Deutsches Institut für Bautechnik

DIBt

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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<br>Klaus-Fischer-Straße 1<br>72178 Waldachtal<br>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

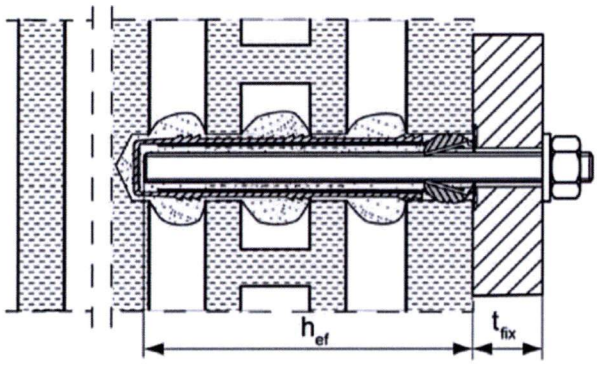
*beglaubigt:*
Baderschneider

Deutsches Institut für Bautechnik DIBt

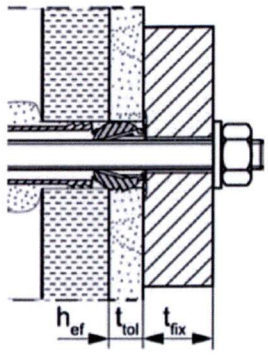
## Installation conditions part 1

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

**Pre-positioned anchorage:**

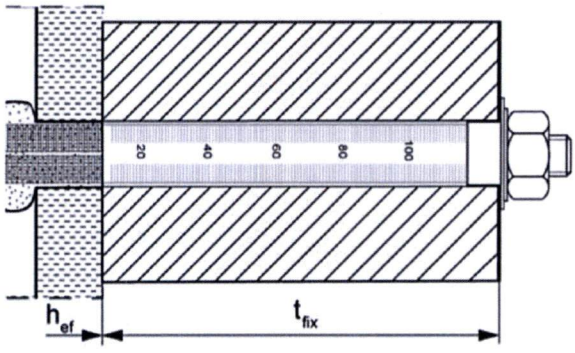



Installation with render bridge

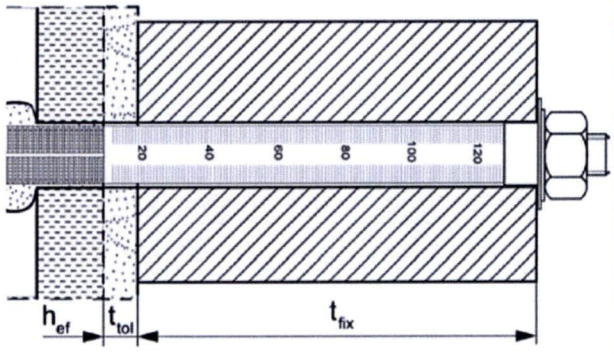



**Size of the perforated sleeve:** FIS H 12x50 K, FIS H 12x85 K, FIS H 16x85 K, FIS H 16x130 K, FIS H 20x85 K, FIS H 20x130 K, FIS H 20x200 K

**Push through anchorage:**



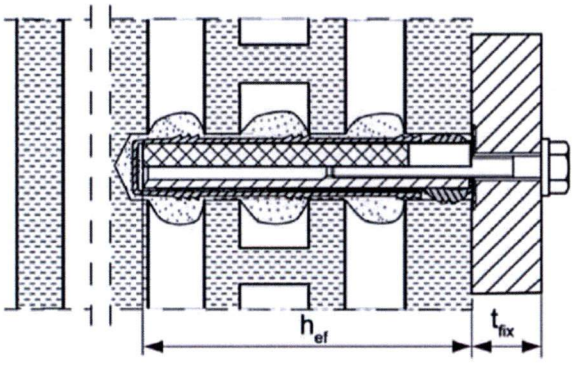

Installation with render bridge



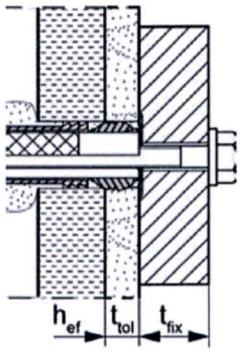

**Size of the perforated sleeve:** FIS H 18x130/200 K

**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

$t_{fix}$ = thickness of fixture

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

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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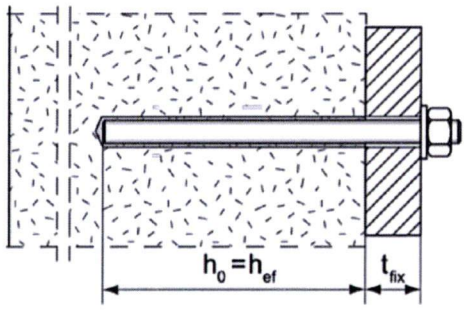
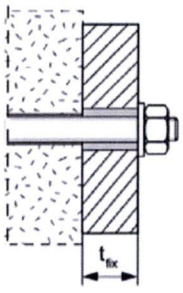
## Installation conditions part 2

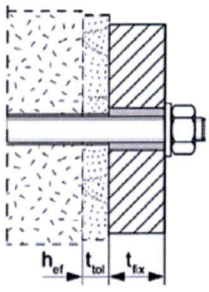
**Anchor rods without perforated sleeve FIS H K; installation in solid brick masonry**

**Pre-positioned anchorage:**




**Push through anchorage:** Annular gap filled with mortar

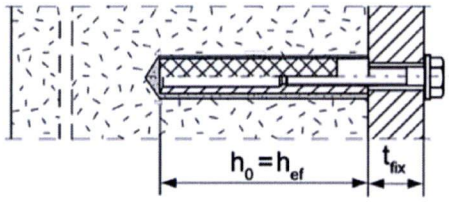


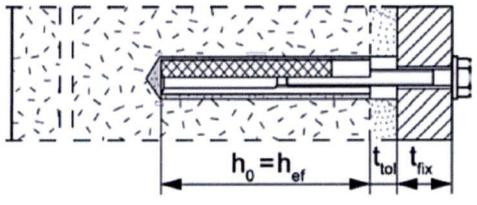

Installation with render bridge

**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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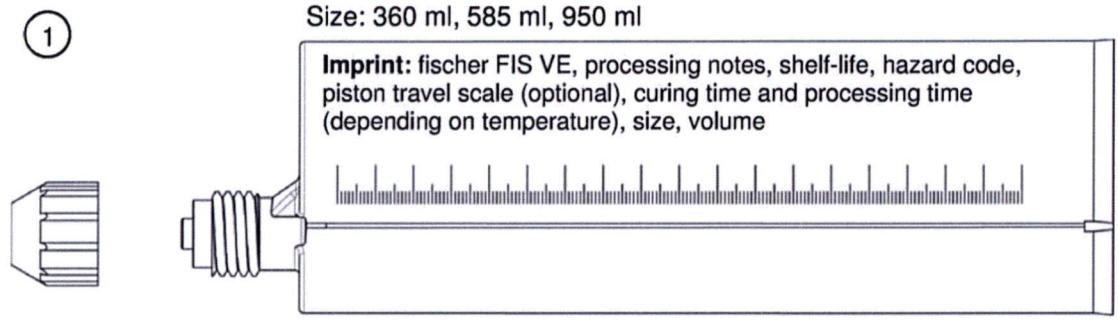
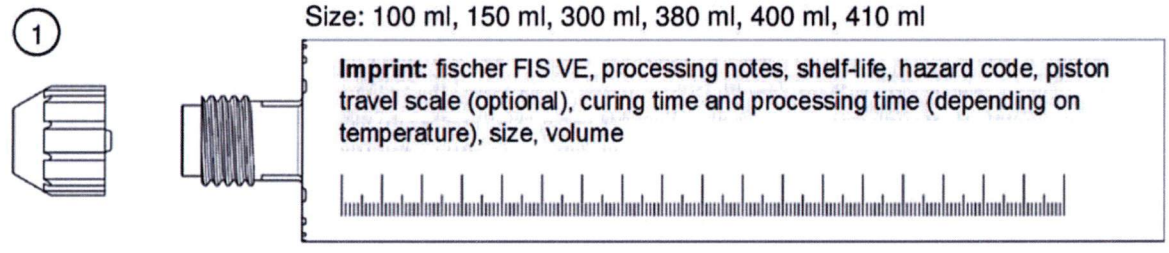
## Overview system components part 1

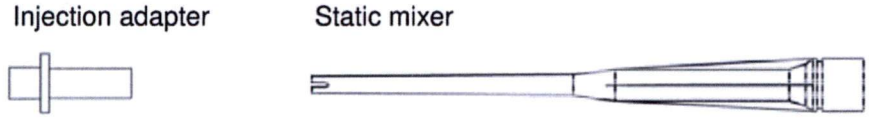
### Mortar cartridge (shuttle cartridge) with sealing cap



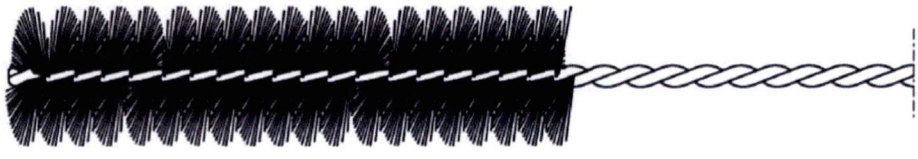

### Mortar cartridge (coaxial cartridge) with sealing cap




### 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**<br>Overview system components part 1: cartridge / static mixer / cleaning brush | |

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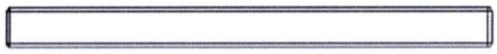
## Overview system components part 2

**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) 

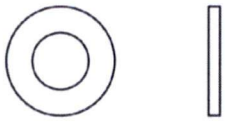
Size: FIS H 16x130 K
FIS H 20x130 K
FIS H 20x200 K

**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)<br>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)<br>Size: FIS H 18x130/200 K |
| Installation conditions | category d/d<br>category w/d<br>category w/w | all bricks | |
| 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**<br>Specifications (part 1) | |

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## 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**<br>Specifications (part 2) | |

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## 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 | |
|---|---|
| **Intended use**<br>Specifications (part 3) | **Annex B 3** |

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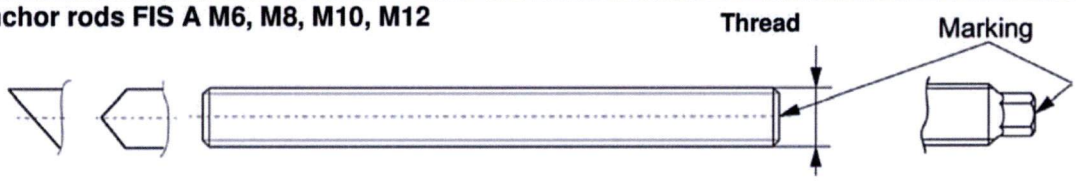
**Table B4.1:** Installation parameters for anchor rods in solid bricks without perforated sleeves

| 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.

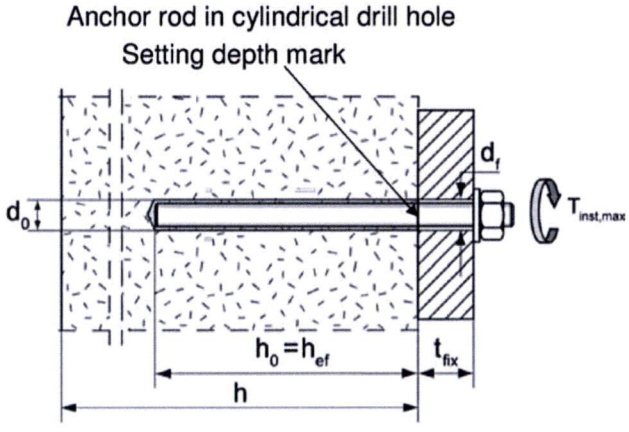
**fischer anchor rods FIS A M6, M8, M10, M12**




**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**

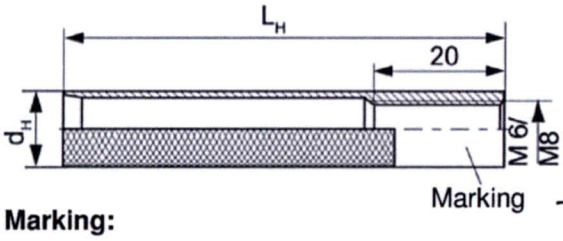
Deutsches Institut für Bautechnik DIBt

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

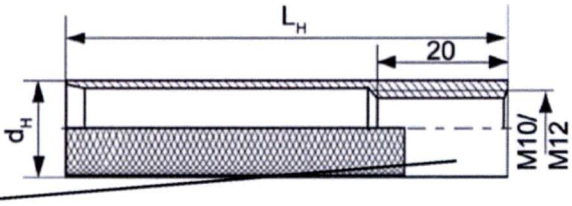
| **Internal threaded anchor FIS E** | | **11x85 M6** | **11x85 M8** | **15x85 M10** | **15x85 M12** |
|---|---|---|---|---|---|
| Diameter of anchor | $d_H$ [mm] | 11 | | 15 | |
| Nominal drill hole diameter | $d_0$ [mm] | 14 | | 18 | |
| Length of anchor | $L_H$ [mm] | 85 | | | |
| Effective anchorage 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

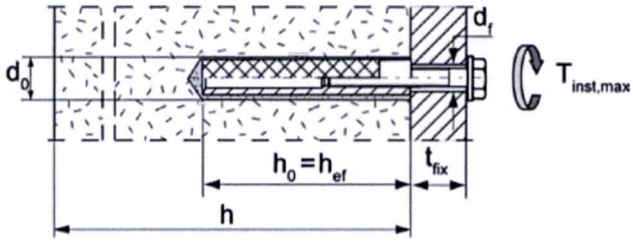



**Marking:**

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.

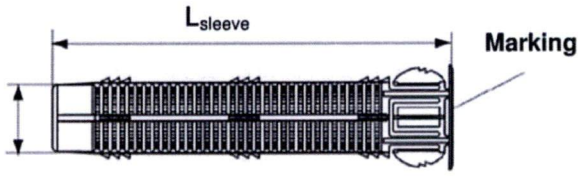
[2)] Bridging of unbearing layer (e.g. plaster) is possible. When reducing the effective anchorage depth $h_{ef,min}$, the values of the next shorter perforated sleeve of the same diameter must be used. The smaller value of charastereristic resistance must be taken.

**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

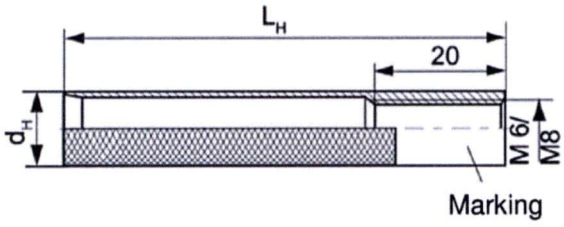
**Marking:**
Size $D_{sleeve,nom}$ x $L_{sleeve}$
(e.g.: 16x85)


$D_{sleeve,nom}$

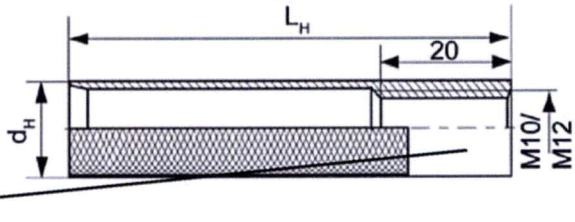



**fischer Internal threaded anchor FIS E**

FIS E 11x85 M6, FIS E 11x85 M8

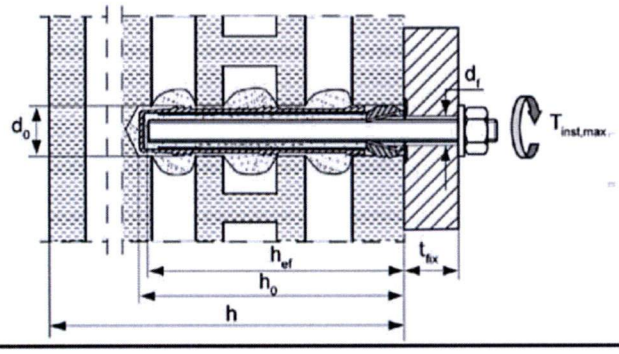



FIS E 15x85 M10, FIS E 15x85 M12

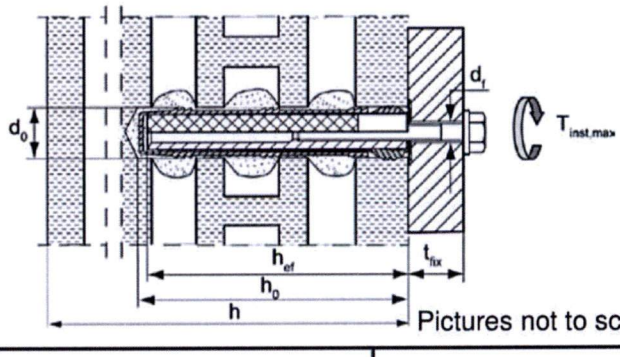



**Installation conditions:**

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**

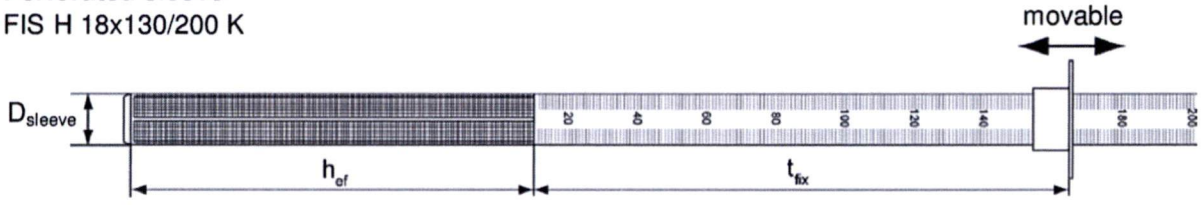
Deutsches Institut für Bautechnik DIBt

**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 | |

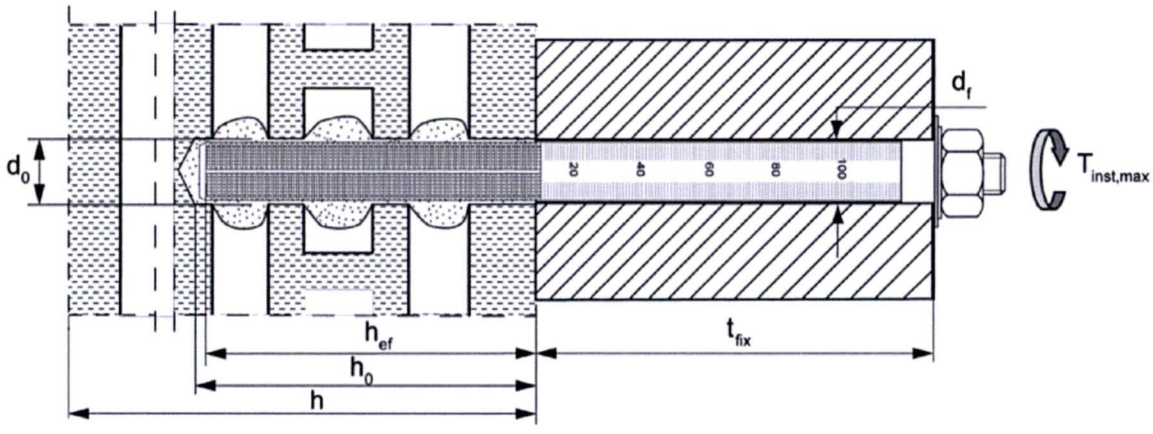
[1] Only for solid areas in hollow bricks and solid bricks.

**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)

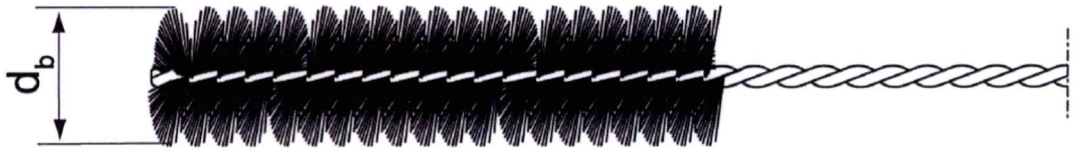
**Annex B 7**

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

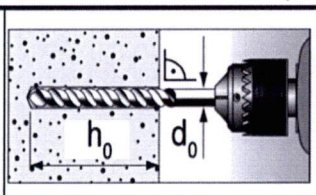
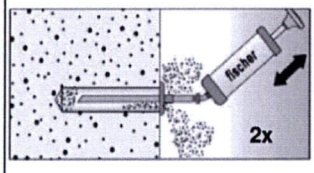
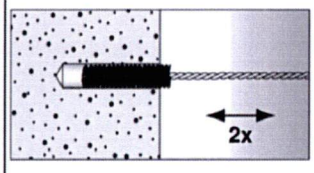
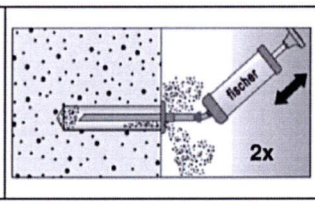
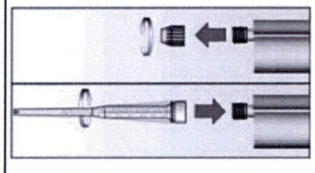
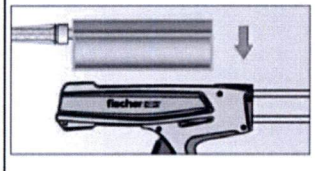
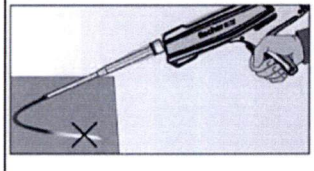
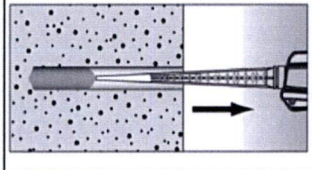
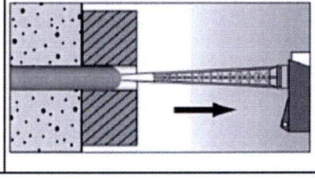
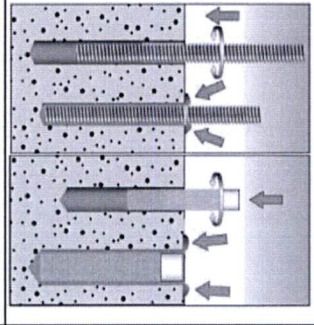
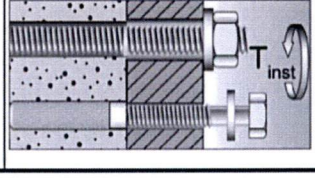
**Intended use**
Cleaning brush (steel brush)
Maximum processing times and minimum curing times

**Annex B 8**

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.<br>Mark the anchor rod for setting depth.<br>Insert the anchor rod or internal threaded anchor FIS E by hand using light turning motions.<br>When reaching the setting depth marking, excess mortar must emerge from the mouth of the drill hole. | | |
| 7 |  | Do not touch.<br>Minimum curing time see Table **B8.2** |  | Mounting the fixture.<br>$T_{inst,max}$ see parameter of brick. |

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

fischer injection system FIS VE for masonry

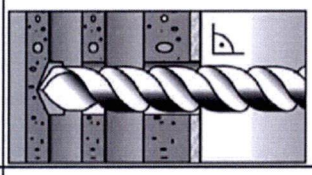
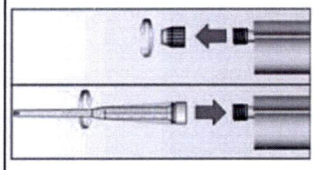
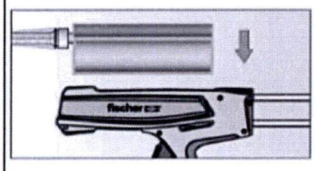
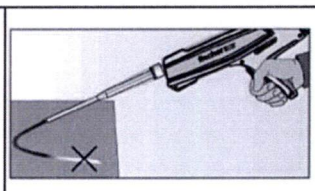
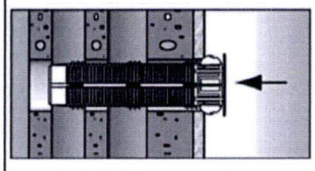
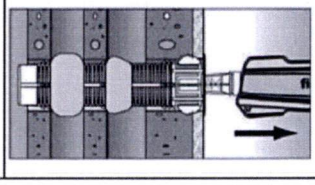
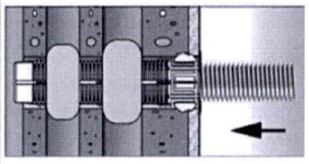
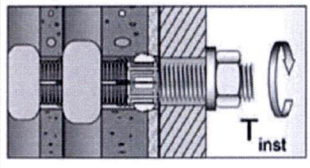
**Intended use**
Installation instruction (without perforated sleeve) part 1

**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 $h_0$ 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 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

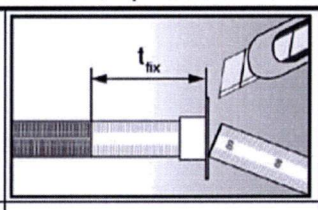
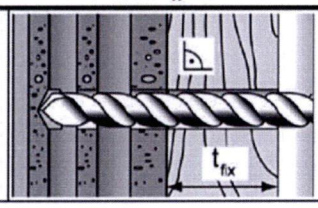
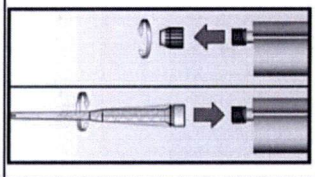
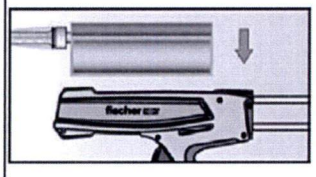
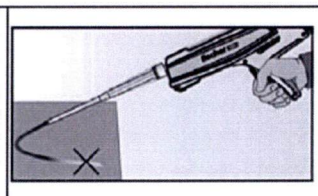
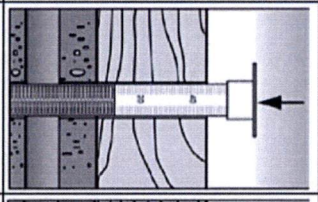
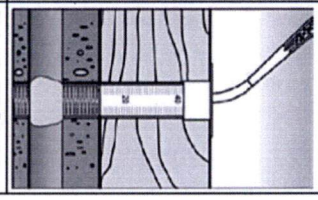
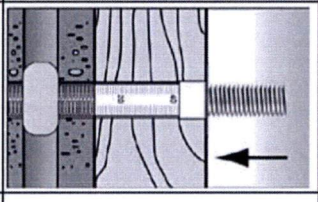
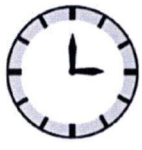
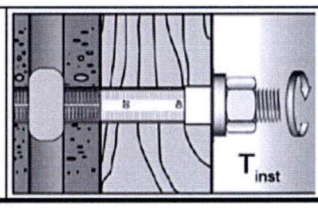
**Intended use**
Installation instruction (with perforated sleeve) part 2

**Annex B 10**

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] | | | | | | | |
| Characterstic 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

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

**Annex C 3**

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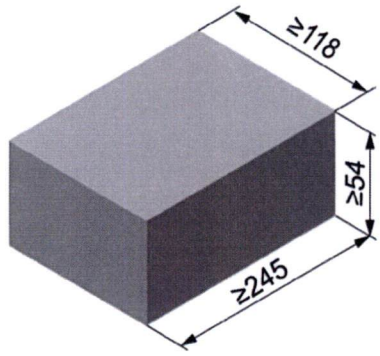
## Solid brick Mz, EN 771-1




| 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 | | 245 | | | | | | | | | | | |
| | $s_{cr}$ ⊥ = $s_{min}$ ⊥ | | 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<br>$\alpha_{g,V}$ II<br>$\alpha_{g,N}$ ⊥<br>$\alpha_{g,V}$ ⊥ | [-] | 2 | | | | | | | | |

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**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

**Performances**
Solid brick Mz, Characteristic resistance under tensile and shear load

**Annex C 5**

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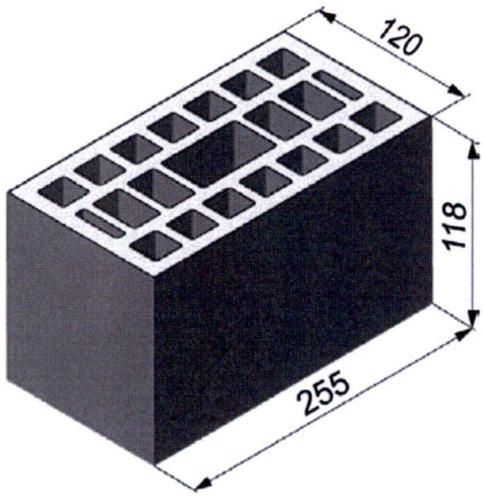
## Vertical perforated brick HLz, EN 771-1




| 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 | | |

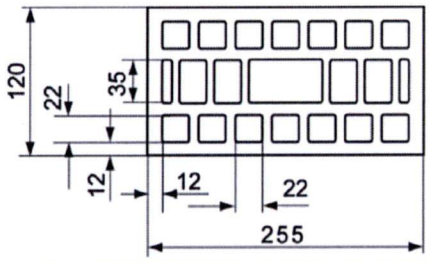



**Table C6.1:** Installation parameters

| **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 $s_{cr}$ II = $s_{min}$ II [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 $\alpha_{g,N}$ II, $\alpha_{g,V}$ II, $\alpha_{g,N}$ ⊥, $\alpha_{g,V}$ ⊥ [-] | 2 | | | | | | | | |

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**Performances**
Vertical perforated brick HLz, dimensions, installation parameters

**Annex C 6**

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## 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 | | 0,5 | | | - | | |
| | d/d | 0,5 | | 0,5 | | 0,5 | | | - | | |
| **4 N/mm²** | w/w w/d | 0,9 | | 0,9 | | 0,9 | | | 0,5 | | |
| | d/d | 0,9 | | 1,2 | | 1,2 | | | 0,5 | | |
| **6 N/mm²** | w/w w/d | 1,2 | | 1,5 | | 1,5 | | | 0,75 | | |
| | d/d | 1,5 | | 1,5 | | 1,5 | | | 0,75 | | |
| **8 N/mm²** | w/w w/d | 1,5 | | 2,0 | | 2,0 | | | 0,9 | | |
| | d/d | 2,0 | | 2,0 | | 2,0 | | | 0,9 | | |
| **10 N/mm²** | w/w w/d | 2,0 | | 2,5 | | 2,5 | | | 1,2 | | |
| | d/d | 2,5 | | 2,5 | | 2,5 | | | 1,2 | | |
| **12 N/mm²** | w/w w/d | 2,5 | | 3,0 | | 3,0 | | | 1,5 | | |
| | d/d | 3,0 | | 3,5 | | 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** | **-** | | **M10** | **M12** | **-** |
| | | | | | | **11x85** | | | | **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

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**Performances**
Vertical perforated brick HLz, Characteristic resistance under shear load

**Annex C 8**

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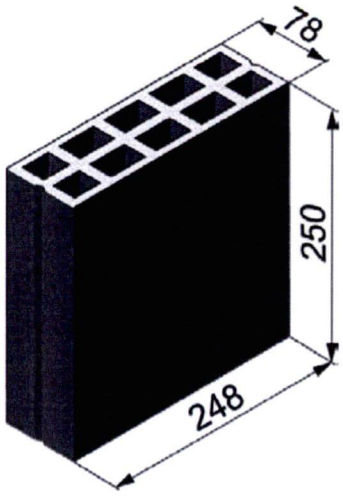
## Horizontal perforated brick LLz, EN 771-1




| 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 | | |

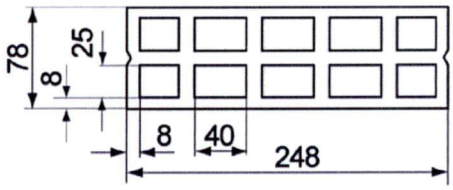



**Table C9.1:** Installation parameters

| **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 | |
| | $\alpha_{g,V}$ ⊥ | [-] | | |

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**Performances**
Horizontal perforated brick LLz, dimensions, installation parameters

**Annex C 9**

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## 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**<br>Horizontal perforated brick LLz, Characteristic resistance under tensile and shear load | |

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## 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<br>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<br>[kN] | $\delta N_0$<br>[mm] | $\delta N_\infty$<br>[mm] | V<br>[kN] | $\delta V_0$<br>[mm] | $\delta V_\infty$<br>[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 |

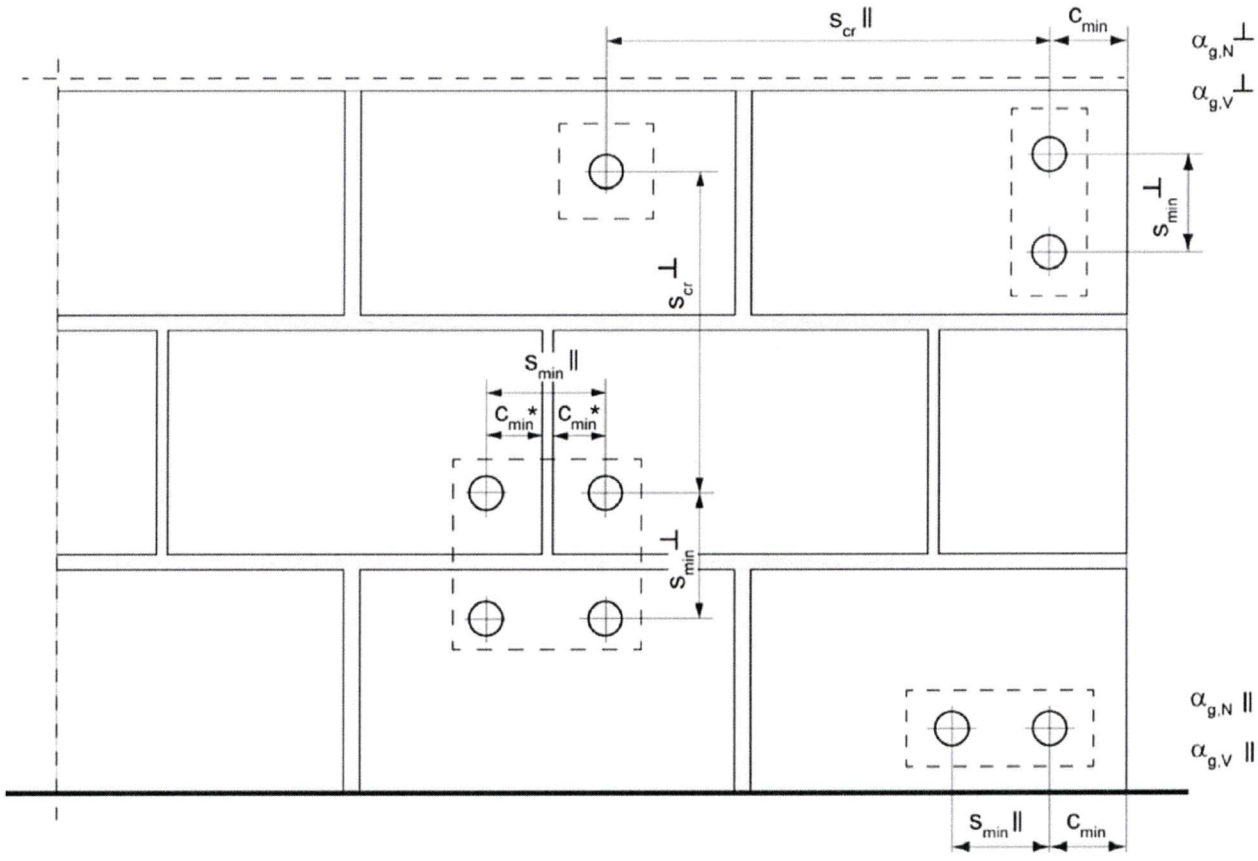
fischer injection system FIS VE for masonry

**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 $s_{min} \leq s < s_{cr}$ $\alpha_g$ 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**<br>Spacing and edge distance | |