Deutsches Institut für Bautechnik
DIBt

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

European Technical Assessment

ETA-15/0263 of 7 July 2020

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 VL for use in masonry
Product family to which the construction product belongs	Injection system for use in masonry
Manufacturer	fischerwerke GmbH & Co. KG Otto-Hahn-Straße 15 79211 Denzlingen DEUTSCHLAND
Manufacturing plant	fischerwerke
This European Technical Assessment contains	47 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, Edition 11/2017
This version replaces	ETA-15/0263 issued on 27 July 2015

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Specific Part

1 Technical description of the product

The fischer injectionsystem FIS VL for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar fischer FIS VL, FIS VL Low Speed and FIS VL High Speed, 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 26
Displacements	See Annex C 27
Durability	See annex B 2

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 7 July 2020 by Deutsches Institut für Bautechnik

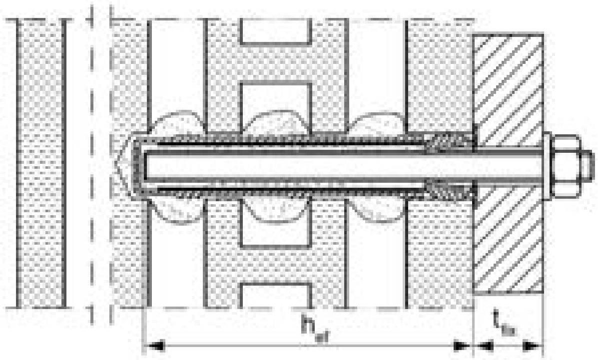
Dr.-Ing. Lars Eckfeldt
p.p. Head of Department

beglaubigt:
Baderschneider

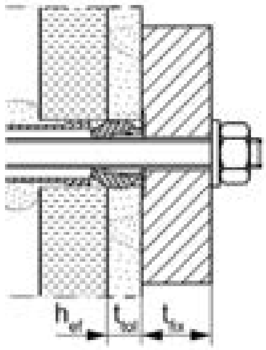
Installation conditions part 1

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

Pre-positioned anchorage:



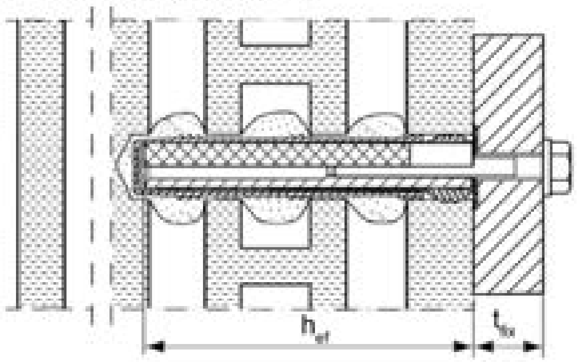
Installation with render bridge



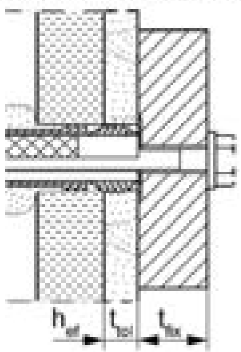
Size of the perforated sleeve: FIS H 12x85 K, FIS H 16x85 K, FIS H 16x130 K, FIS H 20x85 K, FIS H 20x130 K, FIS H 20x200 K

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 VL for masonry

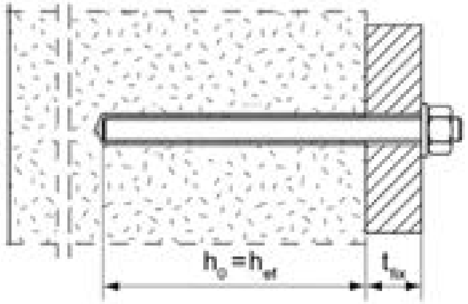
Product description
Installation conditions part 1, Installation in perforated and solid brick masonry
Anchor rods and internal threaded anchor with perforated sleeve

Annex A 1

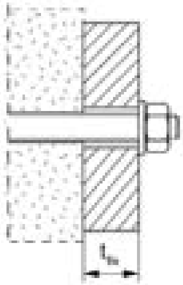
Installation conditions part 2

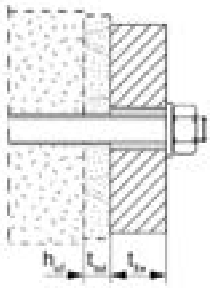
Anchor rods without perforated sleeve FIS H K;
Installation in solid brick masonry and autoclaved aerated concrete

Pre-positioned anchorage:



Push through anchorage: Annular gap filled with mortar

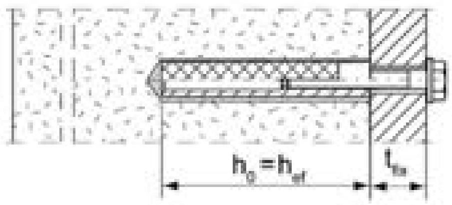




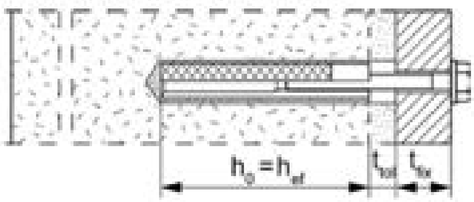
Installation with render bridge

Internal threaded anchors FIS E without perforated sleeve FIS H K;
Installation in solid brick masonry and autoclaved aerated concrete

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

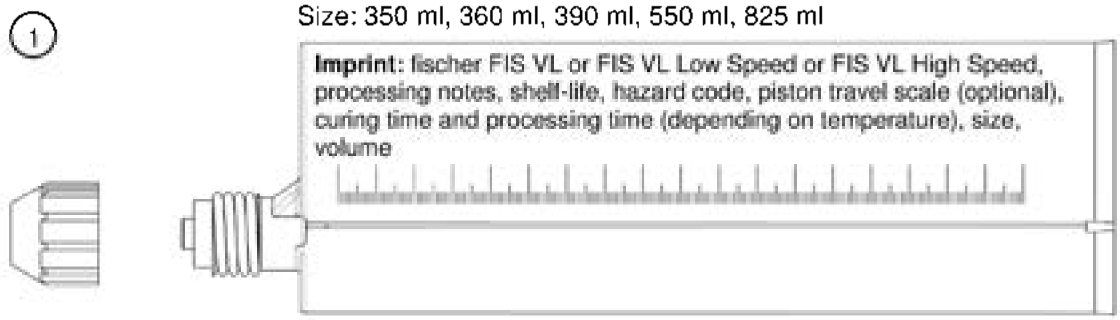
fischer injection system FIS VL for masonry

Product description
Installation conditions part 2, Installation in solid brick masonry and autoclaved aerated concrete. Anchor rods and internal threaded anchors without perforated sleeve

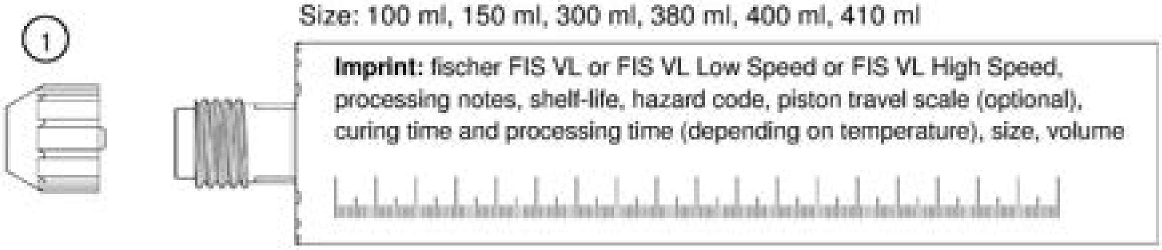
Annex A 2

Overview system components part 1

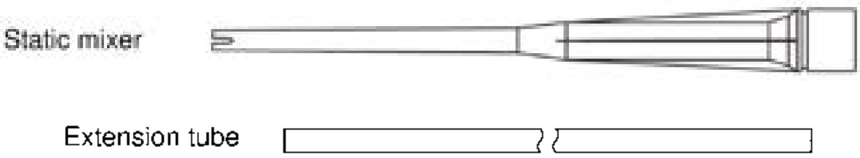
Mortar cartridge (shuttle cartridge) with sealing cap



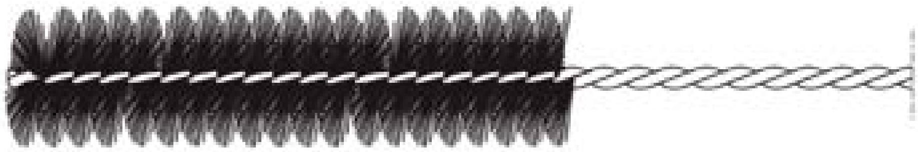
Mortar cartridge (coaxial cartridge) with sealing cap



Static mixer MR Plus with extension tube



Cleaning brush BS



Blow-out pump ABG or ABP

Pictures not to scale

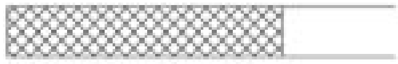
fischer injection system FIS VL for masonry	Annex A 3
System description Overview system components part 1: cartridge / static mixer / cleaning tools	

Overview system components part 2

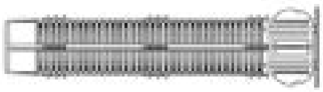
fischer anchor rod

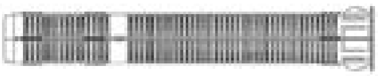
2  Size: M8, M10, M12

Internal threaded anchor FIS E

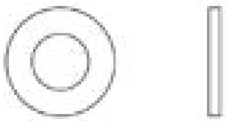
5  Size: 11x85 M6 / M8
15x85 M10 / M12

Perforated sleeve FIS H K

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

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

Washer

3 

Hexagon nut

4 

Pictures not to scale

fischer injection system FIS VL for masonry	**Annex A 4**
System description Overview system components part 2: steel parts / perforated sleeve	

Table A5.1: Materials

Part	Designation	Material		
1	Mortar cartridge	Mortar, hardener; filler		
		Steel	Stainless steel R	High corrosion-resistant steel HCR
		zinc plated	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
2	Anchor rod	Property class 4.8; 5.8 or 8.8; EN ISO 898-1: 2013 zinc plated ≥ 5µm, EN ISO 4042:2018 Zn5/An(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; 1.4662; 1.4462; 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 4042:2018 Zn5/An(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, EN ISO 4042:2018 Zn5/An(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, EN ISO 4042:2018 Zn5/An(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 rod for internal threaded anchor FIS E	Property class 5.8 or 8.8; EN ISO 898-1:2013 zinc plated ≥ 5µm, EN ISO 4042:2018 Zn5/An(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 VL for masonry

Product description
Materials

Annex A 5

Deutsches Institut für Bautechnik DIBt

Specifications of intended use (part 1)

Table B1.1: Overview use and performance categories

		fischer injection system FIS VL for 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 and autoclaved aerated concrete)	Perforated sleeve with anchor rod or internal threaded anchor (in perforated and solid brick masonry) Size: 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 and autoclaved aerated concrete)	---
Installation conditions	category d/d	all bricks	
	category w/d		
	category w/w		
Installation direction		D3 (downward and horizontal and upwards (e.g. overhead) installation)	
Installation temperature		$T_{i,min}$ = 0 °C bis $T_{i,max}$ = +40 °C	
In-service temperature	Temperature range Tb	-40 °C to +80 °C	(max. short term temperature +80 °C max. long term temperature +50 °C)

fischer injection system FIS VL for masonry	**Annex B 1**
Intended Use Specifications (part 1)	

Specifications of intended use (part 2)

Anchorages subject to:

- Static and quasi-static loads

Base materials:

- Solid brick masonry (Use category b) and autoclaved aerated concrete (Use category d), acc. to Annex B 10
- Hollow brick masonry (use category c), according to Annex B 10
- 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 and autoclaved aerated concrete, the characteristic resistance of the anchor may be determined by job site tests according to EOTA Technical Report TR 053, Annex B under consideration of the β-factor according to Annex C 27, Table C27.

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

Temperature Range:

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

Use conditions (Environmental conditions):

- **X1:** Structures subject to dry internal conditions exist
  (zinc coated steel, stainless steel or high corrosion resistant steel)
- **X2:** Structures subject to external atmospheric exposure including industrial and marine environment or exposure to permanently damp internal condition, if no particulary aggressive conditions exist
  (stainless steel or high corrosion resistant steel)
- **X3:** Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particulary aggressive conditions exist (high corrosion resistant steel)

  Note: Particulary 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 VL for masonry	**Annex B 2**
Intended Use Specifications (part2)	

Specifications of intended use (part 2 continued)

Design:

- The anchorages have to be designed in accordance with EOTA Technical Report 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 EOTA Technical Report TR 054.
  $\mathbf{N_{Rk,s}}$, $\mathbf{V_{Rk,s}}$ and $\mathbf{M^0_{Rk,s}}$ see annex C1-C3
  Factors for job site tests and displacements see Annex C27
- 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) at perforated brick masonry 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 7, Table B7.2
- 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 VL for masonry	**Annex B 3**
Intended Use Specifications (part2 continued)	

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

Anchor rod	Thread	M8	M10	M12
Nominal drill hole diameter	d_0 [mm]	10	12	14
Effective anchorage depth h_{ef}[1)] in AAC	$h_{0,min}=h_{ef,min}$ [mm]	100		
	$h_{0,max}=h_{ef,max}$ [mm]	200		
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]	9	12	14
	push through $d_f \leq$ [mm]	11	14	16
Diameter of cleaning brush	$d_b \geq$ [mm]	see Table B7.1		
Maximum installation torque	T_{inst} [Nm]	see parameters of brick		

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

fischer anchor rods M8, M10, M12

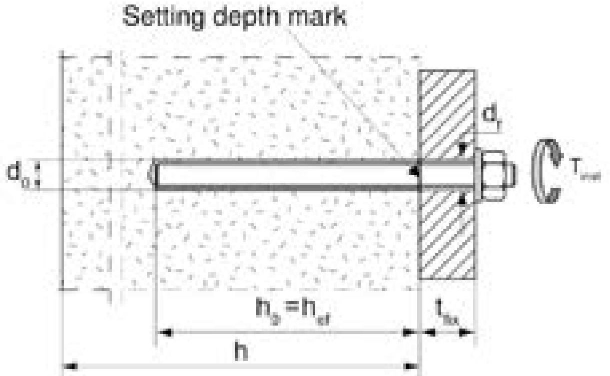
Marking (on random place) fischer anchor rod:

Steel zinc plated PC[1)] 8.8	• or +	Steel hot-dip PC[1)] 8.8	•
High corrosion resistant steel HCR PC[1)] 50	•	High corrosion resistant steel HCR PC[1)] 70	-
High corrosion resistant steel HCR PC[1)] 80	(	Stainless steel R property class 50	~
Stainless steel R property class 80	∗		

Alternatively: Colour coding according to DIN 976-1: 2016

[1)] PC = property class

Installation condition:



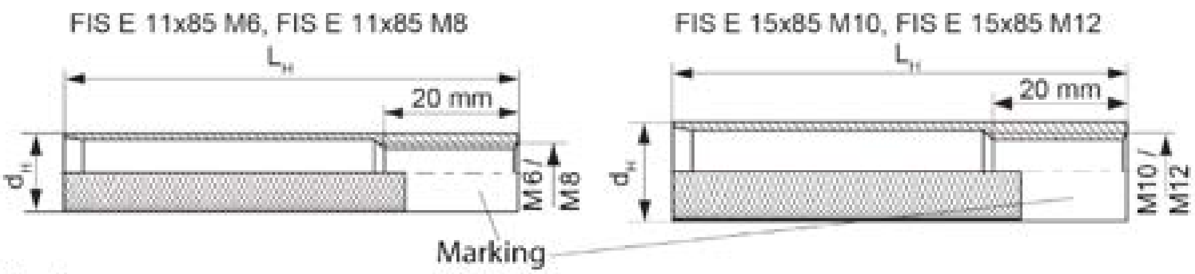
Pictures not to scale

fischer injection system FIS VL for masonry	**Annex B 4**
Intended Use Installation parameters for anchor rods without perforated sleeve	

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

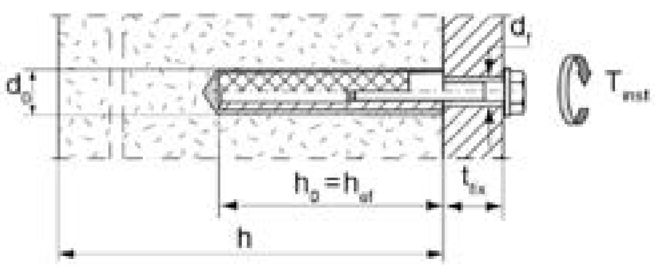
Internal threaded anchor FIS E		11x85 M6	11x85 M8	15x85 M10	15x85 M12
Diameter of anchor	d_H [mm]	11		15	
Nominal drill hole diameter	d_0 [mm]	14		18	
Length of anchor	L_H [mm]	85			
Effective anchorage depth	$h_0 = h_{ef}$ [mm]	85			
Diameter of cleaning brush	$d_b \geq$ [mm]	see Table B7.1			
Maximum installation torque	T_{inst} [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



Marking:
Size, e.g. **M8**, Stainless steel: R, e.g. **M8 R**, High corrosion-resistant steel: HCR, e.g. **M8 HCR**

Installation condition:



Pictures not to scale

fischer injection system FIS VL for masonry

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

Annex B 5

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

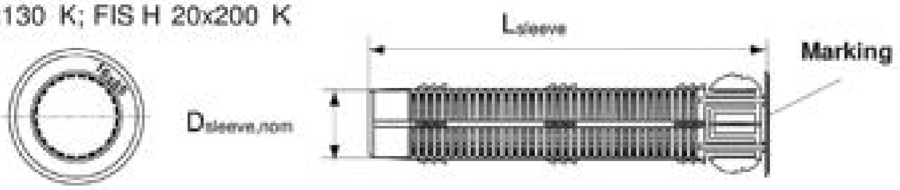
perforated sleeve FIS H K		12x85	16x85	16x130[2)]	20x85	20x130[2)]	20x200[2)]
Nominal drill hole diameter $d_0 = D_{sleeve,nom}$	d_0 [mm]	12	16		20		
Depth of drill hole	h_0 [mm]	90	90	135	90	135	205
Effective anchorage depth	$h_{ef,min}$ [mm]	65	85	110	85	110	180
	$h_{ef,max}$ [mm]	85	85	130	85	130	200
Size of threaded rod	[-]	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 B7.1					
Maximum installation torque	T_{inst} [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 12x85 K; FIS H 16x85 K; FIS H 16x130 K;
FIS H 20x85 K; FIS H 20x130 K; FIS H 20x200 K

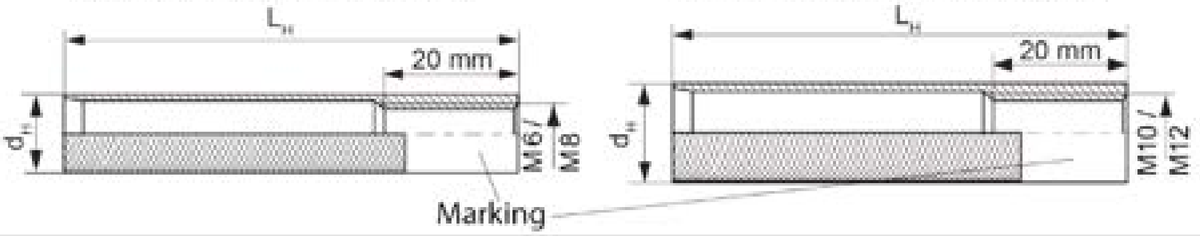
Marking:
Size $D_{sleeve,nom}$ x L_{sleeve}
(e.g.: 16x85)



fischer internal threaded anchor FIS E

FIS E 11x85 M6, FIS E 11x85 M8

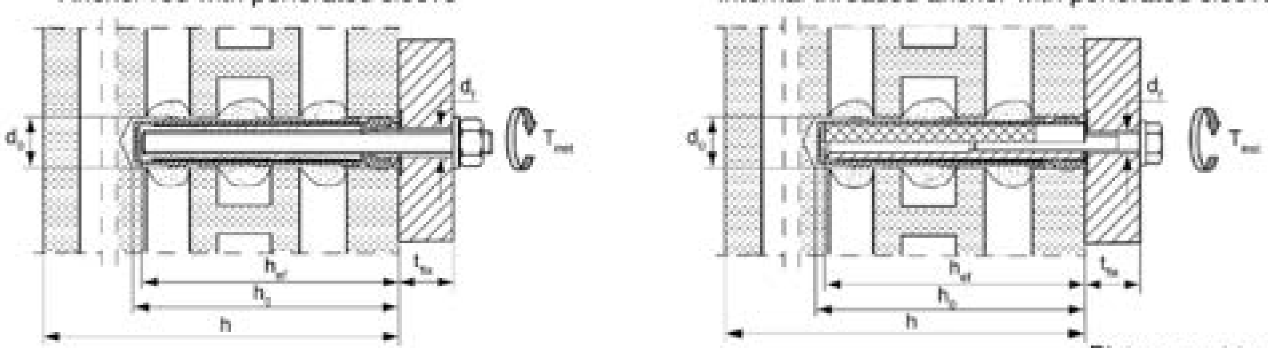
FIS E 15x85 M10, FIS E 15x85 M12



Installation conditions:

Anchor rod with perforated sleeve

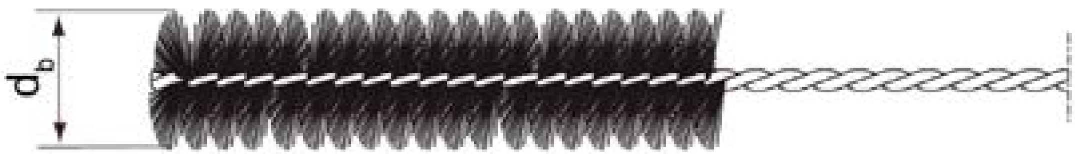
Internal threaded anchor with perforated sleeve



Pictures not to scale

fischer injection system FIS VL for masonry	**Annex B 6**
Intended Use Installation parameters for anchor rods and internal threaded anchors FIS E with perforated sleeve (pre-positioned anchorage)	

Table B7.1: Parameters of the cleaning brush BS (steel brush with steel bristles)							
The size of the cleaning brush refers to the drill hole diameter							
Drill hole diameter	d_0 [mm]	10	12	14	16	18	20
Brush diameter	d_b [mm]	11	14	16	20	20	25



Only for solid bricks and autoclaved aerated concrete

Table B7.2: 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]	Maximum processing time t_{work}			Minimum curing time [1] t_{cure}		
	FIS VL High Speed [3]	FIS VL [2]	FIS VL Low Speed [2]	FIS VL High Speed [3]	FIS VL [2]	FIS VL Low Speed [2]
> 0 to 5	5 min	13 min	20 min	90 min	3 h	6 h
> 5 to 10	3 min	9 min	20 min	45 min	90 min	3 h
> 10 to 20	1 min	5 min	10 min	30 min	60 min	2 h
> 20 to 30	-	4 min	6 min	-	45 min	60 min
> 30 to 40	-	2 min	4 min	-	35 min	30 min

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

[2] Minimum cartridge temperature +5°C

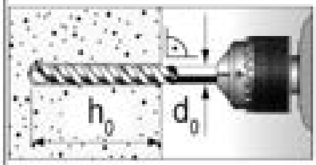
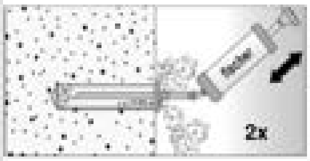
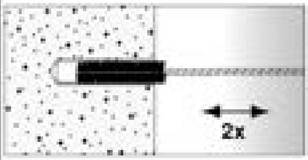
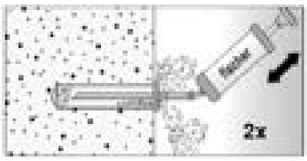
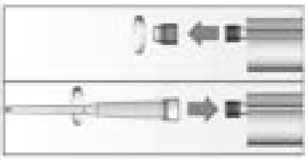
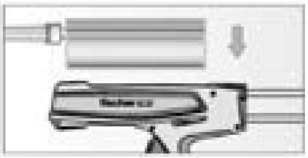
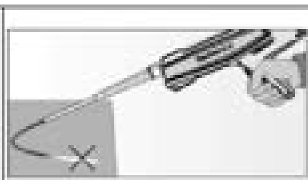
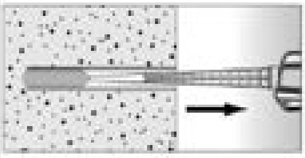
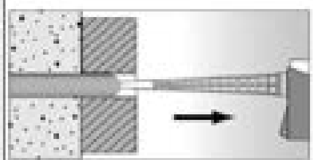
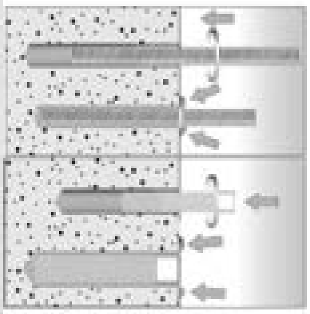
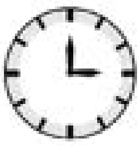
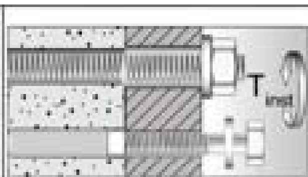
[3] Minimum cartridge temperature ±0°C

Pictures not to scale

fischer injection system FIS VL for masonry	Annex B 7
Intended use Cleaning brush (steel brush) Maximum processing times and minimum curing times	

Installation instruction part 1

Installation in solid brick and autoclaved aerated concrete (without perforated sleeve)

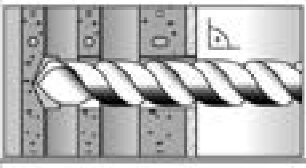
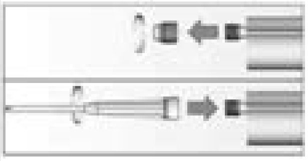
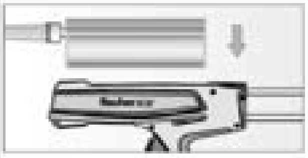
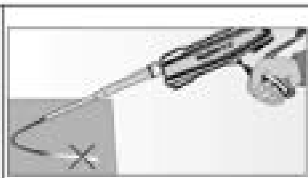
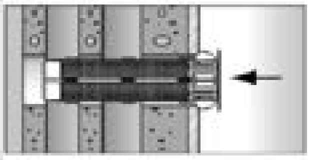
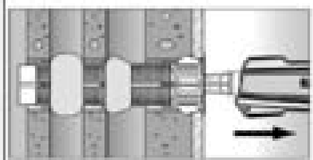
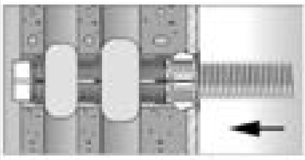
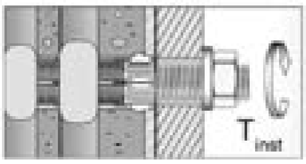
1		Drill the hole (drilling method see Annex C of the respective brick) depth of drill hole $\mathbf{h_0}$ and drill hole diameter $\mathbf{d_0}$ see **Table B4.1; B5.1**		
2				Blow out the drill hole twice. Brush twice and blow out twice again.
3		Remove the sealing cap. Screw on the static mixer. (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 (not FIS E) fill the annular clearance with mortar.
6		Only use clean and oil-free metal parts. 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 **B7.2**		Mounting the fixture. T_{inst} see parameter of brick.

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

fischer injection system FIS VL for masonry	**Annex B 8**
Intended use Installation instruction (without perforated sleeve) part 1	

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 h_0 and drill hole diameter 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 metal parts. 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 **B7.2**		Mounting the fixture. T_{inst} see parameter of brick.

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

fischer injection system FIS VL for masonry	**Annex B 9**
Intended use Installation instruction (with perforated sleeve) part 2	

Table B10.1: Overview of controlled bricks

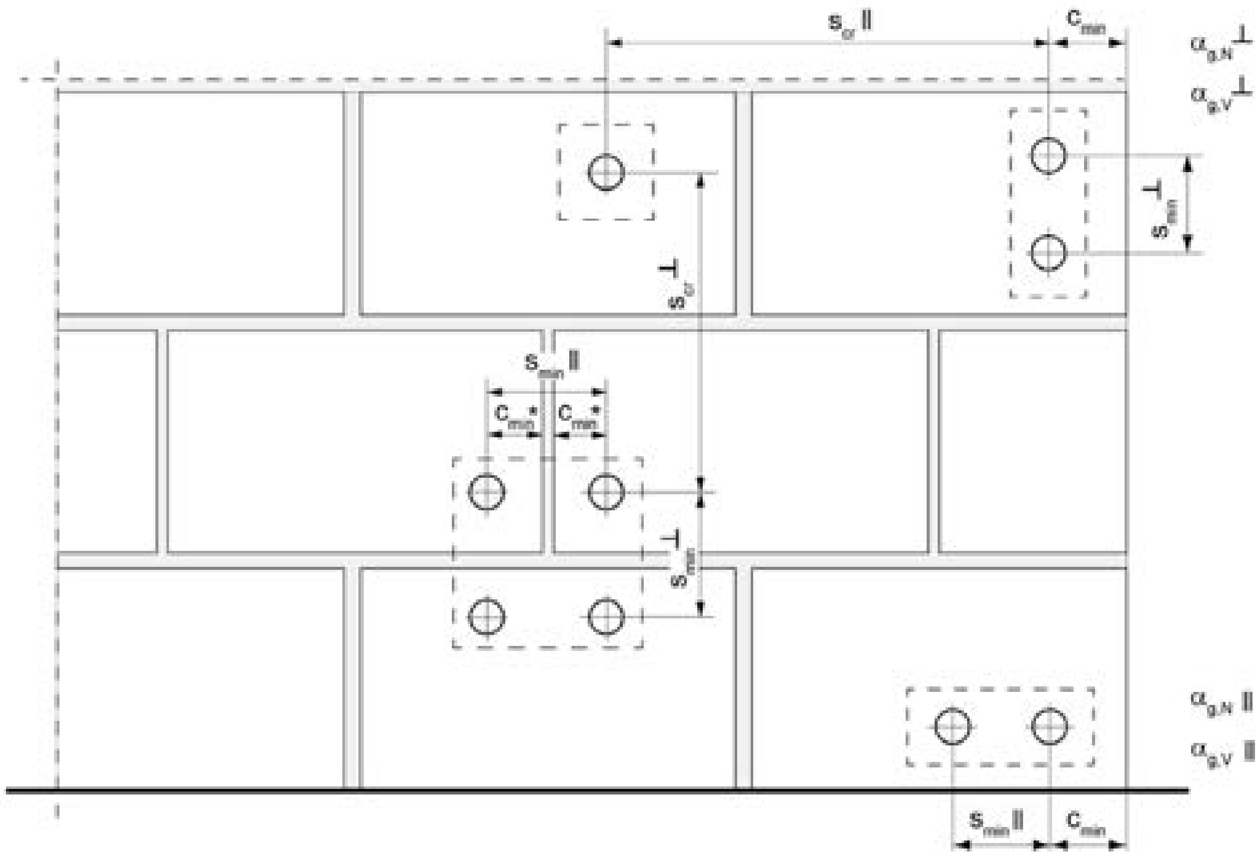
Kind of masonry	Brick format [mm]		Compressive strength f_b [N/mm²]	Density ρ [kg/dm³]	Annex
Solid brick Mz					
Solid brick Mz	NF	240x115x71	≥ 12 or 20	≥ 1,8	C 4 – C 7
Solid sand- lime brick KS / perforated Sand- lime brick KSL					
Solid sand – lime brick KS	NF	240x115x71	≥ 12 or 20	≥ 1,8	C 8 – C 9
		240x115x113	≥ 10 or 20	≥ 1,8	C 10 – C 11
Perforated sand - lime brick KSL	3DF	240x175x113	≥ 12 or 20	≥ 1,4	C 12 – C 13
Vertical perforated brick HLz					
Vertical perforated brick HLz		240x175x113	≥ 10	≥ 0,9	C 14 – C 15
	2DF	240x115x113	≥ 20	≥ 1,4	C 16 – C 17
		500x175x237	≥ 10	≥ 1,0	C 18 – C 19
		370x240x237	≥ 10	≥ 1,0	
		370x250x245	≥ 8	≥ 0,6	C 20 – C 21
Light-weight concrete hollow block Hbl					
Light-weight concrete hollow block Hbl		362x240x240	≥ 4	≥ 1,0	C 22 – C 23
Autoclaved aerated concrete (AAC)					
PP2 / AAC		500x300x250	≥ 2	≥ 0,35	C 24 – C 26
PP4 / AAC			≥ 4	≥ 0,5	
PP6 / AAC			≥ 6	≥ 0,65	

fischer injection system FIS VL for masonry

Intended use
Overview of controlled bricks

Annex B 10

Spacing and edge distance



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

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

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

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

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

$N^g_{Rk} = \alpha_{g,N} \parallel \cdot \alpha_{g,N}\perp \cdot N_{Rk}$; $\quad V^g_{Rk} = \alpha_{g,V} \parallel \cdot \alpha_{g,V}\perp \cdot V_{Rk}$ $\quad$ (Group of 4 anchors)

fischer injection system FIS VL for masonry	**Annex B 11**
Intended use Spacing and edge distance	

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

Anchor rod					**M8**	**M10**	**M12**
Bearing capacity under tensile load, steel failure							
Characterstic resistance $N_{Rk,s}$	Steel zinc plated	Property class	4.8	[kN]	15(13)	23(21)	33
			5.8		19(17)	29(27)	43
			8.8		29(27)	47(43)	68
	Stainless steel R and High corrosion resistant steel HCR		50		19	29	43
			70		26	41	59
			80		30	47	68
Partial factors [1]							
Partial factor $\gamma_{Ms,N}$	Steel zinc plated	Property class	4.8	[-]	1,50		
			5.8		1,50		
			8.8		1,50		
	Stainless steel R and High corrosion resistant steel HCR		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 HCR

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

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

Anchor rod					**M8**	**M10**	**M12**
Bearing capacity under shear load, steel failure							
without lever arm							
Characterstic resistance $V_{Rk,s}$	Steel zinc plated	Property class	4.8	[kN]	9(8)	14(13)	20
			5.8		11(10)	17(16)	25
			8.8		15(13)	23(21)	34
	Stainless steel R and High corrosion resistant steel HCR		50		9	15	21
			70		13	20	30
			80		15	23	34
with lever arm							
Characterstic resistance $M^0_{Rk,s}$	Steel zinc plated	Property class	4.8	[Nm]	15(13)	30(27)	52
			5.8		19(16)	37(33)	65
			8.8		30(26)	60(53)	105
	Stainless steel R and High corrosion resistant steel HCR		50		19	37	65
			70		26	52	92
			80		30	60	105
Partial factors 1)							
Partial factors $\gamma_{Ms,V}$	Steel zinc plated	Property class	4.8	[-]	1,25		
			5.8		1,25		
			8.8		1,25		
	Stainless steel R and High corrosion resistant steel HCR		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 HCR

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

fischer injection system FIS VL for masonry

Performance
Characteristic steel bearing capacity of anchor rods under shear load

Annex C 2

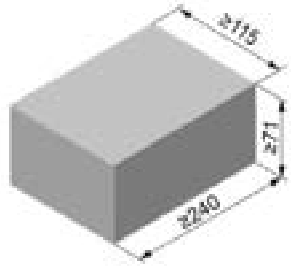
Table C3.1: Characteristic values for the **steel bearing capacity** of **internal threaded anchors FIS E** under tensile / shear load

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	R		14	26	41	59
			HCR		14	26	41	59
Partial factors[1)]								
Partial factor	$\gamma_{Ms,N}$	Property class	5.8	[-]	1,50			
		Property class 70	R		1,87			
			HCR		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	R		7	13	20	30
			HCR		7	13	20	30
with lever arm								
Characterstic resistance	$M^0_{Rk,s}$	Property class	5.8	[Nm]	8	19	37	65
		Property class 70	R		11	26	52	92
			HCR		11	26	52	92
Partial factors[1)]								
Partial factor	$\gamma_{Ms,V}$	Property class	5.8	[-]	1,25			
		Property class 70	R		1,56			
			HCR		1,56			

[1)] In absence of other national regulations

Deutsches Institut für Bautechnik DIBt

Solid brick Mz, NF, EN 771-1



Solid brick Mz, NF, EN 771-1				
Producer		e.g. Wienerberger		
Nominal dimensions	[mm]	length L	width W	height H
		≥ 240	≥ 115	≥ 71
Density ρ	[kg/dm³]	≥ 1,8		
Compressive strength f_b	[N/mm²]	≥ 12 / ≥ 20		
Standard or annex		EN 771-1		

Table C4.1: Installation parameters for edge distance c=100mm

Anchor rod			**M8**	**M10**	**M12**	**-**	
Internal threaded anchor FIS E			**-**	**-**	**-**	**M6**	**M8**
						11x85	
Anchor rod and internal threaded anchor FIS E without perforated sleeve							
Effective anchorage depth	h_{ef}	[mm]	50	50	50	85	
			80	80	80		
			200	200	200		
Max. installation torque	T_{inst}	[Nm]	10			4	10
General installation parameters							
Edge distance	c_{min}	[mm]	100			100	
Edge distance h_{ef}=200	c_{min}		150			-[1)]	
Spacing	s_{min} II,N		60			60	
	h_{ef}=200 s_{min} II,N		240			-[1)]	
	s_{min} II,V		240			240	
	s_{cr} II		240			240	
	s_{cr} ⊥ = s_{min} ⊥		75			75	
Drilling method							
Hammer drilling with hard metal hammer drill							

[1)] No performance assessed

Table C4.2: Group factors

Anchor rods			**M8**	**M10**	**M12**	**-**	
Internal threaded anchor FIS E			**-**	**-**	**-**	**M6**	**M8**
						11x85	
Edge distance	c_{min}	[mm]	100				
Group factor	$\alpha_{g,N}$ II	[-]	1,5				
	$\alpha_{g,V}$ II		2,0				
	h_{ef}=200 $\alpha_{g,N}$ II		1,5				
	h_{ef}=200 $\alpha_{g,V}$ II		2,0				
	$\alpha_{g,N}$ ⊥		2,0				
	$\alpha_{g,V}$ ⊥		2,0				
	h_{ef}=200 $\alpha_{g,N}$⊥		2,0				
	h_{ef}=200 $\alpha_{g,V}$⊥		2,0				

fischer injection system FIS VL for masonry	Annex C 4
Performance Solid brick Mz, NF, dimensions, installation parameters c=100mm	

Solid brick Mz, NF, EN 771-1

Table C5.1: Characteristic resistance under tensile load for edge distance c=100mm

Anchor rod			M8	M10			M12			-	
Internal threaded anchor FIS E			-	-			-			M6	M8
										11x85	
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)											
compressive strength f_b	use categorie		Effective anchorage depth h_{ef} [mm]								
			≥ 50	50	80	200	50	80	200	85	
≥ 12N/mm²	w/w	w/d	2,5	2,0	3,0	7,5	2,0	3,5	5,0	3,5	
	d/d		4,0	3,5	5,0	12,0	3,0	5,5	8,0	5,5	
≥ 20N/mm²	w/w	w/d	3,5	3,0	4,5	11,0	3,0	5,0	7,0	5,0	
	d/d		5,5	5,0	7,0	12,0	4,5	8,0	11,5	8,0	

Table C5.2: Characteristic resistance under shear load for edge distance c=100mm

Anchor rod			M8	M10		M12		-	
Internal threaded anchor FIS E			-	-		-		M6	M8
								11x85	
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)									
compressive strength f_b	use categorie		Effective anchorage depth h_{ef} [mm]						
			≥ 50	≥ 50	200	≥ 50	200	85	
≥ 12N/mm²	w/w	w/d	2,5	4,0	8,5	4,0	11,5	2,5	
	d/d								
≥ 20N/mm²	w/w	w/d	4,0	6,0	12,0	5,5	12,0	4,0	
	d/d								

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	**Annex C 5**
Performance Solid brick Mz, NF, Characteristic resistance under tensile and shear load c=100mm	

Solid brick Mz, NF, EN 771-1

Table C6.1: Installation parameters for edge distance c=60mm

Anchor rod			**M8**	**M10**	**M12**	**-**	
Internal threaded anchor FIS E			-	-	-	**M6**	**M8**
						11x85	
Anchor rod and internal threaded anchor FIS E without perforated sleeve							
Effective anchorage depth	h_{ef}	[mm]	50	50	50	85	
			100	100	100		
			200	200	200		
Max. installation torque	T_{inst}	[Nm]	10			4	10
General installation parameters							
Edge distance	c_{min}	[mm]	60				
Edge distance h_{ef}=200	c_{min}	[mm]	60				
Spacing	s_{min} II,N	[mm]	80				
	h_{ef}=200 s_{min} II,N	[mm]	80				
	s_{min} II,V	[mm]	80				
	s_{cr} II	[mm]	3x h_{ef}				
	s_{min} ⊥	[mm]	80				
	s_{cr} ⊥	[mm]	3x h_{ef}				
Drilling method							
Hammer drilling with hard metal hammer drill							

Table C6.2: Group factors

Anchor rods			**M8**	**M10**	**M12**	**-**	
Internal threaded anchor FIS E			-	-	-	**M6**	**M8**
						11x85	
Edge distance	c_{min}	[mm]	60				
Group factor	$\alpha_{g,N}$ II	[-]	0,6				
	$\alpha_{g,V}$ II	[-]	1,3				
	h_{ef}=200 $\alpha_{g,N}$ II	[-]	1,4				
	h_{ef}=200 $\alpha_{g,V}$ II	[-]	1,5				
	$\alpha_{g,N}$ ⊥	[-]	0,3				
	$\alpha_{g,V}$ ⊥	[-]	1,3				
	h_{ef}=200 $\alpha_{g,N}$ ⊥	[-]	2,0				
	h_{ef}=200 $\alpha_{g,V}$ ⊥	[-]	1,1				

fischer injection system FIS VL for masonry	Annex C 6
Performance Solid brick Mz, NF, dimensions, installation parameters c=60mm	

Solid brick Mz, NF, EN 771-1

Table C7.1: Characteristic resistance under tensile load for edge distance c=60mm

Anchor rod		M8		M10			M12			-	
Internal threaded anchor FIS E		-		-			-			M6	M8
										11x85	
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)											
compres-sive strength f_b	use category	Effective anchorage depth h_{ef} [mm]									
		50	100	50	100	200	50	100	200	85	
≥ 12N/mm²	w/w w/d	2,0	2,0	2,0	2,5	-[1)]	2,0	2,5	-[1)]	-[1)]	
	d/d	3,0	4,0	3,0	4,0	9,5	3,0	4,0	9,5	-[1)]	
≥ 20N/mm²	w/w w/d	2,5	3,0	2,5	3,5	-[1)]	3,0	3,5	-[1)]	-[1)]	
	d/d	4,5	5,5	4,5	5,5	12	4,5	5,5	12	-[1)]	

[1)] No performance assessed

Table C7.2: Characteristic resistance under shear load for edge distance c=60mm

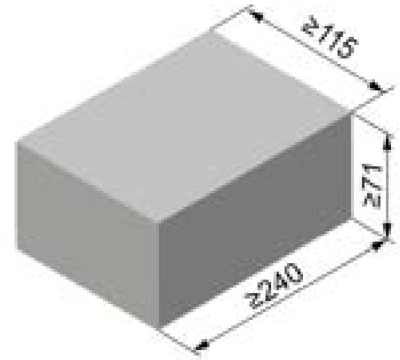
Anchor rod		M8		M10			M12			-	
Internal threaded anchor FIS E		-		-			-			M6	M8
										11x85	
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)											
compres-sive strength f_b	use category	Effective anchorage depth h_{ef} [mm]									
		50	100	50	100	200	50	100	200	85	
≥ 12N/mm²	w/w w/d d/d	1,2	3,0	2,0	3,0	1,5	1,5	3,0	3,0	-[1)]	
≥ 20N/mm²	w/w w/d d/d	1,5	4,5	3,0	4,5	2,5	2,0	4,5	4,5	-[1)]	

[1)] No performance assessed

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	**Annex C 7**
Performance Solid brick Mz, NF, Characteristic resistance under tensile and shear load c=60mm	

Solid sand-lime brick KS, NF, EN 771-2



Solid sand-lime brick KS, NF, EN 771-2			
Producer	-		
Nominal dimensions [mm]	length L	width W	height H
	≥ 240	≥ 115	≥ 71
Density ρ [kg/dm³]	≥ 1,8		
Compressive strength f_b [N/mm²]	≥ 12 / ≥ 20		
Standard or annex	EN 771-2		

Table C8.1: Installation parameters

Anchor rod			M8	M10	M12	-	
Internal threaded anchor FIS E			-	-	-	M6	M8
						11x85	
Anchor rod and internal threaded anchor FIS E without perforated sleeve							
Effective anchorage depth	h_{ef}	[mm]	50	50	50	85	
			100	100	100		
			-[1)]	200	200		
Max. installation torque	T_{inst}	[Nm]	5	15	15	3	5
General installation parameters							
Edge distance	c_{min}	[mm]	60				
Spacing	s_{min} II	[mm]	80				
	s_{cr} II	[mm]	80				
	s_{min} ⊥	[mm]	3x h_{ef}				
	s_{cr} ⊥	[mm]	3x h_{ef}				
Drilling method							
Hammer drilling with hard metal hammer drill							

1) No performance assessed

Table C8.2: Group factors

Anchor rod			M8	M10	M12	-	
Internal threaded anchor FIS E			-	-	-	M6	M8
						11x85	
Group factor	$\alpha_{g,N}$ II	[-]	0,7				
	$\alpha_{g,V}$ II	[-]	1,3				
	$\alpha_{g,N}$ ⊥	[-]	2,0				
	$\alpha_{g,V}$ ⊥	[-]	2,0				

fischer injection system FIS VL for masonry	Annex C 8
Performance Solid sand-lime brick KS, NF, dimensions, installation parameters	

Solid sand-lime brick KS, NF, EN 771-2

Table C9.1: Characteristic resistance under tensile load

Anchor rod			M8		M10			M12			-	
Internal threaded anchor FIS E			-		-			-			M6	M8
											11x85	
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	100	50	100	200	50	100	200	85	
≥ 12N/mm²	w/w	w/d	2,5	4,5	2,5	3,5	7,0	2,5	3,0	6,5	2,5	
	d/d		4,0	8,0	4,0	5,5	12	4,0	4,5	12	4,0	
≥ 20N/mm²	w/w	w/d	3,5	6,5	3,5	4,5	10	3,5	4,0	9,5	3,5	
	d/d		6,0	11	6,0	8,0	12	6,0	6,5	12	6,0	

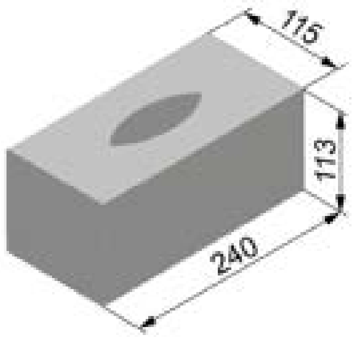
Table C9.2: Characteristic resistance under shear load

Anchor rod			M8		M10		M12		-	
Internal threaded anchor FIS E			-		-		-		M6	M8
									11x85	
Shear load V_{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	100	50	≥100	50	≥100	85	
≥ 12N/mm²	w/w	w/d	1,5	3,0	1,2	2,0	1,2	2,0	1,2	
	d/d									
≥ 20N/mm²	w/w	w/d	2,5	4,0	1,5	3,0	1,5	3,0	1,5	
	d/d									

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	**Annex C 9**
Performance Solid sand-lime brick KS, NF, Characteristic resistance under tensile and shear load	

Solid sand-lime brick KS, EN 771-2



Solid sand-lime brick KS, EN 771-2			
Producer	-		
Nominal dimensions [mm]	length L	width W	height H
	240	115	113
Density ρ [kg/dm³]	≥ 1,8		
Compressive strength f_b [N/mm²]	≥ 10 / ≥ 20		
Standard or annex	EN 771-2		

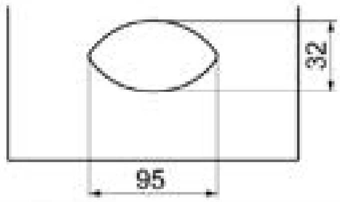


Table C10.1: Installation parameters

Anchor rod			**M8**	**-**		**M8**	**M10**	**M8**	**M10**	**-**		**M12**	**M12**
Internal threaded anchor FIS E			**-**	**M6**	**M8**	**-**		**-**		**M10**	**M12**	**-**	**-**
				11x85						**15x85**			
Perforated sleeve FIS H K			**12x85**	**16x85**				**16x130**		**20x85**			**20x130**
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K													
Max. installation torque	T_{inst}	[Nm]	2										
General installation parameters													
Edge distance	c_{min}	[mm]	100										
Spacing	s_{min} II	[mm]	240										
	s_{cr} II	[mm]	240										
	s_{min} ⊥	[mm]	115										
	s_{cr} ⊥	[mm]	115										
Drilling method													
Hammer drilling with hard metal hammer drill													

Table C10.2: Group factors

Anchor rod			**M8**	**-**		**M8**	**M10**	**M8**	**M10**	**-**		**M12**	**M12**
Internal threaded anchor FIS E			**-**	**M6**	**M8**	**-**		**-**		**M10**	**M12**	**-**	**-**
				11x85						**15x85**			
Perforated sleeve FIS H K			**12x85**	**16x85**				**16x130**		**20x85**			**20x130**
Group factor	$\alpha_{g,N}$ II = $\alpha_{g,V}$ II	[-]	2,0										
	$\alpha_{g,N}$ ⊥ = $\alpha_{g,V}$ ⊥	[-]	2,0										

fischer injection system FIS VL for masonry

Performance
Perforated sand-lime brick KS, dimensions, installation parameters

Annex C 10

Deutsches Institut für Bautechnik DIBt

Solid sand-lime brick KS, EN 771-2

Table C11.1: Characteristic resistance under tensile load

Anchor rod		M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E		-	M6	M8	-		-		M10	M12	-	-
			11x85						15x85			
Perforated sleeve FIS H K		12x85	16x85				16x130		20x85			20x130
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 10N/mm²	w/w, w/d	3,5	2,0				2,0		6,5			4,5
	d/d	6,0	3,5				3,5		8,5			7,0
≥ 20N/mm²	w/w, w/d	5,0	3,0				3,0		8,5			6,0
	d/d	8,5	5,5				5,0		8,5			8,5

Table C11.2: Characteristic resistance under shear load

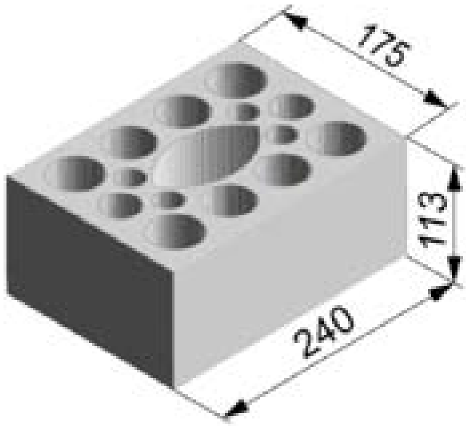
Anchor rod		M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E		-	M6	M8	-		-		M10	M12	-	-
			11x85						15x85			
Perforated sleeve FIS H K		12x85	16x85				16x130		20x85			20x130
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 10N/mm²	w/w, w/d, d/d	3,0		3,5								
≥ 20N/mm²	w/w, w/d, d/d	4,5		5,5								

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	Annex C 11
Performance Perforated sand-lime brick KS, Characteristic resistance under tensile and shear load	

Deutsches Institut für Bautechnik DIBt

Perforated sand-lime brick KSL, 3DF, EN 771-2



Perforated sand-lime brick KSL, 3DF, EN 771-2				
Producer		e.g. KS Wemding		
Nominal dimensions	[mm]	length L	width W	height H
		240	175	113
Density ρ	[kg/dm³]	≥ 1,4		
Compressive strength f_b	[N/mm²]	≥ 12 / ≥ 20		
Standard or annex		EN 771-2		

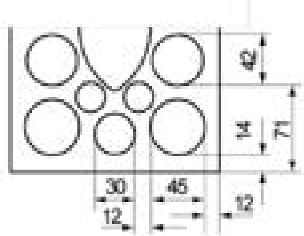


Table C12.1: Installation parameters

Anchor rod			M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E			-	M6	M8	-		-		M10	M12	-	-
				11x85						15x85			
Perforated sleeve FIS H K			12x85	16x85				16x130		20x85			20x130
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K													
Max. installation torque	T_{inst}	[Nm]	2										
General installation parameters													
Edge distance	c_{min}	[mm]	60	80									
Spacing	s_{min} II	[mm]	100										
	s_{cr} II	[mm]	240										
	s_{min} ⊥	[mm]	115										
	s_{cr} ⊥	[mm]	115										
Drilling method													
Hammer drilling with hard metal hammer drill													

Table C12.2: Group factors

Anchor rod			M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E			-	M6	M8	-		-		M10	M12	-	-
				11x85						15x85			
Perforated sleeve FIS H K			12x85	16x85				16x130		20x85			20x130
Group factors	$\alpha_{g,N}$ II = $\alpha_{g,V}$ II	[-]	1,5										
	$\alpha_{g,N}$ ⊥ = $\alpha_{g,V}$ ⊥	[-]	2,0										

fischer injection system FIS VL for masonry

Performance
Perforated sand-lime brick KSL, 3DF, dimensions, installation parameters

Annex C 12

Deutsches Institut für Bautechnik DIBt

Perforated sand-lime brick KSL, 3DF, EN 771-2

Table C13.1: Characteristic resistance under tensile load

Anchor rod		M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E		-	M6	M8	-		-		M10	M12	-	-
			11x85						15x85			
Perforated sleeve FIS H K		12x85	16x85				16x130		20x85			20x130
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 12N/mm²	w/w w/d	2,5	2,5				3,0		3,0			3,0
	d/d	2,5	3,0				3,5		3,5			3,5
≥ 20N/mm²	w/w w/d	4,0	4,5				5,5		5,5			5,5
	d/d	4,5	5,0				6,0		6,0			6,0

Table C13.2: Characteristic resistance under shear load

Anchor rod		M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E		-	M6	M8	-		-		M10	M12	-	-
			11x85						15x85			
Perforated sleeve FIS H K		12x85	16x85				16x130		20x85			20x130
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 12N/mm²	w/w w/d d/d	2,5		4,5								
≥ 20N/mm²	w/w w/d d/d	4,5	4,0	7,5								

Factor for job site tests and displacements see annex C27

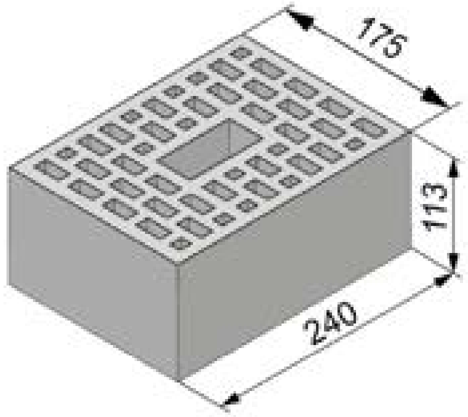
fischer injection system FIS VL for masonry

Performance
Perforated sand-lime brick KSL, 3DF,
Characteristic resistance under tensile and shear load

Annex C 13

Deutsches Institut für Bautechnik DIBt

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
	240	175	113
Density ρ [kg/dm³]	≥ 0,9		
Compressive strength f_b [N/mm²]	≥ 10		
Standard or annex	EN 771-1		

Table C14.1: Installation parameters

Anchor rod	M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E	-	M6	M8	-		-		M10	M12	-	-
		11x85						15x85			
Perforated sleeve FIS H K	12x85	16x85				16x130		20x85			20x130
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K											
Max. installation torque T_{inst} [Nm]	2										
General installation parameters											
Edge distance c_{min} [mm]	100										
Spacing s_{min} II [mm]	240										
Spacing s_{cr} II [mm]	240										
Spacing s_{min} ⊥ [mm]	115										
Spacing s_{cr} ⊥ [mm]	115										
Drilling method											
Hammer drilling with hard metal hammer drill											

Table C14.2: Group factors

Anchor rod	M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E	-	M6	M8	-		-		M10	M12	-	-
		11x85						15x85			
Perforated sleeve FIS H K	12x85	16x85				16x130		20x85			20x130
Group factors $\alpha_{g,N}$ II = $\alpha_{g,V}$ II [-]	2,0										
Group factors $\alpha_{g,N}$ ⊥ = $\alpha_{g,V}$ ⊥ [-]	2,0										

fischer injection system FIS VL for masonry	Annex C 14
Performance Vertical perforated brick HLz, dimensions, installation parameters	

Deutsches Institut für Bautechnik DIBt

Vertical perforated brick HLz, EN 771-1

Table C15.1: Characteristic resistance under tensile load

Anchor rod		M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E		-	M6 11x85	M8 11x85	-		-		M10 15x85	M12 15x85	-	-
Perforated sleeve FIS H K		12x85	16x85				16x130		20x85			20x130
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 10N/mm²	w/w w/d	3,5	3,5				4,5					
	d/d	4,0	3,5				5,0					

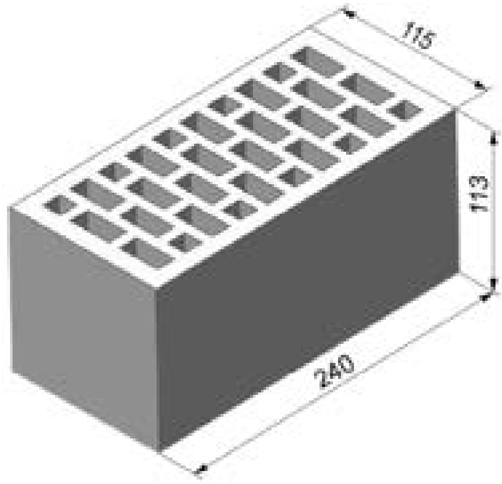
Table C15.2: Characteristic resistance under shear load

Anchor rod		M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E		-	M6 11x85	M8 11x85	-		-		M10 15x85	M12 15x85	-	-
Perforated sleeve FIS H K		12x85	16x85				16x130		20x85			20x130
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 10N/mm²	w/w w/d d/d	4,0		5,5					6,0			

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	Annex C 15
Performance Vertical perforated brick HLz, Characteristic resistance under tensile and shear load	

Vertical perforated brick HLz, 2DF, EN 771-1



Vertical perforated brick HLz, 2DF, EN 771-1			
Producer	e.g. Wienerberger		
Nominal dimensions [mm]	length L	width W	height H
	240	115	113
Density ρ [kg/dm³]	≥ 1,4		
Compressive strength f_b [N/mm²]	≥ 20		
Standard or annex	EN 771-1		

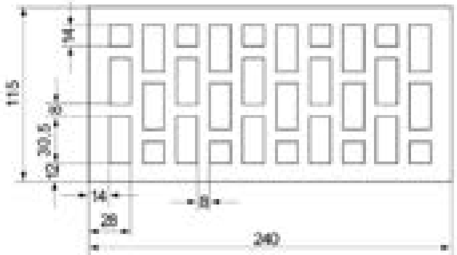


Table C16.1: Installation parameters

Anchor rod			M8	-		M8	M10	-		M12
Internal threaded anchor FIS E			-	M6	M8	-		M10	M12	-
				11x85				15x85		
Perforated sleeve FIS H K			12x85	16x85				20x85		
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K										
Max. installation torque	T_{inst}	[Nm]	2							
General installation parameters										
Edge distance	c_{min}	[mm]	80							
Spacing	s_{cr} II = s_{min} II	[mm]	240							
	$s_{cr} \perp = s_{min} \perp$	[mm]	115							
Drilling method										
Hammer drilling with hard metal hammer drill										

Table C16.2: Group factors

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

fischer injection system FIS VL for masonry

Performance
Vertical perforated brick HLz, 2DF, dimensions, installation parameters

Annex C 16

Deutsches Institut für Bautechnik DIBt

Vertical perforated brick HLz, 2DF, EN 771-1

Table C17.1: Characteristic resistance under tensile load

Anchor rod		**M8**	**-**		**M8**	**M10**	**-**		**M12**
Internal threaded anchor FIS E		-	**M6**	**M8**	-		**M10**	**M12**	-
			11x85				**15x85**		
Perforated sleeve FIS H K		**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								
≥ 20N/mm²	w/w, w/d	3,5	2,5				3,0		
	d/d	4,0	2,5				3,0		

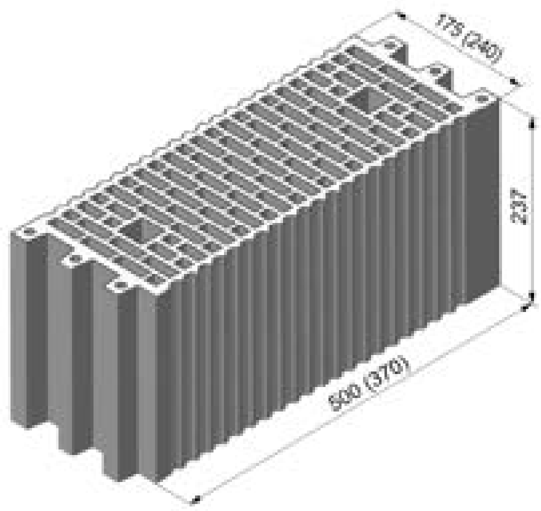
Table C17.2: Characteristic resistance under shear load

Anchor rod		**M8**	**-**		**M8**	**M10**	**-**		**M12**
Internal threaded anchor FIS E		-	**M6**	**M8**	-		**M10**	**M12**	-
			11x85				**15x85**		
Perforated sleeve FIS H K		**12x85**	**16x85**				**20x85**		
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)									
compressive strength f_b	use category								
≥ 20N/mm²	w/w, w/d, d/d	7,5	4,0	4,5			8,5		

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	**Annex C 17**
Performance Vertical perforated brick HLz, 2DF, Characteristic resistance under tensile and shear load	

Vertical perforated brick HLz, EN 771-1



Vertical perforated brick HLz, EN 771-1			
Producer	e.g. Wienerberger, Poroton		
Nominal dimensions [mm]	length L	width W	height H
	500	175	237
	370	240	237
Density ρ [kg/dm³]	≥ 1,0		
Compressive strength f_b [N/mm²]	≥ 10		
Standard or annex	EN 771-1		

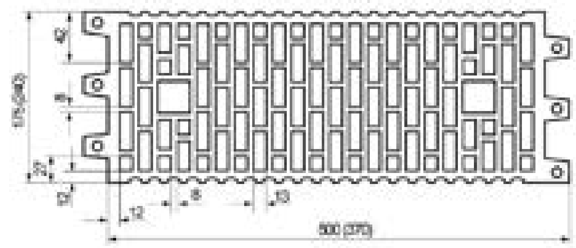


Table C18.1: Installation parameters

Anchor rod	M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E	-	M6	M8	-		-		M10	M12	-	-
		11x85						15x85			
Perforated sleeve FIS H K	12x85	16x85				16x130		20x85			20x130

Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K			
Max. installation torque	T_{inst}	[Nm]	2
General installation parameters			
Edge distance	c_{min}	[mm]	100
Spacing	s_{min} II	[mm]	100
	s_{cr} II	[mm]	500 (370)
	s_{min} ⊥	[mm]	100
	s_{cr} ⊥	[mm]	240
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C18.2: Group factors

Anchor rod	M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E	-	M6	M8	-		-		M10	M12	-	-
		11x85						15x85			
Perforated sleeve FIS H K	12x85	16x85				16x130		20x85			20x130

Group factors	$\alpha_{g,N}$ II = $\alpha_{g,V}$ II	[-]	1
	$\alpha_{g,N} \perp = \alpha_{g,V} \perp$		

fischer injection system FIS VL for masonry	Annex C 18
Performance Vertical perforated brick HLz, dimensions, installation parameters	

Vertical perforated brick HLz, EN 771-1

Table C19.1: Characteristic resistance under tensile load

Anchor rod		**M8**	**-**		**M8**	**M10**	**M8**	**M10**	**-**		**M12**	**M12**
Internal threaded anchor FIS E		-	**M6**	**M8**	-		-		**M10**	**M12**	-	-
			11x85						**15x85**			
Perforated sleeve FIS H K		**12x85**	**16x85**				**16x130**		**20x85**			**20x130**
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 10N/mm²	w/w, w/d	0,9	2,5									3,0
	d/d	0,9	2,5									3,5

Table C19.2: Characteristic resistance under shear load

Anchor rod		**M8**	**-**		**M8**	**M10**	**M8**	**M10**	**-**		**M12**	**M12**
Internal threaded anchor FIS E		-	**M6**	**M8**	-		-		**M10**	**M12**	-	-
			11x85						**15x85**			
Perforated sleeve FIS H K		**12x85**	**16x85**				**16x130**		**20x85**			**20x130**
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)												
compressive strength f_b	use category											
≥ 10N/mm²	w/w, w/d, d/d	1,2					1,5		1,2			1,5

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	**Annex C 19**
Performance Vertical perforated brick HLz, Characteristic resistance under tensile and shear load	

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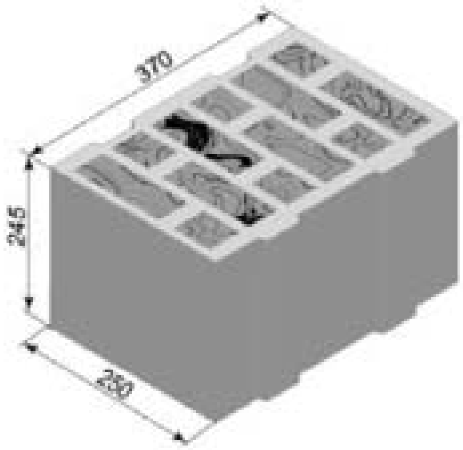
Vertical perforated brick HLz, filled with mineral wool, EN 771-1



Vertical perforated brick HLz, filled with mineral wool, EN 771-1			
Producer	-		
Nominal dimensions [mm]	length L	width W	height H
	370	250	245
Density ρ [kg/dm³]	≥ 0,6		
Compressive strength f_b [N/mm²]	≥ 8		
Standard or annex	EN 771-1		

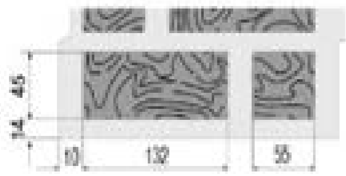


Table C20.1: Installation parameters

Anchor rod	M8	-		M8	M10	M8	M10	-		M12	M12	M12
Internal threaded anchor FIS E	-	M6	M8	-		-		M10	M12	-	-	-
		11x85						15x85				
Perforated sleeve FIS H K	12x85	16x85				16x130		20x85			20x130	20x200

Parameter		Unit	Value
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K			
Max. installation torque	T_{inst}	[Nm]	2
General installation parameters			
Edge distance	c_{min}	[mm]	250
Spacing	s_{min} II	[mm]	250
	s_{cr} II	[mm]	250
	s_{min} ⊥	[mm]	245
	s_{cr} ⊥	[mm]	245
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C20.2: Group factors

Anchor rod	M8	-		M8	M10	M8	M10	-		M12	M12	M12
Internal threaded anchor FIS E	-	M6	M8	-		-		M10	M12	-	-	-
		11x85						15x85				
Perforated sleeve FIS H K	12x85	16x85				16x130		20x85			20x130	20x200

Parameter		Unit	Value
Group factors	$\alpha_{g,N}$ II	[-]	2,0
	$\alpha_{g,V}$ II		
	$\alpha_{g,N}$ ⊥		
	$\alpha_{g,V}$ ⊥		

fischer injection system FIS VL for masonry

Performance
Vertical perforated brick HLz, filled with mineral wool; dimensions, installation parameters

Annex C 20

Deutsches Institut für Bautechnik DIBt

Vertical perforated brick HLz, filled with mineral wool, EN 771-1

Table C21.1: Characteristic resistance under tensile load

<table>
<tr><td colspan="2">Anchor rod</td><td>M8</td><td colspan="2">-</td><td>M8</td><td>M10</td><td>M8</td><td>M10</td><td colspan="2">-</td><td>M12</td><td>M12</td><td>M12</td></tr>
<tr><td colspan="2" rowspan="2">Internal threaded anchor FIS E</td><td rowspan="2">-</td><td>M6</td><td>M8</td><td colspan="2" rowspan="2">-</td><td colspan="2" rowspan="2">-</td><td>M10</td><td>M12</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td></tr>
<tr><td colspan="2">11x85</td><td colspan="2">15x85</td></tr>
<tr><td colspan="2">Perforated sleeve FIS H K</td><td>12x85</td><td colspan="4">16x85</td><td colspan="2">16x130</td><td colspan="3">20x85</td><td>20x130</td><td>20x200</td></tr>
<tr><td colspan="14">Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)</td></tr>
<tr><td>compressive strength f_b</td><td>use category</td><td colspan="12"></td></tr>
<tr><td rowspan="2">≥ 8N/mm²</td><td>w/w w/d</td><td>2,0</td><td colspan="4">1,5</td><td colspan="2">2,5</td><td colspan="4">2,0</td><td>3,0</td></tr>
<tr><td>d/d</td><td>2,0</td><td colspan="4">2,0</td><td colspan="2">3,0</td><td colspan="4">2,0</td><td>3,0</td></tr>
</table>

Table C21.2: Characteristic resistance under shear load

<table>
<tr><td colspan="2">Anchor rod</td><td>M8</td><td colspan="2">-</td><td>M8</td><td>M10</td><td>M8</td><td>M10</td><td colspan="2">-</td><td>M12</td><td>M12</td><td>M12</td></tr>
<tr><td colspan="2" rowspan="2">Internal threaded anchor FIS E</td><td rowspan="2">-</td><td>M6</td><td>M8</td><td colspan="2" rowspan="2">-</td><td colspan="2" rowspan="2">-</td><td>M10</td><td>M12</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td></tr>
<tr><td colspan="2">11x85</td><td colspan="2">15x85</td></tr>
<tr><td colspan="2">Perforated sleeve FIS H K</td><td>12x85</td><td colspan="4">16x85</td><td colspan="2">16x130</td><td colspan="3">20x85</td><td>20x130</td><td>20x200</td></tr>
<tr><td colspan="14">Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)</td></tr>
<tr><td>compressive strength f_b</td><td>use category</td><td colspan="12"></td></tr>
<tr><td rowspan="2">≥ 8N/mm²</td><td>w/w w/d</td><td colspan="2" rowspan="2">2,5</td><td colspan="5" rowspan="2">3,0</td><td colspan="5" rowspan="2">1,5</td></tr>
<tr><td>d/d</td></tr>
</table>

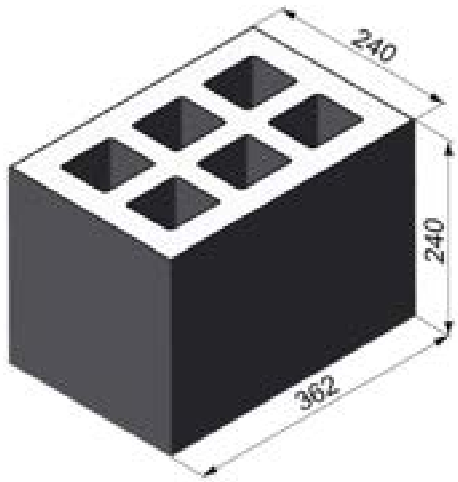
Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry

Performance
Vertical perforated brick HLz, filled with mineral wool;
Characteristic resistance under tensile and shear load

Annex C 21

Light-weight concrete hollow block Hbl, EN 771-3



Light-weight concrete hollow block Hbl, EN 771-3			
Producer	-		
Nominal dimensions [mm]	length L	width W	height H
	362	240	240
Density ρ [kg/dm³]	≥ 1,0		
Compressive strength f_b [N/mm²]	≥ 4		
Standard or annex	EN 771-3		

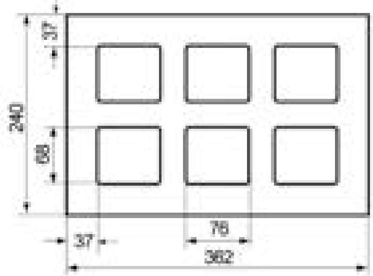


Table C22.1: Installation parameters

Anchor rod			M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E			-	M6	M8	-		-		M10	M12	-	-
				11x85						15x85			
Perforated sleeve FIS H K			12x85	16x85				16x130		20x85			20x130
Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K													
Max. installation torque	T_{inst}	[Nm]	2										
General installation parameters													
Edge distance	c_{min}	[mm]	60										
Spacing	s_{min} II	[mm]	100										
Spacing	s_{cr} II	[mm]	362										
Spacing	$s_{min}\perp = s_{cr}\perp$	[mm]	240										
Drilling method													
Hammer drilling with hard metal hammer drill													

Table C22.2: Group factors

Anchor rod			M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E			-	M6	M8	-		-		M10	M12	-	-
				11x85						15x85			
Perforated sleeve FIS H K			12x85	16x85				16x130		20x85			20x130
Group factors	$\alpha_{g,N}$ II	[-]	1,2										
Group factors	$\alpha_{g,V}$ II	[-]	1,1										
Group factors	$\alpha_{g,N}\perp$	[-]	2,0										
Group factors	$\alpha_{g,V}\perp$	[-]	2,0										

fischer injection system FIS VL for masonry

Performance
Light-weight concrete hollow block Hbl, dimensions, installation parameters

Annex C 22

Light-weight concrete hollow block Hbl, EN 771-3

Table C23.1: Characteristic resistance under tensile load

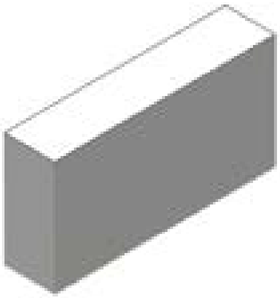
Anchor rod			M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E			-	M6	M8	-		-		M10	M12	-	-
				11x85						15x85			
Perforated sleeve FIS H K			12x85	16x85				16x130		20x85			20x130
Tensile load N_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)													
compressive strength f_b	use category												
≥ 4N/mm²	w/w	w/d	3,0										
	d/d		3,0										

Table C23.2: Characteristic resistance under shear load

Anchor rod			M8	-		M8	M10	M8	M10	-		M12	M12
Internal threaded anchor FIS E			-	M6	M8	-		-		M10	M12	-	-
				11x85						15x85			
Perforated sleeve FIS H K			12x85	16x85				16x130		20x85			20x130
Shear load V_{Rk} [kN] depending on the compressive strength f_b (temperature range 50/80°C)													
compressive strength f_b	use category												
≥ 4N/mm²	w/w	w/d	2,0										
	d/d												

Factor for job site tests and displacements see annex C27

Autoclaved aerated concrete, EN 771-4



Autoclaved aerated concrete, EN 771-4				
Producer		e.g. Ytong		
Density ρ	[kg/dm³]	≥ 0,35	≥ 0,5	≥ 0,65
Compressive strength f_b	[N/mm²]	≥ 2	≥ 4	≥ 6
Standard or annex		EN 771-4		

Table C24.1: Installation parameters

Anchor rod			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]	100	200	100	200	100	200	85			
Max. installation torque	T_{inst}	[Nm]	1	8	2	12	2	16	1		2	
General installation parameters												
Edge distance	c_{min}	[mm]	100									
Spacing	s_{cr} II = s_{min} II	[mm]	250									
Spacing	h_{ef}=200mm s_{min} II	[mm]	80									
Spacing	h_{ef}=200mm s_{cr} II	[mm]	3x h_{ef}									
Spacing	s_{cr} ⊥ = s_{min} ⊥	[mm]	250									
Spacing	h_{ef}=200mm s_{min} ⊥	[mm]	80									
Spacing	h_{ef}=200mm s_{cr} ⊥	[mm]	3x h_{ef}									
Drilling method												
Hammer drilling with hard metal hammer drill												

Table C25.1: Group factors for autoclaved aerated concrete (Compressive strength $f_b \geq 2$ N/mm²)

Anchor rod			M8	M10	M12	-		-	
Internal threaded anchor FIS E			-	-	-	M6	M8	M10	M12
						11x85		15x85	
Group factors	$h_{ef}=200\ \alpha_{g,N\parallel}$	[-]	1,6			-[1]		-[1]	
	$h_{ef}=200\ \alpha_{g,V\parallel}$		1,1			-[1]		-[1]	
	$\alpha_{g,N\parallel}$, $\alpha_{g,V\parallel}$		2						
	$h_{ef}=200\ \alpha_{g,N\perp}$		1,6			-[1]		-[1]	
	$h_{ef}=200\ \alpha_{g,V\perp}$		0,8			-[1]		-[1]	
	$\alpha_{g,N\perp}$, $\alpha_{g,V\perp}$		2						

[1] No performance assessed

Table C25.2: Group factors for autoclaved aerated concrete (Compressive strength $f_b \geq 4$ N/mm²)

Anchor rod			M8	M10	M12	-		-	
Internal threaded anchor FIS E			-	-	-	M6	M8	M10	M12
						11x85		15x85	
Group factors	$h_{ef}=200\ \alpha_{g,N\parallel}$	[-]	0,7			-[1]		-[1]	
	$h_{ef}=200\ \alpha_{g,V\parallel}$		2,0			-[1]		-[1]	
	$\alpha_{g,N\parallel}$, $\alpha_{g,V\parallel}$		2						
	$h_{ef}=200\ \alpha_{g,N\perp}$		0,7			-[1]		-[1]	
	$h_{ef}=200\ \alpha_{g,V\perp}$		1,2			-[1]		-[1]	
	$\alpha_{g,N\perp}$, $\alpha_{g,V\perp}$		2						

[1] No performance assessed

Table C25.3: Group factors for autoclaved aerated concrete (Compressive strength $f_b \geq 6$ N/mm²)

Anchor rod			M8	M10	M12	-		-	
Internal threaded anchor FIS E			-	-	-	M6	M8	M10	M12
						11x85		15x85	
Group factors	$h_{ef}=200\ \alpha_{g,N\parallel}$	[-]	0,7			-[1]		-[1]	
	$h_{ef}=200\ \alpha_{g,V\parallel}$		2,0			-[1]		-[1]	
	$\alpha_{g,N\parallel}$, $\alpha_{g,V\parallel}$		2						
	$h_{ef}=200\ \alpha_{g,N\perp}$		0,7			-[1]		-[1]	
	$h_{ef}=200\ \alpha_{g,V\perp}$		1,2			-[1]		-[1]	
	$\alpha_{g,N\perp}$, $\alpha_{g,V\perp}$		2						

[1] No performance assessed

fischer injection system FIS VL for masonry	Annex C 25
Performance Autoclaved aerated concrete, Group factors	

Autoclaved aerated concrete, EN 771-4

Table C26.1: Characteristic resistance under tensile load

Anchor rod		M8		M10		M12		-	-
Internal threaded anchor FIS E		-		-		-		M6 / M8 11x85	M10 / M12 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]							
		100	200	100	200	100	200	85	
≥ 2 N/mm²	w/w, w/d	1,5	2,0	1,5	3,0	1,5	3,0	1,5	1,5
	d/d	1,5	3,0	1,5	3,5	2,0	4,0	1,5	1,5
≥ 4 N/mm²	w/w, w/d	2,0	1,5	2,5	3,5	2,5	3,5	2,0	1,5
	d/d	2,0	3,0	3,0	5,0	2,5	5,0	2,0	1,5
≥ 6 N/mm²	w/w, w/d	3,0	2,5	4,5	5,0	4,5	7,0	3,5	2,5
	d/d	3,5	4,0	5,0	7,0	5,0	9,0	3,5	2,5

Table C26.2: Characteristic resistance under shear load

Anchor rod		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)											
compressive strength f_b	use category	Effective anchorage depth h_{ef} [mm]									
		100	200	100	200	100	200	85			
≥ 2 N/mm²	w/w, w/d, d/d	1,2	1,2	1,2	1,2	1,5	1,2	1,2			1,5
≥ 4 N/mm²	w/w, w/d, d/d	2,5	2,0	2,0	2,0	2,5	2,0	2,0			2,5
≥ 6 N/mm²	w/w, w/d, d/d	3,0	2,5	3,0	3,0	3,5	4,0	2,5			3,5

Factor for job site tests and displacements see annex C27

fischer injection system FIS VL for masonry	**Annex C 26**
Performance Autoclaved aerated concrete, Characteristic resistance under tensile and shear load	

β-factors for job site tests; displacements

Table C27.1: β-factors for job site tests

use category		w/w and w/d	d/d
temperature range		50/80	50/80
Material	Size		
solid units	M8	0,57	0,96
	M10	0,59	
	M12 FIS E 11x85	0,6	
	FIS E 15x85	0,62	
	FIS H 16x85 K	0,55	
hollow units	all sizes	0,86	0,96
Autoclaved aerated concrete (AAC)	all sizes	0,73	0,81

Table C27.2: Displacements

Material	N [kN]	δN_0 [mm]	δN_∞ [mm]	V [kN]	δV_0 [mm]	δV_∞ [mm]
solid units and autoclaved aerated concrete h_{ef}=100mm	$\frac{N_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	0,03	0,06	$\frac{V_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	0,82	0,88
hollow units	$\frac{N_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	0,48	0,06	$\frac{V_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	1,71	2,56
solid brick Mz NF annex C 4 - C 7	$\frac{N_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	0,74	1,48	$\frac{V_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	1,23	1,85
solid brick KS NF annex C 8 / C 9	$\frac{N_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	0,2	0,4	$\frac{V_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	0,91	1,37
Autoclaved aerated concrete (AAC) h_{ef}=200 mm annex C 24 - C 26	$\frac{N_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	1,03	2,06	$\frac{V_{Rk}}{1{,}4 \cdot \gamma_{Mm}}$	1,25	1,88

For anchorage in autoclaved aerated concrete, the partial factor γ_{MAAC} shall be used instead of γ_{Mm}.

fischer injection system FIS VL for masonry	**Annex C 27**
Performance β-factors for job site tests; displacements	