

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-06/0171
of 23 June 2021

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 / FHB dyn / FDA

Product family
to which the construction product belongs

Bonded expansion fastener for use in concrete

Manufacturer

fischerwerke GmbH & Co. KG
Klaus-Fischer-Straße 1
72178 Waldachtal
DEUTSCHLAND

Manufacturing plant

fischerwerke

This European Technical Assessment
contains

39 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

EAD 330499-01-0601 Edition 04/2020

This version replaces

ETA-06/0171 issued on 26 May 2017

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Specific Part

1 Technical description of the product

The Fischer Highbond-Anchor FHB / FHB dyn / FDA is a bonded expansion fastener consisting of an injection cartridge FIS HB and a steel element. The steel element is made of zinc plated or stainless steel.

The load transfer is realized by mechanical interlock of several cones in the bonding mortar and a combination of bonding and friction forces in the 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 to tension load (static and quasi-static loading)	See Annex C 1 to C 3, B 5 to B 8
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1 and C 2
Displacements under short-term and long-term loading	See Annex C 3
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

3.2 Hygiene, health and the environment (BWR 3)

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

English translation prepared by DIBt

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

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

The system to be applied is: 1

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 23 June 2021 by Deutsches Institut für Bautechnik

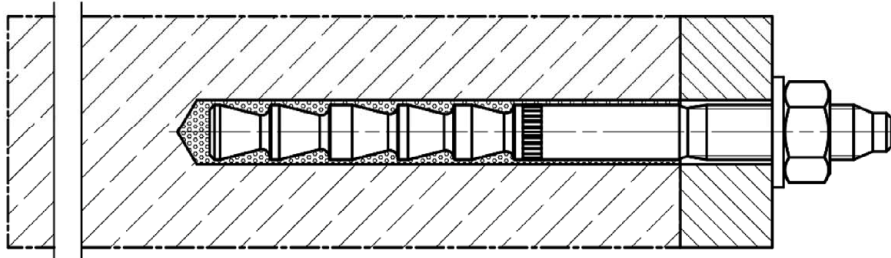
Dipl.-Ing. Beatrix Wittstock
Referatsleiterin

beglaubigt:
Lange

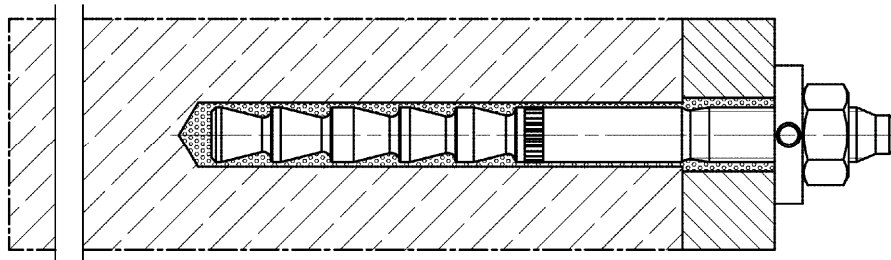
Installation conditions Part 1, FHB / FHB N

fischer Highbond-Anchor FHB / FHB N with fischer injection system FIS HB

Pre-positioned installation



Pre-positioned or push through installation with subsequently injected fischer filling disc (annular gap filled with mortar)



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Product description

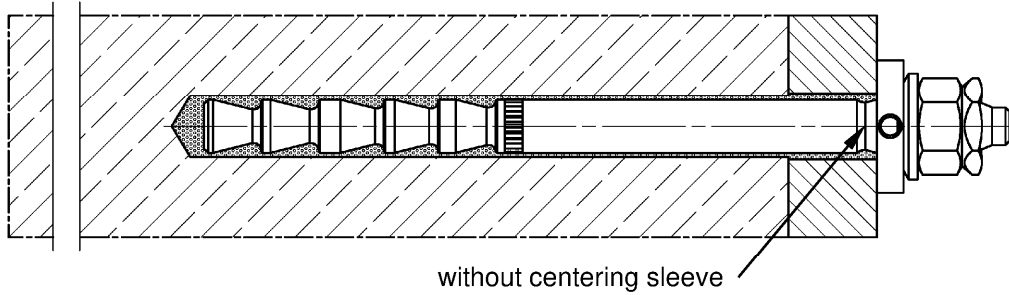
Installation conditions part 1, fischer Highbond-Anchor FHB / FHB N

Annex A 1

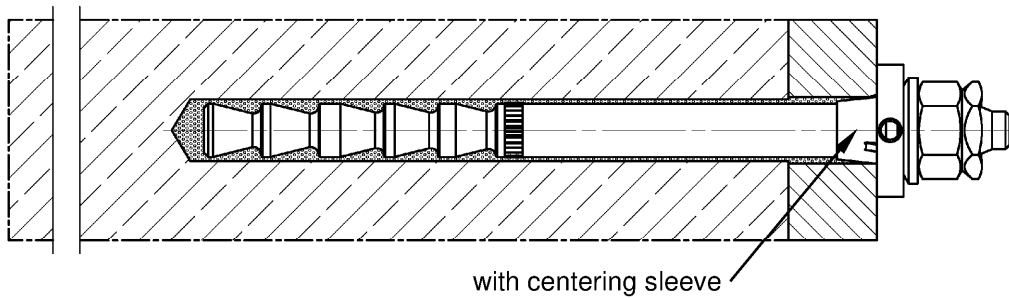
Installation conditions Part 2, FHB dyn

fischer Highbond-Anchor dynamic FHB dyn with fischer injection system FIS HB

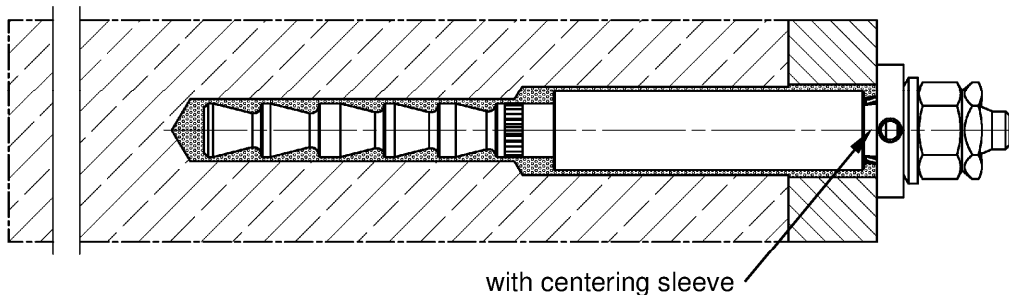
Pre-positioned installation without shear force sleeve, FHB dyn (annular gap filled with mortar)



Push through installation without shear force sleeve, FHB dyn (annular gap filled with mortar)



Push through installation with shear force sleeve, FHB dyn V (annular gap filled with mortar)



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Product description

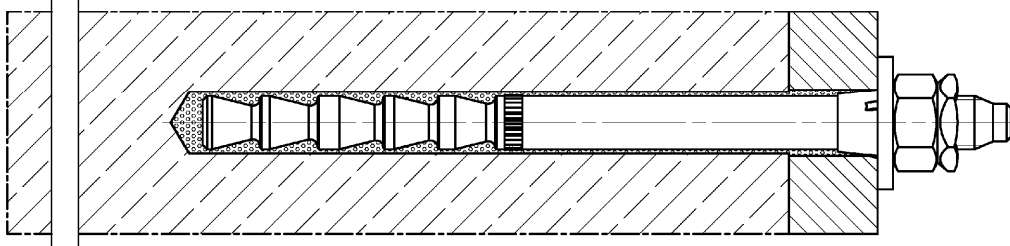
Installation conditions part 2, fischer Highbond-Anchor FHB dyn

Annex A 2

Installation conditions Part 3, FDA

fischer Dynamic-Anchor FDA with fischer injection system FIS HB

Push through installation



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Product description

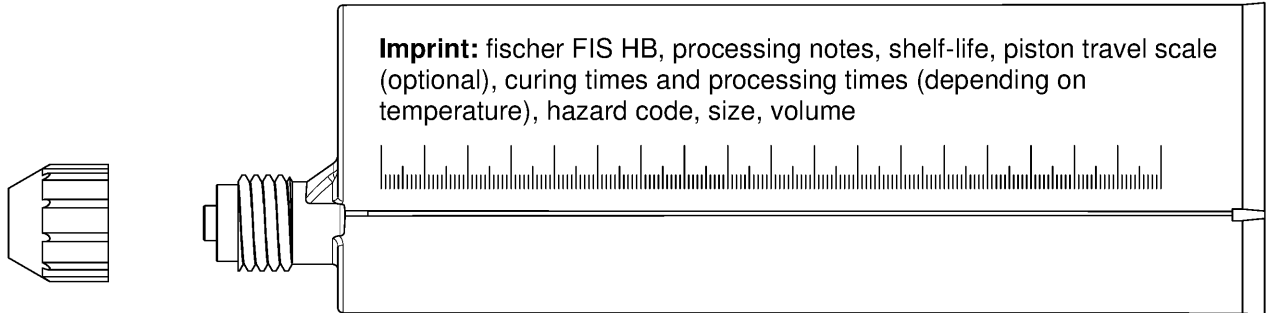
Installation conditions Part 3, fischer Dynamic-Anchor FDA

Annex A 3

Overview system components part 1

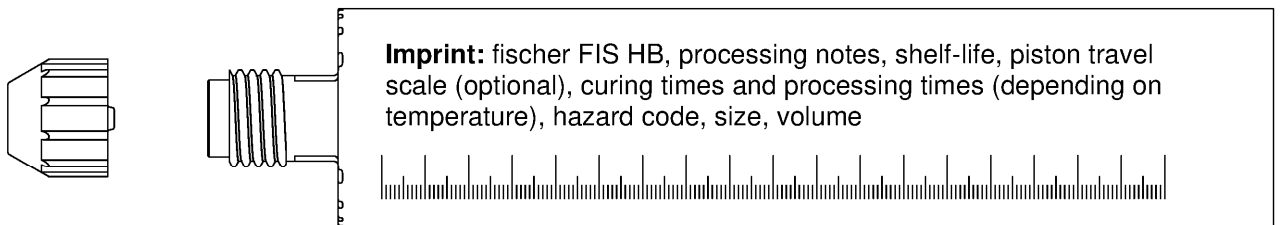
Injection cartridge (shuttle cartridge) with sealing cap

Size: 345 ml, 360 ml, 825 ml

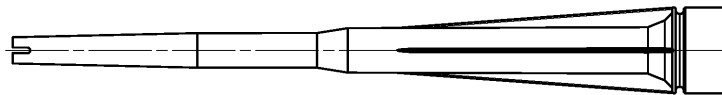


Injection cartridge (coaxial cartridge) with sealing cap

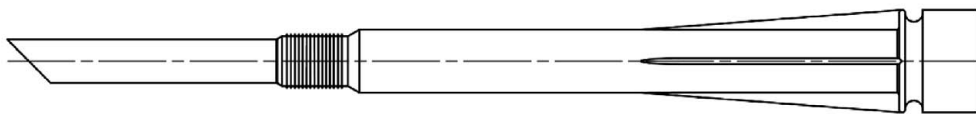
Size: 150 ml, 300 ml, 380 ml, 400 ml, 410 ml



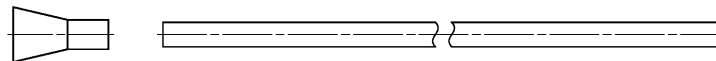
Static mixer FIS MR Plus for injection cartridges up to 410 ml



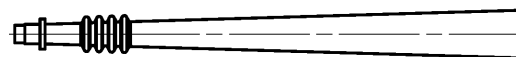
Static mixer FIS JMR for injection cartridge 825 ml



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



Injection adapter



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

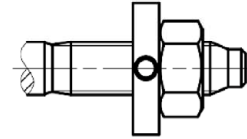
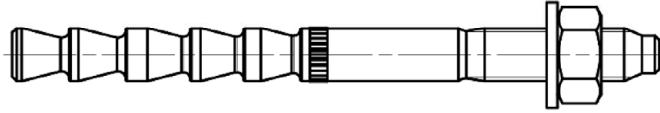
Product description

Overview system components part 1
cartridges / static mixer / accessories

Annex A 4

Overview system components part 2

fischer Highbond-Anchor FHB / FHB N (alternative designation)



fischer anchor rod FHB-A / FHB-A N; Size: M10x60

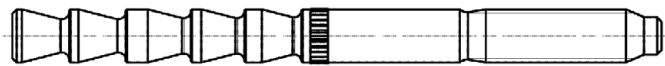
alternative version



fischer anchor rod FHB-A / FHB-A N; Size: M12x80

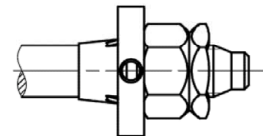
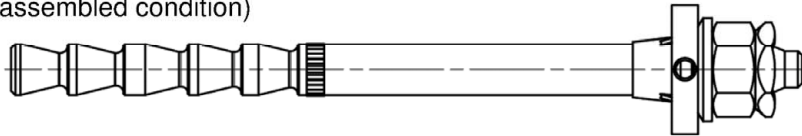


fischer anchor rod FHB-A / FHB-A N; Size: M12x100, M16x125, M20x170, M24x220



fischer Highbond-Anchor dynamic FHB dyn without shear force sleeve

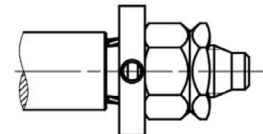
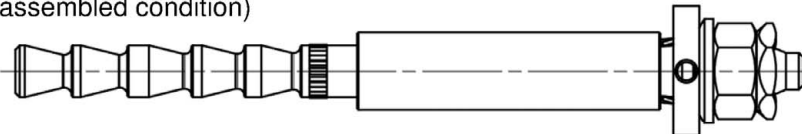
(in assembled condition)



alternative version:
hexagonal nut with
spherical contact surface

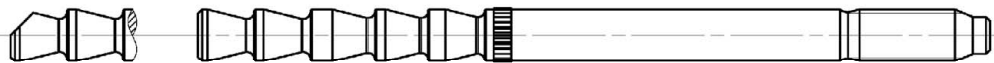
fischer Highbond-Anchor dynamic FHB dyn V with shear force sleeve

(in assembled condition)

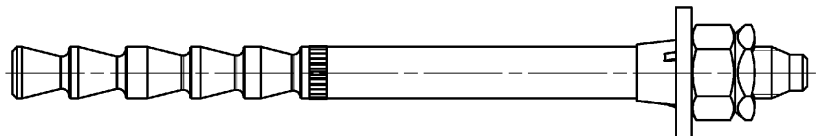


fischer anchor rod FHB-A dyn; Size: M12, M16, M20, M24

alternative

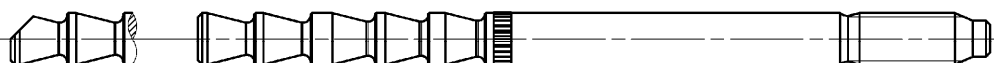


fischer Dynamic-Anchor FDA



fischer anchor rod FDA-A; Size: M12, M16

alternative



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Product description

Overview system components part 2
Metal parts

Annex A 5

Overview system components part 3

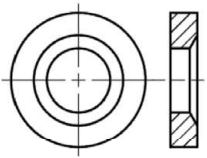
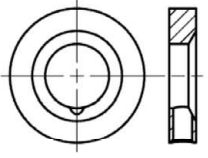
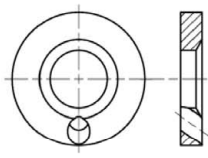
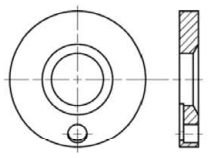
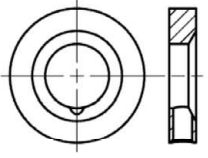
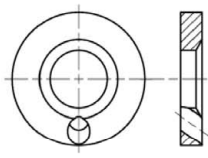
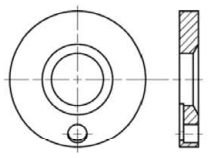
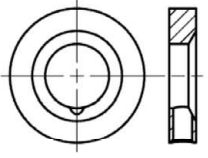
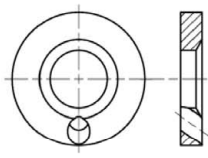
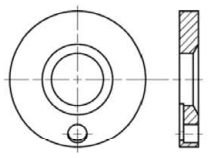
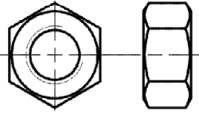
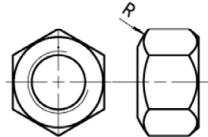
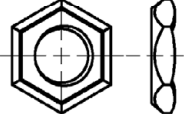

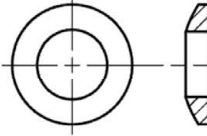
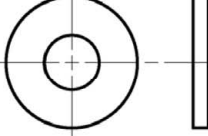
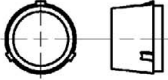
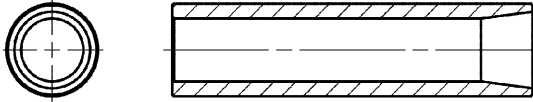
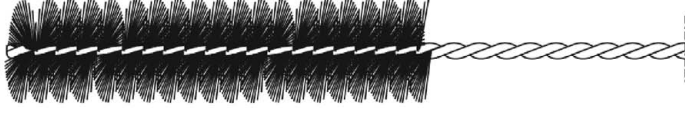

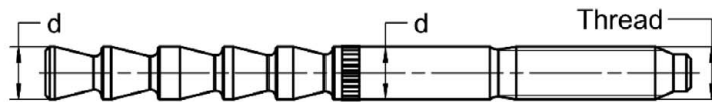
<p>conical washer without drill hole</p> 	<p>fischer filling disc (various versions)</p> <table border="1"> <tr> <td data-bbox="496 376 836 611"> <p>radial</p>  </td> <td data-bbox="841 376 1177 611"> <p>angular</p>  </td> <td data-bbox="1182 376 1522 611"> <p>axial</p>  </td> </tr> </table>			<p>radial</p> 	<p>angular</p> 	<p>axial</p> 
<p>radial</p> 	<p>angular</p> 	<p>axial</p> 				
<p>hexagon nut</p> 	<p>hexagonal nut with spherical contact surface</p> 	<p>lock nut</p> 	<p>hexagon nut, flat</p> 			
<p>spherical washer</p> 	<p>washer</p> 	<p>centering sleeve</p>  <p>only push through installation; FHB dyn and FDA</p>				
<p>shear force sleeve (only FHB dyn V)</p> 						
<p>cleaning brush BS</p> 						
<p>blow-out pump ABP with cleaning nozzle or ABG</p> 						
<p style="text-align: right;">Figures not to scale</p>						
<p>fischer Highbond-Anchor FHB / FHB dyn / FDA</p>			<p style="text-align: center;">Annex A 6</p>			
<p>Product description Overview system components part 3 Metal parts / cleaning brush / blow-out pump</p>						

Table A7.1: Dimensions system components, FHB / FHB N

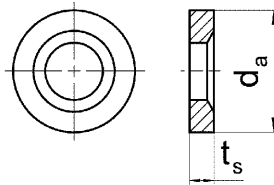
Designation		FHB 10x60	FHB 12x80	FHB 12x100	FHB 16x125	FHB 20x170	FHB 24x220
Thread	[-]	M10	M12	M12	M16	M20	M24
Anchor rod	d	10	12	12	16,5	22	24,5
Conical washer / fischer filling disc	$\geq d_a$	26	30	30	38	46	54
	t_s	6	6	6	7	8	10

Anchor rod:



Conical washer /
fischer filling disc:

(various versions see
Annex A 6)



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

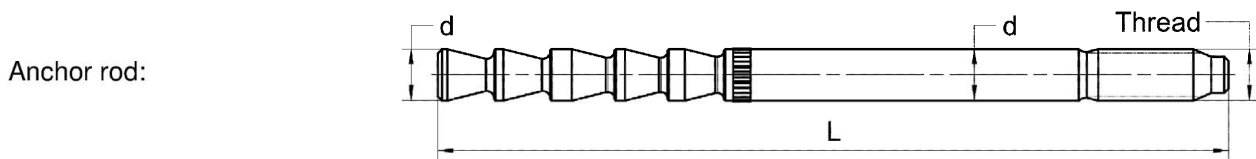
Product description

Dimensions system components, FHB / FHB N

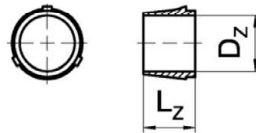
Annex A 7

Table A8.1: Dimensions system components, FHB dyn / FHB dyn V

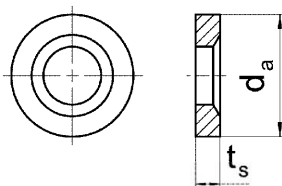
Designation		FHB dyn without shear force sleeve				FHB dyn V with shear force sleeve	
		FHB dyn 12x100	FHB dyn 16x125	FHB dyn 20x170	FHB dyn 24x220	FHB dyn 12x100 V	FHB dyn 16x125 V
Thread	[-]	M12	M16	M20	M24	M12	M16
Anchor rod	d	12	16,5	22	24,5	12	16,5
	L _{min}	135	168	220	280	140	173
	L _{max}	332	365	415	475	337	367
Centering sleeve	D _z	11,8	16,3	21,8	24,3	11,8	16,3
	L _z	11	13	15	15	11	13
Conical washer / fisher filling disc	≥ d _a	30	38	46	54	30	38
	t _s	6	7	8	10	6	7
Shear force sleeve	L _{Q,min}	-	-	-	-	40	55
	L _{Q,max}	-	-	-	-	230	245
	D _Q	-	-	-	-	17,5	23,5



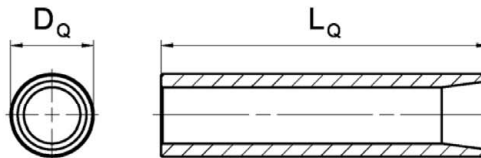
Centering sleeve:
(only push through
installation)



Conical washer /
fisher filling disc:
(various versions see
Annex A 6)



Shear force sleeve:
(only FHB dyn V)



Figures not to scale

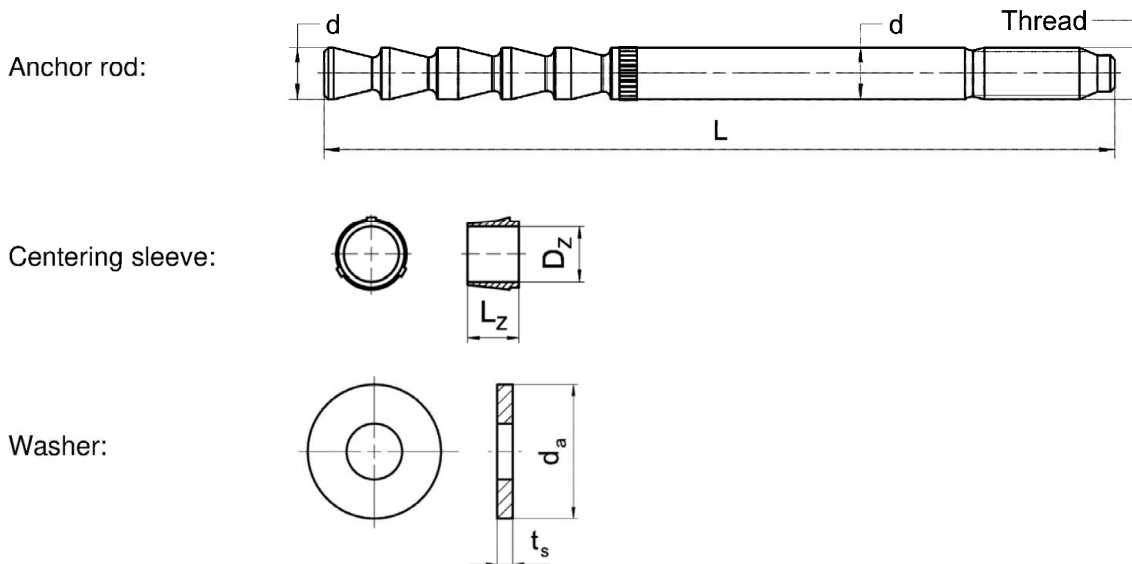
fischer Highbond-Anchor FHB / FHB dyn / FDA

Product description
Dimensions system components, FHB dyn / FHB dyn V

Annex A 8

Table A9.1: Dimensions system components, FDA

Designation		FDA 12x100	FDA 16x125
Thread	[-]	M12	M16
Anchor rod	d	12	16,5
	L _{min}	135	168
	L _{max}	332	365
Centering sleeve	D _z	11,8	16,3
	L _z	11	13
Washer	≥ d _a	30	40
	t _{s,min}	3,5	4
	t _{s,max}	7	8



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Product description
Dimensions system components, FDA

Annex A 9

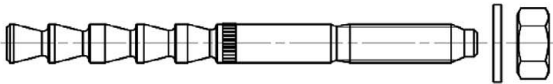


Table A10.1: Materials, FHB / FHB N zinc plated

Part	Designation	Material		
1	Injection cartridge	Mortar, hardener, filler		
	Steel grade	Steel		
		electroplated (gvz)		hot dip galvanised (hdg)
		M10 to M16	M20 to M24	M10 to M24
2	fischer anchor rod FHB-A and FHB-A N	Property class 5.8 Property class 8.8 EN ISO 898-1:2013 electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018 $A_5 > 12\%$ fracture elongation coated	$f_{uk} = 550 \text{ N/mm}^2$ $f_{yk} = 440 \text{ N/mm}^2$ EN ISO 898-1:2013 electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018 $A_5 > 12\%$ fracture elongation coated	Property class 8.8 EN ISO 898-1:2013 hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004 $A_5 > 12\%$ fracture elongation varnish layer coated (M16 to M24)
3	Washer ISO 7089:2000	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018		hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004
4	Conical washer or fischer filling disc similar to DIN 6319-G	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018		hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004
5	Hexagon nut	Property class 8 EN ISO 898-2:2012 electroplated $\geq 5 \mu\text{m}$, Zn5/An (A2K) acc. to EN ISO 4042:2018		Property class 8 EN ISO 898-2:2012 hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004
fischer Highbond-Anchor FHB / FHB dyn / FDA				Annex A 10
Product description Materials, FHB / FHB N zinc plated				

Table A11.1: Materials, FHB / FHB N stainless steel				
Part	Designation	Material		
1	Injection cartridge	Mortar, hardener, filler		
	Steel grade	Stainless steel R		High corrosion resistant steel HCR
		acc. to EN 10088-1:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2015		acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2015
		M10 to M16	M20 to M24	M10 to M24
2	fischer anchor rod FHB-A and FHB-A N	$f_{uk} = 800 \text{ N/mm}^2$ $f_{yk} = 640 \text{ N/mm}^2$ 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 $A_5 > 12\%$ fracture elongation coated	$f_{uk} = 700 \text{ N/mm}^2$ $f_{yk} = 560 \text{ N/mm}^2$ 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 $A_5 > 12\%$ fracture elongation coated	$f_{uk} = 700 \text{ N/mm}^2$ $f_{yk} = 560 \text{ N/mm}^2$ EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014 $A_5 > 12\%$ fracture elongation coated
3	Washer ISO 7089:2000	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	Conical washer or fischer filling disc similar to DIN 6319-G	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014		1.4565; 1.4529; EN 10088-1:2014
5	Hexagon nut	Property class 70 or 80 EN ISO 3506-2:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014		Property class 70 or 80 EN ISO 3506-2:2020 1.4565; 1.4529; EN 10088-1:2014
fischer Highbond-Anchor FHB / FHB dyn / FDA				Annex A 11
Product description Materials, FHB / FHB N stainless steel				

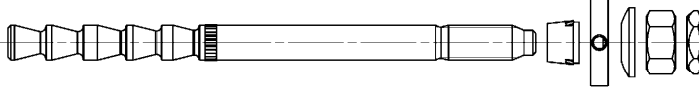
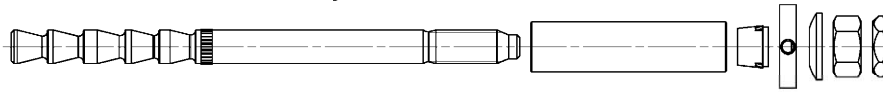


Part	Designation	Material	
1	Injection cartridge	Mortar, hardener, filler	
	Steel grade	Steel	High corrosion resistant steel HCR
		electroplated (gvz)	acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2015
		M12 to M24	M12 to M16
2	fischer anchor rod FHB-A dyn	Property class 8.8 EN ISO 898-1:2013 electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018 $A_5 > 12\%$ fracture elongation coated	EN ISO 3506-1:2009 1.4529 EN 10088-1:2014 $f_{uk} \geq 700 \text{ N/mm}^2$ $A_5 > 12\%$ fracture elongation coated
3	Centering sleeve	Plastic	
4	Conical washer or fischer filling disc similar to DIN 6319-G	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018	1.4529 EN 10088-1:2014
5	Spherical washer	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018	1.4529 EN 10088-1:2014
6a	Hexagon nut	Property class 8 EN ISO 898-2:2012 electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018	Property class 70 EN ISO 3506-2:2020 1.4529 EN 10088-1:2014
6b	hexagonal nut with spherical contact surface		
7a	Lock nut	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018	1.4529 EN 10088-1:2014
7b	hexagon nut, flat		
8	Shear force sleeve	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018	---
fischer Highbond-Anchor FHB / FHB dyn / FDA			Annex A 12
Product description Materials, FHB dyn			

Table A13.1: Materials, FDA		
Part	Designation	Material
1	Injection cartridge	Mortar, hardener, filler
	Steel grade	Steel
		electroplated (gvz)
		M12 to M16
2	fischer anchor rod FDA-A	Property class 8.8 EN ISO 898-1:2013 electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018 $A_5 > 12 \%$ fracture elongation coated
3	Centering sleeve	Plastic
4	Washer	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018
5	Hexagon nut	Property class 8 EN ISO 898-2:2012 electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018
6	Lock nut	electroplated $\geq 5 \mu\text{m}$ Zn5/An (A2K) acc. to EN ISO 4042:2018
fischer Highbond-Anchor FHB / FHB dyn / FDA		Annex A 13
Product description Materials, FDA		

Specifications of intended use (part 1), FHB / FHB N		
Table B1.1: Overview use and performance categories, FHB / FHB N		
fischer Highbond-Anchor FHB / FHB N with FIS HB		
		
Hammer drilling with standard drill bit 	all sizes; Nominal drill bit diameter (d_0) 12 mm to 28 mm	
Hammer drilling with hollow drill bit  (fischer "FHD"; Heller "Duster Expert"; Bosch "Speed Clean"; Hilti "TE-CD, TE-YD"; DreBo „D-Plus“; DreBo „D-Max“)		
Static and quasi static load, in uncracked concrete <hr/> cracked concrete	all sizes; M10 to M24	Tables: C1.1 C2.1 C3.1
Use category 11 dry or wet concrete	all sizes; M10 to M24	
Use category 12 water filled hole	all sizes; M10 to M24	
Installation direction	D3 Downwards, horizontal and upwards (overhead) installation	
Installation method	pre-positioned or push through installation	
Installation temperature ¹⁾	FIS HB: $T_{i,min} = -5\text{ °C}$ to $T_{i,max} = +40\text{ °C}$	
In-service temperature	Temperature range I:	-40 °C to +40 °C (max. short term temperature +40 °C; max. long term temperature +24 °C)
	Temperature range II:	-40 °C to +80 °C (max. short term temperature +80 °C; max. long term temperature +50 °C)
¹⁾ For the standard variation of temperature after installation		
fischer Highbond-Anchor FHB / FHB dyn / FDA		Annex B 1
Intended use Specifications (part 1), FHB / FHB N		

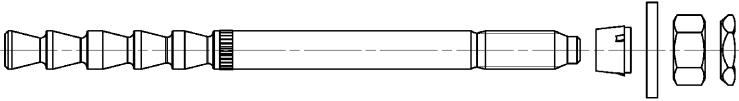
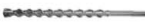

Specifications of intended use (part 2), FHB dyn

Table B2.1: Overview use and performance categories, FHB dyn

		fischer Highbond-Anchor dynamic FHB dyn with FIS HB			
		<p>FHB-A dyn, without shear force sleeve (picture with centering sleeve; use only for push through installation)</p> 			
		<p>FHB-A dyn V, with shear force sleeve</p> 			
		FHB dyn		FHB dyn V	
Hammer drilling with standard drill bit		all sizes; Nominal drill bit diameter (d ₀) 14 mm to 28 mm		all sizes; Nominal drill bit diameter (d ₀) 14 mm and 18 mm Nominal drill bit diameter (d ₁) 20 mm and 28 mm	
Hammer drilling with hollow drill bit					
(fischer "FHD", Heller "Duster Expert"; Bosch "Speed Clean"; Hilti "TE-CD, TE-YD"; DreBo „D-Plus“; DreBo „D-Max“)					
Static and quasi static load, in	uncracked concrete <hr/> cracked concrete	all sizes; M12 to M24	Tables: C1.1 C2.1 C3.1	all sizes; M12 and M16	Tables: C1.1 C2.1 C3.1
Use category	11 dry or wet concrete	all sizes; M12 to M24		all sizes; M12 and M16	
	12 water filled hole	all sizes; M12 to M24		all sizes; M12 and M16	
Installation direction		D3 Downwards, horizontal and upwards (overhead) installation			
Installation method		pre-positioned or push through installation		push through installation	
Installation temperature ¹⁾		FIS HB: T _{i,min} = -5 °C to T _{i,max} = +40 °C			
In-service temperature	Temperature range I:	-40 °C to +40 °C	(max. short term temperature +40 °C; max. long term temperature +24 °C)		
	Temperature range II:	-40 °C to +80 °C	(max. short term temperature +80 °C; max. long term temperature +50 °C)		
¹⁾ For the standard variation of temperature after installation					
fischer Highbond-Anchor FHB / FHB dyn / FDA					Annex B 2
Intended use Specifications (part 2), FHB dyn					

Specifications of intended use (part 3), FDA

Table B3.1: Overview use and performance categories, FDA

		fischer Dynamic-Anchor FDA with FIS HB			
					
Hammer drilling with standard drill bit		all sizes; Nominal drill bit diameter (d_0) 14 mm and 18 mm			
Hammer drilling with hollow drill bit					
(fischer "FHD"; Heller "Duster Expert"; Bosch "Speed Clean"; Hilti "TE-CD, TE-YD"; DreBo „D-Plus“; DreBo „D-Max“)					
Static and quasi static load, in	<table border="0"> <tr> <td style="border-bottom: 1px solid black;">uncracked concrete</td> <td rowspan="2" style="text-align: center;">all sizes; M12 and M16</td> <td rowspan="2" style="text-align: center;">Tables: C1.1 C2.1 C3.1</td> </tr> <tr> <td>cracked concrete</td> </tr> </table>	uncracked concrete	all sizes; M12 and M16	Tables: C1.1 C2.1 C3.1	cracked concrete
uncracked concrete	all sizes; M12 and M16	Tables: C1.1 C2.1 C3.1			
cracked concrete					
Use category	I1 dry or wet concrete	all sizes; M12 and M16			
	I2 water filled hole	all sizes; M12 and M16			
Installation direction	D3 Downwards, horizontal and upwards (overhead) installation				
Installation method	push through installation				
Installation temperature ¹⁾	FIS HB: $T_{i,min} = -5\text{ °C}$ to $T_{i,max} = +40\text{ °C}$				
In-service temperature	Temperature range I:	-40 °C to +40 °C	(max. short term temperature +40 °C; max. long term temperature +24 °C)		
	Temperature range II:	-40 °C to +80 °C	(max. short term temperature +80 °C; max. long term temperature +50 °C)		
¹⁾ For the standard variation of temperature after installation					
fischer Highbond-Anchor FHB / FHB dyn / FDA			Annex B 3		
Intended use Specifications (part 3), FDA					

Specifications of intended use (part 4)

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibers of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016+A2:2021

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc plated steel, stainless steel or high corrosion resistant steel).
- For all other conditions according to EN 1993-1-4:2015 corresponding to corrosion resistance classes to Annex A 11 table A11.1 (FHB / FHB N) or Annex A 12 table A12.1 (FHB dyn).

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 are designed in accordance with:
 - EN 1992-4:2018 and
 - EOTA Technical Report TR 055, Edition February 2018

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.
- Overhead installation is allowed.

fischer Highbond-Anchor FHB / FHB dyn / FDA

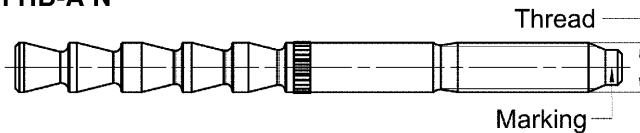
Intended use
Specifications (part 4)

Annex B 4

Table B5.1: Installation parameters for fischer Highbond-Anchor FHB / FHB N

Designation		FHB 10x60	FHB 12x80	FHB 12x100		FHB 16x125		FHB 20x170	FHB 24x220	
Thread	[-]	M10	M12	M12		M16		M20	M24	
Width across flats	SW	17	19	19		24		30	36	
Nominal drill hole diameter	d_0	12	14	14		18		24	28	
Drill hole depth	h_0	65	85	105		130		175	225	
Effective embedment depth	h_{ef}	60	80	100		125		170	220	
Minimum thickness of concrete member	h_{min}	120	160	130	200	160	250	220	440	
Minimum spacing	s_{min}	60	80	100	100	100	100	80	180	
Minimum edge distance	c_{min}			200	100	200	100			
For $h_{min} \leq h \leq 2h_{ef}$: $s_1 \geq s_{min} = 100 \text{ mm}$ $c_1 \geq c_{min} = 100 \text{ mm}$		[mm]		[(3 • c_1 + s_1) • h] ≥ 88000						
Calculation c_{reg} : s_1 and h available				$c_{reg} \geq (88000/h - s_1) / 3$						
Calculation s_{reg} : c_1 and h available				$s_{reg} \geq 88000/h - 3 \cdot c_1$						
Diameter of clearance hole of the fixture	pre-positioned installation	d_f	12	14	14		18		22	26
	push through installation	d_f	14	16	16		20		26	30
Installation torque	T_{inst} [Nm]	20	40	40		60		100	120	

fischer anchor rod FHB-A / FHB-A N



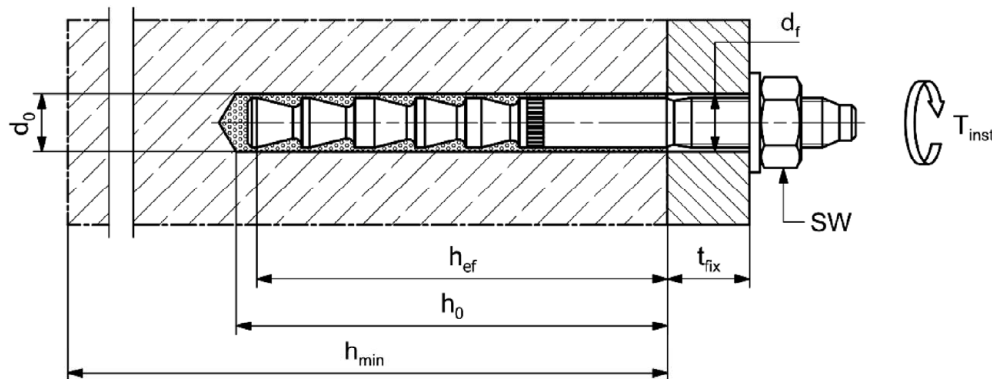
Marking fischer anchor rod:

work symbol, thread diameter, embedment depth e.g.: 16 x 125

For anchor rod property class 5.8 additional "5.8"

For stainless steel additional "R" and for high corrosion resistant steel additional "HCR".

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

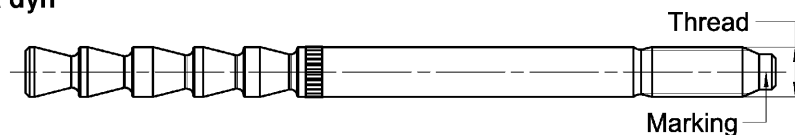
Intended use
Installation parameters fischer Highbond-Anchor FHB / FHB N

Annex B 5

Table B6.1: Installation parameters for fischer Highbond-Anchor dynamic without shear force sleeve FHB dyn

Designation		FHB dyn 12x100	FHB dyn 16x125	FHB dyn 20x170	FHB dyn 24x220		
Thread	[-]	M12	M16	M20	M24		
Width across flats	SW	19	24	30	36		
Nominal drill hole diameter	d_0	14	18	24	28		
Drill hole depth	$h_{0,min}$	105	130	175	225		
Effective embedment depth	h_{ef}	100	125	170	220		
Minimum thickness of concrete member	h_{min}	130	200	160	250	220	440
Minimum spacing	s_{min}	100	100	100	100	80	180
Minimum edge distance	c_{min}	200	100	200	100	80	180
For $h_{min} \leq h \leq 2h_{ef}$: $s_1 \geq s_{min} = 100$ mm $c_1 \geq c_{min} = 100$ mm	[mm]	$[(3 \cdot c_1 + s_1) \cdot h] \geq 88000$					
Calculation c_{reg} : s_1 and h available		$c_{reg} \geq (88000/h - s_1) / 3$				-	
Calculation s_{reg} : c_1 and h available		$s_{reg} \geq 88000/h - 3 \cdot c_1$					
Diameter of the clearance hole of the fixture	d_f	15	19	25	29		
Thickness of fixture	$t_{fix,min}$ $t_{fix,max}$	8	10	12	14	200	
Minimum projection length	$h_{p,min}$	$30 + t_{fix}$	$35 + t_{fix}$	$40 + t_{fix}$	$50 + t_{fix}$		
Installation torque	T_{inst} [Nm]	40	60	100	120		

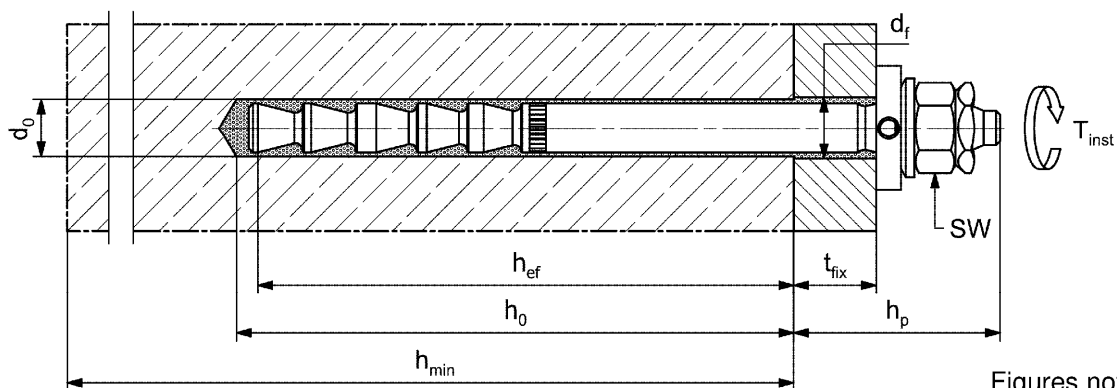
fischer anchor rod FHB-A dyn



Marking fischer anchor rod:

work symbol, thread diameter, embedment depth, intended use e.g. $\varnothing 16 \times 125$ dyn
For high corrosion resistant steel additional "HCR".

Installation conditions: (picture without centering sleeve; pre-positioned installation)



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use

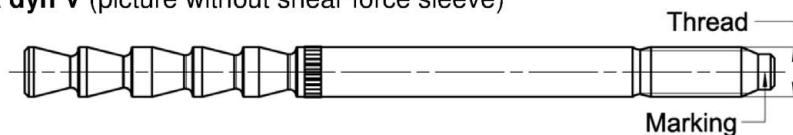
Installation parameters fischer Highbond-Anchor dynamic FHB dyn
(without shear force sleeve)

Annex B 6

Table B7.1: Installation parameters for fischer Highbond-Anchor dynamic with shear force sleeve FHB dyn V

Designation		FHB dyn 12x100 V		FHB dyn 16x125 V	
Thread	[-]	M12		M16	
Width across flats	SW	19		24	
Nominal drill hole diameter	d_0	14		18	
Drill hole depth	$h_{0,min}$	110		135	
Nominal drill hole diameter	d_1	20		28	
Drill hole depth	$h_{1,min}$	35		50	
Effective embedment depth	h_{ef}	105		130	
Minimum thickness of concrete member	h_{min}	130	200	160	250
Minimum spacing	s_{min}	100	100	100	100
Minimum edge distance	c_{min}	200	100	200	100
For $h_{min} \leq h \leq 2h_{ef}$:	$s_1 \geq s_{min} = 100 \text{ mm}$ $c_1 \geq c_{min} = 100 \text{ mm}$	$[(3 \cdot c_1 + s_1) \cdot h] \geq 88000$			
Calculation c_{reg} : s_1 and h available		$c_{reg} \geq (88000/h - s_1) / 3$			
Calculation s_{reg} : c_1 and h available		$s_{reg} \geq 88000/h - 3 \cdot c_1$			
Diameter of the clearance hole of the fixture	d_f	21		29	
Thickness of fixture	$t_{fix,min}$	8		10	
	$t_{fix,max}$	200			
Installation torque	T_{inst} [Nm]	40		60	

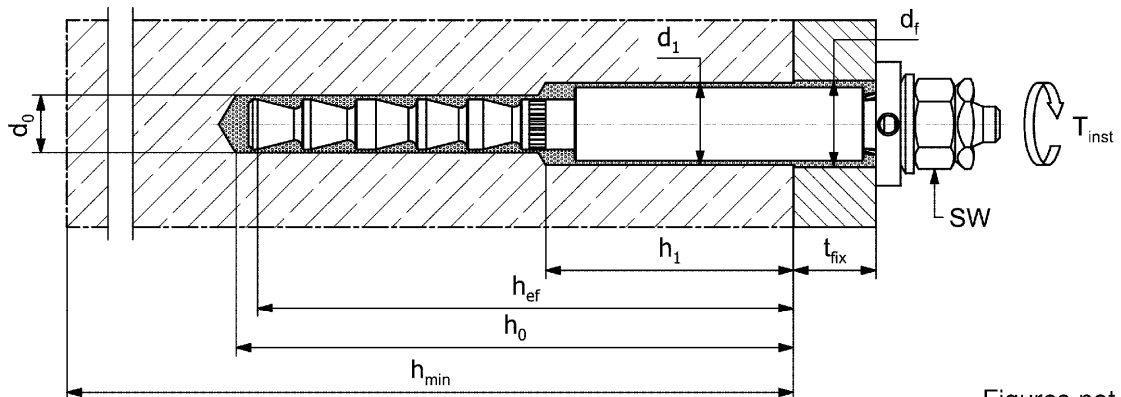
fischer anchor rod FHB-A dyn V (picture without shear force sleeve)



Marking fischer anchor rod:

work symbol, thread diameter, embedment depth, intended use e.g.: $\varnothing 16 \times 125 \text{ dyn V}$

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use

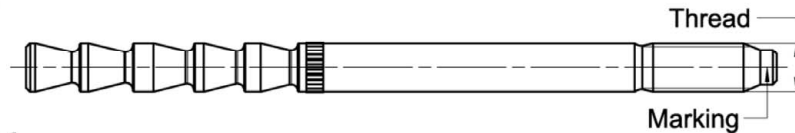
Installation parameters fischer Highbond-Anchor dynamic FHB dyn V
(with shear force sleeve)

Annex B 7

Table B8.1: Installation parameters for fischer Dynamic-Anchor FDA

Designation		FDA 12x100		FDA 16x125	
Thread	[-]	M12		M16	
Width across flats	SW	19		24	
Nominal drill hole diameter	d_0	14		18	
Drill hole depth	$h_{0,min}$	105		130	
Effective embedment depth	h_{ef}	100		125	
Minimum thickness of concrete member	h_{min}	130	200	160	250
Minimum spacing	s_{min}	100	100	100	100
Minimum edge distance	c_{min}	200	100	200	100
For $h_{min} \leq h \leq 2h_{ef}$: $s_1 \geq s_{min} = 100 \text{ mm}$ $c_1 \geq c_{min} = 100 \text{ mm}$	[mm]	$[(3 \cdot c_1 + s_1) \cdot h] \geq 88000$			
Calculation c_{reg} : s_1 and h available		$c_{reg} \geq (88000/h - s_1) / 3$			
Calculation s_{reg} : c_1 and h available		$s_{reg} \geq 88000/h - 3 \cdot c_1$			
Diameter of the clearance hole of the fixture	d_f	15		19	
Thickness of fixture	$t_{fix,min}$	12		16	
	$t_{fix,max}$	200			
Installation torque	T_{inst} [Nm]	40		60	

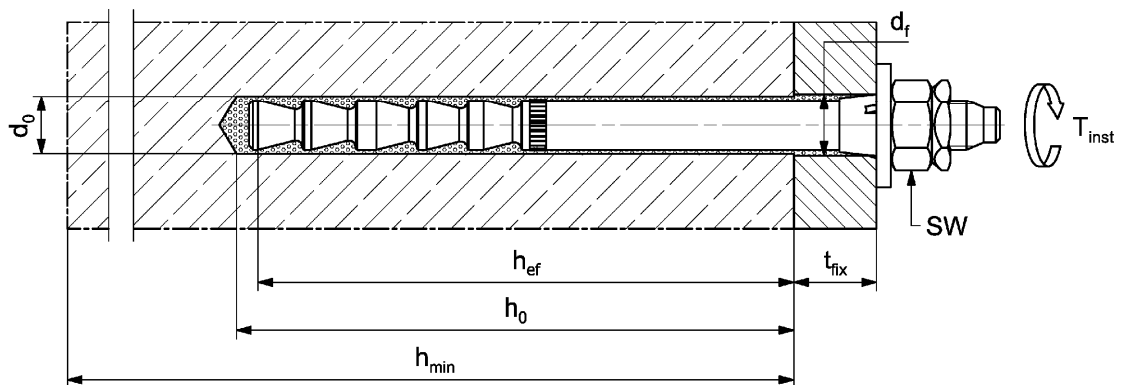
fischer anchor rod FDA-A



Marking fischer anchor rod:

work symbol, thread diameter, embedment depth, intended use e.g.: 16 x 125 dyn

Installation conditions:



Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation parameters fischer Dynamic-Anchor FDA

Annex B 8

Table B9.1: Parameters of the cleaning brush BS (steel brush with steel bristles)

The size of the cleaning brush refers to the drill hole diameter

Nominal drill hole diameter	d_0	[mm]	12	14	18	24	28
Steel brush diameter	d_b		14	16	20	26	30

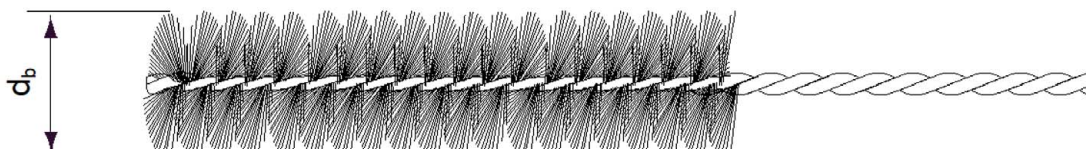


Table B9.2: Processing time t_{work} and curing time t_{cure} (FIS HB)

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

¹⁾ During the curing time of the mortar the temperature of the anchoring base may not fall below -5°C

²⁾ In wet concrete or water filled holes the curing time must be doubled

³⁾ Minimal cartridge temperature +5 °C

Figures not to scale

fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use

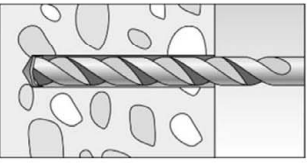
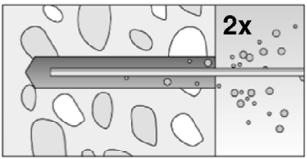

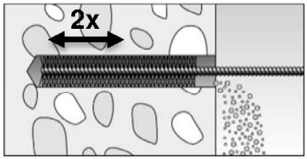
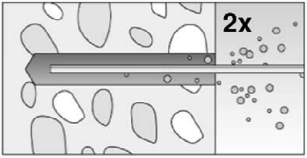

Parameters of the cleaning brush (steel brush);
Processing time and curing time

Annex B 9

Overview installation instructions				
	Anchor type			
	FHB / FHB N	FHB dyn	FHB dyn V	FDA
Drilling and cleaning hammer drilling with standard drill bit	Annex B 11 Step 1a to 4a	Annex B 11 Step 1a to 4a	Annex B 12 Step 1c to 4c	Annex B 11 Step 1a to 4a
Drilling and cleaning hammer drilling with hollow drill bit	Annex B 11 Step 1b to 2b	Annex B 11 Step 1b to 2b	Annex B 12 Step 1d to 2d	Annex B 11 Step 1b to 2b
Preparing the cartridge	Annex B 13 Step 5a to 7a			
Pre-positioned installation	Annex B 14 Step 8a to 12a	Annex B 16 Step 8c to 12c	-	-
Push through installation	Annex B 15 Step 8b to 11b	Annex B 17 Step 8d to 11d	Annex B 18 Step 8e to 11e	Annex B 19 Step 8f to 11f
fischer Highbond-Anchor FHB / FHB dyn / FDA				Annex B 10
Intended use Overview installation instructions				


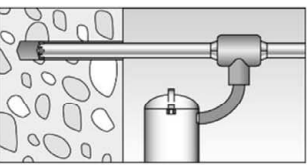
Installation instructions part 1; Drilling and cleaning FHB, FHB N, FHB dyn and FDA

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

1a		<p>Drill the hole. Nominal drill hole diameter d_0 and drill hole depth h_0 see tables: FHB / FHB N → table B5.1 FHB dyn → table B6.1 FDA → table B8.1</p>
2a		<p>Clean the drill hole. Blow out the drill hole twice For drill hole diameter $d_0 < 24$ mm blow out the hole by hand or oil-free compressed air (≥ 6 bar). For drill hole diameter $d_0 \geq 24$ mm blow out the hole with oil-free compressed air (≥ 6 bar). Use a cleaning nozzle.</p> 
3a		<p>Brush the drill hole twice with steel brush. Corresponding brushes see table B9.1</p>
4a		<p>Clean the drill hole. Blow out the drill hole twice For drill hole diameter $d_0 < 24$ mm blow out the hole by hand or oil-free compressed air (≥ 6 bar). For drill hole diameter $d_0 \geq 24$ mm blow out the hole with oil-free compressed air (≥ 6 bar). Use a cleaning nozzle.</p> 

Go to step 5a (Annex B 13)

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

1b		<p>Check a suitable hollow drill (see table B1.1, B2.1 resp. B3.1) for correct operation of the dust extraction</p>
2b		<p>Use a suitable dust extraction system, e.g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data. Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. Nominal drill hole diameter d_0 and drill hole depth h_0 see tables: FHB / FHB N → table B5.1 FHB dyn → table B6.1 FDA → table B8.1</p>

Go to step 5a (Annex B 13)

fischer Highbond-Anchor FHB / FHB dyn / FDA

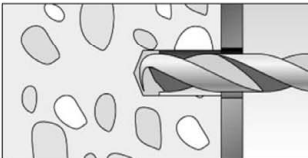
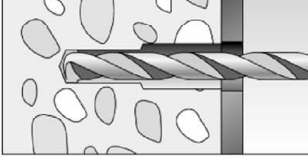
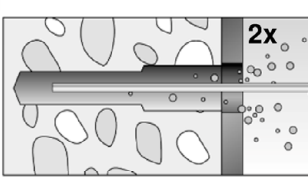

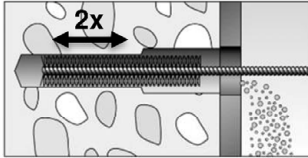
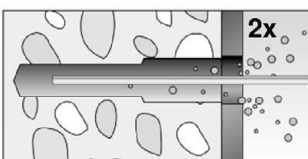

Intended use

Installation instructions part 1
Drilling and cleaning the drill hole FHB, FHB N, FHB dyn and FDA

Annex B 11


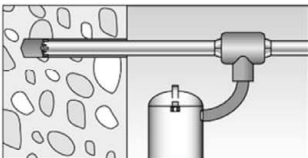
Installation instructions part 2; Drilling and cleaning FHB dyn V

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

1c		<p>Drill hole 1 of the stepped borehole. Nominal drill hole diameter d_1 and drill hole depth h_1 see table B7.1</p>
		<p>Drill hole 2 of the stepped borehole. Nominal drill hole diameter d_0 and drill hole depth h_0 see table B7.1</p>
2c		<p>Clean the drill hole. Blow out the drill hole twice by hand or oil-free compressed air (≥ 6 bar).</p> 
3c		<p>Brush the drill hole 2 of the borehole twice with a steel brush. Corresponding brushes see table B9.1</p>
4c		<p>Clean the drill hole. Blow out the drill hole twice by hand or oil-free compressed air (≥ 6 bar).</p> 

Go to step 5a (Annex B 13)

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

1d		<p>Check a suitable hollow drill (see table B2.1) for correct operation of the dust extraction.</p>
2d		<p>Use a suitable dust extraction system, e.g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data. Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. First drill hole 1 of the stepped borehole with nominal drill hole diameter d_1 and drill hole depth h_1 (see table B7.1). Then drill hole 2 of the stepped borehole with nominal drill hole diameter d_0 and drill hole depth h_0 (see table B7.1).</p>

Go to step 5a (Annex B 13)

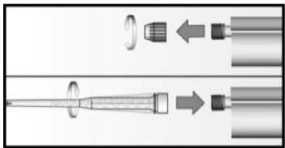
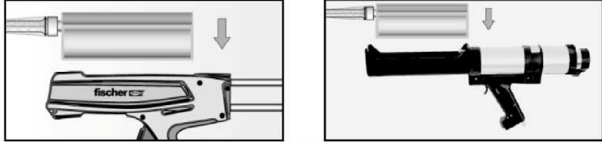

fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 2
Drilling and cleaning the drill hole FHB dyn V

Annex B 12

Installation instructions part 3; injection mortar system FIS HB

Preparing the cartridge

5a		<p>Remove the sealing cap</p> <p>Screw on the static mixer (the spiral in the static mixer must be clearly visible)</p>
6a		<p>Place the cartridge into the dispenser</p>
7a		<p>Extrude approximately 10 cm of material out until the resin is evenly grey in colour.</p> <p>Do not use mortar that is not uniformly grey</p>

Go to step:

- 8a: FHB / FHB N - Pre-positioned installation see Annex B 14
- 8b: FHB / FHB N - Push through installation see Annex B 15
- 8c: FHB dyn - Pre-positioned installation see Annex B 16
- 8d: FHB dyn - Push through installation see Annex B 17
- 8e: FHB dyn V - Push through installation see Annex B 18
- 8f: FDA - Push through installation see Annex B 19

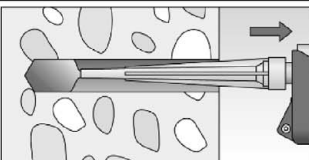
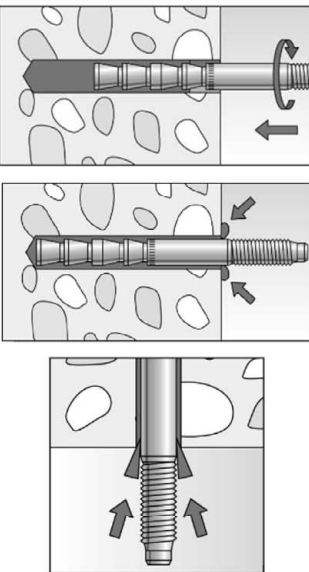

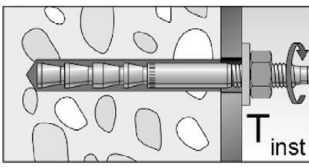
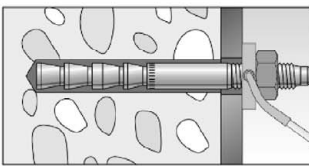
fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 3
Preparing the cartridge

Annex B 13

Installation instructions part 4; Pre-positioned installation FHB / FHB N

Pre-positioned installation FHB / FHB N

8a		<p>Fill approximately 2/3 of the drill hole with mortar. Always begin from the bottom of the hole and avoid bubbles. For drill hole depth $h_0 \geq 150$ mm use an extension tube. For overhead installation or deep holes ($h_0 > 250$ mm) use an injection adapter.</p>
9a		<p>Push the anchor rod down to the bottom of the hole, turning it slightly while doing so. Only use clean and oil-free metal parts.</p> <p>After inserting the anchor rod, excess mortar must be emerged around the anchor element. If not, pull out the anchor rod immediately and reinject mortar.</p> <p>For overhead installations support the anchor rod with wedges. (e.g. fischer centering wedges)</p>
10a		<p>Wait for the specified curing time t_{cure} see table B9.2</p>
11a		<p>Attach the fixture and install the washer and hexagon nut. Ensure the correct position of the metal parts. Tighten the hexagon nut with installation torque T_{inst} (see table B5.1).</p>
12a Option		<p>The gap between metal parts and fixture (annular gap) may be filled with mortar (FIS HB) via the fischer filling disc. ATTENTION: Using fischer filling disc reduces t_{fix} (usable length of the anchor)</p>

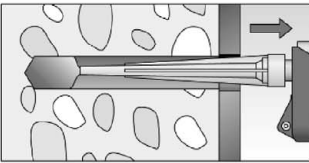
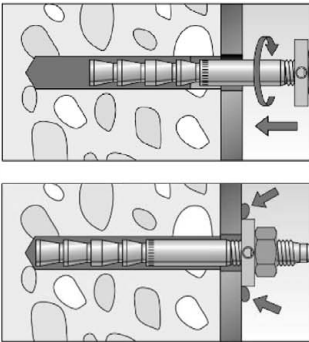

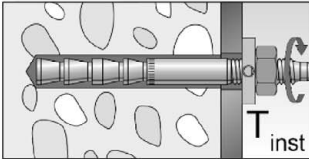
fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 4
Pre-positioned installation FHB / FHB N

Annex B 14

Installation instructions part 5; Push through installation FHB / FHB N

Push through installation FHB / FHB N

8b		<p>Fill approximately 2/3 of the drill hole incl. fixture with mortar. Always begin from the bottom of the hole and avoid bubbles. For drill hole depth $h_0 \geq 150$ mm use an extension tube. For overhead installation or deep holes ($h_0 > 250$ mm) use an injection adapter.</p>
9b		<p>Push the pre-assembled fischer anchor rod (with fischer filling disc and hexagon nut) into the drill hole until the fischer filling disc is in full contact with the surface, turning it slightly while doing so. Ensure the correct position of the metal parts. Only use clean and oil-free metal parts.</p> <p>After inserting the pre-assembled anchor rod, excess mortar must be emerged around the fischer filling disc (minimum on one point). If not, pull out the assembled anchor rod immediately and reinject mortar.</p>
10b		<p>Wait for the specified curing time t_{cure} see table B9.2</p>
11b		<p>Tighten the hexagon nut with installation torque T_{inst} (see table B5.1).</p>

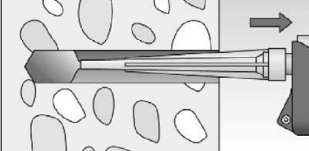
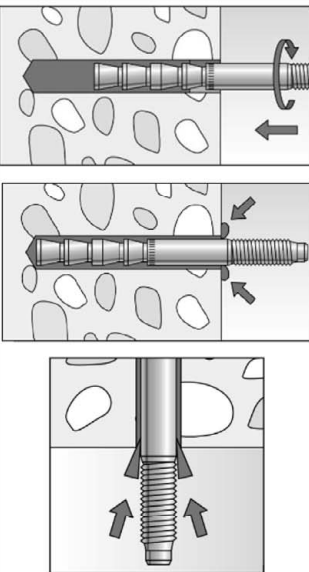

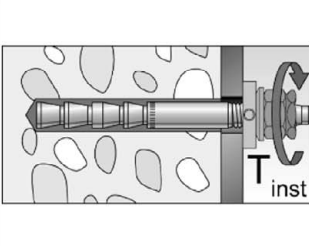
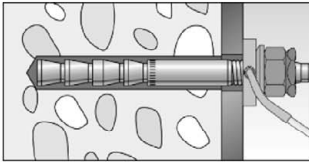
fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 5
Push through installation FHB / FHB N

Annex B 15

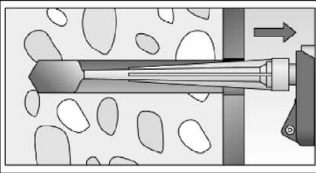
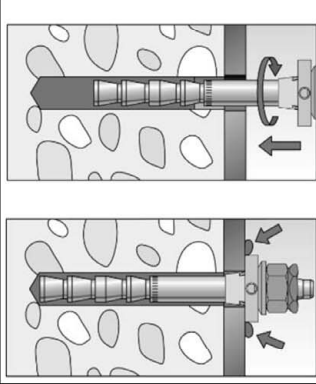

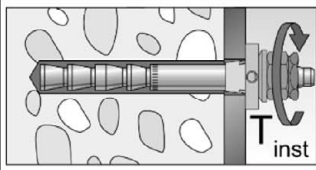
Installation instructions part 6; Pre-positioned installation FHB dyn

Pre-positioned installation FHB dyn

8c		<p>Fill approximately 2/3 of the drill hole with mortar. Always begin from the bottom of the hole and avoid bubbles. For drill hole depth $h_0 \geq 150$ mm use an extension tube. For overhead installation or deep holes ($h_0 > 250$ mm) use an injection adapter.</p>
9c		<p>Push the anchor rod down to the bottom of the hole, turning it slightly while doing so. Observe projection length h_p (see table B6.1) Only use clean and oil-free metal parts.</p> <p>After inserting the anchor rod, excess mortar must be emerged around the anchor element. If not, pull out the anchor rod immediately and reinject mortar.</p> <p>For overhead installations support the anchor rod with wedges. (e.g. fischer centering wedges)</p>
10c		<p>Wait for the specified curing time t_{cure} see table B9.2</p>
11c		<p>Attach the fixture and install the fischer filling disc, the spherical washer and nuts (without centering sleeve). Ensure the correct position of the metal parts. Tighten the hexagon nut with installation torque T_{inst} (see table B6.1). Tighten lock nut manually, then use wrench to give another quarter or half turn. In the high corrosion resistant steel version, the lock nut is a thin nut. Tighten it with a torque of $\frac{1}{4} T_{inst}$.</p>
12c		<p>The gap between metal parts and fixture (annular gap) has to be filled with mortar (FIS HB) via the fischer filling disc. This installation step can be omitted for anchors with pure tension load.</p>
fischer Highbond-Anchor FHB / FHB dyn / FDA		
<p>Intended use Installation instructions part 6 Pre-positioned installation FHB dyn</p>		<p>Annex B 16</p>

Installation instructions part 7; Push through installation FHB dyn

Push through installation FHB dyn

8d		<p>Fill approximately 2/3 of the drill hole incl. fixture with mortar. Always begin from the bottom of the hole and avoid bubbles. For drill hole depth $h_0 \geq 150$ mm use an extension tube. For overhead installation or deep holes ($h_0 > 250$ mm) use an injection-adapter.</p>
9d		<p>Push the pre-assembled fischer anchor rod (with centering sleeve, fischer filling disc, spherical washer, hexagon nut and lock nut) into the drill hole until the fischer filling disc is in full contact with the surface, turning it slightly while doing so. Ensure the correct position of the metal parts and the centering sleeve. Only use clean and oil-free metal parts.</p>
10d		<p>Wait for the specified curing time t_{cure} see table B9.2</p>
11d		<p>Tighten the hexagon nut with installation torque T_{inst} (see table B6.1). Tighten lock nut manually, then use wrench to give another quarter to half turn. In the high corrosion resistant steel version, the lock nut is a thin nut. Tighten it with a torque of $\frac{1}{4} T_{inst}$.</p>

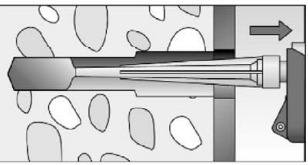
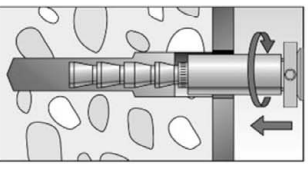
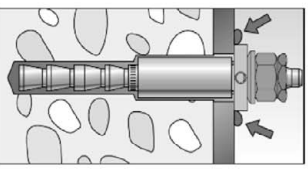

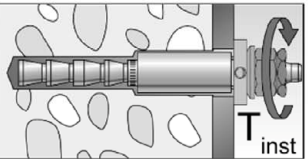
fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 7
Push through installation FHB dyn

Annex B 17

Installation instructions part 8; Push through installation FHB dyn V

Push through installation FHB dyn V

8e		<p>Fill approximately 2/3 of the drill hole incl. fixture with mortar. Always begin from the bottom of the hole and avoid bubbles. For drill hole depth $h_0 \geq 150$ mm use an extension tube. For overhead installation or deep holes ($h_0 > 250$ mm) use an injection adapter.</p>
9e	 	<p>Push the pre-assembled Fischer anchor rod (with shear force sleeve, centering sleeve, Fischer filling disc, spherical washer, hexagon nut and lock nut) into the drill hole until the Fischer filling disc is in full contact with the surface, turning it slightly while doing so. Ensure the correct position of the metal parts and the centering sleeve. Only use clean and oil-free metal parts.</p> <p>After inserting the pre-assembled anchor rod, excess mortar must be emerged around the Fischer filling disc (minimum on one point). If not, pull out the assembled anchor rod immediately and reinject mortar.</p>
10e		<p>Wait for the specified curing time t_{cure} see table B9.2</p>
11e		<p>Tighten the hexagon nut with installation torque T_{inst} (see table B7.1). Tighten lock nut manually, then use wrench to give another quarter to half turn.</p>

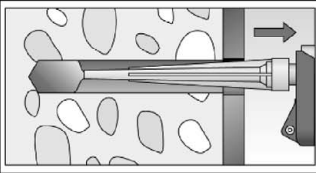
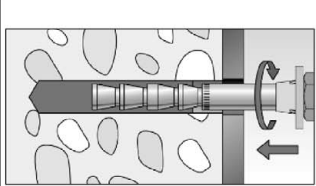
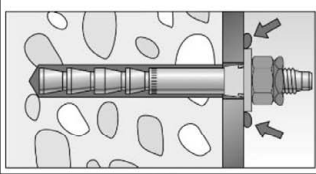

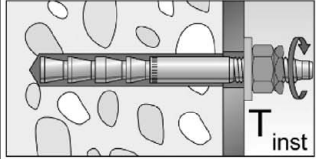
fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 8
Push through installation FHB dyn V

Annex B 18

Installation instructions part 9; Push through installation FDA

Push through installation FDA

8f		<p>Fill approximately 2/3 of the drill hole incl. fixture with mortar. Always begin from the bottom of the hole and avoid bubbles. For drill hole depth $h_0 \geq 150$ mm use an extension tube. For overhead installation or deep holes ($h_0 > 250$ mm) use an injection adapter.</p>
9f	 	<p>Push the pre-assembled Fischer anchor rod (with centering sleeve, washer, hexagon nut and lock nut) into the drill hole until the washer is in full contact with the surface, turning it slightly while doing so. Gently hammer the anchor to the setting depth. Ensure the correct position of the metal parts and the centering sleeve. Only use clean and oil-free metal parts.</p> <p>After inserting the pre-assembled anchor rod, excess mortar must be emerged under the entire washer. If not, pull out the assembled anchor rod immediately and reinject mortar.</p>
10f		<p>Wait for the specified curing time t_{cure} see table B9.2</p>
11f		<p>Tighten the hexagon nut with installation torque T_{inst} (see table B8.1). Tighten lock nut manually, then use wrench to give another quarter to half turn.</p>

fischer Highbond-Anchor FHB / FHB dyn / FDA

Intended use
Installation instructions part 9
Push through installation FDA

Annex B 19

Table C1.1: Characteristic values for steel failure under tension / shear load of fischer anchor rods FHB-A / FHB-A N / FHB-A dyn (V) / FDA										
Anchor rod size			10x60	12x80	12x100	16x125	20x170	24x220		
Bearing capacity under tension load, steel failure										
Characteristic resistance $N_{Rk,s}$	FHB-A / FHB-A N	gvz	8.8	[kN]	25,8	44,3	44,3	81,7	130,8 ²⁾	179,8 ²⁾
		gvz	5.8		16,1	27,7	27,7	51,1	- ³⁾	- ³⁾
		hdg	8.8		25,8	44,3	44,3	81,7	190,2	261,5
		R	80		25,8	44,3	44,3	81,7	166,5 ⁴⁾	228,8 ⁴⁾
		HCR	70		22,5	38,8	38,8	71,5	166,5	228,8
	FHB-A dyn	gvz	8.8		- ³⁾	- ³⁾	44,3	81,7	190,2	261,5
		HCR	70		- ³⁾	- ³⁾	38,8	71,5	- ³⁾	- ³⁾
	FHB-A dyn V	gvz	8.8		- ³⁾	- ³⁾	44,3	81,7	- ³⁾	- ³⁾
	FDA	gvz	8.8		- ³⁾	- ³⁾	44,3	81,7	- ³⁾	- ³⁾
	Partial factors¹⁾									
Partial factor		$\gamma_{Ms,N}$	[-]	1,50						
Bearing capacity under shear load, steel failure										
without lever arm										
Characteristic resistance $V_{Rk,s}$	FHB-A / FHB-A N	gvz	8.8	[kN]	16,6	28,1	28,1	52,2	61,1 ²⁾	90,8 ²⁾
		gvz	5.8		10,4	17,6	17,6	32,7	- ³⁾	- ³⁾
		hdg	8.8		16,6	28,1	28,1	52,2	98,0	141,2
		R	80		24,8	32,8	32,8	62,8	85,8 ⁴⁾	152,6 ⁴⁾
		HCR	70		25,1	36,9	36,9	55,0	85,8	141,1
	FHB-A dyn	gvz	8.8		- ³⁾	- ³⁾	28,1	52,2	98,0	141,2
		HCR	70		- ³⁾	- ³⁾	36,9	55,0	- ³⁾	- ³⁾
	FHB-A dyn V	gvz	8.8		- ³⁾	- ³⁾	56,9	96,2	- ³⁾	- ³⁾
	FDA	gvz	8.8		- ³⁾	- ³⁾	28,1	52,2	- ³⁾	- ³⁾
	Ductility factor		k_7		[-]	1,0				
with lever arm										
Characteristic resistance $M_{Rk,s}^0$	FHB-A / FHB-A N	gvz	8.8	[Nm]	59,8	104,8	104,8	266,4	357,0 ²⁾	617,4 ²⁾
		gvz	5.8		37,4	65,5	65,5	166,5	- ³⁾	- ³⁾
		hdg	8.8		59,8	104,8	104,8	266,4	519,3	898,0
		R	80		59,8	104,8	104,8	266,4	454,4 ⁴⁾	785,8 ⁴⁾
		HCR	70		52,3	91,7	91,7	233,1	454,4	785,8
	FHB-A dyn	gvz	8.8		- ³⁾	- ³⁾	104,8	266,4	519,3	898,0
		HCR	70		- ³⁾	- ³⁾	91,7	233,1	- ³⁾	- ³⁾
	FHB-A dyn V	gvz	8.8		- ³⁾	- ³⁾	104,8	266,4	- ³⁾	- ³⁾
	FDA	gvz	8.8		- ³⁾	- ³⁾	104,8	266,4	- ³⁾	- ³⁾
	Partial factors¹⁾									
Partial factor		$\gamma_{Ms,V}$	[-]	1,25						
¹⁾ In absence of other national regulations ²⁾ $f_{yk} = 440 \text{ N/mm}^2 / f_{uk} = 550 \text{ N/mm}^2$ ³⁾ No performance assessed ⁴⁾ $f_{yk} = 560 \text{ N/mm}^2 / f_{uk} = 700 \text{ N/mm}^2$										
fischer Highbond-Anchor FHB / FHB dyn / FDA								Annex C 1		
Performances Characteristic values for steel failure under tension / shear load of fischer anchor rods FHB-A / FHB-A N / FHB-A dyn (V) / FDA										

Table C2.1: Characteristic values for concrete failure under tension / shear load								
				FHB / FHB N / FHB dyn / FDA				
Size				All sizes				
Tension load								
Installation factor	γ_{inst}	[-]	See annex C 3					
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				
Splitting failure								
Edge distance	$c_{cr,sp}$	[mm]	2 h_{ef}					
Spacing	$s_{cr,sp}$		4 h_{ef}					
Concrete failure								
Uncracked concrete	$k_{ucr,N}$	[-]	11,0					
Cracked concrete	$k_{cr,N}$		7,7					
Edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}					
Spacing	$s_{cr,N}$		3 h_{ef}					
Shear load								
Installation factor	γ_{inst}	[-]	1,0					
Concrete pry-out failure								
Factor for pry-out failure	k_8	[-]	2,0					
Concrete edge failure								
Anchor size			10x60	12x80	12x100	16x125	20x170	24x220
Effective length of anchor	l_f	[mm]	60	80	100	125	170	220
Calculation diameter	d_{nom}		10	12	12	17	22	25
fischer Highbond-Anchor FHB / FHB dyn / FDA							Annex C 2	
Performances Characteristic values for concrete failure under tension / shear load								

Table C3.1: Characteristic values for pull-out failure for fischer anchor rods FHB-A / FHB-A N / FHB-A dyn (V) / FDA									
Anchor rod size		10x60	12x80	12x100	16x125	20x170	24x220		
Pull-out failure									
Calculation diameter	d	[mm]	10	12	12	16	20	24	
Uncracked concrete									
Characteristic resistance in uncracked concrete C20/25									
Tem- perature range	I: 24 °C / 40 °C	N _{Rk,p}	[kN]	26,9	41,3	42,1	70,5	113,6	122,2
	II: 50 °C / 80 °C			23,7	36,3	37,0	62,0	100,0	107,5
Cracked concrete									
Characteristic resistance in cracked concrete C20/25									
Tem- perature range	I: 24 °C / 40 °C	N _{Rk,p}	[kN]	15,5	25,0	30,0	47,8	58,9	89,4
	II: 50 °C / 80 °C			13,6	22,0	26,4	42,1	51,8	78,7
Installation factors									
Dry or wet concrete	γ _{inst}	[-]	1,0						
Water filled hole			1,0	1,0	1,0	1,2	1,0	1,0	
Table C3.2: Displacements for fischer anchor rods FHB-A / FHB-A N / FHB-A dyn (V) / FDA									
Anchor rod size		10x60	12x80	12x100	16x125	20x170	24x220		
Displacement-Factors for tension load ¹⁾									
Uncracked concrete; Temperature range I, II									
Displacements	δ _{N0}	[mm/kN]	0,025	0,01	0,01	0,007	0,006	0,006	
	δ _{N∞}		0,05	0,02	0,02	0,014	0,012	0,012	
Cracked concrete; Temperature range I, II									
Displacements	δ _{N0}	[mm/kN]	0,04	0,02	0,02	0,02	0,02	0,02	
	δ _{N∞}		0,06	0,03	0,03	0,03	0,03	0,03	
Displacement-Factors for shear load ²⁾									
Uncracked or cracked concrete; Temperature range I, II									
Displacements	δ _{V0}	[mm/kN]	0,025	0,01	0,01	0,007	0,006	0,006	
	δ _{V∞}		0,05	0,02	0,02	0,014	0,012	0,012	
¹⁾ Calculation of effective displacement: $\delta_{N0} = \delta_{N0-Factor} \cdot N_{Ed}$ $\delta_{N\infty} = \delta_{N\infty-Factor} \cdot N_{Ed}$ (N _{Ed} : Design value of the applied tensile force)				²⁾ Calculation of effective displacement: $\delta_{V0} = \delta_{V0-Factor} \cdot V_{Ed}$ $\delta_{V\infty} = \delta_{V\infty-Factor} \cdot V_{Ed}$ (V _{Ed} : Design value of the applied shear force)					
fischer Highbond-Anchor FHB / FHB dyn / FDA							Annex C 3		
Performances Characteristic values for combined pull-out and concrete failure; Displacements for fischer anchor rods FHB-A / FHB-A N / FHB-A dyn (V) / FDA									