Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment

ETA-18/0206 of 11 September 2018

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 Injection system FIS VE for masonry
Product family to which the construction product belongs	Metal Injection anchors for use in masonry
Manufacturer	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND
Manufacturing plant	fischerwerke
This European Technical Assessment contains	33 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 330076-00-0604

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Specific Part

1 Technical description of the product

The fischer Injection system FIS VE for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar FIS VE, a perforated sieve sleeve and an anchor rod with hexagon nut and washer or an internal threaded rod. The steel elements are made of zinc coated steel, stainless steel or high corrosion resistant steel.

The anchor rod is placed into a drilled hole filled with injection mortar and is anchored via the bond between steel element, injection mortar and masonry and mechanical interlock.

The product description is given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic values for resistance	See Annexes C 1 to C 12
Displacements	See Annex C 11

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.3 Hygiene, health and the environment (BWR 3)

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

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

In accordance with the European Assessment Document EAD 330076-00-0604 the applicable European legal act is: [97/177/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 11 September 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

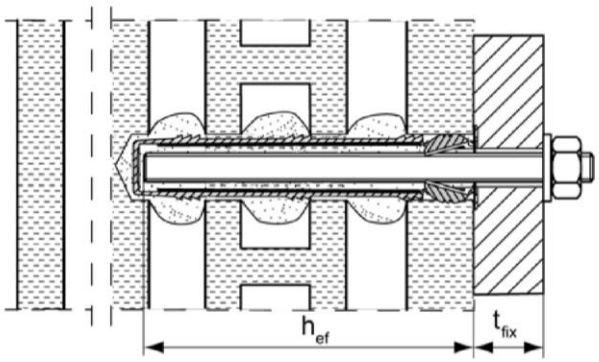
beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik DIBt

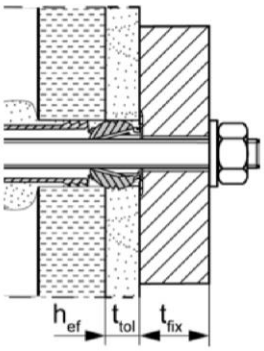
Installation conditions part 1

Anchor rods with perforated sleeve FIS H K; Installation in perforated and solid brick masonry

Pre-positioned anchorage:

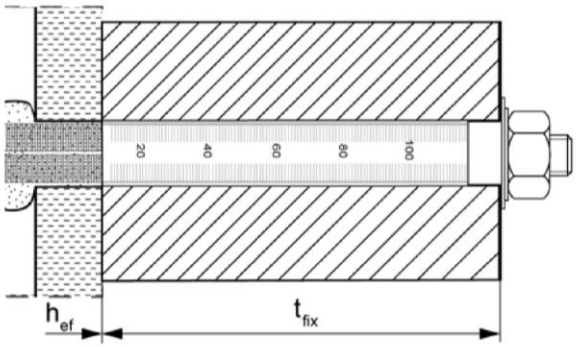


Installation with render bridge

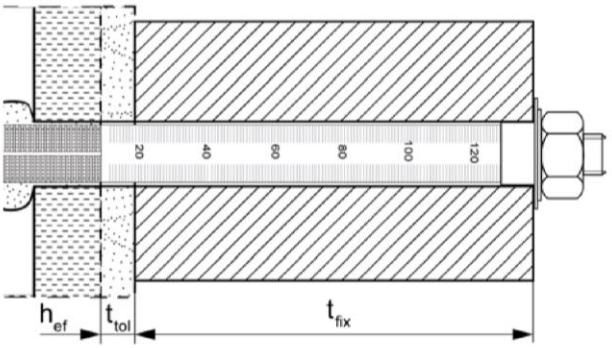


Size of the perforated sleeve: FIS H 12x50 K, FIS H 12x85 K, FIS H 16x85 K, FIS H 16x130 K, FIS H 20x85 K, FIS H 20x130 K, FIS H 20x200 K

Push through anchorage:



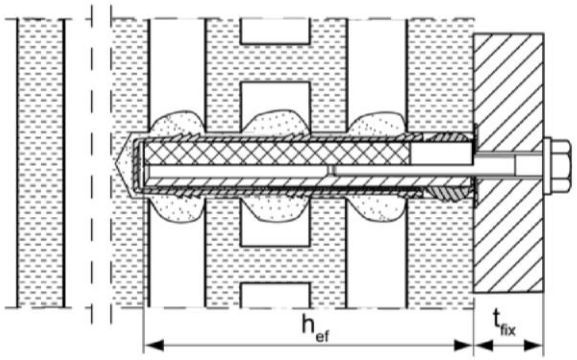
Installation with render bridge



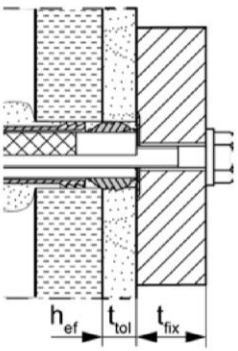
Size of the perforated sleeve: FIS H 18x130/200 K

Internal threaded anchor FIS E with perforated sleeve FIS H K; Installation in perforated and solid brick masonry

Pre-positioned anchorage:



Installation with render bridge



Pictures not to scale

h_{ef} = effective anchorage depth

t_{tol} = thickness of unbearing layer (e.g. plaster)

t_{fix} = thickness of fixture

fischer injection system FIS VE for masonry

Product description
Installation conditions part 1,
Anchor rods and internal threaded anchor with perforated sleeve

Annex A 1

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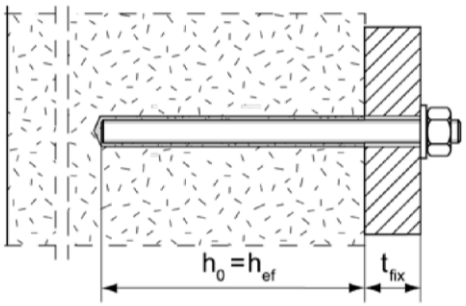
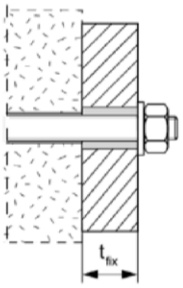
Installation conditions part 2

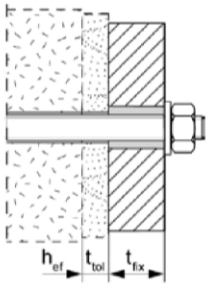
Anchor rods without perforated sleeve FIS H K; installation in solid brick masonry

Pre-positioned anchorage:



Push through anchorage: Annular gap filled with mortar

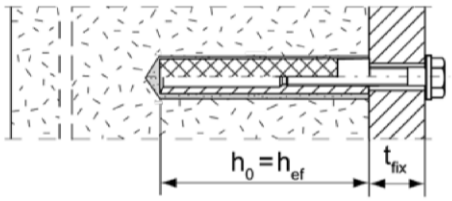




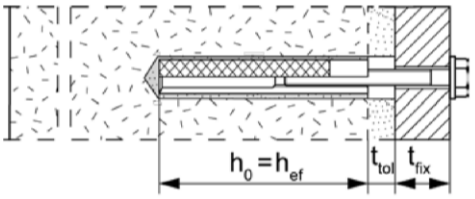
Installation with render bridge

Internal threaded anchors FIS E without perforated sleeve FIS H K; installation in solid brick masonry

Pre-positioned anchorage:



Installation with render bridge



Pictures not to scale

h_0 = depth of drill hole
h_{ef} = effective anchorage depth
t_{tol} = thickness of unbearing layer (e.g. plaster)
t_{fix} = thickness of fixture

fischer injection system FIS VE for masonry

Product description
Installation conditions part 2,
Anchor rods and internal threaded anchor without perforated sleeve

Annex A 2

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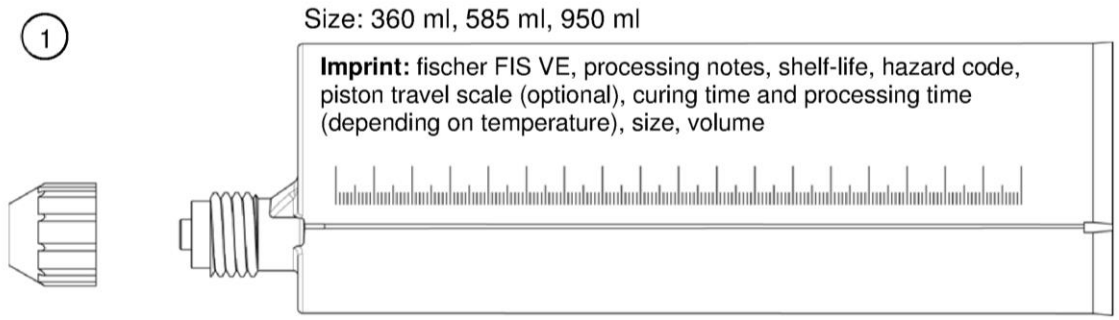
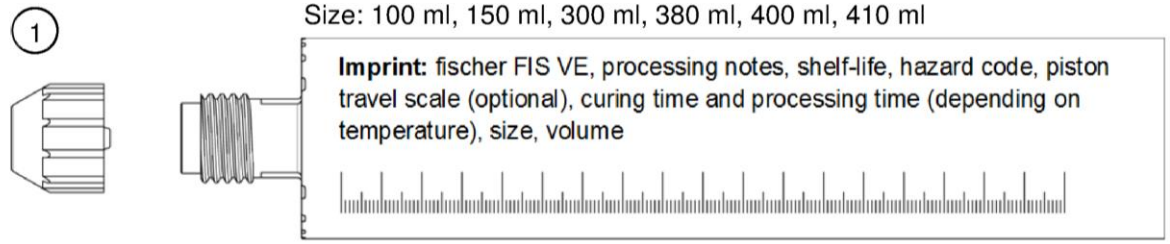
Overview system components part 1

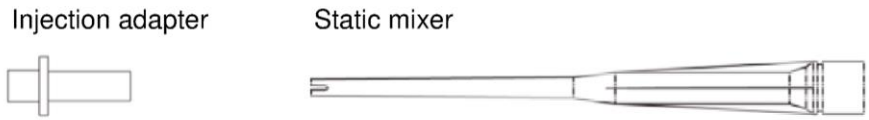
Mortar cartridge (shuttle cartridge) with sealing cap



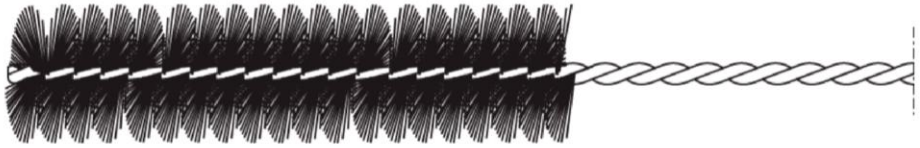
Mortar cartridge (coaxial cartridge) with sealing cap



Static mixer FIS MR Plus with injection adapter



Cleaning brush BS / BSB



Blow-out pump ABG or ABP

Pictures not to scale

fischer injection system FIS VE for masonry	**Annex A 3**
System description Overview system components part 1: cartridge / static mixer / cleaning brush	

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Overview system components part 2

fischer anchor rod

(2) 

Size: M6, M8, M10, M12

Internal threaded anchor FIS E

(5) 

Size: 11x85 M6 / M8
15x85 M10 / M12

Perforated sleeve FIS H K

(7) 

Size: FIS H 12x50 K
FIS H 12x85 K
FIS H 16x85 K
FIS H 20x85 K

(7) 

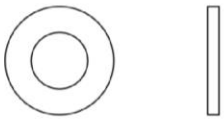
Size: FIS H 16x130 K
FIS H 20x130 K
FIS H 20x200 K

Perforated sleeve FIS H K (push through anchorage)

(7) 

Size:
FIS H 18x130/200 K

Washer

(3) 

Hexagon nut

(4) 

Pictures not to scale

fischer injection system FIS VE for masonry

System description
Overview system components part 2: steel parts / perforated sleeve

Annex A 4

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Table A5.1: Materials

Part	Designation	Material		
1	Mortar cartridge	Mortar, hardener; filler		
		Steel, zinc plated	Stainless steel A4	High corrosion-resistant steel C
2	Anchor rod	Property class 4.6; 4.8; 5.8 oder 8.8; EN ISO 898-1: 2013 zinc plated ≥ 5µm, EN ISO 4042:1999 A2K or hot-dip galvanised EN ISO 10684:2004 $f_{uk} \leq 1000$ N/mm² $A_5 > 8\%$ fracture elongation	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062 EN 10088-1:2014 $f_{uk} \leq 1000$ N/mm² $A_5 > 8\%$ fracture elongation	Property class 50 or 80 EN ISO 3506-1:2009 or property class 70 with f_{yk}= 560 N/mm² 1.4565; 1.4529 EN 10088-1:2014 $f_{uk} \leq 1000$ N/mm² $A_5 > 8\%$ fracture elongation
3	Washer ISO 7089:2000	zinc plated ≥ 5µm, EN ISO 4042:1999 A2K or hot-dip galvanised EN ISO 10684:2004	1.4401; 1.4404; 1.4578;1.4571; 1.4439; 1.4362 EN 10088-1:2014	1.4565;1.4529 EN 10088-1:2014
4	Hexagon nut	Property class 5 or 8; EN ISO 898-2:2012 zinc plated ≥ 5µm, ISO 4042:1999 A2K or hot-dip galvanised ISO 10684:2004	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362 EN 10088-1:2014	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014
5	Internal threaded anchor FIS E	Property class 5.8; EN 10277-1:2008-06 zinc plated ≥ 5µm, ISO 4042:1999 A2K	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362 EN 10088-1:2014	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014
6	Commercial standard screw or threaded / anchor rod for internal threaded anchor FIS E	Property class 5.8 or 8.8; EN ISO 898-1:2013 zinc plated ≥ 5µm, ISO 4042:1999 A2K	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362 EN 10088-1:2014	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014
7	Perforated sleeve	PP / PE		

fischer injection system FIS VE for masonry

Product description
Materials

Annex A 5

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Specifications of intended use (part 1)

Table B1.1: Overview use and performance categories

Anchorages subject to		**fischer injection system FIS VE masonry**	
Hole drilling with hammer drill mode		all bricks	
Hole drilling with rotary drill mode		all bricks	
Static and quasi static load, in masonry		all bricks	
Use category	dry or wet masonry	all bricks	
Installation	Pre-positioned anchorage	Anchor rod or internal threaded anchor (in solid brick masonry)	Perforated sleeve with threaded rod or internal threaded anchor (in perforated and solid brick masonry) Size: FIS H 12x50 K FIS H 12x85 K FIS H 16x85 K FIS H 16x130 K FIS H 20x85 K FIS H 20x130 K FIS H 20x200 K
	Push through anchorage	Anchor rod (in solid brick masonry)	Perforated sleeve with threaded rod (in perforated and solid brick masonry) Size: FIS H 18x130/200 K
Installation conditions	category d/d	all bricks	
	category w/d		
	category w/w		
Installation temperature		0°C to +40°C	
In-service temperature		-40°C to +80°C	max. short term temperature +80 °C and max. long term temperature +50 °C
		-40°C to +120°C	max. short term temperature +120 °C and max. long term temperature +72 °C

fischer injection system FIS VE for masonry	**Annex B 1**
Intended use Specifications (part 1)	

Deutsches Institut für Bautechnik DIBt

Specifications of intended use (part 2)

Anchorages subject to:

- Static and quasi-static loads

Base materials:

- Solid brick masonry (Use category b) acc. to Annex B 12
- Hollow brick masonry (use category c), according to Annex B 12
- For minimum thickness of masonry member is h_{ef}+30mm
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010
- For other bricks in solid masonry, hollow or perforated masonry the characteristic resistance of the anchor may be determined by job site tests according to TR 053 under consideration of the β-factor according to Annex C 11, Table C11.1

  Note (only applies to solid bricks):
  The characteristic resistance is also valid for larger brick sizes, higher compressive strength and higher raw density of the masonry unit.

Temperature Range:

- **I**: From - 40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)
- **II**: From -40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C)

Use conditions (Environmental conditions):

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

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

fischer injection system FIS VE for masonry	**Annex B 2**
Intended use Specifications (part 2)	

Deutsches Institut für Bautechnik DIBt

Specifications of intended use (part 3)

Design:

- The anchorages have to be designed in accordance with the TR 054, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.
  Applies to all bricks, if no other values are specified:
  $N_{Rk} = N_{Rk,b} = N_{Rk,p}$
  $V_{Rk} = V_{Rk,b} = V_{Rk,c}$
  For the Calculation of pulling out a brick under tensile load $\mathbf{N_{Rk,pb}}$ or
  pushing out a brick under shear load $\mathbf{V_{Rk,pb}}$ see TR 054.
  $\mathbf{N_{Rk,s}}$, $\mathbf{V_{Rk,s}}$ and $\mathbf{M_{Rk,s}}$ see annex C1-C3
  Factors for job site tests and displacements see Annex C11
- Verifiable calculation notes and drawings have to be prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings.

Installation:

- Category d/d: - Installation and use in dry structures
- Category w/w: - Installation and use in dry and wet structures
- Category w/d: - Installation in wet structures and use in dry structures
- Hole drilling see Annex C (drilling method)
- In case of aborted hole: The hole shall be filled with mortar
- Bridging of unbearing layer (e.g. plaster) see Annex B 6, Table B6.1
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Fastening screws or anchor rods (including nut and washer) must comply with the appropriate material and property class of the fischer internal threaded anchor FIS E.
- minimum curing time see Annex B 8, Table B8.2
- Commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:
  Material dimensions and mechanical properties of the metal parts according to the specifications are given in Annex A 5, Table 5.1
  Conformation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN 10204:2004, the documents shall be stored
  Marking of the anchor rod with the envisage embedment depth. This may be done by the manufacturer of the rod or by a person on job site

fischer injection system FIS VE for masonry	**Annex B 3**
Intended use Specifications (part 3)	

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Table B4.1: Installation parameters for anchor rods in solid bricks without perforated sleeves

Anchor rod	**Thread**	**M6**	**M8**	**M10**	**M12**
Nominal drill hole diameter	d_0 [mm]	8	10	12	14
Effective anchorage depth h_{ef} [1)] in solid brick (depth of drill hole $h_0 = h_{ef}$)	$h_{ef,min}$ [mm]	50			
	$h_{ef,max}$ [mm]	h-30, ≤200			
Diameter of clearance hole in the fixture	pre-position $d_f \leq$ [mm]	7	9	12	14
	push through $d_f \leq$ [mm]	9	11	14	16
Diameter of cleaning brush	$d_b \geq$ [mm]	see Table B8.1			
Maximum installation torque	$T_{inst,max}$ [Nm]	see parameters of brick			

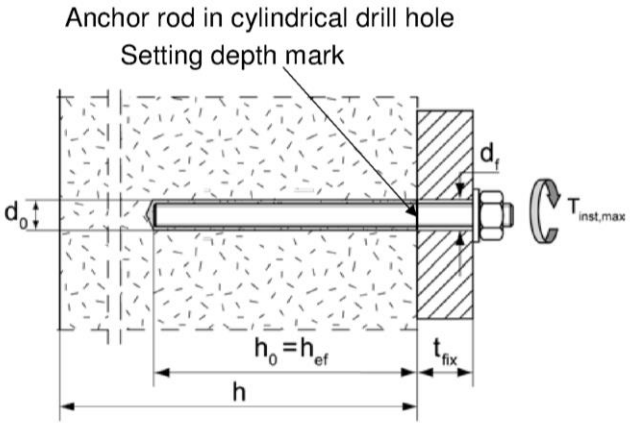
[1)] $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ is possible.

fischer anchor rods FIS A M6, M8, M10, M12

Marking:

Property class 8.8, stainless steel A4 property class 80 and high corrosion resistant steel C property class 80: •
Stainless steel A4 property class 50 and high corrosion resistant steel C property class 50: ••
Or colour coding according to DIN 976-1:2016-09, property class 4.6 or 4.8 marking according to EN ISO 898-1:2013

Installation conditions:



Pictures not to scale

fischer injection system FIS VE for masonry

Intended use
Installation parameters for anchor rods without perforated sleeve

Annex B 4

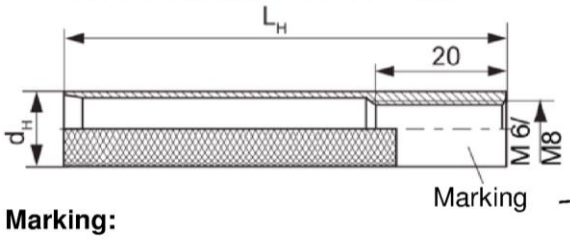
Deutsches Institut für Bautechnik DIBt

Table B5.1: Installation parameters for internal threaded anchors FIS E in solid bricks without perforated sleeves

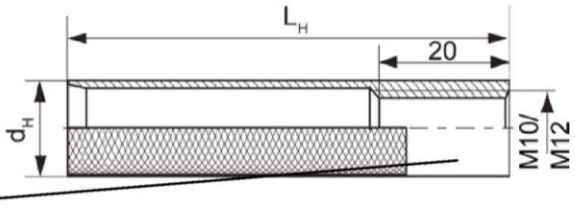
Internal threaded anchor FIS E		**11x85 M6**	**11x85 M8**	**15x85 M10**	**15x85 M12**
Diameter of anchor	d_H [mm]	11		15	
Nominal drill hole diameter	d_0 [mm]	14		18	
Length of anchor	L_H [mm]	85			
Effective anchorage depth	$h_0 = h_{ef}$ [mm]	85			
Diameter of cleaning brush	$d_b \geq$ [mm]	see Table B8.1			
Maximum installation torque	$T_{inst,max}$ [Nm]	see parameters of brick			
Diameter of clearance hole in the fixture	d_f [mm]	7	9	12	14
Screw-in depth	$l_{E,min}$ [mm]	6	8	10	12
	$l_{E,max}$ [mm]	60			

fischer Internal threaded anchor FIS E

FIS E 11x85 M6, FIS E 11x85 M8



FIS E 15x85 M10, FIS E 15x85 M12

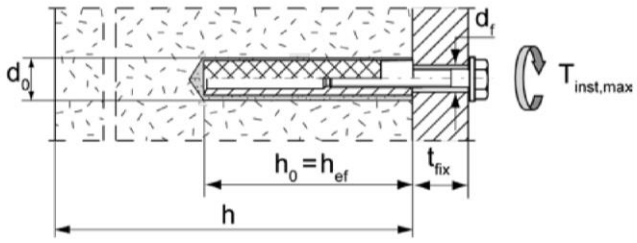


Marking:

Size, e.g. **M8**, Stainless steel: A4, e.g. **M8 A4**, High corrosion-resistant steel: C, e.g. **M8 C**

Installation conditions:

Internal threaded anchor in cylindrical drill hole



Pictures not to scale

fischer injection system FIS VE for masonry

Intended use
Installation parameters for internal threaded rods FIS E without perforated sleeve

Annex B 5

Deutsches Institut für Bautechnik DIBt

Table B6.1: Installation parameters for anchor rods and internal threaded anchors FIS E with perforated sleeves (pre-positioned anchorage)

perforated sleeve FIS H K		12x50	12x85[2)]	16x85	16x130[2)]	20x85	20x130[2)]	20x200[2)]
Nominal drill hole diameter $d_0 = D_{sleeve,nom}$	d_0 [mm]	12		16		20		
Depth of drill hole	h_0 [mm]	55	90	90	135	90	135	205
Effective anchorage depth	$h_{ef,min}$ [mm]	50	65	85	110	85	110	180
	$h_{ef,max}$ [mm]	50	85	85	130	85	130	200
Size of threaded rod	[-]	M6 and M8		M8 and M10		M12		
Size of internal threaded anchor FIS E		-	-	11x85	-	15x85	-	-
Diameter of cleaning brush[1)]	$d_b \geq$ [mm]	see Table B8.1						
Maximum installation torque	$T_{inst,max}$ [Nm]	see parameters of brick						

[1)] Only for solid areas in hollow bricks and solid bricks.

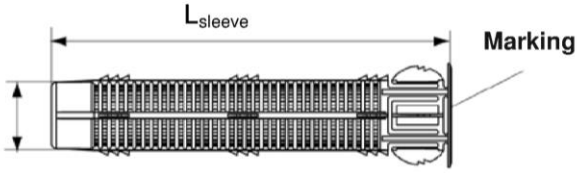
[2)] Bridging of unbearing layer (e.g. plaster) is possible. When reducing the effective anchorage depth $h_{ef,min}$, the values of the next shorter perforated sleeve of the same diameter must be used. The smaller value of charastereristic resistance must be taken.

Perforated sleeve

FIS H 12x50 K; FIS H 12x85 K; FIS H 16x85 K; FIS H 16x130 K;
FIS H 20x85 K; FIS H 20x130 K; FIS H 20x200 K

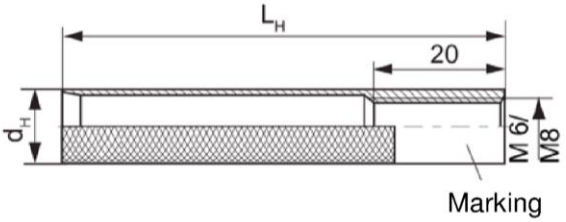
Marking:
Size $D_{sleeve,nom}$ x L_{sleeve}
(e.g.: 16x85)

$D_{sleeve,nom}$

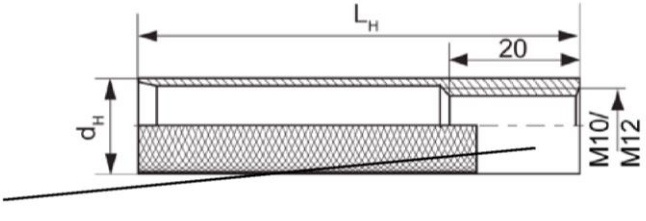


fischer Internal threaded anchor FIS E

FIS E 11x85 M6, FIS E 11x85 M8

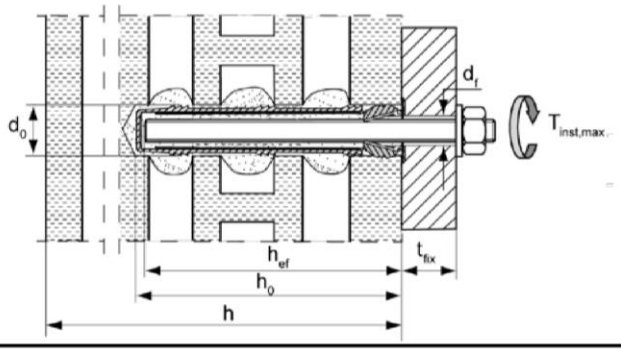


FIS E 15x85 M10, FIS E 15x85 M12

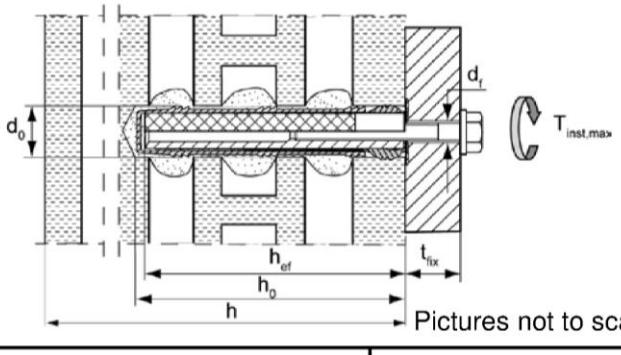


Installation conditions:

Anchor rod with perforated sleeve



Internal threaded anchor with perforated sleeve



Pictures not to scale

fischer injection system FIS VE for masonry

Intended use
Installation parameters for anchor rods and internal threaded anchors FIS E with perforated sleeve (pre-positioned anchorage)

Annex B 6

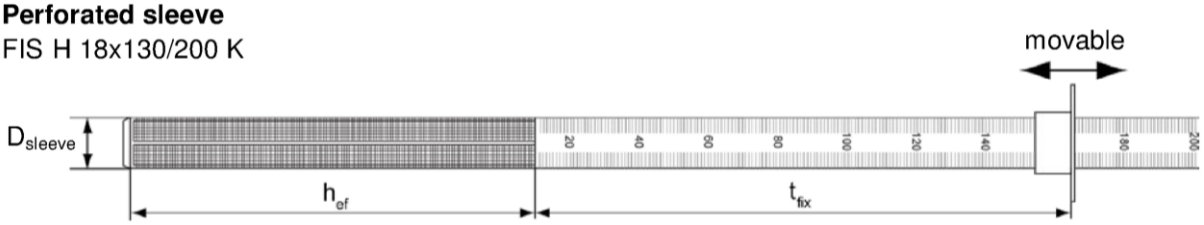
Deutsches Institut für Bautechnik DIBt

Table B7.1: Installation parameters for anchor rods with perforated sleeves (push through anchorage)

Perforated sleeve FIS H K		**18x130/200**	
Nominal sleeve diameter	$D_{sleeve,nom}$ [mm]	16	
Nominal drill hole diameter	d_0 [mm]	18	
Depth of drill hole	h_0 [mm]	135 + t_{fix}	
Effective anchorage depth	h_{ef} [mm]	≥130	
Diameter of cleaning brush [1]	d_b ≥ [mm]	Siehe Tabelle B8.1	
Size of threaded rod	[-]	M10	M12
Maximum installation torque	$T_{inst,max}$ [Nm]	see parameters of brick	
Thickness of fixture	$t_{fix,max}$ [mm]	200	

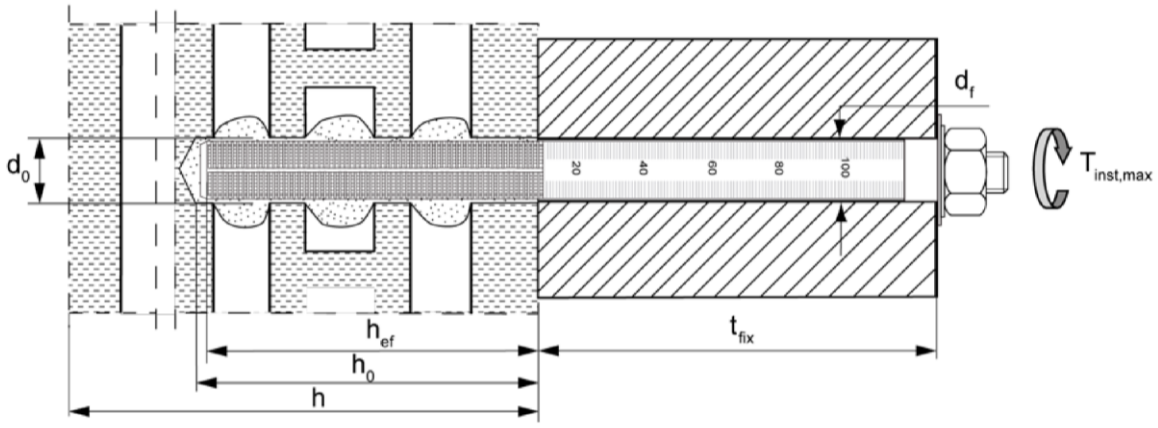
[1] Only for solid areas in hollow bricks and solid bricks.

Perforated sleeve
FIS H 18x130/200 K



Installation conditions:

Anchor rod with perforated sleeve



Pictures not to scale

fischer injection system FIS VE for masonry

Intended use
Installation parameters for anchor rods with perforated sleeves (push through anchorage)

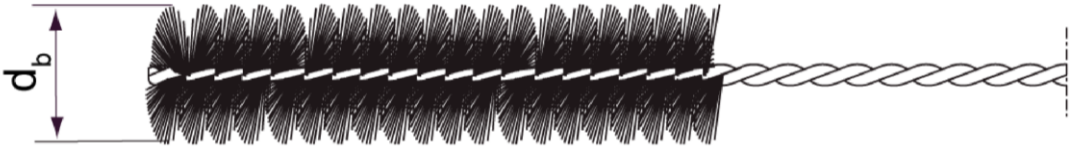
Annex B 7

Deutsches Institut für Bautechnik DIBt

Tabelle B8.1: Parameters of the cleaning brush BS (steel brush)

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

Drill hole diameter	d_0 [mm]	8	10	12	14	16	18	20
Brush diameter	d_b [mm]	9	11	14	16	20	20	25



Only for solid bricks

Table B8.2: Maximum processing times and minimum curing times
(During the curing time of the mortar the masonry temperature may not fall below the listed minimum temperature)

Temperature at anchoring base [°C]	Minimum curing time [1] t_{cure}
	FIS VE [2]
±0 to +5	3 h
>+5 to +10	90 min
>+10 to +20	60 min
>+20 to +30	45 min
>+30 to +40	35 min

System-temperature (mortar) [°C]	Maximum processing time t_{work}
	FIS VE [2]
+5	13 min
+10	9 min
+20	5 min
+30	4 min
+40	2 min

[1] For wet bricks the curing time must be doubled

[2] Minimum cartridge temperature +5°C

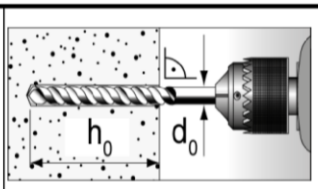
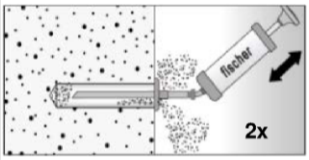
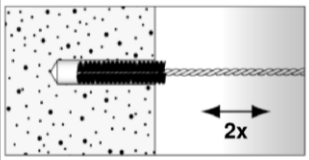
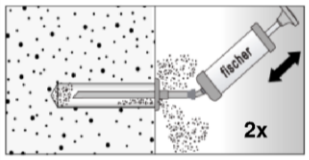
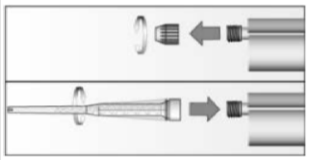
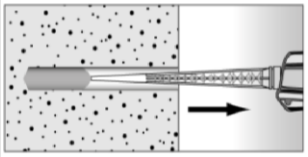
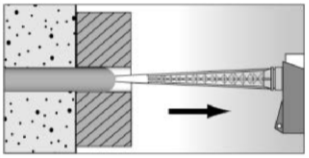
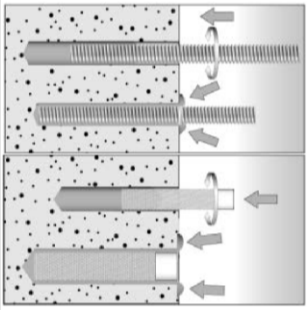
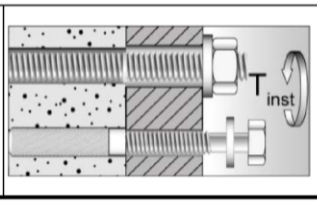
Pictures not to scale

fischer injection system FIS VE for masonry	**Annex B 8**
Intended use Cleaning brush (steel brush) Maximum processing times and minimum curing times	

Deutsches Institut für Bautechnik DIBt

Installation instruction part 1

Installation in solid brick (without perforated sleeve)

1		Drill the hole (drilling method see Annex C of the respective brick) depth of drill hole $\mathbf{h_0}$ and drill hole diameter $\mathbf{d_0}$ see **Table B4.1; B5.1**		
2				Blow out the drill hole twice. Brush twice and blow out twice again.
3		Remove the sealing cap. Screw on the static mixer. (the spiral in the static mixer must be clearly visible)		
4		Place the cartridge into a suitable dispenser		Press out approximately 10 cm of mortar until the resin is permanently grey in colour. Mortar which is not grey in colour will not cure and must be disposed of.
5		Fill approximetly 2/3 of the drill hole with mortar beginning from the bottom of the hole[1)]. Avoid bubbles!		For push through anchorage fill the annular clearance with mortar.
6		Only use clean and oil-free anchor elements. Mark the anchor rod for setting depth. Insert the anchor rod or internal threaded anchor FIS E by hand using light turning motions. When reaching the setting depth marking, excess mortar must emerge from the mouth of the drill hole.		
7		Do not touch. Minimum curing time see Table **B8.2**		Mounting the fixture. $T_{inst,max}$ see parameter of brick.

[1)] Exact volume of mortar see manufacturer´s specification.

fischer injection system FIS VE for masonry

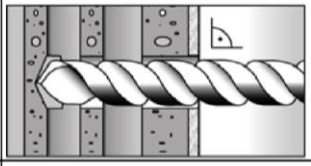
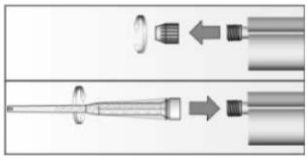
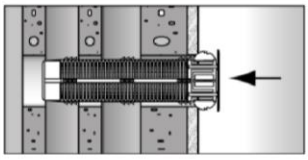
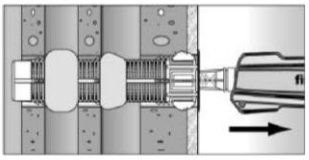
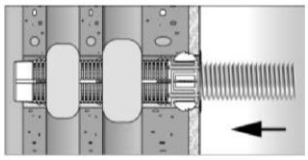
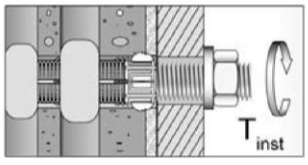
Intended use
Installation instruction (without perforated sleeve) part 1

Annex B 9

Deutsches Institut für Bautechnik DIBt

Installation instruction part 2

Installation in perforated or solid brick with perforated sleeve (pre-positioned anchorage)

1		Drill the hole (drilling method see Annex C of the respective brick). depth of drill hole $\mathbf{h_0}$ and drill hole diameter $\mathbf{d_0}$ see **Table B6.1**	When install perforated sleeves in solid bricks or solid areas of hollow bricks, also clean the hole by blowing out and brushing.	
2		Remove the sealing cap. Screw on the static mixer. (the spiral in the static mixer must be clearly visible)		
3		Place the cartridge into a suitable dispenser.		Press out approximately 10 cm of mortar until the resin is permanently grey in colour. Mortar which is not grey in colour will not cure and must be disposed of.
4		Insert the perforated sleeve flush with the surface of the masonry or plaster.		Fill the perforated sleeve completely with mortar beginning from the bottom of the hole[1].
5		Only use clean and oil-free anchor elements. Mark the ancher rod for setting depth. Insert the anchor rod or the internal threaded anchor FIS E by hand using light turning motions until reaching the setting depth marking (anchor rod) or flush with the surface (internal threaded anchor).		
6		Do not touch. Minimum curing time see Table **B8.2**		Mounting the fixture. $T_{inst,max}$ see parameter of brick.

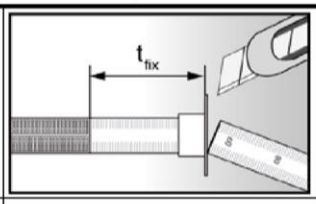
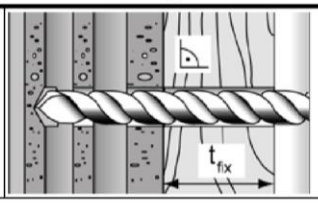
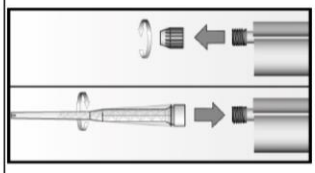
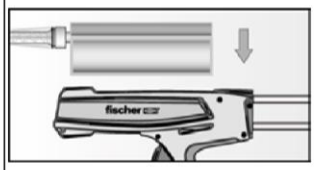
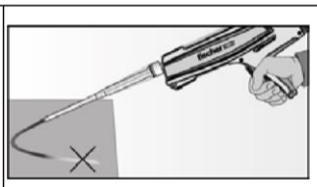
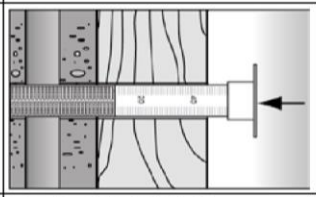
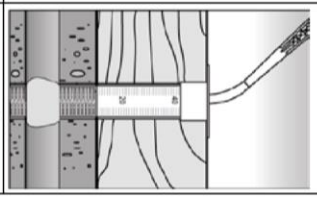
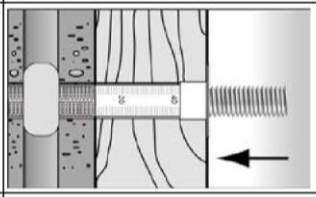
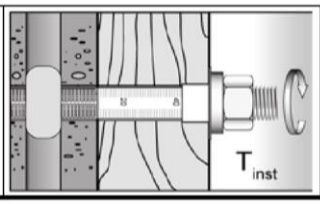
[1] Exact volume of mortar see manufacturer´s specification.

fischer injection system FIS VE for masonry	**Annex B 10**
Intended use Installation instruction (with perforated sleeve) part 2	

Deutsches Institut für Bautechnik DIBt

Installation instruction part 3

Installation in perforated or solid brick with perforated sleeve (push through anchorage)

1		Push the movable stop up to the correct thickness of fixture and cut the overlap.		Drill the hole through the fixture. Depth of drill hole **(h_0 + t_{fix})** and drill hole diameter see **Table B7.1**
2		Remove the sealing cap. Screw on the static mixer. (the spiral in the static mixer must be clearly visible)		
3		Place the cartridge into a suitable dispenser.		Press out approximately 10 cm of mortar until the resin is permanently grey in colour. Mortar which is not grey in colour will not cure and must be disposed of.
4		Insert the perforated sleeve flush with the surface of the fixture into the drill hole.		Fill the sleeve with mortar beginning from the bottom of the hole.[1] For deep drill holes use an extension tube.
5		Only use clean and oil-free anchor elements. Mark the anchor rod for setting depth. Insert the anchor rod by hand using light turning motions until reaching the the bottom of the perforated sleeve..		
6		Do not touch. Minimum curing time see Table **B8.2**		Mounting the fixture. $T_{inst,max}$ see parameter of brick.

[1] Exact volume of mortar see manufacturer´s specification.

fischer injection system FIS VE for masonry

Intended use
Installation instruction (with perforated sleeve) part 3

Annex B 11

Deutsches Institut für Bautechnik DIBt

Table B12.1: Overview of controlled bricks (part 1)

Kind of masonry	Brick format [mm]	Compressive strength f_b N/mm^2]	Producing counrty	Density ρ [kg/dm^3]	Annex
Solid brick Mz					
Solid brick Mz	≥ 245x118x54	10 - 20	Italy	≥1,8	C 4 / C 5
Vertical perforated brick HLz					
Vertical perforated brick HLz	255x120x118	2 - 12	Italy	≥1,0	C 6 – C 8
Horizontal perforated brick LLz					
Horizontal perforated brick LLz	248x78x250	2 - 6	Italy	≥0,7	C 9 / C 10

fischer injection system FIS VE for masonry

Intended use
Overview of controlled bricks

Annex B 12

Deutsches Institut für Bautechnik DIBt

Table C1.1: Characteristic values for the **steel bearing capacity** of **anchor rods** under tensile load

Anchor rod				**M6**	**M8**	**M10**	**M12**
Bearing capacity under tensile load, steel failure[3]							
Characteristic resistance $N_{Rk,s}$	Steel zinc plated	Property class	4.6	8	15 (13)	23 (21)	34
			4.8	8	15 (13)	23 (21)	34
			5.8	10	18 (17)	29 (27)	42
			8.8	16	29 (27)	46 (43)	67
	Stainless steel A4 and High corrosion resistant steel C		50	10	18	29	42
			70	14	26	41	59
			80	16	29	46	67
			[kN]				
Partial safety factors [1]							
Partial safety factor $\gamma_{Ms,N}$	Steel zinc plated	Property class	4.6	2,00			
			4.8	1,50			
			5.8	1,50			
			8.8	1,50			
	Stainless steel A4 and High corrosion resistant steel C		50	2,86			
			70	1,50[2] / 1,87			
			80	1,60			
			[-]				

[1] In absence of other national regulations

[2] Only for fischer FIS A made of high corrosion-resistant steel C

[3] Values in brackets are valid for undersized commercial threaded rods with smaller stress area A_s for hotdip galvanised standard threaded rods according to EN ISO 10684:2004+AC:2009.

fischer injection system FIS VE for masonry

Performances
Characteristic steel bearing capacity of anchor rods

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C2.1: Characteristic values for the **steel bearing capacity** of **anchor rods** under shear load

Anchor rod					**M6**	**M8**	**M10**	**M12**
Bearing capacity under shear load, steel failure[3]								
without lever arm								
Characteristic resistance $V_{Rk,s}$	Steel zinc plated	Property class	4.6	[kN]	4	7 (6)	12 (11)	17
			4.8		4	7 (6)	12 (11)	17
			5.8		5	9 (8)	15 (13)	21
			8.8		8	15 (13)	23 (21)	34
	Stainless steel A4 and High corrosion resistant steel C		50		5	9	15	21
			70		7	13	20	30
			80		8	15	23	34
with lever arm								
Characteristic bending moment $M_{Rk,s}$	Steel zinc plated	Property class	4.6	[Nm]	6	15 (13)	30 (27)	52
			4.8		6	15 (13)	30 (27)	52
			5.8		8	19 (16)	37 (33)	65
			8.8		12	30 (26)	60 (53)	105
	Stainless steel A4 and High corrosion resistant steel C		50		7	19	37	65
			70		10	26	52	92
			80		12	30	60	105
Partial safety factors[1]								
Partial safety factor $\gamma_{Ms,V}$	Steel zinc plated	Property class	4.6	[-]	1,67			
			4.8		1,25			
			5.8		1,25			
			8.8		1,25			
	Stainless steel A4 and High corrosion resistant steel C		50		2,38			
			70		1,25[2] / 1,56			
			80		1,33			

[1] In absence of other national regulations

[2] Only for fischer FIS A made of high corrosion-resistant steel C

[3] Values in brackets are valid for undersized commercial threaded rods with smaller stress area A_s for hotdip galvanised standard threaded rods according to EN ISO 10684:2004+AC:2009.

fischer injection system FIS VE for masonry

Performances
Characteristic steel bearing capacity of anchor rods

Annex C 2

Deutsches Institut für Bautechnik DIBt

Table C3.1: Characteristic values for the **steel bearing capacity** of **internal threaded anchors FIS E** under tensile / shear load

fischer internal threaded anchor FIS E					**M6**	**M8**	**M10**	**M12**
Bearing capacity under tensile load, steel failure								
Characterstic resistance with screw	$N_{Rk,s}$	Property class	5.8	[kN]	10	18	29	42
		Property class 70	A4		14	26	41	59
			C		14	26	41	59
Partial safety factors[1)]								
Partial safety factor	$\gamma_{Ms,N}$	Property class	5.8	[-]	1,50			
		Property class 70	A4		1,87			
			C		1,87			
Bearing capacity under shear load, steel failure								
without lever arm								
Characterstic resistance with screw	$V_{Rk,s}$	Property class	5.8	[kN]	5	9	15	21
		Property class 70	A4		7	13	20	30
			C		7	13	20	30
with lever arm								
Characteristic bending moment	$M_{Rk,s}$	Property class	5.8	[Nm]	8	19	37	65
		Property class 70	A4		11	26	52	92
			C		11	26	52	92
Partial safety factors[1)]								
Partial safety factor	$\gamma_{Ms,V}$	Property class	5.8	[-]	1,25			
		Property class 70	A4		1,56			
			C		1,56			

[1)] In absence of other national regulations

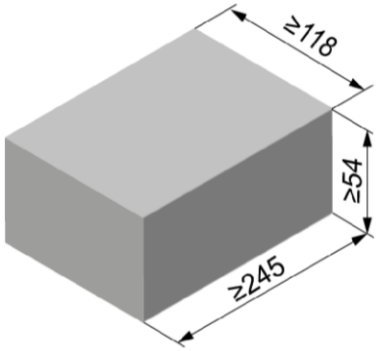
fischer injection system FIS VE for masonry

Performances
Characteristic steel bearing capacity of fischer internal threaded anchor FIS E

Annex C 3

Deutsches Institut für Bautechnik DIBt

Solid brick Mz, EN 771-1



Solid brick Mz, EN 771-1			
Producer	e.g. Nigra		
Nominal dimensions [mm]	length L	width W	height H
	≥ 245	≥ 118	≥ 54
Density ρ [kg/dm³]	≥ 1,8		
Compressive strength f_b [N/mm²]	10 / 20		
Standard or annex	EN 771-1		

Table C4.1: Installation parameters

Anchor rod			**M6**		**M8**		**M10**		**M12**		-		-	
Internal threaded anchor FIS E			-		-		-		-		**M6**	**M8**	**M10**	**M12**
											11x85		**15x85**	
Anchor rod and internal threaded anchor FIS E without perforated sleeve														
Effective anchorage depth	h_{ef}	[mm]	50	100	50	100	50	100	50	100	85			
Max. installation torque	$T_{inst,max}$	[Nm]	4		10						4	10		
General installation parameters														
Edge distance	c_{min}	[mm]	60											
Spacing	s_{cr} II = s_{min} II	[mm]	245											
	s_{cr} ⊥ = s_{min} ⊥	[mm]	60											
Drilling method														
Hammer drilling with hard metal hammer drill														

Table C4.2: Group factors

Anchor rods			**M6**	**M8**	**M10**	**M12**	**M16**	-		-	
Internal threaded anchor FIS E			-	-	-	-	-	**M6**	**M8**	**M10**	**M12**
								11x85		**15x85**	
Group factor	$\alpha_{g,N}$ II $\alpha_{g,V}$ II $\alpha_{g,N}$ ⊥ $\alpha_{g,V}$ ⊥	[-]	2								

fischer injection system FIS VE for masonry

Performances
Solid brick Mz, dimensions, installation parameters

Annex C 4

Deutsches Institut für Bautechnik DIBt

Solid brick Mz, EN 771-1

Table C5.1: Characteristic resistance under tensile load

Anchor rod		**M6**	**M8**	**M10**	**M12**	-		-	
Internal threaded anchor FIS E		-	-	-	-	**M6** | **M8**		**M10** | **M12**	
						11x85		**15x85**	
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)									
compressive strength f_b	use category	Effective anchorage depth h_{ef} [mm] ≥ 50				85			
10N/mm²	w/w | w/d	0,6	0,9	0,75	0,75	0,6		0,75	
	d/d	1,2	1,5	1,2	1,2	1,2		1,2	
20N/mm²	w/w | w/d	0,9	1,5	1,2	1,2	0,9		1,2	
	d/d	1,5	2,5	2,0	2,0	1,5		2,0	

Factor for temperature range 72/120°C: 0,83

Table C5.2: Characteristic resistance under shear load

Anchor rod		**M6**	**M8**	**M10**	**M12**	-		-	
Internal threaded anchor FIS E		-	-	-	-	**M6** | **M8**		**M10** | **M12**	
						11x85		**15x85**	
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)									
compressive strength f_b	use category	Effective anchorage depth h_{ef} [mm] ≥ 50				85			
10N/mm²	w/w | w/d	2,0	3,0	4,0	4,5	2,0	3,0	4,0	4,5
	d/d								
20N/mm²	w/w | w/d	2,5	4,0	5,5	6,0	2,5	4,0	5,5	6,0
	d/d								

Factor for job site tests and displacements see annex C11

fischer injection system FIS VE for masonry	**Annex C 5**
Performances Solid brick Mz, Characteristic resistance under tensile and shear load	

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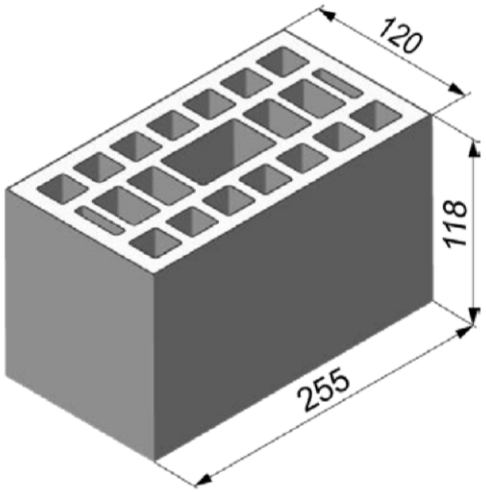
Vertical perforated brick HLz, EN 771-1



Vertical perforated brick HLz, EN 771-1			
Producer	e.g. Wienerberger		
Nominal dimensions [mm]	length L	width W	height H
	255	120	118
Density ρ [kg/dm³]	≥ 1,0		
Compressive strength f_b [N/mm²]	2 / 4 / 6 / 8 / 10 / 12		
Standard or annex	EN 771-1		

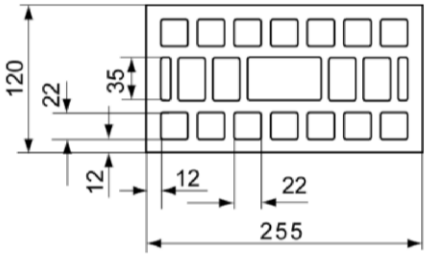


Table C6.1: Installation parameters

Anchor rod	**M6**	**M8**	**M6**	**M8**	**-**	**M8**	**M10**	**-**	**M12**
Internal threaded anchor FIS E	-		-		**M6** **M8** **11x85**	-		**M10** **M12** **15x85**	-
Perforated sleeve FIS H K	**12x50**		**12x85**		**16x85**			**20x85**	
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K									
Max. installation torque $T_{inst,max}$	[Nm]	2							
General installation parameters									
Edge distance c_{min}	[mm]	60							
Spacing s_{cr} ∥ = s_{min} ∥	[mm]	255							
Spacing s_{cr} ⊥ = s_{min} ⊥	[mm]	120							
Drilling method									
Hammer drilling with hard metal hammer drill									

Table C6.2: Group factors

Anchor rod	**M6**	**M8**	**M6**	**M8**	**-**	**M8**	**M10**	**-**	**M12**
Internal threaded anchor FIS E	-		-		**M6** **M8** **11x85**	-		**M10** **M12** **15x85**	-
Perforated sleeve FIS H K	**12x50**		**12x85**		**16x85**			**20x85**	
Group factors $\alpha_{g,N}$ ∥, $\alpha_{g,V}$ ∥, $\alpha_{g,N}$ ⊥, $\alpha_{g,V}$ ⊥	[-]	2							

fischer injection system FIS VE for masonry

Performances
Vertical perforated brick HLz, dimensions, installation parameters

Annex C 6

Deutsches Institut für Bautechnik DIBt

Vertical perforated brick HLz, EN 771-1

Table C7.1: Characteristic resistance under tensile load

Anchor rod		**M6**	**M8**	**M6**	**M8**	**-**	**M8**	**M10**	**-**	**M12**
Internal threaded anchor FIS E		**-**		**-**		**M6** / **11x85**	**M8** / **11x85**	**-**	**M10** / **15x85**	**M12** / **15x85**	**-**
Perforated sleeve FIS H K		**12x50**		**12x85**		**16x85**			**20x85**		
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)											
compressive strength f_b	use category										
2 N/mm²	w/w w/d	0,4		0,5					-		
	d/d	0,5		0,5					-		
4 N/mm²	w/w w/d	0,9		0,9					0,5		
	d/d	0,9		1,2					0,5		
6 N/mm²	w/w w/d	1,2		1,5					0,75		
	d/d	1,5		1,5					0,75		
8 N/mm²	w/w w/d	1,5		2,0					0,9		
	d/d	2,0		2,0					0,9		
10 N/mm²	w/w w/d	2,0		2,5					1,2		
	d/d	2,5		2,5					1,2		
12 N/mm²	w/w w/d	2,5		3,0					1,5		
	d/d	3,0		3,5					1,5		

Factor for job site tests and displacements see annex C11

Factor for temperature range 72/120°C: 0,83

fischer injection system FIS VE for masonry

Performances
Vertical perforated brick HLz, Characteristic resistance under tensile load

Annex C 7

Deutsches Institut für Bautechnik DIBt

Vertical perforated brick HLz, EN 771-1

Table C8.1: Characteristic resistance under shear load

Anchor rod		**M6**	**M8**	**M6**	**M8**	**-**	**M8**	**M10**	**-**	**M12**
Internal threaded anchor FIS E		**-**		**-**		**M6** **M8** **11x85**	**-**		**M10** **M12** **15x85**	**-**
Perforated sleeve FIS H K		**12x50**		**12x85**		**16x85**			**20x85**	
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)										
compressivestrength f_b	use category									
2 N/mm²	w/w w/d d/d	0,6	0,75	0,6	0,75	0,9				
4 N/mm²	w/w w/d d/d	1,2	1,5	1,2	1,5	2,0				
6 N/mm²	w/w w/d d/d	2,0	2,0	2,0	2,0	2,5				
8 N/mm²	w/w w/d d/d	2,5	3,0	2,5	3,0	3,5				
10 N/mm²	w/w w/d d/d	3,0	3,5	3,0	3,5	4,5				
12 N/mm²	w/w w/d d/d	4,0	4,5	4,0	4,5	5,5				

Factor for job site tests and displacements see annex C11

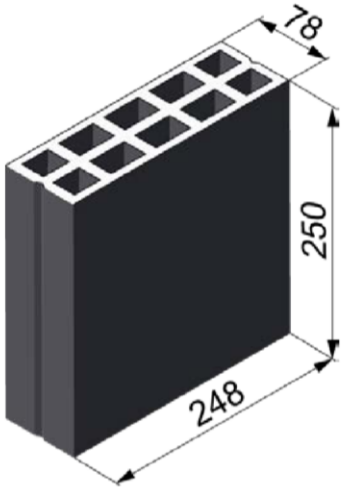
fischer injection system FIS VE for masonry

Performances
Vertical perforated brick HLz, Characteristic resistance under shear load

Annex C 8

Deutsches Institut für Bautechnik DIBt

Horizontal perforated brick LLz, EN 771-1



Horizontal perforated brick LLz, EN 771-1				
Producer		-		
Nominal dimensions [mm]		length L	width W	height H
		250	78	248
Density ρ	[kg/dm³]	≥ 0,7		
Compressive strength f_b	[N/mm²]	2 / 4 / 6		
Standard or annex		EN 771-1		

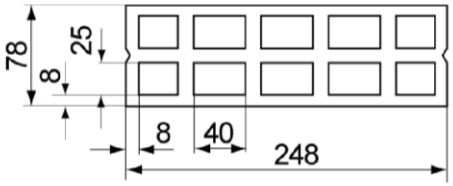


Table C9.1: Installation parameters

Anchor rod			**M6**	**M8**
Perforated sleeve FIS H K			**12x50**	
Anchor rod with perforated sleeve FIS H K				
Max. installation torque	$T_{inst,max}$	[Nm]	2	
General installation parameters				
Edge distance	c_{min}	[mm]	100	
Spacing	s_{min} ∥	[mm]	75	
	s_{cr} ∥	[mm]	250	
	s_{min} ⊥ = s_{cr} ⊥	[mm]	250	
Drilling method				
Hammer drilling with hard metal hammer drill				

Table C9.2: Group factors

Anchor rod			**M6**	**M8**
Perforated sleeve FIS H K			**12x50**	
Group factors	$\alpha_{g,N}$ ∥	[-]	1,6	
	$\alpha_{g,V}$ ∥	[-]	1,1	
	$\alpha_{g,N}$ ⊥	[-]	2,0	
	$\alpha_{g,V}$ ⊥	[-]		

fischer injection system FIS VE for masonry

Performances
Horizontal perforated brick LLz, dimensions, installation parameters

Annex C 9

Deutsches Institut für Bautechnik DIBt

Horizontal perforated brick LLz, EN 771-1

Table C10.1: Characteristic resistance under tensile load

Anchor rod		**M6**	**M8**
Perforated sleeve FIS H K		**12x50**	
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)			
compressive strength f_b	use category		
2 N/mm²	w/w w/d	0,5	
	d/d	0,6	
4 N/mm²	w/w w/d	0,9	
	d/d	1,2	
6 N/mm²	w/w w/d	1,5	
	d/d	1,5	

Factor for temperature range 72/120°C: 0,83

Table C10.2: Characteristic resistance under shear load

Anchor rod		**M6**	**M8**
Perforated sleeve FIS H K		**12x50**	
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)			
compressive strength f_b	use category		
2 N/mm²	w/w w/d	0,5	
	d/d		
4 N/mm²	w/w w/d	0,9	
	d/d		
6 N/mm²	w/w w/d	1,5	
	d/d		

Factor for job site tests and displacements see annex C11

fischer injection system FIS VE for masonry	**Annex C 10**
Performances Horizontal perforated brick LLz, Characteristic resistance under tensile and shear load	

Deutsches Institut für Bautechnik DIBt

β-factors for job site tests; displacements

Table C11.1: β-factors for job site tests

use category		w/w and w/d		d/d	
temperature range		50/80	72/120	50/80	72/120
Material	Size				
solid units	M6	0,55	0,46	0,96	0,80
	M8	0,57	0,51		
	M10	0,59	0,52		
	M12 FIS E 11x85	0,6	0,54		
	FIS E 15x85	0,62	0,52		
	16x85	0,55	0,46		
hollow units	all sizes	0,86	0,72	0,96	0,8

Table C11.2: Displacements

Material	N [kN]	δN_0 [mm]	δN_∞ [mm]	V [kN]	δV_0 [mm]	δV_∞ [mm]
solid units h_{ef}=100m	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,03	0,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	0,82	0,88
hollow units	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,48	0,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	1,71	2,56

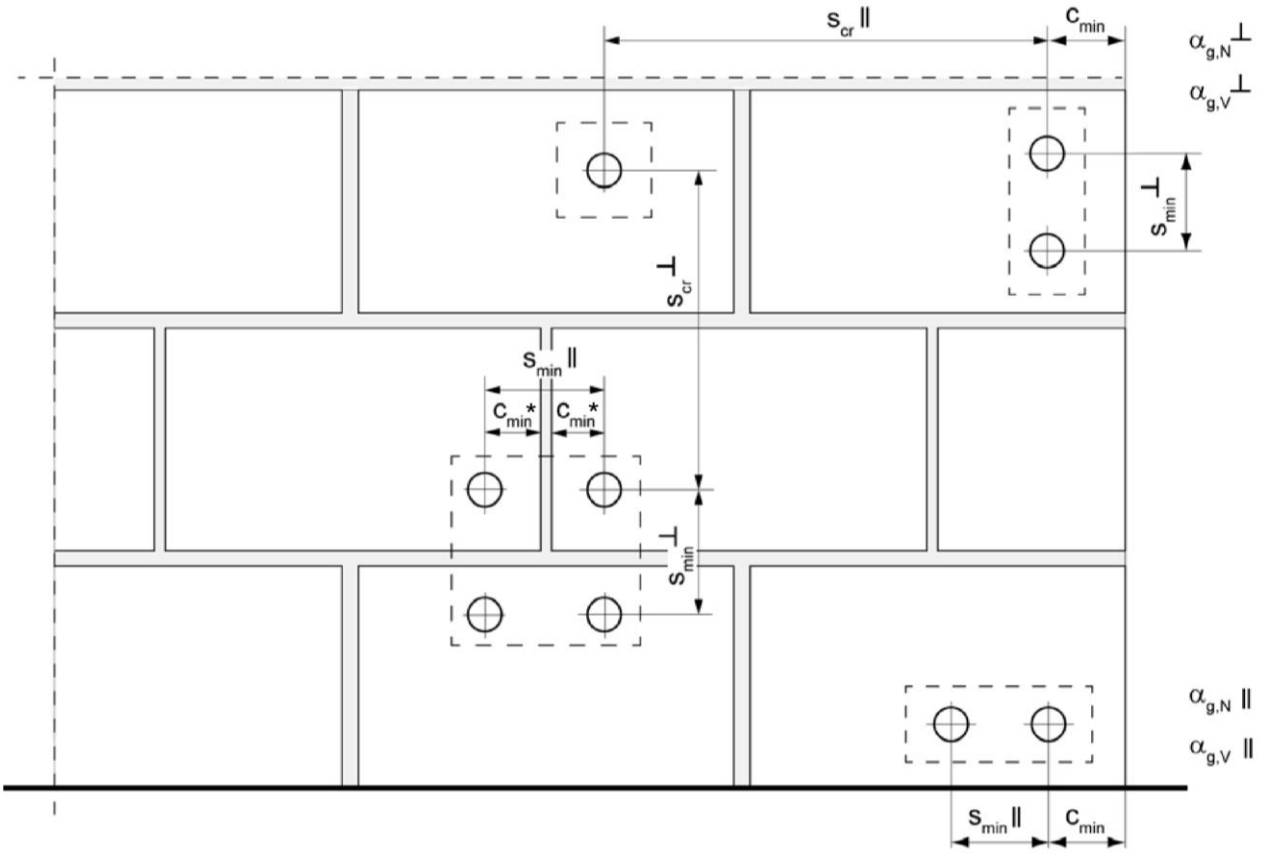
fischer injection system FIS VE for masonry

Performances
β-factors for job site tests; displacements

Annex C 11

Deutsches Institut für Bautechnik DIBt

Spacing and edge distance



* Only, if vertical joints are not completely filled with mortar

s_{min} ||	=	Minimum spacing parallel to bed joint
s_{min} ⊥	=	Minimum spacing vertical to bed joint
s_{cr} ||	=	Characteristic spacing parallel to bed joint
s_{cr} ⊥	=	Characteristic spacing vertical to bed joint
$c_{cr} = c_{min}$	=	Edge distance
$\alpha_{g,N}$ ||	=	Group factor for tensile load, anchor group parallel to bed joint
$\alpha_{g,V}$ ||	=	Group factor for shear load, anchor group parallel to bed joint
$\alpha_{g,N}$ ⊥	=	Group factor for tensile load, anchor group vertical to bed joint
$\alpha_{g,V}$ ⊥	=	Group factor for shear load, anchor group vertical to bed joint

For $s \geq s_{cr}$ $\alpha_g = 2$

For $s_{min} \leq s < s_{cr}$ α_g according to installation parameters of brick

$N^g_{Rk} = \alpha_{g,N} \bullet N_{Rk}$; $V^g_{Rk} = \alpha_{g,V} \bullet V_{Rk}$ (Group of 2 anchors)

$N^g_{Rk} = \alpha_{g,N}$ || $\bullet$ $\alpha_{g,N}$ ⊥ $\bullet$ $N_{Rk;}$ $V^g_{Rk} = \alpha_{g,V}$ || $\bullet$ $\alpha_{g,V}$ ⊥ $\bullet$ V_{Rk} (Group of 4 anchors)

fischer injection system FIS VE for masonry	**Annex C 12**
Performances Spacing and edge distance	