



ΕN

#### **DECLARATION OF PERFORMANCE**

#### **DoP 0369**

for fischer injection system FIS V Zero (Metal injection anchors for use in masonry)

1. <u>Unique identification code of the product-type:</u> **DoP 0369** 

2. <u>Intended use/es:</u> Post-installed fastening in masonry units, see appendix, especially annexes B1 - B14.

3. Manufacturer: fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Germany

4. <u>Authorised representative:</u> –

5. System/s of AVCP:

6. European Assessment Document: EAD 330076-01-0604, Edition 10/2022

European Technical Assessment: ETA-21/0267; 2024-11-14

Technical Assessment Body: DIBt- Deutsches Institut für Bautechnik

Notified body/ies: 2873 TU Darmstadt

7. Declared performance/s:

#### Mechanical resistance and stability (BWR 1)

Characteristic resistance for static and quasi-static loading:

- 1 Characteristic resistance to steel failure of a single anchor under tension loading: See appendix, especially annexes C1, C3
- 2 Characteristic resistance to steel failure of a single anchor under shear loading with and without level arm: See appendix, especially annexes C2, C3
- 3 Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading, Reduction factor: See appendix, especially annexes C5, C7, C10, C13, C15, C18
- 4 Characteristic resistance to local brick failure or brick breakout failure of a single anchor under shear loading: See appendix, especially annexes C5, C7, C11, C13, C15, C19
- 5 Characteristic resistance to brick breakout failure of an anchor group under tension loading: See appendix, especially annexes B13, B14, C4, C6, C8, C9, C12, C14, C17
- 6 Characteristic resistance to local brick failure or brick breakout failure of an anchor group under shear loading: See appendix, especially annexes B13 ,B14, C4, C5, C6, C7, C8, C9, C11, C12, C13, C14, C15, C17, C19
- 7 Edge distances, spacing, member thickness: See appendix, especially annexes B13, B14, C4, C6, C8, C9, C12, C14, C16
- 8 Displacements under tension and shear loading: see appendix, especially annex C21
- 9 Maximum installation torque: See appendix, especially annexes B4-B7

Characteristic resistance and displacements for seismic loading:

- 10 Resistance to tension load, displacements: NPD
- 11 Resistance to shear load, displacements: NPD
- 12 Factor annular gap: NPD

#### Safety in case of fire (BWR 2)

- 13 Reaction to fire: Class (A1)
- 14 Resistance to fire under tension and shear loading with and without level arm, minimum edge distances and spacing: NPD

#### Hygiene, health and the environment (BWR 3)

15 Content, emission and/or release of dangerous substances: NPD

8. <u>Appropriate Technical Documentation and/or Specific – Technical Documentation:</u>

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Dr. Ronald Mihala, Head of Development and Production Management

Tumlingen, 2024-12-12

Jürgen Grün Managing Director Chemistry & Quality

This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.

The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

Fischer DATA DOP\_ECs\_V100.xlsm 1 / 1



Translation guidance Essential Characteristics and Performance Parameters for Annexes

| Me | echanical resistance and stability (BWR 1)  |   |
|----|---|---|
| Cł | naracteristic resistance for static and quasi-static loading:   |   |
| 1  | Characteristic resistance to steel failure of a single anchor under tension loading:  | N <sub>Rk,s</sub> [kN]  |
| 2  | Characteristic resistance to steel failure of a single anchor under shear loading with and without level arm:                       | V <sub>Rk,s</sub> [kN], M <sup>0</sup> <sub>Rk,s</sub> [Nm]   |
| 3  | Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading, Reduction factor: | $N_{Rk,p}$ ; $N_{Rk,b}$ ; [kN] $N_{Rk,p,c}$ ; $N_{Rk,b,c}$ [kN], $\beta$ [-]  |
| 4  | Characteristic resistance to local brick failure or brick breakout failure of a single anchor under shear loading:                  | $V_{Rk,b}$ ; $V_{Rk,c,II}$ ; $V_{Rk,c,\perp}$ [kN]  |
| 5  | Characteristic resistance to brick breakout failure of an anchor group under tension loading:                                       | $N^g_{Rk}$ [kN], $\alpha_{g,N}$ [-]   |
| 6  | Characteristic resistance to local brick failure or brick breakout failure of an anchor group under shear loading:                  | $\begin{array}{c} V^{g}_{Rk,b}; \ V^{g}_{Rk,c,ll}; \ V^{g}_{Rk,c,\perp} \ [kN]; \\ \alpha_{g,V,ll}; \ \alpha_{g,V,\perp} \ [-] \end{array}$ |
| 7  | Edge distances, spacing, member thickness:  | c <sub>cr</sub> ; s <sub>cr</sub> ; c <sub>min</sub> ; s <sub>min,II</sub> ; s <sub>min,L</sub> ; h <sub>min</sub> [mm]                     |
| 8  | Displacements under tension and shear loading:  | $\delta_{N0};  \delta_{N\infty;}  \delta_{V0;}  \delta_{V\infty}  [mm]$   |
| 9  | Maximum installation torque:  | max. T <sub>inst</sub> [Nm]   |
| Cr | I<br>naracteristic resistance and displacements for seismic loading:  |   |
| 10 | Resistance to tension load, displacements:  | $N_{Rk,s,eq}$ ; $N_{Rk,eq}$ [kN], $\alpha_{N,seis}$ [-]; $\delta_{N,eq}$ [mm]   |
| 11 | Resistance to shear load, displacements:  | $V_{Rk,s,eq}$ ; $V_{Rk,b,eq}$ [kN],<br>$\alpha_{V,seis}$ [-]; $\delta_{V,eq}$ [mm]  |
| 12 | Factor annular gap:   | α <sub>gap</sub> [-]  |
| Sa | Ifety in case of fire (BWR 2)   |   |
| 13 | Reaction to fire:   | -   |
| 14 | Resistance to fire under tension and shear loading with and without level arm, minimum edge distances and spacing:                  | $N_{Rk,s,fi}$ ; $N_{Rk,p,fi}$ ; [kN],<br>$N_{Rk,b,fi}$ ; $V_{Rk,s,fi}$ [kN],<br>$M^{0}_{Rk,s}$ [Nm], $c_{cr,fi}$ , $s_{cr,fi}$ [mm]         |
| Hy | /giene, health and the environment (BWR 3)  |   |
| 15 | Content, emission and/or release of dangerous substances:   | -   |

#### **Specific Part**

#### 1 Technical description of the product

The fischer injection system FIS V Zero for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar fischer FIS V Zero, a perforated 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 fastener 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 fastener of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

#### 3.1 Mechanical resistance and stability (BWR 1)

| Essential characteristic  | Performance                              |
|---|--|
| Characteristic resistance for static and quasi-static loading   | See Annexes B 4 to B 7, B 14 C 1 to C 21 |
| Characteristic resistance and displacements for seismic loading |  |

#### 3.2 Safety in case of fire (BWR 2)

| Essential characteristic  | Performance             |
|---|-------------------------|
| Reaction to fire  | Class A1                |
| Resistance to fire under tension and shear loading with and without lever arm. Minimum edge distances and spacing | No performance assessed |

#### 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 330076-01-0604 the applicable European legal act is: [97/177/EC].

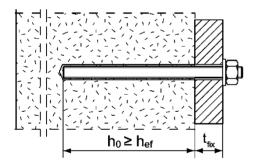
The system to be applied is: 1

# Installation conditions part 1 Anchor rods with perforated sleeve FIS H K; Installation in perforated and solid brick masonry Pre-positioned installation: Installation with render bridge FIS H 16x85 K Size of the perforated sleeve: FIS H 12x50 K FIS H 20x85 K FIS H 12x85 K FIS H 16x130 K FIS H 20x130 K Push through installation: Installation with render bridge Size of the perforated sleeve: FIS H 18x130/200 K FIS H 22x130/200 K Internal threaded anchor FIS E with perforated sleeve FIS H K; Installation in perforated and solid brick masonry Pre-positioned installation: Installation with render bridge Figures not to scale hef = effective anchorage depth t<sub>tol</sub> = thickness of unbearing layer (e.g. plaster) t<sub>fix</sub> = thickness of fixture fischer injection system FIS V Zero for masonry Annex A1 **Product description** Installation conditions part 1, Anchor rods and internal threaded anchor with perforated sleeve FIS H K Appendix 3 / 42

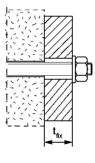
#### Installation conditions part 2

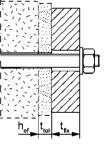
Anchor rods without perforated sleeve FIS H K; installation in solid brick masonry and autoclaved aerated concrete (AAC)

#### Pre-positioned installation:



#### Push through installation: Annular gap filled with mortar

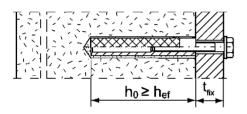




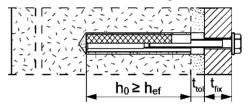
Installation with render bridge

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

#### Pre-positioned installation:



#### Installation with render bridge



Figures not to scale

 $h_0$  = depth of drill hole

hef = effective anchorage depth

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

t<sub>fix</sub> = thickness of fixture

#### fischer injection system FIS V Zero for masonry

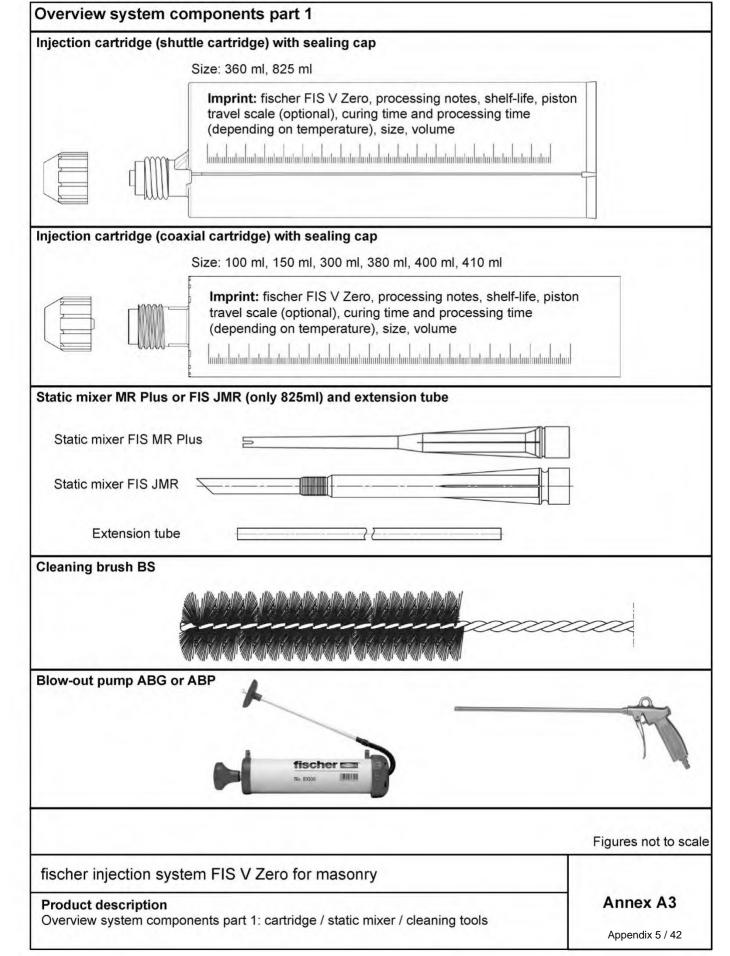
#### **Product description**

Installation conditions part 2,

Anchor rods and internal threaded anchor without perforated sleeve

Annex A2

Appendix 4 / 42



| Overview system components part : fischer anchor rod | _   |  |   |  |  |
|--|---|--|---|--|--|
|  | Size:   | M8, M10, M12, M16  |   |  |  |
| Internal threaded anchor FIS E                       |   |  |   |  |  |
|  | Size:   | 11x85 M8<br>15x85 M10 / M12                                      |   |  |  |
| Perforated sleeve FIS H K                            | Size:   | FIS H 12x50 K<br>FIS H 12x85 K<br>FIS H 16x85 K<br>FIS H 20x85 K |   |  |  |
|  | Size:   | FIS H 16x130 K<br>FIS H 20x130 K                                 |   |  |  |
| Perforated sleeve FIS H K (push through in           | stallation)   |  |   |  |  |
|  |   |  | Size:<br>FIS H 18x130/200 K<br>FIS H 22x130/200 K |  |  |
| Washer   |   |  |   |  |  |
|  |   |  |   |  |  |
| Hexagon nut  |   |  |   |  |  |
|  |   |  |   |  |  |
|  |   |  |   |  |  |
|  |   |  |   |  |  |
|  |   |  |   |  |  |
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|  |   |  |   |  |  |
|  |   |  |   |  |  |
|  |   |  | Figures not to scale                              |  |  |
| fischer injection system FIS V Zero fo               | r masonry   |  |   |  |  |
| Product description                                  | oarte / norferete   | d sleeves FIS H V  | Annex A4  |  |  |
| Overview system components part 2. Metal p           | Overview system components part 2: Metal parts / perforated sleeves FIS H K |  |   |  |  |

| Table A5.1: Materials            |   |   |   |   |  |
|----------------------------------|---|---|---|---|--|
| Part Designation                 |   | Material  |   |   |  |
| 1                                | Injection cartridge   | Mortar, hardener; filler  |   |   |  |
|                                  |   | Steel   | Stainless steel R   | High corrosion-resistant steel HCR  |  |
|                                  | Steel grade   | zinc plated   | acc. to EN 10088-1:2023<br>Corrosion resistance class<br>CRC III<br>acc. to EN 1993-1-4:2020  | acc. to EN 10088-1:2023<br>Corrosion resistance class<br>CRC V<br>acc. to EN 1993-1-4:2020  |  |
| 2 Anchor rod                     |   | Property class 4.6; 4.8; 5.8 or 8.8; EN ISO 898-1: 2013 zinc plated ≥ 5µm, EN ISO 4042:2022 Zn5/An(A2K) or hot-dip galvanised EN ISO 10684:2004+AC:2009f <sub>uk</sub> ≤ 1000 N/mm² A <sub>5</sub> > 8% fracture elongation | Property class 50, 70 or 80 EN ISO 3506-1:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062; 1.4662; 1.4462; EN 10088-1:2023 f <sub>uk</sub> ≤ 1000 N/mm² A <sub>5</sub> > 8% fracture elongation | Property class 50 or 80 EN ISO 3506-1:2020 or property class 70 with $f_{yk}$ = 560 N/mm <sup>2</sup> 1.4565; 1.4529 EN 10088-1:2023 $f_{uk} \le 1000 \text{ N/mm}^2$ $A_5 > 8\% \text{ fracture}$ elongation |  |
| 3 Washer<br>ISO 7089:2000        |   | zinc plated ≥ 5µm,<br>ISO 4042:2022<br>Zn5/An(A2K)<br>or hot-dip galvanised<br>EN ISO 10684:2004  | 1.4401; 1.4404;<br>1.4578; 1.4571;<br>1.4439; 1.4362;<br>EN 10088-1:2023  | 1.4565;1.4529<br>EN 10088-1:2023  |  |
| 4 Hexagon nut                    |   | Property class 5 or 8;<br>EN ISO 898-2:2012<br>zinc plated ≥ 5µm,<br>ISO 4042:2022<br>Zn5/An(A2K)<br>or hot-dip galvanised<br>ISO 10684:2004  | Property class 50, 70 or 80<br>EN ISO 3506-1:2020<br>1.4401; 1.4404;<br>1.4578; 1.4571;<br>1.4439; 1.4362;<br>EN 10088-1:2023   | Property class 50, 70 or 80<br>EN ISO 3506-1:2020<br>1.4565; 1.4529<br>EN 10088-1:2023  |  |
| 5 Internal threaded anchor FIS E |   | Property class 5.8;<br>EN 10277-1:2018<br>zinc plated ≥ 5μm,<br>ISO 4042:2022<br>Zn5/An(A2K)  | Property class 70<br>EN ISO 3506-1:2020<br>1.4401; 1.4404;<br>1.4578; 1.4571;<br>1.4439; 1.4362;<br>EN 10088-1:2023   | Property class 70<br>EN ISO 3506-1:2020<br>1.4565; 1.4529<br>EN 10088-1:2023  |  |
| 6                                | Commercial standard<br>screw or threaded rod<br>for internal threaded<br>anchor FIS E | Property class 5.8 or 8.8;<br>EN ISO 898-1:2013<br>zinc plated ≥ 5µm,<br>ISO 4042:2022<br>Zn5/An(A2K)   | Property class 70<br>EN ISO 3506-1:2020<br>1.4401; 1.4404;<br>1.4578; 1.4571;<br>1.4439; 1.4362;<br>EN 10088-1:2023   | Property class 70<br>EN ISO 3506-1:2020<br>1.4565; 1.4529<br>EN 10088-1:2023  |  |
| 7                                | Perforated sleeve<br>FIS H K  | PP / PE   |   |   |  |
|                                  |   |   |   |   |  |

# Product description Materials

#### Specifications of intended use (part 1) Table B1.1 Overview installation and use fischer injection system FIS V Zero for masonry Hole drilling with hammer drill mode all bricks Hole drilling with rotary drill mode all bricks Static and quasi-static load all bricks Use conditions dry masonry all bricks Perforated sleeve with anchor rod or internal threaded anchor (in perforated and solid brick masonry) Anchor rod or internal threaded anchor Pre-positioned Size: FIS H 12x50 K (in solid brick masonry and FIS H 12x85 K autoclaved aerated concrete) FIS H 16x85 K FIS H 16x130 K Installation FIS H 20x85 K FIS H 20x130 K Perforated sleeve with anchor rod (in perforated and solid brick Anchor rod masonry) Push through (in solid brick masonry and autoclaved aerated concrete) Size: FIS H 18x130/200 K FIS H 22x130/200 K Installation and condition d/d all bricks use conditions (dry/dry) Installation temperature $T_{i,min}$ = -10 °C to $T_{i,max}$ = +40 °C Temperature (max. short term temperature +40 °C -40 °C to +40 °C max. long term temperature +24 °C) range Ta Temperature (max. short term temperature +80 °C Service -40 °C to +80 °C range Tb max. long term temperature +50 °C) temperature Temperature (max. short term temperature +120 °C; -40 °C to +120 °C max. long term temperature +72 °C) range Tc

| fischer injection system | FIS V Zero for | masonry |
|--------------------------|----------------|---------|
|--------------------------|----------------|---------|

Intended use

Specifications (part 1)

Annex B1

Appendix 8 / 42

#### Specifications of intended use (part 2)

#### Anchorages subject to:

· Static and quasi-static loads

#### Base materials:

- · Solid brick masonry (base material group b) and AAC masonry (base material groub d), acc. to Annex B 12
- Hollow brick masonry (base material group c), according to Annex B12
- Minimum thickness of masonry member is hef+30mm
- Mortar strength class of the masonry M2.5 at minimum according to EN 998-2:2016
- For other bricks in solid masonry, hollow, perforated masonry or AAC masonry the characteristic resistance of the anchor may be determined by job site tests according to EOTA Technical Report TR 053:2016-04 under consideration of the β-factor according to Annex C20, Table C20.1

Note (only applies to solid bricks and AAC):

The characteristic resistance is also valid for larger brick sizes, higher mean compressive strength and higher mean gross dry density of the masonry unit.

#### Temperature Range:

- Ta: from -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C)
- Tb: from -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)
- Tc: from -40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C)

#### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc plated steel, stainless steel or high corrosion resistant steel)
- For all other conditions according to EN 1993-1-4:2006+A2:2020 corresponding to corrosion resistance classes to Annex A5. Table A5.1.

| fischer injection | n system f | FIS V Zero | for masonry |
|-------------------|------------|------------|-------------|
|-------------------|------------|------------|-------------|

#### Specifications of intended use (part 2 continued)

#### Design:

The anchorages have to be designed in accordance with EOTA Technical Report TR 054:2022-07,
 Design method A under the responsibility of an experienced in anchorages and masonry work.
 Applies to all bricks, if no other values are specified:

$$N_{Rk} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c} = N_{Rk,p,c}$$

$$V_{Rk} = V_{Rk,b} = V_{Rk,c,l} = V_{Rk,c,l}$$

For the Calculation of pulling out a brick under tension load  $N_{Rk,pb}$  or pushing out a brick under shear load  $V_{Rk,pb}$  see EOTA Technical Report TR 054:2022-07.

N<sub>Rk,s</sub>, V<sub>Rk,s</sub> and M<sup>0</sup><sub>Rk,s</sub> see annex C1-C3

Factors for job site tests see Annes C20 and displacements see Annex C21

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:

- Condition d/d: Installation and use in structures subject to dry, internal conditions
- · Hole drilling see Annex B1.1
- 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 B6, 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 B8, 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 A5, 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 effective anchorage depth. This may be done by the manufacturer of the rod or by a person on job site

fischer injection system FIS V Zero for masonry

Intended use

Specifications (part 2 continued)

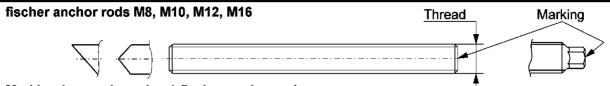
Annex B3

Appendix 10 / 42

**Table B4.1:** Installation parameters for anchor rods in solid bricks and AAC without perforated sleeves FIS H K

| Anchor rod Thread  |                             | Thread                   | M8             | M10              | M12              | M16 |
|--|-----------------------------|--------------------------|----------------|------------------|------------------|-----|
| Nominal drill hole diame   | eter                        | d₀[mm]                   | 10             | 12               | 14               | 18  |
| Effective anchorage depth h <sub>ef</sub> <sup>1)</sup> in solid brick h <sub>0,min</sub> =h <sub>ef,min</sub> [mm] (cycl. drill hole) |                             | h <sub>ef,min</sub> [mm] | 100            |                  |                  |     |
| Effective anchorage dep  | oth h <sub>ef</sub> 1)      | h <sub>ef,min</sub> [mm] |                | 50               | )                |     |
| in solid brick (depth of drill hole $h_0 = h$  | lef)                        | h <sub>ef,max</sub> [mm] |                | h-30,            | ≤200             |     |
| Diameter of clearance  | pre-positioned installation | d <sub>f</sub> ≤[mm]     | 9              | 12               | 14               | 18  |
| •  | push through installation   | d <sub>f</sub> ≤[mm]     | 11             | 14               | 16               | 20  |
| Diameter of cleaning brush d <sub>b</sub> ≥[mm]  |                             | d <sub>b</sub> ≥[mm]     | see Table B8.1 |                  |                  |     |
| Maximum installation torque max T <sub>inst</sub> [Nm]   |                             | x T <sub>inst</sub> [Nm] | 5              | see parameters o | of brick Annex ( | 2   |

<sup>1)</sup>  $h_{ef,min} \le h_{ef} \le h_{ef,max}$  is possible.



Marking (on random place) fischer anchor rod:

| Steel zinc plated PC¹) 8.8 • o             |   | Steel hot-dip galvanised PC1) 8.8          | • |
|--|---|--|---|
| High corrosion resistant steel HCR PC1) 50 | • | High corrosion resistant steel HCR PC1) 70 | _ |
| High corrosion resistant steel HCR PC1) 80 | ( | Stainless steel R property class 50        | ~ |
| Stainless steel R property class 80        | * |  |   |

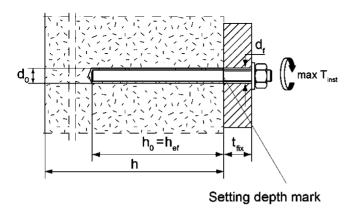
Alternatively: Colour coding according to DIN 976-1: 2016;

property class 4.6 marking according to EN ISO 898-1:2013

1) PC = property class

#### Installation conditions:

Anchor rod



Figures not to scale

| fischer injection system FIS \ | V Zero for masonry |
|--------------------------------|--------------------|
|--------------------------------|--------------------|

#### Intended use

Installation parameters for anchor rods without perforated sleeve

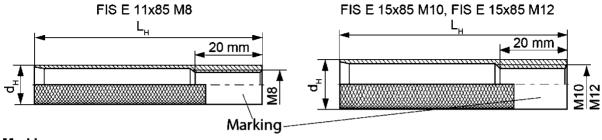
Annex B4

Appendix 11 / 42

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

| Internal threaded anchor FIS E            | •                          | 11x85 M8       | 15x85 M10              | 15x85 M12 |  |  |
|---|----------------------------|----------------|------------------------|-----------|--|--|
| Diameter of anchor                        | d <sub>H</sub> [mm]        | 11 15          |                        |           |  |  |
| Nominal drill hole diameter               | d₀[mm]                     | 14 18          |                        |           |  |  |
| Length of anchor                          | L <sub>H</sub> [mm]        | 85             |                        |           |  |  |
| Effective anchorage depth                 | $h_0 = h_{ef}[mm]$         | 85             |                        |           |  |  |
| Diameter of cleaning brush                | d <sub>b</sub> ≥[mm]       | see Table B8.1 |                        |           |  |  |
| Maximum installation torque               | max T <sub>inst</sub> [Nm] | see par        | ameters of brick Annex | C4-C16    |  |  |
| Diameter of clearance hole in the fixture | d/lmml                     |                | 12                     | 14        |  |  |
| Carau in donth                            | I <sub>E,min</sub> [mm]    | 8 10           |                        |           |  |  |
| Screw-in depth                            | I <sub>E,max</sub> [mm]    | 60             |                        |           |  |  |

#### fischer Internal threaded anchor FISE

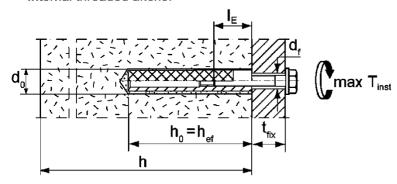


#### Marking:

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

#### Installation conditions:

Internal threaded anchor



Figures not to scale

| fischer injection system F | FIS V Zero for masonry |
|----------------------------|------------------------|
|----------------------------|------------------------|

#### Intended use

Installation parameters for internal threaded rods FIS E without perforated sleeve

Annex B5

Appendix 12 / 42

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

| perforated sleeve FIS H K  |                            | 12x50                           | 12x85 <sup>2)</sup> | 16x85      | 16x130 <sup>2)</sup> | 20x85       | 20x130 <sup>2)</sup> |
|--|----------------------------|---------------------------------|---------------------|------------|----------------------|-------------|----------------------|
| Nominal drill hole diameter d <sub>0</sub> = D <sub>sleeve,nom</sub> | d₀ [mm]                    | 12                              |                     | 16         |                      | 20          |                      |
| Depth of drill hole  | h₀ [mm]                    | 55                              | 90                  | 90         | 135                  | 90          | 135                  |
| Estanti a analana a la ath   | h <sub>ef,min</sub> [mm]   | 50                              | 65                  | 85         | 110                  | 85          | 110                  |
| Effective anchorage depth  | h <sub>ef,max</sub> [mm]   | 50                              | 85                  | 85         | 130                  | 85          | 130                  |
| Size of threaded rod   | [-]                        | M8                              |                     | M8 and M10 |                      | M12 and M16 |                      |
| Size of internal threaded anch                                       | or FIS E                   | -                               | -                   | 11x85      | -                    | 15x85       | -                    |
| Diameter of cleaning brush 1)  | d₅≥[mm]                    | n] see Table B8.1               |                     |            |                      |             |                      |
| Maximum installation torque  | max T <sub>inst</sub> [Nm] | see parameters of brick Annex C |                     |            |                      |             |                      |

<sup>1)</sup> Only for solid areas in hollow bricks and solid bricks.

#### Perforated sleeve

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

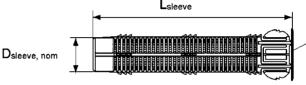
FIS H 20x85 K; FIS H 20x130 K

#### Marking:

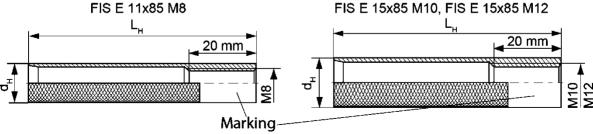
Size D<sub>sleeve, nom</sub> x L<sub>sleeve</sub>

(e.g.: 16x85)

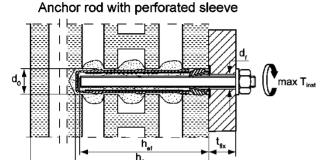




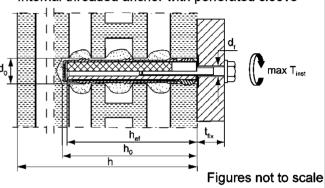
#### fischer Internal threaded anchor FIS E



#### Installation conditions:



#### Internal threaded anchor with perforated sleeve



#### fischer injection system FIS V Zero for masonry

#### Intended use

Installation parameters for anchor rods and internal threaded anchors FIS E with perforated sleeve FIS H K (pre-positioned installation)

#### Annex B6

Marking

Appendix 13 / 42

<sup>&</sup>lt;sup>2)</sup> Bridging of unbearing layer (e.g. plaster) is possible. When reducing the effective anchorage depth h<sub>ef, min</sub>, the values of the next shorter perforated sleeve of the same diameter must be used. The smaller value of charastereristic resistance must be taken.

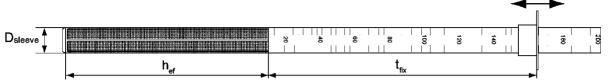
**Table B7.1:** Installation parameters for anchor rods with perforated push through sleeves (push through installation)

| Perforated sleeve FIS H K     |                              | 18x13                           | 22x130/200 |     |  |
|-------------------------------|------------------------------|---------------------------------|------------|-----|--|
| Nominal sleeve diameter       | D <sub>sleeve,nom</sub> [mm] | 16                              |            | 20  |  |
| Nominal drill hole diameter   | d₀ [mm]                      | 18                              |            | 22  |  |
| Depth of drill hole           | h₀ [mm]                      | 135                             |            |     |  |
| Effective anchorage depth     | h <sub>ef</sub> [mm]         | ≥130                            |            |     |  |
| Diameter of cleaning brush 1) | d <sub>b</sub> ≥ [mm]        | see Table B8.1                  |            |     |  |
| Size of threaded rod          | [-]                          | M10                             | M12        | M16 |  |
| Maximum installation torque   | max T <sub>inst</sub> [Nm]   | see parameters of brick Annex C |            |     |  |
| Thickness of fixture          | t <sub>fix,max</sub> [mm]    | 200                             |            |     |  |

<sup>1)</sup> Only for solid areas in hollow bricks and solid bricks.

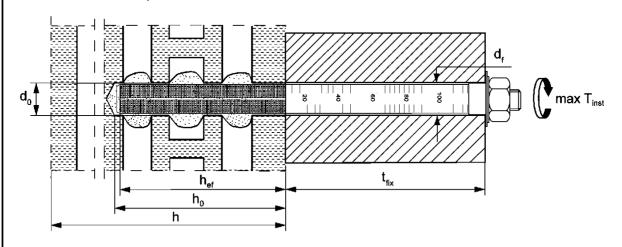
#### Perforated push through sleeve

FIS H 18x130/200 K: FIS H 22x130/200 K



#### Installation conditions:

Anchor rod with perforated sleeve



Figures not to scale

movable

# fischer injection system FIS V Zero for masonry

#### Intended use

Installation parameters for anchor rods with perforated push through sleeves (push through installation)

Annex B7

Appendix 14 / 42

| Table B8.1:         Parameters of the cleaning brush BS (steel brush with steel bristles) |         |    |    |    |    |    |    |    |  |
|---|---------|----|----|----|----|----|----|----|--|
| The size of the cleaning brush refers to the drill hole diameter                          |         |    |    |    |    |    |    |    |  |
| Nominal drill hole diameter   | d₀[mm]  | 10 | 12 | 14 | 16 | 18 | 20 | 22 |  |
| Steel brush diameter  | d₅ [mm] | 11 | 14 | 16 | 20 | 20 | 25 | 25 |  |



Only for solid areas in hollow bricks or solid bricks and autoclaved aerated concrete

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

| Tomporeture et          | Maximum processing time | Minimum curing time |  |  |
|-------------------------|-------------------------|---------------------|--|--|
| Temperature at          | t <sub>work</sub>       | t <sub>cure</sub>   |  |  |
| anchoring base          |                         |                     |  |  |
| [°C]                    | FIS V Zero              | FIS V Zero          |  |  |
|                         | 110 \$ 2010             | 110 1 2010          |  |  |
| -10 to -5 <sup>1)</sup> | 6 h                     | 72 h                |  |  |
| > -5 to 0 <sup>1)</sup> | 2 h                     | 24 h                |  |  |
| > 0 to 5 1)             | 45 min                  | 12 h                |  |  |
| > 5 to 10               | 20 min                  | 6 h                 |  |  |
|                         |                         |                     |  |  |
| > 10 to 15              | 8 min                   | 3 h                 |  |  |
| > 15 to 20              | 5 min                   | 2 h                 |  |  |
| > 20 to 25              | 3 min                   | 1 h                 |  |  |
|                         |                         |                     |  |  |
| > 25 to 30              | 2 min                   | 45 min              |  |  |
| > 30 to 40              | 1 min                   | 30 min              |  |  |

<sup>&</sup>lt;sup>1)</sup> Minimum cartridge temperature +5°C

Figures not to scale

| fischer injection system FIS V Zero for masonry                                |                  |
|--|------------------|
| Intended use   | Annex B8         |
| Parameters of the cleaning brush (steel brush) Processing time and curing time | Appendix 15 / 42 |

#### Installation instruction part 1 Installation in solid brick and autoclaved aerated concrete without perforated sleeve Drill the hole (drilling method see Annex C of the respective brick) depth of drill hole ho and nominal drill hole diameter do see Table B4.1: B5.1 Blow out the drill hole 2 twice. Brush twice and blow out twice again. Remove the sealing cap. Screw on the static mixer. (the spiral in the static 3 mixer must be clearly visible) Extrude approximately 10 cm of material out until Place the cartridge into the resin is evenly grey in 4 a suitable dispenser colour. Do not use mortar that is not uniformly grev. Fill approximetly 2/3 of the drill hole with mortar For push through beginning from the installation fill the annular 5 bottom of the hole.1) gap with mortar. Avoid bubbles Only use clean and oil-free metal parts. Mark the setting depth. Insert the anchor rod or internal threaded anchor FIS E by hand. Recommendation: 6 Rotation back and forth of the anchor rod or internal threaded anchor FIS E makes pushing easy. When reaching the setting depth mark, excess mortar must emerge from the mouth of the drill hole. Do not touch. Mounting the fixture. 7 Minimum curing time see max T<sub>inst</sub> max Tinst see parameter of Table B8.2 brick. 1) Exact volume of mortar see manufacturer's specifications

fischer injection system FIS V Zero for masonry

Intended use

Installation instruction part 1
Installation in solid brick without perforated sleeve

Annex B9

Appendix 16 / 42

#### Installation instruction part 2 Installation in perforated or solid brick with perforated sleeve (pre-positioned installation) Drill the hole (drilling method see Annex C of the respective brick). When install perforated sleeves in solid bricks or depth of drill hole ho and solid areas of hollow bricks, also clean the hole by nominal drill hole blowing out and brushing. diameter do see Table B6.1 Remove the sealing cap. Screw on the static mixer, (the spiral in the static 2 mixer must be clearly visible) Extrude approximately 10 cm of material out until Place the cartridge into the resin is evenly grey in 3 a suitable dispenser. colour. Do not use mortar that is not uniformly grev. Insert the perforated Fill the perforated sleeve sleeve flush with the completely with mortar beginning from the surface of the masonry bottom of the hole 1) or plaster. Only use clean and oil-free metal parts. Mark the setting depth. Insert the anchor rod or the internal threaded anchor FIS E by hand. 5 Recommendation: Rotation back and forth of the anchor rod or internal threaded anchor FIS E makes pushing easy until reaching the setting depth mark (anchor rod) or flush with the surface (internal threaded anchor). Do not touch. Mounting the fixture. Minimum curing time max T<sub>inst</sub> see parameter 6 see Table B8.2 of brick. max T<sub>inst</sub> 1) Exact volume of mortar see manufacturer's specification.

fischer injection system FIS V Zero for masonry

Intended use

Installation instruction part 2

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

Annex B10

Appendix 17 / 42

#### Installation instruction part 3 Installation in perforated or solid brick with perforated sleeve (push through installation) Drill the hole through the fixture. Depth of drill hole Push the movable stop up to the correct (ho + tfix) 1 thickness of fixture and and nominal drill hole cut the overlap. diameter do see Table B7 1 Remove the sealing cap. Screw on the static mixer. (the spiral in the static 2 mixer must be clearly visible) Extrude approximately 10 cm of material out until Place the cartridge into the resin is evenly grey in 3 a suitable dispenser. colour. Do not use mortar that is not uniformly grey. Fill the sleeve with mortar Insert the perforated beginning from the sleeve flush with the bottom of the hole. 1) surface of the fixture into For deep drill holes use the drill hole an extension tube. Only use clean and oil-free metal parts. Mark the setting depth. Insert the anchor rod by hand. manaman 5 Recommendation: Rotation back and forth of the anchor rod makes pushing easy until reaching the setting depth mark (anchor rod). Do not touch. Mounting the fixture. 6 Minimum curing time max T<sub>inst</sub> see parameter see Table B8.2 of brick $\max T_{inst}$ 1) Exact volume of mortar see manufacturer's specification.

fischer injection system FIS V Zero for masonry

Intended use

Installation instruction part 3

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

Annex B11

Appendix 18 / 42

| Kind of masonry   | Brick format<br>[mm]                      | Mean<br>compressive<br>strength<br>[N/mm²]            | Main country<br>of origin | Mean gross<br>dry<br>density ρ<br>[kg/dm³] | Annex       |
|---|---|---|---------------------------|--|-------------|
|   | So  | lid brick Mz  |                           |  |             |
| Solid brick Mz  | ≥ 230x108x55                              | 36 - 48   | Denmark                   | ≥2,0                                       | C4/C5       |
| Solid calcium silicate  | (sand - lime) brick KS                    | / perforated cald                                     | ium silicate (sa          | nd - lime) brid                            | k KSL       |
| Solid calcium silicate<br>brick KS  | <b>NF</b> ≥240x115x71                     | 8- 20   | Germany                   | ≥2,0                                       | C6/C7       |
| Perforated calcium silicate brick KSL   | <b>3DF</b> 240x175x113                    | 8 - 16  | Germany                   | ≥1,6                                       | C8 – C11    |
|   | Vertical p                                | erforated brick H                                     | Lz                        |  |             |
| Vertical perforated brick<br>HLz  | 230x108x55                                | 6 - 16  | Denmark                   | ≥1,6                                       | C12/C13     |
|   | Lightweight aggrega                       | ate concrete hollo                                    | w block Hbl               |  |             |
| Lightweight aggregate concrete hollow block Hbl                                       | 2 - 4                                     | France  | ≥1,0                      | C14/C15                                    |             |
|   | Autoclave                                 | d aerated concre                                      | te                        |  |             |
| PP2 / AAC<br>AAC PP4 / AAC<br>PP6 / AAC   |   | 2<br>4<br>6   | Germany                   | ≥0,35<br>≥0,5<br>≥0,65                     | C16-C19     |
| <b>Table B12.2:</b> Overview Perforated calcium silicate (s 3DF, EN 771-2:2011+A1:201 |   | forated and ho<br>Lightweight aggr<br>2011+A1:2015; e | egate concrete h          |  |             |
| vertical perforated brick HLz 2011+A1:2015; e.g. Wienerberger according               | 24<br>24<br>24<br>45<br>12<br>, EN 771-1: | 200   |                           |  |             |
| 25 12<br>230  |   |   |                           | Meas                                       | sures in [m |

Figures not to scale

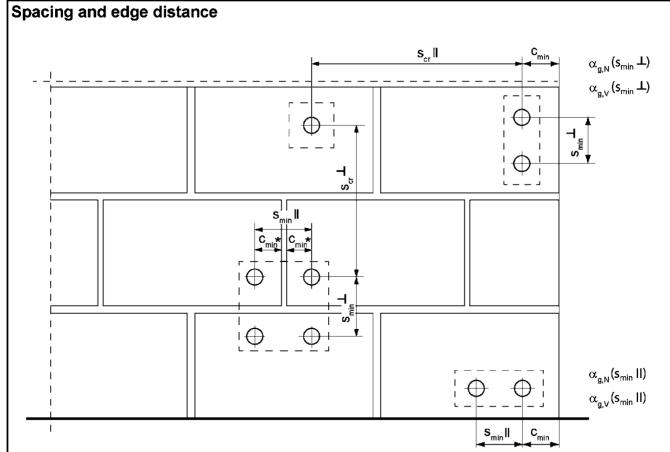
fischer injection system FIS V Zero for masonry

Intended use

Annex B12

Overview of assessed bricks Overview dimensions of perforated and hollow bricks

Appendix 19 / 42



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

s<sub>min</sub> II = Minimum spacing parallel to horizontal joint

 $s_{min}$  = Minimum spacing perpendicular to horizontal joint

s<sub>cr</sub> II = Characteristic spacing parallel to horizontal joint

 $s_{cr}^{\perp}$  = Characteristic spacing perpendicular to horizontal joint

 $c_{cr} = c_{min}$  = Edge distance

 $\alpha_{q,N}(s_{min}|I)$  = Group factor for tension load, anchor group parallel to horizontal joint

 $\alpha_{g,V}(s_{min} \, II)$  = Group factor for shear load, anchor group parallel to horizontal joint

 $\alpha_{g,N}(s_{min}\perp)$  = Group factor for tension load, anchor group vertical to horizontal joint

 $\alpha_{g,V}(s_{min}\perp)$  = Group factor for shear load, anchor group vertical to horizontal joint

fischer injection system FIS V Zero for masonry

Intended use

Spacing and edge distance

**Annex B13** 

Appendix 20 / 42

#### Spacing and edge distance (continuation)

For 
$$s \ge s_{cr}$$
  $\alpha_a = 2$ 

For  $s_{min} \le s < s_{cr}$   $\alpha_g$  according to installation parameters of brick Annex C

#### Group of 2 anchors

$$N^{g}_{Rk} = \alpha_{g,N} \cdot N_{Rk}$$
;  $V^{g}_{Rk,b} = V^{g}_{Rk,c,II} = V^{g}_{Rk,c,\perp} = \alpha_{g,V} \cdot V_{Rk}$ 

#### Group of 4 anchors

$$N^{g}_{Rk} = \alpha_{g,N} (s_{min}II) \cdot \alpha_{g,N} (s_{min}^{\perp}) \cdot N_{Rk}$$
;

$$V^{g}_{Rk,b} = V^{g}_{Rk,c,II} = V^{g}_{Rk,c,\perp} = \alpha_{g,V} (s_{min}II) \cdot \alpha_{g,V} (s_{min}\perp) \cdot V_{Rk}$$

with N<sub>Rk</sub> and  $\alpha_{g,N}$  depending on s<sub>min</sub>II or s<sub>min</sub> $\perp$  acc. to Annex C

with V<sub>Rk</sub> and α<sub>g,V</sub> depending on s<sub>min</sub>II or s<sub>min</sub>⊥ acc. to Annex C

fischer injection system FIS V Zero for masonry

Intended use

Spacing and edge distance (continuation)

**Annex B14** 

Appendix 21 / 42

Table C1.1: Characteristic resistance to steel failure of a single anchor under tension loading of fischer anchor rods and standard threaded rods

| Anchor rod / standard threaded rod          |                                    |              |         | M8 <sup>3)</sup> | M10 <sup>3)</sup>         | M12    | M16 |     |  |
|---|------------------------------------|--------------|---------|------------------|---------------------------|--------|-----|-----|--|
| Chara                                       | acteristic resistar                | ice to steel | failure | under            | tension loadi             | ng     |     |     |  |
| Characteristic resistance N <sub>Rk,s</sub> |                                    |              | 4.6     |                  | 15(13)                    | 23(21) | 33  | 63  |  |
|   | Ctaal wine plated                  |              | 4.8     |                  | 15(13)                    | 23(21) | 33  | 63  |  |
|   | Steel zinc plated                  |              | 5.8     |                  | 19(17)                    | 29(27) | 43  | 79  |  |
|   |                                    | Property     | 8.8     | FLANT            | 29(27)                    | 47(43) | 68  | 126 |  |
|   | Stainless steel R and              | class –      | 50      | [kN] —           | 19                        | 29     | 43  | 79  |  |
|   | High corrosion resistant steel HCR |              | 70      |                  | 26                        | 41     | 59  | 110 |  |
|   |                                    |              | 80      |                  | 30                        | 47     | 68  | 126 |  |
| Partia                                      | Il factors 1)                      |              |         |                  |                           |        |     |     |  |
|   |                                    | ·-           | 4.6     |                  | 2,00                      |        |     |     |  |
|   | Stool zing plated                  |              | 4.8     |                  | 1,50                      |        |     |     |  |
| ors   | Steel zinc plated                  |              | 5.8     |                  | 1,50                      |        |     |     |  |
| fact<br>s,N                                 |                                    | Property     | 8.8     |                  | 1,50                      |        |     |     |  |
| Partial factors                             | Stainless steel R and              | class        | 50      | [-]              | 2,86                      |        |     |     |  |
| Ра  | High corrosion                     | 70           | 70      |                  | 1,50 <sup>2)</sup> / 1,87 |        |     |     |  |
|   | resistant steel<br>HCR             |              |         | 1,60             |                           |        |     |     |  |

<sup>1)</sup> In absence of other national regulations

| fischer injection syste | m FIS V Zero for masonry |
|-------------------------|--------------------------|
|-------------------------|--------------------------|

#### Performances

Characteristic resistance to steel failure of a single anchor under tension loading of fischer anchor rods and standard threaded rods

Annex C1

Appendix 22 / 42

<sup>2)</sup> Only for fischer anchor rod FIS A made of high corrosion-resistant steel HCR

<sup>&</sup>lt;sup>3)</sup> Values in brackets are valid for undersized threaded rods with smaller stress area A<sub>s</sub> for hot dip galvanised standard threaded rods according to EN ISO 10684:2004+AC:2009

Table C2.1: Characteristic resistance to steel failure of a single anchor under shear loading with and without lever arm of fischer anchor rods and standard threaded rods

| Anchor rod / standard threaded rod               |   |                   |         | M8 <sup>3)</sup> | M10 <sup>3)</sup>         | M12    | M16 |     |  |
|--|---|-------------------|---------|------------------|---------------------------|--------|-----|-----|--|
| Chara  | acteristic resistar                       | ice to steel      | failure | under            | shear loading             |        |     |     |  |
| witho  | ut lever arm                              |                   |         |                  |                           |        |     |     |  |
|  | A. (*** *** * * * * * * * * * * * * * * * |                   | 4.6     |                  | 9(8)                      | 14(13) | 20  | 38  |  |
| Characteristi<br>resistance V <sub>R</sub>       | Stool zine plated                         |                   | 4.8     |                  | 9(8)                      | 14(13) | 20  | 38  |  |
|  | Steel zinc plated                         |                   | 5.8     |                  | 11(10)                    | 17(16) | 25  | 47  |  |
|  |   | Property          | 8.8     | [kN]             | 15(13)                    | 23(21) | 34  | 63  |  |
|  | Stainless steel R and                     | class             | 50      | [KIN]            | 9                         | 15     | 21  | 39  |  |
|  | High corrosion                            |                   | 70      |                  | 13                        | 20     | 30  | 55  |  |
|  | resistant steel<br>HCR                    |                   | 80      |                  | 15                        | 23     | 34  | 63  |  |
| with I   | ever arm                                  |                   |         |                  |                           |        |     |     |  |
| g  | Steel zinc plated                         | Property<br>class | 4.6     |                  | 15(13)                    | 30(27) | 52  | 133 |  |
| tan  |   |                   | 4.8     |                  | 15(13)                    | 30(27) | 52  | 133 |  |
| Sis  |   |                   | 5.8     |                  | 19(16)                    | 37(33) | 65  | 166 |  |
| ristic re<br>M <sup>o</sup> rk,s                 |   |                   | 8.8     | [Nm]             | 30(26)                    | 60(53) | 105 | 266 |  |
| erist<br>M°                                      | Stainless steel R and                     |                   | 50      |                  | 19                        | 37     | 65  | 166 |  |
| Characteristic resistance<br>M <sup>0</sup> Rk,s | High corrosion resistant steel HCR        |                   | 70      |                  | 26                        | 52     | 92  | 232 |  |
| Ç  |   |                   | 80      |                  | 30                        | 60     | 105 | 266 |  |
| Partia   | al factors 1)                             |                   |         |                  |                           |        |     |     |  |
|  |   |                   | 4.6     |                  | 1,67                      |        |     |     |  |
| 447  | Steel zinc plated                         |                   | 4.8     |                  |                           | 1,2    | 25  |     |  |
| tors   | Steel Zille piated                        |                   | 5.8     |                  |                           | 1,2    | 25  |     |  |
| al fact<br>Yms,v                                 |   | Property          | 8.8     | [-]              |                           | 1,2    | 25  |     |  |
| Partial factors                                  | Stainless steel R and                     | class             | 50      | [-]              | 2,38                      |        |     |     |  |
| ď,   | High corrosion resistant steel            |                   | 70      |                  | 1,25 <sup>2)</sup> / 1,56 |        |     |     |  |
|  | HCR                                       |                   | 80      |                  | 1,33                      |        |     |     |  |

<sup>1)</sup> In absence of other national regulations

| fischer injection | system FIS \ | / Zero for | masonry |
|-------------------|--------------|------------|---------|
|-------------------|--------------|------------|---------|

#### Performances

Characteristic resistance to steel failure of a single anchor under shear loading with and without lever arm of fischer anchor rods and standard threaded rods

Annex C2

Appendix 23 / 42

<sup>&</sup>lt;sup>2)</sup> Only for fischer anchor rod FIS A made of high corrosion-resistant steel HCR

<sup>&</sup>lt;sup>3)</sup> Values in brackets are valid for undersized threaded rods with smaller stress area A<sub>s</sub> for hot dip galvanised standard threaded rods (M8 resp. M10) according to EN ISO 10684:2004+AC:2009.

Table C3.1: Characteristic resistance to steel failure of a single anchor under tension / shear loading of internal threaded anchors FIS E

| fischer internal         | thread            | ed anchor      | FIS E     |          | M8            | M10  | M12 |
|--------------------------|-------------------|----------------|-----------|----------|---------------|------|-----|
| Characteristic i         | esistar           | ice to stee    | l failure | under te | nsion loading |      |     |
| Characteristic           |                   | Property class | 5.8       |          | 18            | 29   | 42  |
| resistance<br>with screw | N <sub>Rk,s</sub> | Property       | R         | [kN]     | 26            | 41   | 59  |
| With Sciew               |                   | class 70       | HCR       |          | 26            | 41   | 59  |
| Partial factors 1        | )                 |                |           |          |               |      |     |
|                          |                   | Property class | 5.8       |          |               | 1,50 |     |
| Partial factors          | $\gamma_{Ms,N}$   | Property       | R         | [-]      |               | 1,87 |     |
|                          |                   | class 70       | HCR       |          |               | 1,87 |     |
| Characteristic i         | resistar          | ice to stee    | l failure | under sh | near loading  |      |     |
| without lever a          | rm                |                |           |          |               |      |     |
| Characteristic           |                   | Property class | 5.8       |          | 9             | 15   | 21  |
| resistance with screw    | $V_{Rk,s}$        | Property       | R         | [kN]     | 13            | 20   | 30  |
| With Sciew               |                   | class 70       | HCR       |          | 13            | 20   | 30  |
| with lever arm           |                   |                |           |          |               |      |     |
| Characteristic           |                   | Property class | 5.8       | fN1 - 1  | 19            | 37   | 65  |
| resistance               | $M^0$ Rk,s        | Property       | R         | [Nm]     | 26            | 52   | 92  |
|                          |                   | class 70       | HCR       |          | 26            | 52   | 92  |
| Partial factors 1        | )                 |                |           |          |               |      |     |
| Darkate                  |                   | Property class | 5.8       |          |               | 1,25 |     |
| Partial factors          | $\gamma$ Ms,V     | Property       | R         | [-]      |               | 1,56 |     |
|                          |                   | class 70       | HCR       |          |               | 1,56 |     |

<sup>1)</sup> In absence of other national regulations

| fischer injection | system FIS V | Zero for masonry |
|-------------------|--------------|------------------|
|-------------------|--------------|------------------|

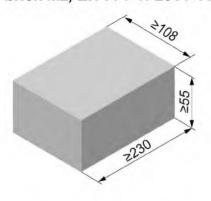
#### **Performances**

Characteristic resistance to steel failure of a single anchor under tension / shear loading of internal threaded anchors FIS E

Annex C3

Appendix 24 / 42

# Solid brick Mz, EN 771-1: 2011+A1:2015



| Solid brid                           | ck Mz, EN             | 771-1: 201 | 1+A1:2015   |          |
|--------------------------------------|-----------------------|------------|-------------|----------|
| Producer                             |                       | e.g        | . Wienerber | ger      |
| Naminal dimensions                   | [mm]                  | length L   | width W     | height H |
| Nominal dimensions                   | [mm]                  | ≥ 230      | ≥ 108       | ≥ 55     |
| Mean gross<br>dry density ρ          | [kg/dm <sup>3</sup> ] |            | ≥ 2,0       |          |
| Normalised mean compressive strength | [N/mm <sup>2</sup> ]  |            | 36 / 48     |          |
| Standard                             |                       | EN 77      | 1-1: 2011+A | 1:2015   |

#### Table C4.1: Installation parameters

| Anchor rod                     |                                    |        | N     | 18     | M      | 10     | М       | 12      | M               | 16          | <u> -</u> , |            | - |
|--------------------------------|------------------------------------|--------|-------|--------|--------|--------|---------|---------|-----------------|-------------|-------------|------------|---|
| Internal threaded anchor FIS E |                                    |        |       | -      |        |        |         |         |                 | M8<br>11x85 | M10         | M12<br>x85 |   |
| Anchor rod and                 | internal                           | thread | ed an | chor F | IS E w | ithout | perfora | ated sl | eeve            | _           |             |            |   |
| Effective<br>anchorage deptl   | h <sub>ef</sub>                    | [mm]   | 50    | 80     | 50     | 80     | 50      | 80      | 50              | 80          |             | 85         |   |
| Max. installation torque       | max T <sub>inst</sub>              | [Nm]   |       | 10     |        |        |         |         | 10              |             |             |            |   |
| General installa               | ation para                         | meters | 3     |        |        |        |         |         |                 |             |             |            |   |
| Edge distance                  | C <sub>min</sub> = C <sub>cr</sub> |        |       |        |        |        |         | 1       | 00              |             |             |            |   |
|                                | s <sub>min</sub> II                |        |       |        |        |        |         | 10      | 00              |             |             |            |   |
| _                              | s <sub>cr</sub> II                 | [mm]   |       |        |        |        |         | 3 x     | h <sub>ef</sub> |             |             |            |   |
| Spacing —                      | S <sub>min</sub> $\bot$            |        |       |        |        |        |         | 1       | 00              |             |             |            |   |
| _                              | Scr⊥                               |        |       |        |        |        |         | 3 x     | h <sub>ef</sub> |             |             |            |   |

Hole drilling with rotary drill mode or hammer drilling with hard metal hammer drill

#### Table C4.2: Group factors

| Anchor ro                | ds                                     |     | M8 | M10 | M12 | M16 | - A   |     | -   |
|--------------------------|--|-----|----|-----|-----|-----|-------|-----|-----|
| Internal threaded anchor |  |     |    |     |     | M8  | M10   | M12 |     |
| FIS E                    | The second second                      |     | -  | •   |     | -   | 11x85 | 153 | x85 |
|                          | α <sub>g,N</sub> (s <sub>min</sub> II) |     |    |     | 1,  | 81  |       |     |     |
| Group                    | αg, v (Smin II)                        |     |    |     | 1,  | 49  |       |     |     |
| factors                  | α <sub>g,N</sub> (S <sub>min</sub> ⊥)  | [-] |    |     | 1,  | 74  |       |     |     |
|                          | α <sub>g,V</sub> (s <sub>min</sub> ⊥)  |     |    |     | 1,  | 49  |       |     |     |

| fischer injection | system FIS \ | ✓ Zero for masonry |
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|                   |              |                    |

#### **Performances**

Solid brick Mz, dimensions, installation parameters

Annex C4

Appendix 25 / 42

#### Solid brick Mz, EN 771-1:2015

**Table C5.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod        | M8 | M10 | M12 | M16 | -     |     | -   |
|-------------------|----|-----|-----|-----|-------|-----|-----|
| Internal threaded |    |     |     |     | M8    | M10 | M12 |
| anchor FIS E      | -  | -   |     | -   | 11x85 | 15: | x85 |

# Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the normalised mean compressive strength $f_b$ ; (temperature range 24/40°C)

| Normalised mean                    |     |     |     | Ef  | fective a | anchora | ge dep | h h <sub>ef</sub> [mm] |     |
|------------------------------------|-----|-----|-----|-----|-----------|---------|--------|------------------------|-----|
| compressive<br>strength <b>f</b> ь | 50  | 80  | 50  | 80  | 50        | 80      | 50     | 80                     | 85  |
| 36 N/mm <sup>2</sup>               | 2,5 | 3,0 | 3,0 | 3,0 | 3,0       | 3,0     | 3,0    | 4,5                    | 2,5 |
| 48 N/mm <sup>2</sup>               | 3,0 | 3,5 | 3,5 | 3,5 | 3,5       | 3,5     | 3,5    | 5,0                    | 3,0 |

# Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the normalised mean compressive strength $f_b$ (temperature range 50/80°C and 72/120°C)

| Normalised mean                    |     |     |     | Ef  | fective a | anchora | ge dept | th hef [mm] |     |
|------------------------------------|-----|-----|-----|-----|-----------|---------|---------|-------------|-----|
| compressive<br>strength <b>f</b> ₅ | 50  | 80  | 50  | 80  | 50        | 80      | 50      | 80          | 85  |
| 36 N/mm <sup>2</sup>               | 1,5 | 2,0 | 2,0 | 2,0 | 2,0       | 2,0     | 2,0     | 3,5         | 1,5 |
| 48 N/mm <sup>2</sup>               | 1,5 | 2,5 | 2,5 | 2,5 | 2,5       | 2,5     | 2,5     | 4,0         | 1,5 |

# **Table C5.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod        | M8 | M10 | M12 | M16 | -     |     |     |
|-------------------|----|-----|-----|-----|-------|-----|-----|
| Internal threaded |    |     |     |     | M8    | M10 | M12 |
| anchor FIS E      | -  | -   |     |     | 11x85 | 15: | x85 |

# Shear resistance $V_{Rk} = V_{Rk,c,ll} = V_{Rk,c,\perp}$ [kN] depending on the normalised mean compressive strength $f_b$ ; (temperature range 24/40°C, 50/80°C and 72/120°C)

| Normalised mean                               |     | Effective anchorage depth hef [mm] |     |     |     |     |     |     |     |     |  |
|---|-----|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|--|
| compressive<br>strength <b>f</b> <sub>b</sub> | 50  | 50 80 50 80 50 80 85               |     |     |     |     |     |     | 35  |     |  |
| 36 N/mm <sup>2</sup>                          | 2,5 | 4,5                                | 2,5 | 4,5 | 2,5 | 4,5 | 2,5 | 4,5 | 2,5 | 2,5 |  |
| 48 N/mm <sup>2</sup>                          | 3,0 | 5,0                                | 3,0 | 5,0 | 3,0 | 5,0 | 3,0 | 5,0 | 3,0 | 3,0 |  |

Factor for job site tests see annex C20 and displacements see annex C21

fischer injection system FIS V Zero for masonry

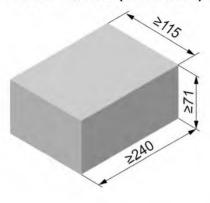
#### Performances

Solid brick Mz, Characteristic resistance under tension and shear loading

Annex C5

Appendix 26 / 42

# Solid calcium silicate (sand-lime) brick KS, NF, EN 771-2: 2011+A1:2015



| Solid calci<br>NF,                   |                       | e (sand-lin<br>: 2011+A1 |             | S,       |  |  |  |
|--------------------------------------|-----------------------|--------------------------|-------------|----------|--|--|--|
| Producer                             |                       |                          |             |          |  |  |  |
| Naminal dimensions                   | [mama]                | length L                 | width W     | height H |  |  |  |
| Nominal dimensions                   | [mm]                  | ≥ 240                    | ≥ 115       | ≥ 71     |  |  |  |
| Mean gross<br>dry density            | [kg/dm <sup>3</sup> ] |                          | ≥ 2,0       |          |  |  |  |
| Normalised mean compressive strength | [N/mm <sup>2</sup> ]  | 12 / 16 / 20             |             |          |  |  |  |
| Standard                             |                       | EN 77                    | I-2: 2011+A | 1:2015   |  |  |  |

Table C6.1: Installation parameters

| Anchor rod                      |                       |        | IV    | 18     | M      | 10     | M      | 12     | M               | 16 | -           |     |            |
|---------------------------------|-----------------------|--------|-------|--------|--------|--------|--------|--------|-----------------|----|-------------|-----|------------|
| Internal thread<br>FIS E        | ed anchoi             | -      |       | -      |        |        |        | -      |                 |    | M8<br>11x85 | M10 | M12<br>x85 |
| Anchor rod and                  | dinternal             | thread | ed an | chor F | IS E w | ithout | perfor | ated s | leeve           |    |             |     |            |
| Effective<br>anchorage<br>depth | h <sub>ef</sub>       | [mm]   | 50    | 80     | 50     | 80     | 50     | 80     | 50              | 80 | 85          | 8   | 5          |
| Max. installatior torque        | max T <sub>inst</sub> | [Nm]   |       | 3      |        |        | 1      | 0      |                 |    | 8           | 1   | 0          |
| General install                 | ation para            | meter  | s     |        |        |        |        |        |                 |    |             |     |            |
| Edge distance                   | Cmin = Ccr            |        |       |        |        |        |        | 1      | 00              |    |             |     |            |
|                                 | s <sub>min</sub> II   |        |       |        |        |        |        | 1      | 00              |    |             |     |            |
|                                 | s <sub>cr</sub> II    | [mm]   |       |        |        |        |        | 3 x    | h <sub>ef</sub> |    |             |     |            |
| Spacing —                       | S <sub>min</sub> ⊥    |        |       |        |        |        |        | 1      | 00              |    |             |     |            |
| -                               | S <sub>cr</sub> ⊥     |        |       |        |        |        |        | 3 x    | hef             |    |             |     |            |

#### **Drilling method**

Hole drilling with rotary drill mode or hammer drilling with hard metal hammer drill

Table C6.2: Group factors

| Anchor ro     | d                                      |     | M8 | M10 | M12 | M16 | -     |     | -   |
|---------------|--|-----|----|-----|-----|-----|-------|-----|-----|
| Internal th   | readed anchor                          |     |    |     | _   |     | M8    | M10 | M12 |
| FIS E         |  |     | -  | •   | -   | •   | 11x85 | 153 | x85 |
|               | α <sub>g,N</sub> (S <sub>min</sub> II) |     |    |     | 1,  | 67  |       |     |     |
| Group         | α <sub>g,V</sub> (s <sub>min</sub> II) | r 1 |    |     | 1,  | 26  |       |     |     |
| Group factors | α <sub>g,N</sub> (S <sub>min</sub> ⊥)  | [-] |    |     | 1,  | 67  |       |     |     |
|               | αg,ν (Smin ⊥)                          |     |    |     | 2   | ,0  |       |     |     |

| fischer injection system FIS V Zero for masonry | fischer in | jection sys | stem FIS \ | / Zero | for masonry |
|---|------------|-------------|------------|--------|-------------|
|---|------------|-------------|------------|--------|-------------|

#### **Performances**

Solid calcium silicate (sand-lime) brick KS, NF, dimensions, installation parameters

Annex C6

Appendix 27 / 42

#### Solid calcium silicate (sand-lime) brick KS, NF, EN 771-2: 2011+A1:2015

**Table C7.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod        | M8 | M10 | M12 | M16 |       |     |     |
|-------------------|----|-----|-----|-----|-------|-----|-----|
| Internal threaded |    |     | 1   |     | M8    | M10 | M12 |
| anchor FIS E      | 7  | -   |     |     | 11x85 | 15: | x85 |

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the normalised mean compressive strength  $f_b$ ; (temperature range 24/40°C)

| Normalised mean                    |     |     |     | Ef  | fective a | anchora | ge dept | th h <sub>ef</sub> [mm | ]  |    |
|------------------------------------|-----|-----|-----|-----|-----------|---------|---------|------------------------|----|----|
| compressive<br>strength <b>f</b> ₅ | 50  | 80  | 50  | 80  | 50        | 80      | 50      | 80                     | 85 | 85 |
| 12 N/mm <sup>2</sup>               | 2,0 | 2,0 | 2,5 | 4,5 | 2,0       | 4,5     | 2,0     | 2,0                    | 2  | ,0 |
| 16 N/mm <sup>2</sup>               | 2,5 | 2,5 | 2,5 | 5,0 | 2,5       | 5,0     | 2,5     | 2,5                    | 2  | ,5 |
| 20 N/mm <sup>2</sup>               | 2,5 | 3,0 | 3,0 | 6,0 | 2,5       | 6,0     | 2,5     | 3,0                    | 2  | ,5 |

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,p,c} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the normalised mean compressive strength  $f_b$ ; (temperature range 50/80°C and 72/120°C)

| Normalised mean                    | M.  |     |     | Ef  | fective a | anchora | ge dept | h hef [mm | ]  |    |
|------------------------------------|-----|-----|-----|-----|-----------|---------|---------|-----------|----|----|
| compressive<br>strength <b>f</b> ь | 50  | 80  | 50  | 80  | 50        | 80      | 50      | 80        | 85 | 85 |
| 12 N/mm <sup>2</sup>               | 1,5 | 1,5 | 1,5 | 3,0 | 1,5       | 3,0     | 1,5     | 1,5       | 1  | 5  |
| 16 N/mm <sup>2</sup>               | 1,5 | 1,5 | 2,0 | 3,5 | 1,5       | 3,5     | 1,5     | 1,5       | 1  | 5  |
| 20 N/mm <sup>2</sup>               | 2,0 | 2,0 | 2,0 | 4,0 | 2,0       | 4,0     | 2,0     | 2,0       | 2  | 0  |

**Table C7.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod        | M8 | M10 | M12 | M16 | -     |     | •   |
|-------------------|----|-----|-----|-----|-------|-----|-----|
| Internal threaded |    |     |     |     | M8    | M10 | M12 |
| anchor FIS E      |    | -   |     | -   | 11x85 | 15: | x85 |

Shear resistance  $V_{Rk} = V_{Rk,c,\parallel} = V_{Rk,c,\parallel} = V_{Rk,c,\perp}$  [kN] depending on the normalised mean compressive strength  $f_b$ ; (temperature range 24/40°C, 50/80°C and 72/120°C)

| Normalised mean                    |     |     |     | Ef  | fective | anchora | ge dep | th h <sub>ef</sub> [mm | 1]  |     |
|------------------------------------|-----|-----|-----|-----|---------|---------|--------|------------------------|-----|-----|
| compressive<br>strength <b>f</b> ₅ | 50  | 80  | 50  | 80  | 50      | 80      | 50     | 80                     | 85  | 85  |
| 12 N/mm <sup>2</sup>               | 3,5 | 3,5 | 4,5 | 4,5 | 3,5     | 4,0     | 3,5    | 4,0                    | 3,5 | 3,5 |
| 16 N/mm <sup>2</sup>               | 4,0 | 4,0 | 5,0 | 5,0 | 4,0     | 4,5     | 4,0    | 4,5                    | 4,0 | 4,0 |
| 20 N/mm <sup>2</sup>               | 4,5 | 4,5 | 6,0 | 6,0 | 4,5     | 5,0     | 4,5    | 5,0                    | 4,5 | 4,5 |

Factor for job site tests see annex C20 and displacements see annex C21

fischer injection system FIS V Zero for masonry

#### Performances

Solid calcium silicate (sand-lime) brick KS, NF, Characteristic resistance under tension and shear loading

Annex C7

Appendix 28 / 42

#### Perforated calcium silicate (sand-lime) brick KSL, 3DF, EN 771-2: 2011+A1:2015 Perforated calcium silicate (sand-lime) brick KSL, 3DF. EN 771-2: 2011+A1:2015 Producer e.a. KS Wemdina lenath L width W height H Nominal dimensions [mm] 240 175 113 Mean gross [kg/dm<sup>3</sup>] ≥ 1.6 dry density o Normalised mean $[N/mm^2]$ 6/8/10/12/16 compressive strength Standard EN 771-2: 2011+A1:2015 4 Dimensions see 4 also Annex B12 12 Table C8.1: Installation parameters (Pre-positioned installation with perforated sleeve FIS H K) M8 M10 M8 M10 M12 M16 M12 M16 Anchor rod **M8 M8** M10 M12 **M8** Internal threaded anchor FIS F 11x85 15x85 Perforated sleeve FIS H K 12x50 12x85 16x85 16x130 20x85 20x130 Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K Max. installation max Tinst [Nm] 10 10 10 torque General installation parameters Edge distance Cmin = Ccr 100 100 Smin II 240 scr II [mm] Spacing 100 Smin 1 Scr 1 115 **Drilling method** Hole drilling with rotary drill mode or hammer drilling with hard metal hammer drill Table C8.2: **Group factors** Anchor rod M8 M10 M8 M10 M12 M16 M12 M16 **M8 M8** M10 M12 **M8** Internal threaded anchor FIS E 15x85 11x85 Perforated sleeve FIS H K 12x50 16x85 12x85 16x130 20x85 20x130 1.14 aan (Smin II) 1,51 ag,v (Smin II) Group [-] factors 1,14 αa,N (Smin ⊥) 1,54 $\alpha_{g,V}$ (Smin $\perp$ ) fischer injection system FIS V Zero for masonry Annex C8 Performances Perforated calcium silicate (sand-lime) brick KSL, 3DF, dimensions, installation Appendix 29 / 42 parameters

#### Perforated calcium silicate (sand-lime) brick KSL, 3DF, EN 771-2: 2011+A1:2015

Table C9.1: Installation parameters

(Push through installation with perforated sleeve FIS H K)

| Anchor rod               |                                    |           | M10     | M12   | M16        |
|--------------------------|------------------------------------|-----------|---------|-------|------------|
| Perforated slee          | ve FIS H                           | (         | 18x13   | 0/200 | 22x130/200 |
| Anchor rod wit           | h perforat                         | ed sleeve | FIS H K |       |            |
| Max. installation torque | max T <sub>inst</sub>              | [Nm]      |         | 10    |            |
| General installa         | ation para                         | meters    |         |       |            |
| Edge distance            | C <sub>min</sub> = C <sub>cr</sub> |           |         | 100   |            |
|                          | Smin II                            |           |         | 100   |            |
| Cassian                  | Scr II                             | [mm]      |         | 240   |            |
| Spacing                  | S <sub>min</sub> $\bot$            |           |         | 100   |            |
|                          | S <sub>cr</sub> ⊥                  |           |         | 115   |            |

#### **Drilling method**

Hole drilling with rotary drill mode or hammer drilling with hard metal hammer drill

#### Table C9.2: Group factors

| Anchor ro  | d                                      | M10   | M12    | M16        |
|------------|--|-------|--------|------------|
| Perforated | d sleeve FIS H K                       | 18x13 | 30/200 | 22x130/200 |
|            | α <sub>g,N</sub> (S <sub>min</sub> II) |       | 1,14   |            |
| Group      | αg, v (Smin II)                        |       | 1,51   |            |
| factors    | $\alpha_{g,N}$ ( $s_{min} \perp$ ) [-] |       | 1,14   |            |
|            | α <sub>g,V</sub> (s <sub>min</sub> ⊥)  |       | 1,54   |            |

| fischer injection system FIS | V Zero for masonry |
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#### Performances

Perforated calcium silicate (sand-lime) brick KSL, 3DF, dimensions, installation parameters

#### Annex C9

Appendix 30 / 42

| Anchor rod   | M8                                       | M8                | -           | M8 M10  | M8 M10   |                         | M12 M1 | 6 M12 M16 |
|--|--|-------------------|-------------|---|--|-------------------------|--------|-----------|
| Internal threaded anchor FIS E   | -  | -                 | M8<br>11x85 | -   | -  | M10 M12<br>15x85        |        | -         |
| Perforated sleeve FIS H K  | 12x50                                    | 12x85             |             | x85   | 16x130   | 20x                     | 85     | 20x130    |
| Tension resistance N <sub>Rk</sub> = N <sub>Rk,p</sub>   |  |                   |             | lepending   | on the no  | rmalised                | mean   |           |
| compressive strength f <sub>b</sub> ; (tem<br>Norm. mean compressive strength f <sub>b</sub>   | *  | ange 24/40        | J-C)        |   |  |                         |        |           |
| 6 N/mm <sup>2</sup>  |  | .2                | 0           | 0,9   | 2,0  | 0,                      | a      | 2,0       |
| 8 N/mm²  |  | ,5                |             | ,2  | 2,5  | 1,                      |        | 2,5       |
| 10 N/mm²   | -  | ,5                | 1           | ,5  | 3,0  | 1,                      |        | 3,0       |
| 12 N/mm²   |  | ,0                |             | ,5  | 3,5  | 1,                      |        | 3,5       |
| 16 N/mm²   | _  | ,5                | 1           | 2,0   | 4,5  | 2,                      |        | 4,5       |
| Tension resistance N <sub>Rk</sub> = N <sub>Rk,p</sub>   | _  |                   |             |   |  |                         |        | 1 4,0     |
| compressive strength fb; (tem  | perature ra                              |                   |             |   |  |                         |        |           |
| Norm. mean compressive strength fb   |  |                   |             |   |  |                         |        |           |
| 6 N/mm <sup>2</sup>  | -  | .6                |             | .75   | 1,5  | 0,7                     |        | 1.5       |
| 8 N/mm <sup>2</sup>  | -  | 75                |             | ),9   | 2,0  | 0,                      |        | 2,0       |
| 10 N/mm²   |  | ,9                | -           | ),9   | 2,5  | 0,                      |        | 2,5       |
| 12 N/mm²   |  | ,9                | +           | ,2  | 2,5  | 1,                      |        | 2,5       |
| 16 N/mm²   | 1  | ,2                | 1           | ,5  | 3,5  | 1,                      | 5      | 3,5       |
| Anchor rod Perforated sleeve FIS H K   | M  | 10<br>18v1        | M<br>30/200 | 112   |  | M <sup>2</sup><br>22x13 |        |           |
| Tension resistance N <sub>Rk</sub> = N <sub>Rk,p</sub>   | p = N <sub>Rk,b</sub> = N                |                   |             | lepending   | on the no  |                         |        | r         |
| compressive strength fb; (tem  |  |                   |             |   |  | iye ing wasin           |        |           |
|  | 7.1                                      |                   |             |   |  |                         |        |           |
| Norm. mean compressive strength $\mathbf{f}_{b}$   |  |                   |             |   |  |                         |        |           |
| 6 N/mm <sup>2</sup>  |  |                   |             | 2   | .0   |                         |        |           |
|  |  |                   |             |   | .0<br>,5   |                         |        |           |
| 6 N/mm <sup>2</sup><br>8 N/mm <sup>2</sup><br>10 N/mm <sup>2</sup>   |  |                   |             | 2   |  |                         |        |           |
| 6 N/mm <sup>2</sup><br>8 N/mm <sup>2</sup>   |  |                   |             | 2   | ,5   |                         |        |           |
| 6 N/mm <sup>2</sup><br>8 N/mm <sup>2</sup><br>10 N/mm <sup>2</sup>   |  |                   |             | 3 3   | ,5<br>,0   |                         |        |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub>  | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending   | ,5<br>,0<br>,5<br>,5   | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub>  | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending   | ,5<br>,0<br>,5<br>,5   | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem   | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br>on the no                                      | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem   | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br>on the no                                      | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem Norm. mean compressive strength f <sub>b</sub>  | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br><b>on the no</b>                               | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem Norm. mean compressive strength f <sub>b</sub> 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup>  | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br>,5<br><b>on the no</b>                         | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem Norm. mean compressive strength f <sub>b</sub> 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup>   | p = N <sub>Rk,b</sub> = N                |                   |             | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br><b>on the no</b>                               | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem Norm. mean compressive strength f <sub>b</sub> 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup>                      | p = N <sub>Rk,b</sub> = N<br>perature ra | ange <b>50</b> /8 | 0°C and 7   | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br><b>on the no</b><br>,5<br>,0<br>,5             | ormalised               | mean   |           |
| 6 N/mm² 8 N/mm² 10 N/mm² 12 N/mm² 16 N/mm² Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem Norm. mean compressive strength f <sub>b</sub> 6 N/mm² 8 N/mm² 10 N/mm² 12 N/mm² 16 N/mm² Factor for job site tests see a   | p = N <sub>Rk,b</sub> = N<br>perature ra | nd displac        | o°C and 7   | 2<br>3<br>3<br>4<br>depending<br>2/120°C)   | ,5<br>,0<br>,5<br>,5<br><b>on the no</b><br>,5<br>,0<br>,5             | ormalised               | mean   |           |
| 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> Tension resistance N <sub>Rk</sub> = N <sub>Rk,F</sub> compressive strength f <sub>b</sub> ; (tem Norm. mean compressive strength f <sub>b</sub> 6 N/mm <sup>2</sup> 8 N/mm <sup>2</sup> 10 N/mm <sup>2</sup> 12 N/mm <sup>2</sup> 16 N/mm <sup>2</sup> | nnex C20 a                               | nd displac        | ements se   | 2<br>3<br>3<br>4<br>depending<br>2/120°C)<br>1<br>2<br>2<br>2<br>2<br>3<br>ee annex C | ,5<br>,0<br>,5<br>,5<br><b>on the no</b><br>,5<br>,0<br>,5<br>,5<br>,5 |                         | mean   | c C10     |

#### Perforated calcium silicate (sand-lime) brick KSL, 3DF, EN 771-2: 2011+A1:2015

**Table C11.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod  | M8    | M8     | -     | M8  | M10   | M8   | M10   |     | -     | M12  | M16   | M12 M16 |
|---|-------|--------|-------|-----|-------|------|-------|-----|-------|------|-------|---------|
| Internal threaded   |       | 1 3971 | M8    |     |       |      |       | M10 | M12   |      |       |         |
| anchor FIS E  | 5.01  | -      | 11x85 |     |       | Ш    |       | 15  | x85   |      | •     | -       |
| Perforated sleeve FIS H K   | 12x50 | 12x85  | 16    | x85 |       | 16)  | (130  |     | 20    | x85  |       | 20x130  |
| Shear resistance $V_{Rk} = V_{Rk,b} = V$<br>strength $f_b$ ; (temperature range |       |        |       |     | he no | orma | lised | mea | n coi | mpre | ssive | )       |
| Normalised mean compressive strength $f_b$                                      |       |        |       |     |       |      |       |     |       |      |       |         |
| 6 N/mm²   | 1     | ,5     |       | 2   | 2,0   |      |       |     |       | 3    | ,0    |         |
| 8 N/mm²   | 2     | ,0     |       | 2   | 2,5   |      |       |     |       | 3    | ,5    |         |
| 10 N/mm²  | 2     | ,5     |       | 3   | 3,0   |      |       |     |       | 4    | ,5    |         |
| 12 N/mm²  | 2     | ,5     |       | 3   | 3,5   |      |       |     |       | 5    | ,0    |         |
| 16 N/mm <sup>2</sup>  | 3     | ,5     |       | 4   | 1,0   |      |       |     |       | 6    | ,5    |         |

**Table C11.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Push through installation)

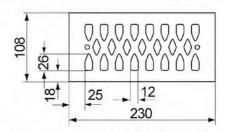
| Anchor rod  | M10   | M12                                    | M16                      |
|---|---|--|--------------------------|
| Perforated sleeve FIS H K   | 18x13   | 30/200                                 | 22x130/200               |
| Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk}$ , strength $f_b$ ; (temperature range 2 | <sub>c,II</sub> = V <sub>Rk,c,⊥</sub> [kN] d<br>4/40°C, 50/80°C a | lepending on the norm<br>and 72/120°C) | nalised mean compressive |
| Normalised mean compressive strength f <sub>b</sub>                                   |   |  |                          |
| 6 N/mm²   | 2   | ,0                                     | 3,0                      |
| 8 N/mm²   | 2   | ,5                                     | 3,5                      |
| 10 N/mm²  | 3   | ,0                                     | 4,5                      |
| 12 N/mm²  | 3   | ,5                                     | 5,0                      |
| 16 N/mm <sup>2</sup>  | 4   | ,0                                     | 6,5                      |

Factor for job site tests see annex C20 and displacements see annex C21

| fischer injection system FIS V Zero for masonry  |                      |
|--|----------------------|
| Performances   | Annex C11            |
| Perforated calcium silicate (sand-lime) brick KSL, 3DF, Characteristic resistance und<br>shear loading | der Appendix 32 / 42 |

# Vertical perforated brick HLz, EN 771-1: 2011+A1:2015 Vertical perforate Producer Nominal dimensions Mean gross dry density ρ Normalised mean compressive strengthese str

| Vertical perforate                   | d brick H             | Lz, EN 77 | 1-1: 2011+/   | 1:2015   |
|--------------------------------------|-----------------------|-----------|---------------|----------|
| Producer                             |                       | e.g       | . Wienerbe    | rger.    |
| Naminal disconsions                  | France 1              | length L  | width W       | height H |
| Nominal dimensions                   | fuuul                 | 230       | 108           | 55       |
| Mean gross<br>dry density ρ          | [kg/dm <sup>3</sup> ] |           | ≥ 1,6         |          |
| Normalised mean compressive strength | [N/mm <sup>2</sup> ]  | 8         | 3 / 10 / 12 / | 16       |
| Standard                             |                       | EN 77     | 1-1: 2011+/   | A1:2015  |



Dimensions see also Annex B12

Table C12.1: Installation parameters

| Anchor rod                | M8    | M8    | -           | M8  | M10 | M8  | M10 | -             | M12 | M16 | M12 | M16 |
|---------------------------|-------|-------|-------------|-----|-----|-----|-----|---------------|-----|-----|-----|-----|
| Internal threaded         |       |       | M8<br>11x85 |     |     |     |     | M10 M12       | -   |     |     |     |
| Perforated sleeve FIS H K | 12x50 | 12x85 |             | x85 |     | 16> | 130 | - C-4/10-12-1 | k85 |     | 20x | 130 |

#### Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K

Max. installation torque max T<sub>inst</sub> [Nm] 5

#### General installation parameters

#### **Drilling method**

Hole drilling with rotary drill mode or hammer drilling with hard metal hammer drill

#### Table C12.2: Group factors

| Anchor ro   | od   |     | M8    | M8    | 0.50        | M8  | M10 | M8  | M10  | -                | M12 M16 | M12 M16 |
|-------------|--|-----|-------|-------|-------------|-----|-----|-----|------|------------------|---------|---------|
| Internal th |  |     |       | 3- 11 | M8<br>11x85 |     |     |     | -    | M10 M12<br>15x85 |         | ·       |
| Perforated  | d sleeve FIS H k                                 | (   | 12x50 | 12x85 | 16          | x85 |     | 16> | (130 | 20:              | x85     | 20x130  |
|             | α <sub>g,N</sub> (s <sub>min</sub> II)           |     |       |       |             |     | 1,  | 65  |      |                  |         |         |
| Group       | α <sub>g,V</sub> (s <sub>min</sub> II)           | r 1 |       |       |             |     | 1,  | 64  |      |                  |         |         |
| factors     | αg,N (Smin ⊥)                                    | [-] |       |       |             |     | 1,  | 65  |      |                  |         |         |
|             | $\alpha_{\text{g,V}}$ ( $s_{\text{min}} \perp$ ) |     |       |       |             |     | 2,  | 00  |      |                  |         |         |

#### fischer injection system FIS V Zero for masonry

#### **Performances**

Vertical perforated brick HLz, dimensions, installation parameters

Annex C12

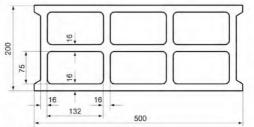
Appendix 33 / 42

|  | M8<br>-<br>12x85<br>I <sub>Rk,b</sub> = N <sub>Rk,p,</sub><br>ature range   | c = N <sub>Rk,b,c</sub> [   | M8 M10<br>-<br>x85<br>kN] depend  | M8 M10<br>-<br>16x130                                 | M10 M12<br>15x85 | M12 M16     | M12 M16<br> - |
|--|---|---|---|---|------------------|-------------|---------------|
| = N <sub>Rk,p</sub> = N <sub>s</sub> ; (tempera    | $I_{Rk,b} = N_{Rk,p,}$  | 11x85<br>16:<br>c = N <sub>Rk,b,c</sub> [   |   | -<br>16x130   | 15x85            |             | -             |
| = N <sub>Rk,p</sub> = N <sub>s</sub> ; (tempera    | $I_{Rk,b} = N_{Rk,p,}$  | c = N <sub>Rk,b,c</sub> [   |   | 16x130  | 201              |             |               |
| 1,2  |   |   | kN] depend  |   | 207              | x85         | 20x130        |
| 1,2  |   | •   |   | ing on the  | normalise        | d mean      |               |
|  |   |   |   |   |                  |             |               |
| 1,2  | 1,5   | 1   | ,5  | 2,5   | 1,               | ,5          | 2,5           |
|  | 2,0   | 2   | .,0   | 2,5   | 2                | ,0          | 2,5           |
| 1,5  | 2,0   | 2   | .,0   | 3,0   | 2                | ,0          | 3,0           |
| 1,5  | 2,5   | 2   | .,5   | 3,5   | 2                | ,5          | 3,5           |
|  |   |   |   |   | normalise        | d mean      |               |
|  |   |   |   | -,  |                  |             |               |
| 0,6  | 1,2   | 1   | ,2  | 1,5   | 1.               | ,2          | 1,5           |
| 0,75   | 1,2   | 1   | ,2  | 2,0   | 1.               | ,2          | 2,0           |
| 0,75   | 1,5   | 1   | ,5  | 2,0   | 1,               | ,5          | 2,0           |
| 0,9  | 1,5   | 1   | ,5  | 2,5   | 1,               | ,5          | 2,5           |
| or under   | shear loa   | ding  |   |   | k edge fa        |             |               |
| 1110   | iii.o   |   | 1110  | ino inito   | M10 M12          |             |               |
| •  |   | 11x85   | •   | 1.5   | 15x85            | -           | -             |
| 12x50  | 12x85   | 16:   | x85   | 16x130  | 202              | <b>c</b> 85 | 20x130        |
| V <sub>Rk,b</sub> = V <sub>Rk,</sub><br>e range 24 | <sub>c,II</sub> = V <sub>Rk,c,⊥</sub><br>4/40°C, 50/8   | [kN] deper<br>80°C and 7  | nding on th<br>2/120°C)   | e normalis  | ed mean c        | ompressiv   | re            |
| 2,0  | 3,5   | 2   | .,5   | 3,5   | 2                | ,5          | 3,5           |
| 2,0  | 4,0   | 3   | ,0  | 4,0   | 3                | ,0          | 4,0           |
| 2,0  | 4,0   | 3   | ,0  | 4,5   | 3                | ,0          | 4,5           |
| 2,5  | 5,0   |   |   | 5,0<br>ex C21   | 3.               | ,5          | 5,0           |
| Sec annex  | COZO and C  | пэріасстіст   | nto occ anno  | 021   |                  |             |               |
| em FIS V   | Zero for  | masonry   |   |   |                  |             |               |
|  | 0,6<br>0,75<br>0,75<br>0,9<br>acteristic<br>or under  M8  - 12x50 V <sub>Rk,b</sub> = V <sub>Rk,c</sub> e range 24  2,0 2,0 2,0 2,5 see annex | 0,6 1,2 0,75 1,2 0,75 1,5 0,9 1,5 acteristic resistance or under shear load M8 M8 12x50 12x85 VRk,b = VRk,c,I = VRk,c,L e range 24/40°C, 50/8 2,0 4,0 2,0 4,0 2,5 5,0 see annex C20 and d | 0,6 1,2 1 0,75 1,2 1 0,75 1,5 1 0,9 1,5 1  acteristic resistance to local or under shear loading  M8 M8 - | 0,6 1,2 1,2 0,75 1,2 1,2 0,75 1,5 1,5 0,9 1,5 1,5 1,5 | 0,6              | 0,6         | 0,6           |

# Lightweight aggregate concrete hollow block Hbl , EN 771-3: 2011+A1:2015

#### Lightweight aggregate concrete hollow block Hbl, EN 771-3: 2011+A1:2015

| 200                                  | 0.000                 | 2000     |             |          |
|--------------------------------------|-----------------------|----------|-------------|----------|
| Producer                             |                       |          | e.g. Sepa   |          |
| Nominal dimensions                   | [mana]                | length L | width W     | height H |
| Nominal differsions                  | [mm]                  | 500      | 200         | 200      |
| Mean gross<br>dry density ρ          | [kg/dm <sup>3</sup> ] |          | ≥ 1,0       |          |
| Normalised mean compressive strength | [N/mm <sup>2</sup> ]  |          | 2/4         |          |
| Standard                             |                       | EN 77    | 1-1: 2011+/ | A1:2015  |



Dimensions see also Annex B12

Installation parameters Table C14.1:

| Anchor rod                |       | M8   | M10 | M8  | M10 | M10   | M12   |     | -   | M12 | M16 | M12 | M16 |
|---------------------------|-------|------|-----|-----|-----|-------|-------|-----|-----|-----|-----|-----|-----|
| Internal threaded         | M8    |      |     |     |     |       |       | M10 | M12 |     |     |     |     |
| anchor FIS E              | 11x85 | 14.2 | •   |     | -   |       |       | 15  | x85 |     |     |     |     |
| Perforated sleeve FIS H K | 16    | x85  |     | 16) | 130 | 18x13 | 0/200 |     | 202 | x85 |     | 20x | 130 |

#### Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K

Max. installation max Tinst [Nm] 2 torque

#### General installation parameters

| Edge distance | C <sub>min</sub> = C <sub>cr</sub> | 100 |  |
|---------------|------------------------------------|-----|--|
|               | s <sub>min</sub> II                | 100 |  |
| Chaoina       | s <sub>cr</sub> II [mm]            | 500 |  |
| Spacing       | S <sub>min</sub> ⊥                 | 100 |  |
|               | S <sub>cr</sub> ⊥                  | 200 |  |

#### **Drilling method**

Hole drilling with rotary drill mode or hammer drilling with hard metal hammer drill

#### Group factors Table C14.2:

| Anchor ro   | d                                      |     | -     | M8  | M10 | M8  | M10 | M10  | M12    |     | -   | M12 | M16 | M12 | M16 |
|-------------|--|-----|-------|-----|-----|-----|-----|------|--------|-----|-----|-----|-----|-----|-----|
| Internal th | readed                                 |     | M8    |     |     |     |     |      |        | M10 | M12 |     |     |     |     |
| anchor FI   | SE                                     |     | 11x85 |     | •   |     |     |      | •      | 15  | x85 |     |     |     | •0  |
| Perforated  | d sleeve FIS H K                       |     | 16    | x85 |     | 16> | 130 | 18x1 | 30/200 |     | 20: | x85 |     | 20x | 130 |
|             | αg,N (Smin II)                         |     |       |     |     |     |     | 2,   | ,00    |     |     |     |     |     |     |
| Group       | α <sub>g,V</sub> (S <sub>min</sub> II) |     |       |     |     |     |     | 1,   | ,28    |     |     |     |     |     |     |
| factors     | αg,N (Smin ⊥)                          | [-] |       |     |     |     |     | 1,   | ,40    |     |     |     |     |     |     |
|             | α <sub>g,V</sub> (s <sub>min</sub> ⊥)  |     |       |     |     |     |     | 2,   | ,00    |     |     |     |     |     |     |

#### fischer injection system FIS V Zero for masonry

#### **Performances**

Lightweight aggregate concrete hollow block Hbl, dimensions, installation parameters

Annex C14

Appendix 35 / 42

| Internal threaded<br>anchor FIS E<br>Perforated sleeve<br>FIS H K<br>Tension resistance N <sub>RK</sub><br>compressive strength<br>Normalised mean<br>compressive         | M8<br>11x85  |         | M10                  | M8      | M10                        | M10                   | M12                |            |           | M12        | M16  | M12 M1 |
|---|--|---------|----------------------|---------|----------------------------|-----------------------|--------------------|------------|-----------|------------|------|--------|
| FIS H K Tension resistance N <sub>RK</sub> compressive strength Normalised mean   | 40   | 1       | -                    |         | -                          |                       |                    | M10        | M12       |            |      | -      |
| Normalised mean   | 16   | x85     |                      | 16>     | c130                       | 18x13                 | 30/200             |            |           | x85        |      | 20x130 |
|   |  |         |                      |         |                            | lepend                | ding o             | n the n    | orma      | lised r    | nean |        |
| strength <b>f</b> <sub>b</sub>  |  |         |                      |         |                            |                       |                    |            |           |            |      |        |
| 2 N/mm <sup>2</sup>   |  |         |                      |         | 0                          | ,4                    |                    |            |           |            |      | 0,6    |
| 4 N/mm <sup>2</sup>   |  |         |                      |         | 0                          | ,5                    |                    |            |           |            |      | 0,75   |
| Tension resistance N <sub>Rk</sub><br>compressivestrength f   |  |         |                      |         |                            |                       |                    | n the n    | orma      | lised r    | nean |        |
| Normalised mean<br>compressive<br>strength <b>f</b> ₅   |  |         |                      |         |                            |                       |                    |            |           |            |      |        |
| 2 N/mm <sup>2</sup>   |  |         |                      |         | 0                          | ,3                    |                    |            |           |            |      | 0,5    |
| 4 N/mm <sup>2</sup>   |  |         |                      |         | 0                          | ,4                    |                    |            |           |            |      | 0,6    |
| anch  | ıracteristic ı<br>hor under s                        | hear    | loadin               | g       |                            |                       |                    | brick      | edge      |            |      |        |
| anch Anchor rod Internal threaded   | hor under s<br>-<br>M8                               |         |                      |         | al bric                    | k failu<br>M10        |                    | M10        | M12       | failu      |      |        |
| anch Anchor rod Internal threaded anchor FIS E  | hor under s  | hear    | loadin               | g       |                            |                       |                    |            | M12       |            |      |        |
|   | - M8 11x85   | hear    | loadin               | g<br>M8 |                            | M10                   |                    | M10        | M12<br>85 |            |      |        |
| Anchor rod Internal threaded anchor FIS E Perforated sleeve FIS H K Shear resistance V <sub>Rk</sub> = strength f <sub>b</sub> ; (temperati                               | - M8 11x85 16 V <sub>Rk,b</sub> = V <sub>Rk,c,</sub> | M8  x85 | M10<br>-<br>,c,⊥ [kN | M8 16x  | M10<br>-<br><130<br>ending | M10<br>18x13          | M12<br>-<br>30/200 | M10<br>15> | M12<br>85 | M12<br>x85 | M16  | M12 M1 |
| Anchor rod Internal threaded anchor FIS E Perforated sleeve FIS H K Shear resistance V <sub>Rk</sub> =  | - M8 11x85 16 V <sub>Rk,b</sub> = V <sub>Rk,c,</sub> | M8  x85 | M10<br>-<br>,c,⊥ [kN | M8 16x  | M10<br>-<br><130<br>ending | M10<br>18x13          | M12<br>-<br>30/200 | M10<br>15> | M12<br>85 | M12<br>x85 | M16  | M12 M1 |
| Anchor rod Internal threaded anchor FIS E Perforated sleeve FIS H K Shear resistance V <sub>Rk</sub> = strength f <sub>b</sub> ; (temperated) Normalised mean compressive | - M8 11x85 16 V <sub>Rk,b</sub> = V <sub>Rk,c,</sub> | M8  x85 | M10<br>-<br>,c,⊥ [kN | M8 16x  | M10<br>-<br><130<br>ending | M10<br>18x13<br>on th | M12<br>-<br>30/200 | M10<br>15> | M12<br>85 | M12<br>x85 | M16  | M12 M1 |

#### Autoclaved aerated concrete (cylindrical drill hole), EN 771-4:2011+A1:2015



| Producer  | e.g. Ytong            |                   |        |      |
|---|-----------------------|-------------------|--------|------|
| Mean gross dry density ρ  | [kg/dm <sup>3</sup> ] | 0,35              | 0,5    | 0,65 |
| Mean compressive strength / Min. compressive strength single brick 1) | [N/mm²]               | 2,5 / 2           | 5/4    | 8/6  |
| Standard or annex   | EN 771                | -4:2011+ <i>A</i> | 1:2015 |      |

#### Table C16.1: Installation parameters

| Anchor rod                     |                       |          | M8 M10 M12 N   |                      |       |     |  |  |
|--------------------------------|-----------------------|----------|----------------|----------------------|-------|-----|--|--|
| Internal threaded anchor FIS E |                       |          |                |                      |       | -   |  |  |
| Anchor rod and                 | internal              | threaded | anchor FIS E v | vithout perforated s | leeve |     |  |  |
| Effective<br>anchorage depth   | h <sub>ef</sub>       | [mm]     | 100            | 100                  | 100   | 100 |  |  |
| Max. installation torque       | max T <sub>inst</sub> | [Nm]     | 2              | 2                    | 2     | 2   |  |  |
| General installat              | tion para             | meters   |                |                      |       |     |  |  |
| Edge distance                  | Cmin                  |          | 100            |                      |       |     |  |  |
| Edge distance                  | Ccr                   |          |                |                      | 250   |     |  |  |
| Scr II                         |                       | [1       | 250            |                      |       |     |  |  |
| 0                              | s <sub>min</sub> II   | [mm]     | 100            |                      |       |     |  |  |
| Spacing                        | <b>s</b> cr⊥          |          |                |                      | 250   |     |  |  |
|                                | Smin 1                |          |                | 119                  | 100   |     |  |  |

#### **Drilling method**

Hammer drilling with hard metal hammer drill

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|---------------------|------------|-----------|-----------|
|---------------------|------------|-----------|-----------|

#### Performance

Autoclaved aerated concrete (cylindrical drill hole), dimensions, installation parameters

Annex C16

Appendix 37 / 42

<sup>1)</sup> The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

| Table        | •   |            |      | aerated concrete<br>ingle brick 2 N/mi |      |     |  |  |
|--------------|---|------------|------|--|------|-----|--|--|
| Ancho        | or rod  | M8 M10 M12 |      |  |      |     |  |  |
|              | α <sub>g,N</sub> II, (s <sub>min</sub> II)  |            | 1,13 |  |      |     |  |  |
| actors       | $\begin{array}{c} & & & & \\ & & \alpha_{\text{g,N}} \perp,  (\textbf{s}_{\text{min}} \perp) \\ & & & \\ & & & \alpha_{\text{g,V}},  (\textbf{s}_{\text{min}}  \textbf{II}) \\ \end{array}$ |            | 1,20 |  |      |     |  |  |
| 3roup!       | α <sub>g,V</sub> , (s <sub>min</sub> II)  |            |      | 1,                                     | 39   |     |  |  |
| O            | α <sub>g,</sub> ν , <b>(s</b> <sub>min</sub> ⊥)   |            |      | 1,                                     | 17   |     |  |  |
| Table        | -   |            |      | aerated concrete<br>ingle brick 4 N/mi |      |     |  |  |
| Ancho        | or rod  |            | M8   | M10                                    | M12  | M16 |  |  |
| m            | α <sub>g,N</sub> II, (s <sub>min</sub> II)  |            |      | 1,                                     | 1,13 |     |  |  |
| factor       | α <sub>g,N</sub> ⊥, (S <sub>min</sub> ⊥)  | .,         | 1,20 |  |      |     |  |  |
| Groupfactors | α <sub>g,V</sub> , (s <sub>min</sub> II)  | [-]        | 1,39 |  |      |     |  |  |
| Ü            | α <sub>g,</sub> ∨, ( <b>s</b> <sub>min</sub> ⊥)   |            | 1,17 |  |      |     |  |  |
| Table        | -   |            |      | aerated concrete<br>ingle brick 6 N/mi |      |     |  |  |
| Ancho        | or rod  |            | M8   | M10                                    | M12  | M16 |  |  |
| <b>(</b> 0   | α <sub>g,N</sub> II, (s <sub>min</sub> II)  |            |      | 1,                                     | 13   |     |  |  |
| Groupfactors | αg,N 丄, (Smin 丄)  |            |      | 1,                                     | 20   |     |  |  |
| <b>3roup</b> | α <sub>g,V</sub> , (s <sub>min</sub> II)  | [-]        |      | 1,:                                    | 39   |     |  |  |
| Ü            | α <sub>g,</sub> ∨, ( <b>s</b> <sub>min</sub> ⊥)   |            | 1,17 |  |      |     |  |  |
|              |   |            |      |  |      |     |  |  |

Autoclaved aerated concrete (cylindrical drill hole), Group factors

Annex C17

# Autoclaved aerated concrete (cylindrical drill hole), EN 771-4:2011+A1:2015

**Table C18.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod  |                   | M8              | M10                | M12 N                          |                 |  |
|---|-------------------|-----------------|--------------------|--------------------------------|-----------------|--|
| Tension resistance N <sub>Rk</sub> =<br>Min. compressive streng       |                   |                 |                    | n the mean compr               | essive strength |  |
| Mean compressive stren-   |                   |                 | age depth hef [mm] |                                |                 |  |
| gth / Min. compressive<br>strength single brick 1)                    | Use<br>conditions | 100             | 100                | 100                            | 100             |  |
| 2,5 / 2 N/mm <sup>2</sup>   | d/d               | 1,2             | 1,2                | 1,2                            | 1,5             |  |
| 5 / 4 N/mm <sup>2</sup>   | d/d               | 1,2             | 1,2                | 1,2                            | 1,5             |  |
| 8 / 6 N/mm <sup>2</sup>   | d/d               | 1,2             | 1,2                | 1,2                            | 1,5             |  |
|   |                   |                 |                    |                                |                 |  |
| Anchor rod  |                   | M8              | M10                | M12                            | M16             |  |
| ension resistance N <sub>Rk</sub> =<br>//in. compressive streng       |                   |                 |                    | n the mean compr               | essive strength |  |
| 30.01.3   | in single brick   | i, (temperature | e range 50/80°C)   |                                |                 |  |
|   | in single brick   | , (temperature  |                    | age depth hef [mm]             |                 |  |
| Mean compressive stren-<br>gth / Min. compressive                     | Use conditions    | 100             |                    | age depth h <sub>ef</sub> [mm] | 100             |  |
| Mean compressive stren-<br>gth / Min. compressive                     | Use               |                 | Effective anchor   |                                | 100             |  |
| Mean compressive strength / Min. compressive strength single brick 1) | Use<br>conditions | 100             | Effective anchor   | 100                            |                 |  |

<sup>1)</sup> The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

fischer injection system FIS V Zero for masonry

Performance

Autoclaved aerated concrete (cylindrical drill hole), Characteristic resistance under tension loading Annex C18

Appendix 39 / 42

| Anchor rod  |  | od M8 M10                                      |   | M12   | M16         |
|---|--|--|---|---|-------------|
| nternal threaded<br>anchor FIS E  |  |  |   | -   | 7-7         |
| hear resistance V <sub>Rk</sub> = V <sub>R</sub><br>ompressive strength sin   | <sub>Rk,b</sub> = V <sub>Rk,c,ll</sub> =<br>ngle brick; (t | V <sub>Rk,c,⊥</sub> [kN] dep<br>emperature ran | ending on the mear<br>ge 24/40°C and 50/8 | ocompressive stre<br>0°C) c <sub>min</sub> ≥100mm | ngth / Min. |
| Mean compressive stren-   | Use  |  | Effective anchorage                       | e depth h <sub>ef</sub> [mm]                      | 1           |
| gth / Min. compressive strength single brick 1)                               | con-<br>ditions  | 100  | 100                                       | 100   | 100         |
| 2,5 / 2 N/mm²   | d/d  | 1,2  | 1,2                                       | 1,2   | 1,2         |
| 5 / 4 N/mm²   | d/d  | 1,2  | 1,2                                       | 1,2   | 1,2         |
| 8 / 6 N/mm <sup>2</sup>   | d/d  | 1,2  | 1,2                                       | 1,2   | 1,2         |
|   |  |  |   |   |             |
| Anchor rod  |  | M8   | M10                                       | M12   | M16         |
| Internal threaded anchor FIS E  |  | -  | -   | -   | -           |
| Shear resistance V <sub>Rk</sub> = V <sub>R</sub><br>compressive strength sin | Rk,b = VRk,c,II =<br>ngle brick; (t                        | V <sub>Rk,c,⊥</sub> [kN] dep<br>emperature ran | ge 24/40°C and 50/8                       | 0°C) c <sub>cr</sub> >250mm                       | ngth / Min. |
| Mean compressive stren-   | Use  | Í  | Effective anchorage                       | e depth h <sub>ef</sub> [mm]                      | ì           |
| gth / Min. compressive<br>strength single brick <sup>1)</sup>                 | con-<br>ditions  | 100  | 100                                       | 100   | 100         |
| 2,5 / 2 N/mm <sup>2</sup> d/d 5 / 4 N/mm <sup>2</sup> d/d                     |  | 2,5  | 2,5                                       | 2,5   | 2,5<br>2,5  |
|   |  | 2,5  | 2,5                                       | 2,5   |             |
| <b>8 / 6 N/mm²</b> d/d  |  | 2,5  | 2,5                                       | 2,5   | 2,5         |
| The compressive strength.  Factor for job site tests s                        |  |  | ust not be less than 80                   |   | ressive     |

Performance

Autoclaved aerated concrete (cylindrical drill hole), Characteristic resistance under shear loading Annex C19

Appendix 40 / 42

# β-factors for job site tests

 Table C20.1:
 β-factors for job site tests

| Installation and use conditions | d/d   |       |        |  |  |  |
|---------------------------------|-------|-------|--------|--|--|--|
| temperature range [°C]          | 24/40 | 50/80 | 72/120 |  |  |  |
| M8                              | 0,81  | 0,47  | 0,45   |  |  |  |
| M10                             | 0,62  | 0,49  | 0,45   |  |  |  |
| M12 / FIS E 11x85               | 0,62  | 0,49  | 0,52   |  |  |  |
| M16 / FIS E 15x85               | 0,56  | 0,45  | 0,57   |  |  |  |

# **Table C20.2:** β-factors for job site tests for AAC

| Installation and use conditions | d,    | ⁄d    |
|---------------------------------|-------|-------|
| temperature range [°C]          | 24/40 | 50/80 |
| All sizes                       | 0,58  | 0.49  |

fischer injection system FIS V Zero for masonry

Performances

β-factors for job site tests

Annex C20

Appendix 41 / 42

| Material                            | Size         | Effective<br>anchorage<br>depth<br>[mm] | N<br>[kN] | δΝ <sub>ο</sub><br>[mm] | δN∞<br>[mm] | \<br>[k |    | δVo<br>[mm] | δV∞<br>[mm] |
|-------------------------------------|--------------|---|-----------|-------------------------|-------------|---------|----|-------------|-------------|
|                                     | M8 -         | 50                                      | 0,57      | 0,00                    | 0,00        | 0,      | 71 | 0,08        | 0,12        |
|                                     | IVIO         | 80                                      | 1,00      | 0,00                    | 0,00        | 1,      | 71 | 0,32        | 0,48        |
|                                     | M10 -        | 50                                      | 0,57      | 0,00                    | 0,00        | 0,      | 71 | 0,18        | 0,27        |
| Solid brick                         | 10110        | 80                                      | 1,00      | 0,01                    | 0,02        | 1,      | 71 | 0,50        | 0,75        |
| acc. to C4-C5                       | M12 -        | 50                                      | 1,29      | 0,03                    | 0,06        | 0,      | 71 | 0,05        | 0,08        |
|                                     | 10112 -      | 80                                      | 1,00      | 0,01                    | 0,02        | 1,      | 71 | 0,75        | 1,13        |
|                                     | N446         | 50                                      | 1,29      | 0,03                    | 0,06        | 0,      | 71 | 0,35        | 0,53        |
|                                     | M16 -        | 80                                      | 1,71      | 0,04                    | 0,08        | 1,      | 71 | 0,20        | 0,30        |
|                                     |              | 50                                      | 0,86      | 0,03                    | 0,06        | 1,4     | 43 |             |             |
|                                     | M8 -         | 80                                      | 0,86      | 0,00                    | 0,00        | 1,4     | 43 | 0,32        | 0,48        |
| Solid calcium                       | ••••         | 50                                      | 0,86      | 0,00                    | 0,00        | 1,4     | 43 |             | 0,51        |
| silicate                            | M10 -        | 80                                      | 1,71      | 0,02                    | 0,04        | 1,4     | 43 | 0,34        |             |
| (sand-lime)<br>brick                | M12 -        | 50                                      | 0,86      | 0,03                    | 0,06        | 1,      | 43 | 0,12        | 0,18        |
| acc. to C6-C7                       |              | 80                                      | 1,71      | 0,04                    | 0,08        | 1,4     | 43 | 0,32        | 0,48        |
|                                     | M16 -        | 50                                      | 0,86      | 0,03                    | 0,06        | 1,      | 43 | 0,57        | 0,86        |
|                                     |              | 80                                      | 1,14      | 0,02                    | 0,04        | 1,4     | 43 | 0,20        | 0,03        |
|                                     |              | 12x50                                   |           | ·                       |             |         |    | ·           |             |
| Perforated                          | M8 -         | 12x85                                   | 0,71      | 0,01                    | 0,02        | 1,0     | 00 | 0,16        | 0,24        |
| calcium silicate (sand-lime)        | M8           | 16x85                                   | 0,57      | 0,02                    | 0,04        | 1,      | 14 | 0,57        | 0,86        |
| brick                               | M10 -        | 16x130                                  | 1,29      | 0,06                    | 0,12        | 1,      | 14 | 1,03        | 1,55        |
| acc. to<br>C8-C11                   | M12          | 20x85                                   | 0,57      | 0,03                    | 0,06        | 1,8     | 36 | 1,15        | 1,73        |
| 00 071                              | M16          | 20x130                                  | 1,29      | 0,04                    | 0,08        | 1,8     | 36 | 1,24        | 1,86        |
|                                     |              | 12x50                                   | 0,43      | 0,00                    | 0,00        | 0,      | 71 | 0,25        | 0,38        |
|                                     | M8 -         | 12x85                                   | 0,71      | 0,00                    | 0,00        | 1,4     | 43 | 0,61        | 0,92        |
| Perforated brick<br>Hlz             | M8           | 16x85                                   | 0,71      | 0,03                    | 0,06        |         | 00 | 0,36        | 0,54        |
| acc. to                             | M10          | 16x130                                  | 1,00      | 0,02                    | 0,04        |         | 43 | 0,30        | 0,45        |
| C12-C13                             | M12          | 20x85                                   | 0,71      | 0,00                    | 0,00        | 1,0     | 00 | 0,22        | 0,33        |
|                                     | M16          | 20x130                                  | 1,00      | 0,04                    | 0,08        | -       | 43 | 0,17        | 0,26        |
| Lightweight                         | M8           | 16x85                                   | 0,14      | 0,03                    | 0,06        | 0,      |    | 1,54        | 2,31        |
| aggregate                           | M10 -        | 16x130                                  | 0,14      | 0,02                    | 0,04        | 0,      |    | 1,01        | 1,52        |
| concrete hollow l<br>block Hbl acc. | N440         | 20x85                                   | 0,14      | 0,06                    | 0,12        | 0,      |    | 1,31        | 1,97        |
| to<br>C14-C15                       | M12 _<br>M16 | 20x130                                  | 0,21      | 0,04                    | 0,08        | 0,      |    | 0,82        | 1,23        |
| Autoclaved aerated                  |              | M8x100<br>M10x100                       | 0,48      | 0,08                    | 0,16        | 0,8     | 39 | 1,49        | 2,24        |
| concrete acc. to                    |              | M12x100                                 | 0,49      | 0,09                    | 0,18        | 0,8     | 39 | 1,49        | 2,24        |
| C16-C19                             |              | M16x100                                 | 0,65      | 0,12                    | 0,24        | 0,8     | 39 | 1,49        | 2,24        |

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Performances displacements

Annex C21

Appendix 42 / 42