
	$h_{ef,3}$ [mm]	—	—	—	160	—	—
Thickness of fixure	$t_{fix} \leq$ [mm]	1500					

Size	**FHB II - A S**	M10	M12	M16	M20	M24
Shank diameter	d [mm]	8,9	10,7	14,5	23,0	23,0
Cone diameter	d_k [mm]	9,4	11,3	14,5	23,0	23,0
Effective anchorage depth	$h_{ef,1}$ [mm]	60	75	95	170	170
	$h_{ef,2}$ [mm]	75	—	—	—	—
Thickness of fixure	$t_{fix} \leq$ [mm]	1500				

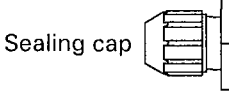
Table 2: Materials fischer anchor rod FHB II - A L and FHB II - A S

Part	Designation	Steel, zinc plated	Stainless steel (A4)	high corrosion-resitance steel (C)
1	Anchor rod FHB II - A L FHB II - A S	Property class 8.8, EN ISO 898-1 zinc plated ≥ 5 µm; A2K (EN ISO 4042)	Property class 70 EN ISO 3506, EN 10 088 1.4401; 1.4404;1.4578; 1.4571; 1.4439; 1.4362	Property class 70 EN 10 088 1.4565; 1.4529
2	Washer	EN ISO 7089, zinc plated ≥ 5 µm A2K (EN ISO 4042)	EN 10 088 1.4401; 1.4404;1.4578; 1.4571; 1.4439; 1.4362	EN 10 088 1.4565; 1.4529
3	Hexagon nut	Property class 8 DIN EN 20898-2 zinc plated ≥ 5 µm; A2K (EN ISO 4042)	Property class 70 EN ISO 3506, EN 10 088 1.4401; 1.4404;1.4578; 1.4571; 1.4439; 1.4362	Property class 70 EN 10 088 1.4565; 1.4529

fischer Highbond Anchor FHB II	**Annex 2** of European Technical Approval **ETA-05/0164**
Anchor dimensions Materials	

Doc: FHB II-05-10

Injection mortar FIS HB, mortar cartridge
different container



Mortar cartridge:
contains reaction mortar and additives

Hardener cartridge: contains hardener

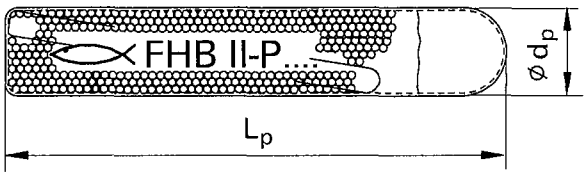
Table 3: Processing times and curing times

Concrete temperature	Processing time	Curing time [1] t_{cure}
- 5°C	—	6 hours
0°C	—	3 hours
5°C	15 minutes	90 minutes
20°C	6 minutes	35 minutes
30°C	4 minutes	20 minutes
> 40°C	2 minutes	12 minutes

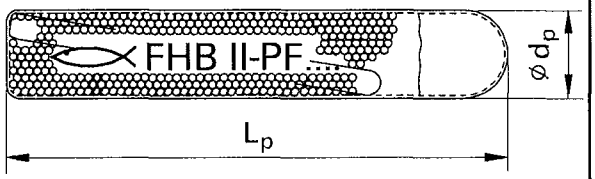
[1] For wet concrete the curing times must be doubled.

Mortar capsule

FHB II-P (standard)



FHB II-PF (quick)



Marking: Size and effective anchorage depth h_{ef}
Contains: Reaction mortar, additives and hardener

Table 4: Dimensions of the capsules FHB II-P and FHB II-PF

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

Table 5: Curing times

Capsule FHB II-P (standard)	
Concrete temperature	Curing times [1] t_{cure}
-5°C	4 hours
0°C	45 minutes
+10°C	20 minutes
≥ +20°C	10 minutes

Capsule FHB II-PF (quick)	
Concrete temperature	Curing times [1] t_{cure}
-5°C	8 minutes
0°C	6 minutes
+10°C	4 minutes
≥ +20°C	2 minutes

[1] For wet concrete the curing times must be doubled.

fischer Highbond Anchor FHB II

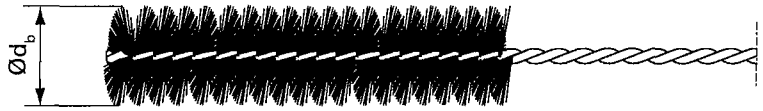
Injection mortar FIS HB cartridge and Capsules FHB II - P / FHB II - PF
Materials, dimensions,
processing times and curing times

Annex 3
of European
Technical Approval
ETA-05/0164

Table 6: Installation parameters anchor rod FHB II - A L

Size			M8x 60	M10x 95	M12x 100 | 120		M16x 125 | 145 | 160			M20x 210	M24x 210
Nominal drill diameter		d_0 = [mm]	10	12	14		18			25	
Drill hole depth		h_0 = [mm]	75	110	115	135	140	160	175	235	
Diameter of clearence hole in the fixure	Pre-positioned anchorage	$d_f \leq$ [mm]	9	12	14		18			22	26
	In-place anchorage	$d_f \leq$ [mm]	11	14	16		20			26	
Diameter of steel brush		$d_{b,nom}$ = [mm]	11	13	16		20			27	
Torque moment		T_{inst} = [Nm]	15	20	40		60			100	

Steel brush



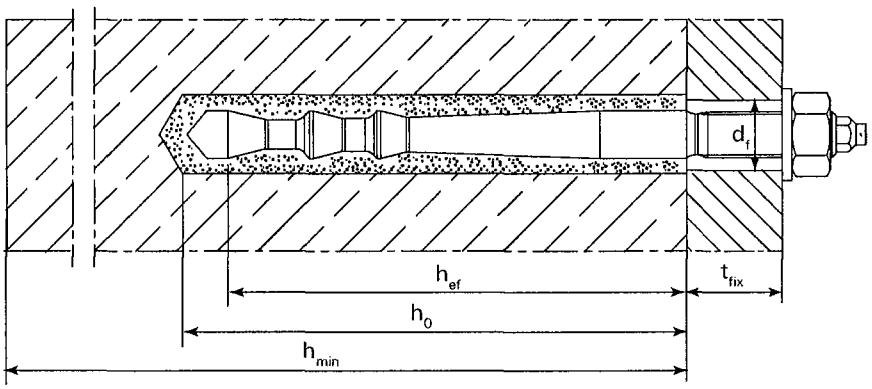


Table 7: Minimum distance and minimum member thickness FHB II - A L

Size	Minimum thickness of concrete member h_{min} [mm]	Minimum free edge distance and minimum spacing $s_{min} = c_{min}$ [mm]
FHB II - A L M 8x60	100	40
FHB II - A L M10x95	140	
FHB II - A L M12x100		50
FHB II - A L M12x120	170	
FHB II - A L M16x125	170	55
FHB II - A L M16x145	190	60
FHB II - A L M16x160	220	70
FHB II - A L M20x210	280	90
FHB II - A L M24x210		

fischer Highbond Anchor FHB II

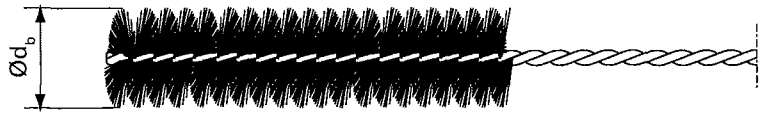
Installation parameters
Anchor rod FHB II - A L

Annex 4
of European
Technical Approval
ETA-05/0164

Table 8: Installation parameters anchor rod FHB II - A S

Size			M10x 60	M10x 75	M12x 75	M16x 95	M20x 170	M24x 170
Nominal drill diameter		d_0 = [mm]	10		12	16	25	
Depth of drill hole		h_0 = [mm]	75	90	90	110	190	
Diameter of clearance hole in the fixure	Pre-positioned anchorage	$d_f \leq$ [mm]	12		14	18	22	26
	In-place anchorage	$d_f \leq$ [mm]					26	
Diameter of steel brush		d_b = [mm]	11		13	20	27	
Torque moment		T_{inst} = [Nm]	15		30	50	100	

Steel brush



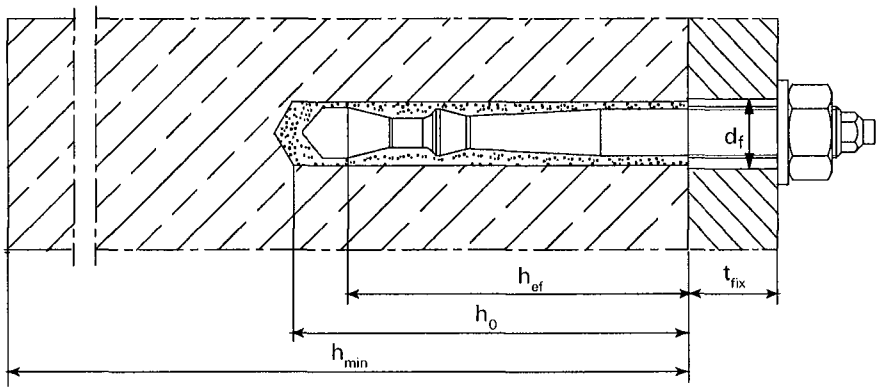
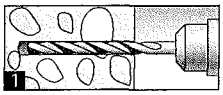


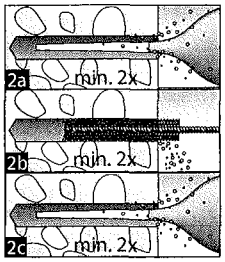
Table 9: Minimum distance and minimum member thickness FHB II - A S

Size	Minimum thickness of concrete member h_{min} [mm]	Minimum free edge distance and minimum spacing $c_{min} = s_{min}$ [mm]
FHB II - A S M10x60	100	40
FHB II - A S M10x75	120	
FHB II - A S M12x75		
FHB II - A S M16x95	150	50
FHB II - A S M20x170	240	80
FHB II - A S M24x170		

Installation instructions

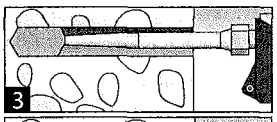


Drill the hole (h_0 and d_0 see Table 6 or 8).

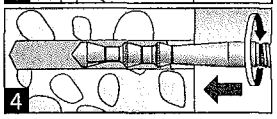


Clean the hole:
Blow out the hole two times,
brush the hole two times and
blow out the hole two times again.
For holes d_0 = 25 mm use oilfree pressure air and a cleaning nozzle.

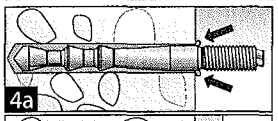
Installation with FIS HB mortar cartridge (pre-positioned and in-place anchorage)



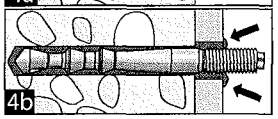
Fill the clean hole with mortar beginning from the bottom of the hole. For the quantity of mortar see installation instruction (scale divisions). Avoid bubbles! For holes $h_0 \geq 170$ mm use an extension hose.



Insert the fischer- anchor rod FHB II - A L or FHB II - A S by hand using light turning motions.

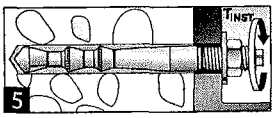


When reaching the setting depth marking of the rod, excess mortar must exit the drill hole (visual check).



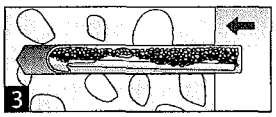
When using anchor FHB II - A L for in-place anchorange, fill the clearence hole in the fixure also completely with mortar.

Hardening times t_{cure} see Table 3

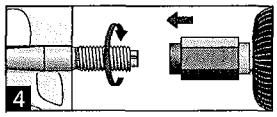


Attaching the fixture.
Torque moment T_{inst} see Table 6 or 8

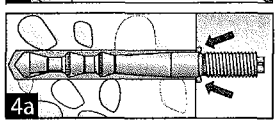
Installation with FHB II-P or FHB II-PF mortar capsule (pre-positioned anchorage)



Put the capsule into the clean drill hole.

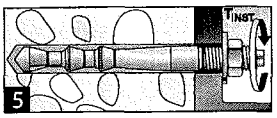


Rotate or punch the enclosed positioning screw and attach the anchor rod using a suitable hammer-action/percussion drill. If the setting depth is aligned with the concrete surface: stop!



When reaching the setting depth marking of the rod, excess mortar must exit the drill hole (visual check).

Hardening times t_{cure} see Table 5



Attaching the fixture.
Torque moment T_{inst} see Table 6 or 8

fischer Highbond-Anker FHB II	**Annex 6** of European Technical Approval ETA-05/0164
Installation instruction	

Table 10: Characteristic values for tension loads

Size		FHB II-A L									FHB II-A S					
		M8x 60	M10x 95	M12x 100	M12x 120	M16x 125	M16x 145	M16x 160	M20x 210	M24x 210	M10x 60	M10x 75	M12x 75	M16x 95	M20x 170	M24x 170
Steelfailure																
Characteristic resistance	$N_{Rk,s}$ [kN]	25,1	34,4	49,8	49,8	96,6	96,6	96,6	137,6	137,6	25,1	25,1	34,4	61,6	128,5	128,5
Partial safety factor	γ_{Ms} [3]	1,5														
Pullout failure in cracked concrete C20/25																
Characteristic resistance	$N_{Rk,p}$ [kN]	[4]														
Pullout and splitting failure in non-cracked concrete C20/25																
Characteristic resistance	$N_{Rk,p}$ [kN]	[4] [5]														
	$s_{cr,sp}$ [mm]	300	480	380	600	375	500	580	630	630	300	300	300	340	510	510
	$c_{cr,sp}$ [mm]	150	240	190	300	190	250	290	315	315	150	150	150	170	255	255
Pullout and splitting failure in non-cracked concrete C20/25																
Characteristic resistance	$N_{Rk,p}$ [6] [kN]	20	35	40	50	[4] [5]	75	95	[4] [5]		20	25	25	40	[4] [5]	
	$s_{cr,sp}$ [mm]	$3,0h_{ef}$														
	$c_{cr,sp}$ [mm]	$1,5h_{ef}$														
Increasing factors for $N^0_{Rk,sp}$	ψ_c C25/30	1,10														
	C30/37	1,22														
	C35/45	1,34														
	C40/50	1,41														
	C45/55	1,48														
	C50/60	1,55														
Partial safety factor	γ_{Mc} [2)3)]	1,5[1]	1,5								1,5[1]	1,5				
Concrete cone failure																
Effective anchoring depth	h_{ef} [mm]	60	95	100	120	125	145	160	210	210	60	75	75	95	170	170
Spacing	$s_{cr,N}$ [mm]	$3,0h_{ef}$														
Edge distance	$c_{cr,N}$ [mm]	$1,5h_{ef}$														
Partial safety factor	γ_{Mc} [2)3)]	1,5[1]	1,5								1,5[1]	1,5				

[1] With mortar capsule $\gamma_{Mc} = 1,8$ ($\gamma_2 = 1,2$ is included)

[2] The partial safety factor $\gamma_2 = 1,0$ is included.

[3] If no other national regulations exist.

[4] not decisive

[5] Proof of splitting failure according to ETAG 001, Annex C.

[6] Proof of splitting failure according to ETAG 001, Annex C (Section 5.3). Instead of $N^0_{Rk,c}$ use $N_{Rk,p}$

Table 11: Characteristic values to shear load

Size			FHB II-A L								FHB II-A S					
			M8x 60	M10x 95	M12x 100	M12x 120	M16x 125	M16x 145	M16x 160	M20x 210	M24x 210	M10x 60	M10x 75	M12x 75	M16x 95	M20x 170	M24x 170
Effective anchrage depth	h_{ef}	[mm]	60	95	100	120	125	145	160	210	210	60	75	75	95	170	170
Steel failure without lever arm																	
Charac-teristic resistance	$V_{Rk,s}$ gvz	[kN]	13,7	20,8	30,3		56,3			87,9	126,9	19,7		27,3	50,8	80,3	114,2
	A4	[kN]	15,2	23,2	33,7		62,7			97,9	141,0	24,1		33,7	62,7	97,9	124,5
	C	[kN]	15,2	23,2	33,7		62,7			97,9	141,0	24,1		33,7	62,7	97,9	141,0
Partial safety factor	γ_{Ms} [1]	[-]	1,25														
Steel failure with lever arm																	
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	31	60	105		266			519	896	62		105	266	519	896
Partial safety factor	γ_{Ms} [1]	[-]	1,25														
Concrete pryout failure																	
Factor k in equation (5.6) of ETAG Annex C, Section5.2.3.3		[-]	2,0														
Partial safety factor	γ_{Mcp} [1]	[-]	1,5														
Concrete edge failure																	
Effective length of anchor	l_f	[mm]	60	95	100	112	125	144	144	200	200	60	75	75	95	170	170
Effective diameter	d_{nom}	[mm]	10	12	14		18			25		10		12	16	25	
Partial safety factor	γ_{Mc} [1]	[-]	1,5														

[1] If no other national regulations exist.

Table 12: Displacements under tension load

Size	Tension load in cracked concrete [kN]	Displacement δ_{N0} [mm]	Displacement $\delta_{N\infty}$ [mm]	Tension load in un-cracked concrete [kN]	Displacement δ_{N0} [mm]	Displacement $\delta_{N\infty}$ [mm]
FHB II-A L						
M8x60	6,6	0,8	1,7	9,3	0,2	1,7
M10x95	15,9			22,3	0,4	
M12x100	17,1			24,0		
M12x120	22,5			31,6		
M16x125	24,0	0,6		33,6		
M16x145	30,0			42,0		
M16x160	34,7			48,7		
M20x210	52,2			73,2	0,6	
M24x210	52,2			73,2		
FHB II-A S						
M10x60	6,6	0,8	1,7	9,3	0,2	1,7
M10x75	11,1	0,3		15,6		
M12x75	11,1			15,6		
M16x95	15,9	0,4		22,3		
M20x170	38,0	0,6		53,3	0,5	
M24x170	38,0			53,3		

Table 13: Displacements under shear load

Size	Steel, zink plated Shear load [kN]	Displacement δ_{V0} [mm]	Displacement $\delta_{V\infty}$ [mm]	Stainless steel Shear load [kN]	Displacement δ_{V0} [mm]	Displacement $\delta_{V\infty}$ [mm]	High corrosion-resitant steel Shear load [kN]	Displacement δ_{V0} [mm]	Displacement $\delta_{V\infty}$ [mm]
FHB II-A L									
M8x60	7,8	1,2	1,8	8,7	1,0	1,5	8,7	1,2	1,8
M10x95	11,9	1,2	1,8	13,3	1,0	1,5	13,3	1,2	1,8
M12x100	17,3	1,3	2,0	19,3	1,1	1,7	19,3	1,3	2,0
M12x120	17,3	1,3	2,0	19,3	1,1	1,7	19,3	1,3	2,0
M16x125	32,2	1,3	2,0	35,8	2,2	3,3	35,8	2,4	3,6
M16x145	32,2	1,3	2,0	35,8	2,2	3,3	35,8	2,4	3,6
M16x160	32,2	1,3	2,0	35,8	2,2	3,3	35,8	2,4	3,6
M20x210	50,2	3,5	5,3	55,9	3,5	5,3	55,9	3,7	5,6
M24x210	72,5	3,5	5,3	80,6	3,5	5,3	80,6	5,0	7,5
FHB II-A S									
M10x60	11,3	1,2	1,8	13,8	1,0	1,5	13,8	1,2	1,8
M10x75	11,3	1,2	1,8	13,8	1,0	1,5	13,8	1,2	1,8
M12x75	12,7	1,5	2,3	19,3	1,1	1,7	19,3	1,3	2,0
M16x95	29,0	1,5	2,3	35,8	2,2	3,3	35,8	2,4	3,6
M20x170	45,9	2,8	4,2	55,9	3,5	5,3	55,9	3,7	5,6
M24x170	65,3	2,8	4,2	71,1	3,5	5,3	80,6	5,0	7,5