

## PRESTATIEVERKLARING

### DoP 0381

voor fischer injectiesysteem FIS V Plus (Verbindingsbevestiging voor gebruik in metselstenen)

NL

1. Unieke identificatiecode van het producttype: **DoP 0381**
2. Beoogd(e) gebruik(en): **Bevestiging in metselstenen, Zie bijlage, met name de bijlagen B1 - B22.**
3. Fabrikant: **fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Duitsland**
4. Gemachtigde: **-**
5. Het systeem of de systemen voor de beoordeling en verificatie van de prestatiebestendigheid: **1**
6. Europees beoordelingsdocument: **EAD 330076-01-0604-v01, Edition 03/2024**  
Europese technische beoordeling: **ETA-20/0729; 2025-02-03**  
Technische beoordelingsinstantie: **DIBt- Deutsches Institut für Bautechnik**  
Aangemelde instantie(s): **-**
7. Aangegeven prestatie(s):  
**Mechanische weerstand en stabiliteit (BWR 1)**  
Kenmerkende weerstand onder statische en quasi-statische belasting:
  - 1 Kenmerkende weerstand tegen staalbreuk van een enkel anker onder trekbelasting: Zie bijlage, met name de bijlagen C1, C3
  - 2 Kenmerkende weerstand tegen staalbreuk van een enkel anker onder afschuifbelasting met en zonder waterpasarm: Zie bijlage, met name de bijlagen C2, C3
  - 3 Karakteristieke weerstand tegen bezwijken door uittrekken of doorbreken van bakstenen van een enkel anker onder trekbelasting, Reductiefactor: Zie bijlage, met name de bijlagen C5, C7, C9, C11, C13, C15, C17, C19, C22, C26, C29, C31, C34, C38, C42, C46, C50, C54, C58, C62, C65, C67, C70, C74, C78, C82, C85, C88, C92, C95, C97, C100, C103, C106, C109, C112, C115, C117, C120, C122, C123
  - 4 Karakteristieke weerstand tegen lokale breuk van bakstenen of breuk van bakstenen van een enkel anker onder afschuifbelasting: Zie bijlage, met name de bijlagen C5, C7, C9, C11, C13, C15, C17, C19, C23, C27, C29, C31, C35, C39, C43, C47, C51, C55, C59, C63, C65, C68, C71, C75, C79, C83, C85, C89, C93, C95, C97, C101, C103, C107, C109, C113, C115, C117, C120, C122
  - 5 Karakteristieke weerstand tegen breuk van een ankergroep onder trekbelasting: Zie bijlage, met name de bijlagen B21, B22, C4, C6, C8, C10, C12, C14, C16, C18, C20, C21, C24, C25, C28, C30, C32, C33, C36, C37, C40, C41, C44, C45, C48, C49, C52, C53, C56, C57, C60, C61, C64, C66, C69, C72, C73, C76, C77, C80, C81, C84, C86, C87, C90, C91, C94, C96, C98, C99, C102, C104, C105, C108, C110, C111, C114, C116, C119, C121
  - 6 Karakteristieke weerstand tegen lokaal bezwijken van bakstenen of bezwijken van bakstenen van een ankergroep onder afschuifbelasting: Zie bijlage, met name de bijlagen B21, B22, C4, C6, C8, C10, C12, C14, C16, C18, C20, C21, C24, C25, C28, C30, C32, C33, C36, C37, C40, C41, C44, C45, C48, C49, C52, C53, C56, C57, C60, C61, C64, C66, C69, C72, C73, C76, C77, C80, C81, C84, C86, C87, C90, C91, C94, C96, C98, C99, C102, C104, C105, C108, C110, C111, C114, C116, C119, C121
  - 7 Randafstanden, tussenruimten, dikte van het element: Zie bijlage, met name de bijlagen B21, B22, C4, C6, C8, C10, C12, C14, C16, C18, C20, C21, C24, C25, C28, C30, C32, C33, C36, C37, C40, C41, C44, C45, C48, C49, C52, C53, C56, C57, C60, C61, C64, C66, C69, C72, C73, C76, C77, C80, C81, C84, C86, C87, C90, C91, C94, C96, C98, C99, C102, C104, C105, C108, C110, C111, C114, C116, C118, C121
  - 8 Verplaatsingen onder trek- en schuifbelasting: zie bijlage, met name bijlage C123
  - 9 Maximaal installatiekoppel: Zie bijlage, met name de bijlagen C4, C6, C8, C10, C12, C14, C16, C18, C20, C21, C24, C25, C28, C30, C32, C33, C36, C37, C40, C41, C44, C45, C48, C49, C52, C53, C56, C57, C60, C61, C64, C66, C69, C72, C73, C76, C77, C80, C81, C84, C86, C87, C90, C91, C94, C96, C98, C99, C102, C104, C105, C108, C110, C111, C114, C116, C118, C121  
Kenmerkende weerstand en verplaatsingen onder seismische belasting:
  - 10 Trekkraachtweerstand, verplaatsingen: NPd
  - 11 Weerstands afschuifbelasting, verplaatsingen: NPd
  - 12 Factor ringvormige opening: NPd  
**Veiligheid in geval van brand (BWR 2)**
  - 13 Reactie op brand: Klasse (A1)
  - 14 Brandwerendheid onder trek- en afschuifbelasting met en zonder vlakke arm, minimale randafstanden en tussenruimten: zie bijlage, met name de bijlagen C124-C127  
**Hygiëne, gezondheid en milieu (BWR 3)**
  - 15 Content, emission and/or release of dangerous substances: NPd
8. Geëigende technische documentatie en/of specifieke technische documentatie: **-**

De prestaties van het hierboven omschreven product zijn conform de aangegeven prestaties. Deze prestatieverklaring wordt in overeenstemming met Verordening (EU) nr. 305/2011 onder de exclusieve verantwoordelijkheid van de hierboven vermelde fabrikant verstrekt.

Ondertekend voor en namens de fabrikant door:



Dr. Ronald Mihala, Hoofd ontwikkeling en productiebeheer  
Tumlingen, 2025-02-17



Dieter Pfaff, Hoofd van de Internationale Productiefederatie en Kwaliteitsbeheer

Deze DoP is opgesteld in meerdere talen. In het geval van geschillen over de interpretatie zal de Engelse tekst altijd prevaleren.

Het aanhangsel bevat vrijwillige en aanvullende informatie in het Engels die de (taal-neutraal gespecificeerde) wettelijke vereisten overschrijdt.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

**Vertaal assistent van de essentiële kenmerken en eigenschappen voor bijlagen**

| Mechanical resistance and stability (BWR 1)                                |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanische weerstand en stabiliteit (BWR 1)                               |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| Characteristic resistance for static and quasi-static loading:             |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| <b>Kenmerkende weerstand onder statische en quasi-statische belasting:</b> |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| 1                                                                          | Characteristic resistance to steel failure of a single anchor under tension loading:<br><b>Kenmerkende weerstand tegen staalbreuk van een enkel anker onder trekbelasting:</b>                                                                                                               | $N_{Rk,s}$ [kN]                                                                                                                                   |
| 2                                                                          | Characteristic resistance to steel failure of a single anchor under shear loading with and without level arm:<br><b>Kenmerkende weerstand tegen staalbreuk van een enkel anker onder afschuifbelasting met en zonder waterpasarm:</b>                                                        | $V_{Rk,s}$ [kN], $M_{Rk,s}^0$ [Nm]                                                                                                                |
| 3                                                                          | Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading, Reduction factor:<br><b>Karakteristieke weerstand tegen bezwijken door uittrekken of doorbreken van bakstenen van een enkel anker onder trekbelasting, Reductiefactor:</b> | $N_{Rk,p}$ , $N_{Rk,b}$ [kN]<br>$N_{Rk,p,c}$ , $N_{Rk,b,c}$ [kN], $\beta$ [-]                                                                     |
| 4                                                                          | Characteristic resistance to local brick failure or brick breakout failure of a single anchor under shear loading:<br><b>Karakteristieke weerstand tegen lokale breuk van bakstenen of breuk van bakstenen van een enkel anker onder afschuifbelasting:</b>                                  | $V_{Rk,b}$ , $V_{Rk,c,fl}$ , $V_{Rk,c,l}$ [kN]                                                                                                    |
| 5                                                                          | Characteristic resistance to brick breakout failure of an anchor group under tension loading:<br><b>Karakteristieke weerstand tegen breuk van een ankergroep onder trekbelasting:</b>                                                                                                        | $N_{Rk}^0$ [kN], $\alpha_{g,N}$ [-]                                                                                                               |
| 6                                                                          | Characteristic resistance to local brick failure or brick breakout failure of an anchor group under shear loading:<br><b>Karakteristieke weerstand tegen lokaal bezwijken van bakstenen of bezwijken van bakstenen van een ankergroep onder afschuifbelasting:</b>                           | $V_{Rk,b}^0$ , $V_{Rk,c,fl}^0$ , $V_{Rk,c,l}^0$ [kN];<br>$\alpha_{g,V,fl}$ , $\alpha_{g,V,l}$ [-]                                                 |
| 7                                                                          | Edge distances, spacing, member thickness:<br><b>Randafstanden, tussenruimten, dikte van het element:</b>                                                                                                                                                                                    | $c_{cr}$ , $s_{cr}$ , $c_{min}$ , $s_{min,fl}$ , $s_{min,l}$ , $h_{min}$ [mm]                                                                     |
| 8                                                                          | Displacements under tension and shear loading:<br><b>Verplaatsingen onder trek- en schuifbelasting:</b>                                                                                                                                                                                      | $\delta_{N0}$ , $\delta_{N\infty}$ , $\delta_{V0}$ , $\delta_{V\infty}$ [mm]                                                                      |
| 9                                                                          | Maximum installation torque:<br><b>Maximaal installatiekoppel:</b>                                                                                                                                                                                                                           | $\max. T_{inst}$ [Nm]                                                                                                                             |
| Characteristic resistance and displacements for seismic loading:           |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| <b>Kenmerkende weerstand en verplaatsingen onder seismische belasting:</b> |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| 10                                                                         | Resistance to tension load, displacements:<br><b>Trekkrachtweerstand, verplaatsingen:</b>                                                                                                                                                                                                    | $N_{Rk,s,eq}$ , $N_{Rk,eq}$ [kN],<br>$\alpha_{N,seis}$ [-]; $\delta_{N,eq}$ [mm]                                                                  |
| 11                                                                         | Resistance to shear load, displacements:<br><b>Weerstand afschuifbelasting, verplaatsingen:</b>                                                                                                                                                                                              | $V_{Rk,s,eq}$ , $V_{Rk,b,eq}$ [kN],<br>$\alpha_{V,seis}$ [-]; $\delta_{V,eq}$ [mm]                                                                |
| 12                                                                         | Factor annular gap:<br><b>Factor ringvormige opening:</b>                                                                                                                                                                                                                                    | $\alpha_{gap}$ [-]                                                                                                                                |
| Safety in case of fire (BWR 2)                                             |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| Veiligheid in geval van brand (BWR 2)                                      |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| 13                                                                         | Reaction to fire:<br><b>Reactie op brand:</b>                                                                                                                                                                                                                                                | -                                                                                                                                                 |
| 14                                                                         | Resistance to fire under tension and shear loading with and without level arm, minimum edge distances and spacing:<br><b>Brandwerendheid onder trek- en afschuifbelasting met en zonder vlakke arm, minimale randafstanden en tussenruimten:</b>                                             | $N_{Rk,s,fl}$ , $N_{Rk,p,fl}$ [kN],<br>$N_{Rk,b,fl}$ , $N_{Rk,b,fl}^0$ , $V_{Rk,s,fl}$ [kN],<br>$M_{Rk,s}^0$ [Nm], $c_{cr,fl}$ , $s_{cr,fl}$ [mm] |
| Hygiene, health and the environment (BWR 3)                                |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| Hygiëne, gezondheid en milieu (BWR 3)                                      |                                                                                                                                                                                                                                                                                              |                                                                                                                                                   |
| 15                                                                         | Content, emission and/or release of dangerous substances:<br><b>Content, emission and/or release of dangerous substances:</b>                                                                                                                                                                | -                                                                                                                                                 |

## Specific part

### 1 Technical description of the product

The fischer injection system FIS V Plus for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar fischer FIS V Plus, FIS VS Plus Low Speed and FIS VW Plus High Speed, a perforated sieve sleeve and an anchor rod with hexagon nut and washer or an internal threaded rod in the range of M6 to M16. 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 B4 to B7, B21, B22, C1 to C123 |
| Characteristic resistance and displacements for seismic loading | No performance assessed                    |

#### 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 | See Annex C124 to C127 |

#### 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

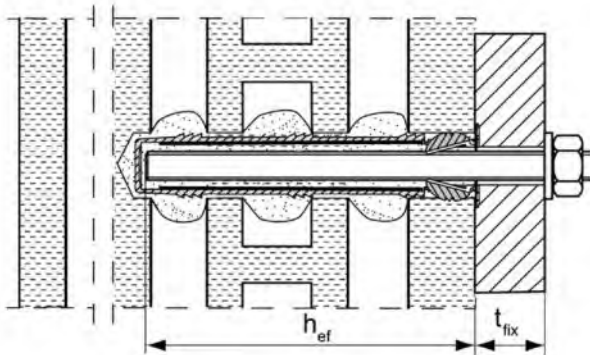
In accordance with the European Assessment Document EAD 330076-01-0604-v01 the applicable European legal act is: [97/177/EC].

The system to be applied is: 1

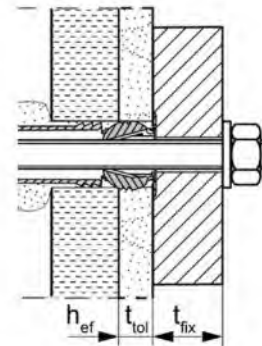
# Installation conditions part 1

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

### Pre-positioned installation:



### Installation with render bridge



### Size of the perforated sleeve:

FIS H 12x50 K

FIS H 16x85 K

FIS H 20x85 K

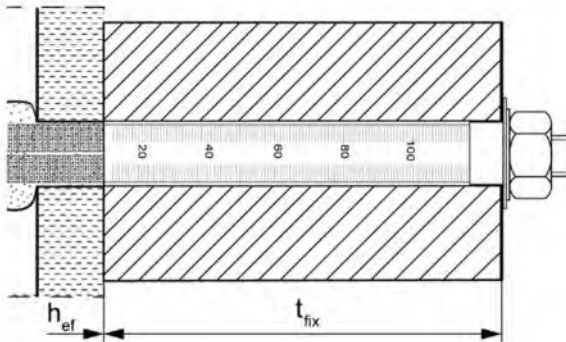
FIS H 20x200 K

FIS H 12x85 K

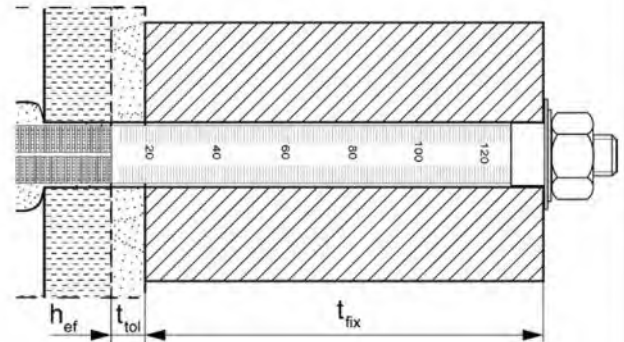
FIS H 16x130 K

FIS H 20x130 K

### Push through installation:



### Installation with render bridge



### Size of the perforated sleeve:

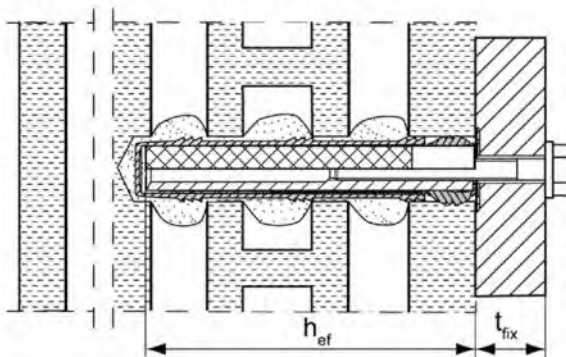
FIS H 18x130/200 K

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:



Figures not to scale

$h_{ef}$  = effective anchorage depth

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

$t_{fix}$  = thickness of fixture

fischer injection system FIS V Plus for masonry

### Product description

Installation conditions part 1,

Anchor rods and internal threaded anchor with perforated sleeve

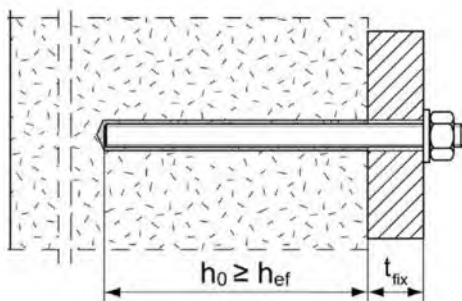
## Annex A1

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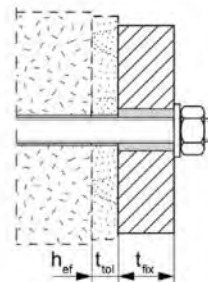
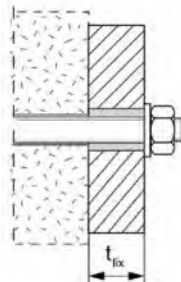
## Installation conditions part 2

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

**Pre-positioned installation:**



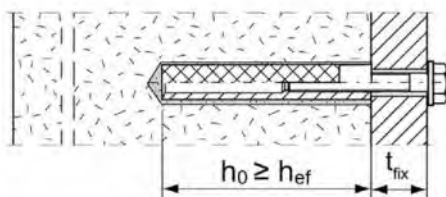
**Push through installation: Annular gap filled with mortar**



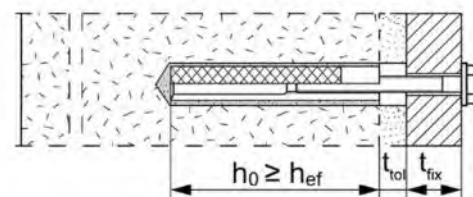
Installation with  
render bridge

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

**Pre-positioned installation:**



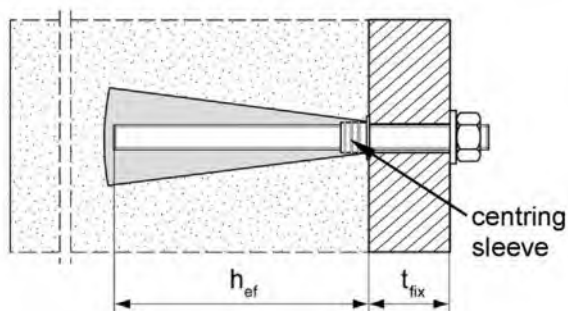
Installation with render bridge



**Anchor rods and internal threaded anchors FIS E without perforated sleeve FIS H K; installation with  
centring sleeve in autoclaved aerated concrete with conical drill hole  
(installation with special conic drill bit PBB)**

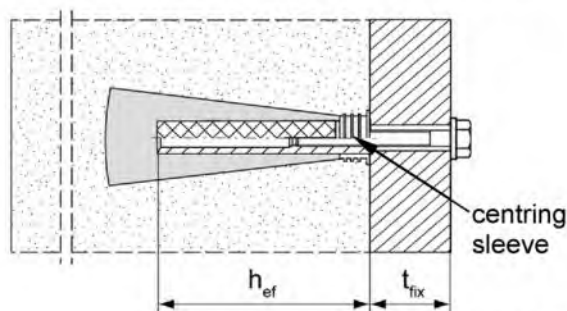
**Pre-positioned installation:**

anchor rods M8, M10, M12



**Pre-positioned installation:**

Internal threaded anchor FIS E 11x85 M6 / M8



Figures not to scale

$h_0$  = depth of drill hole

$h_{ef}$  = effective anchorage depth

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

$t_{fix}$  = thickness of fixture

fischer injection system FIS V Plus for masonry

### Product description

Installation conditions part 2, Anchor rods and internal threaded anchor without perforated sleeve / with centring sleeve

### Annex A2

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Overview system components part 1

Mortar cartridge (shuttle cartridge) with sealing cap

1

Size: 360 ml, 825 ml

**Imprint:** fischer FIS V Plus or FIS VS Plus Low Speed or FIS VW Plus High Speed, processing notes, shelf-life, hazard code, piston travel scale (optional), curing time and processing time (depending on temperature), size, volume

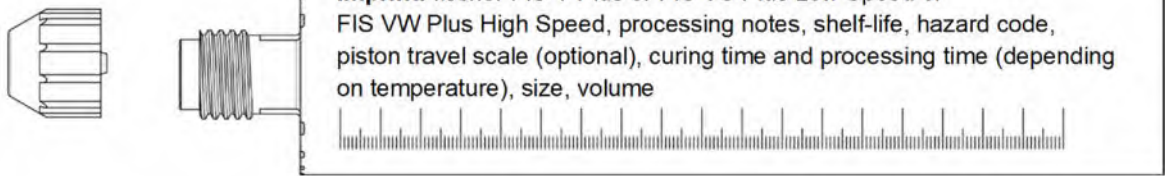


Mortar cartridge (coaxial cartridge) with sealing cap

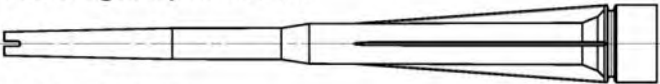
1

Size: 100 ml, 150 ml, 300 ml, 380 ml, 400 ml, 410 ml

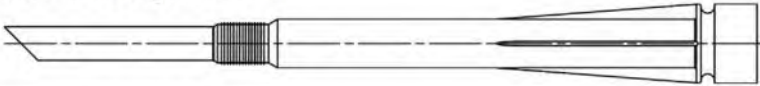
**Imprint:** fischer FIS V Plus or FIS VS Plus Low Speed or FIS VW Plus High Speed, processing notes, shelf-life, hazard code, piston travel scale (optional), curing time and processing time (depending on temperature), size, volume



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



Static mixer FIS JMR for injection cartridges 825 ml



Extension tube Ø 9 for static mixer FIS MR Plus;  
Extension tube Ø 9 or Ø 15 for static mixer FIS JMR



Cleaning brush BS



Blow-out pump ABG



compressed-air cleaning tool



Figures not to scale

fischer injection system FIS V Plus for masonry

**Product description**  
Overview system components part 1: cartridge / static mixer / cleaning tools

**Annex A3**

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## Overview system components part 2

### fischer anchor rod

②



Size: M6, M8, M10, M12, M16

### Internal threaded anchor FIS E

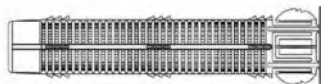
⑤



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

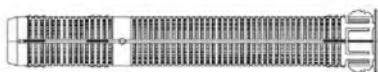
### Perforated sleeve FIS H K

⑦



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

⑦



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

### Perforated sleeve FIS H K (push through installation)

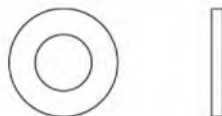
⑦



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

### Washer

③



### Hexagon nut

④



### Injection adapter

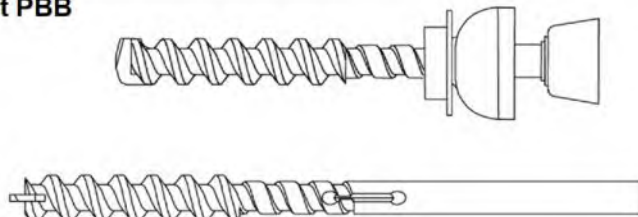


### centring sleeve PBZ

⑦



### Special conic drill bit PBB



Figures not to scale

fischer injection system FIS V Plus for masonry

### Product description

Overview system components part 2: steel parts / perforated sleeve / conical drill bit / Injection adapter / centring sleeve

**Annex A4**

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**Table A5.1: Materials**

| Part | Designation                                                                              | Material                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                             |
|------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Mortar cartridge                                                                         | Mortar, hardener; filler                                                                                                                                                                                                                          |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                             |
|      |                                                                                          | Steel                                                                                                                                                                                                                                             | Stainless steel R                                                                                                                                                                                                                | High corrosion resistant steel HCR                                                                                                                                                                                          |
|      |                                                                                          | zinc plated                                                                                                                                                                                                                                       | acc. to EN 10088-1:2023<br>Corrosion resistance class<br>CRC III acc. to<br>EN 1993-1-4:2006+A1:2015                                                                                                                             | acc. to EN 10088-1:2023<br>Corrosion resistance class<br>CRC V acc. to<br>EN 1993-1-4:2006+A1:2015                                                                                                                          |
| 2    | Anchor rod                                                                               | Property class<br>4.6; 4.8; 5.8 or 8.8;<br>EN ISO 898-1: 2013<br>zinc plated $\geq 5\mu\text{m}$ ,<br>ISO 4042:2022<br>or hot-dip galvanised<br>EN ISO 10684:2004+AC:2009<br>$f_{uk} \leq 1000 \text{ N/mm}^2$<br>$A_5 > 8\%$ fracture elongation | Property class<br>50, 70 or 80<br>EN ISO 3506-1:2020<br>1.4401; 1.4404; 1.4578;<br>1.4571; 1.4439; 1.4362;<br>1.4062; 1.4662; 1.4462;<br>EN 10088-1:2023<br>$f_{uk} \leq 1000 \text{ N/mm}^2$<br>$A_5 > 8\%$ fracture elongation | Property class<br>50 or 80<br>EN ISO 3506-1:2020<br>or property class 70<br>with $f_{yk} = 560 \text{ N/mm}^2$<br>1.4565; 1.4529<br>EN 10088-1:2023<br>$f_{uk} \leq 1000 \text{ N/mm}^2$<br>$A_5 > 8\%$ fracture elongation |
| 3    | Washer<br>ISO 7089:2000                                                                  | zinc plated $\geq 5\mu\text{m}$ ,<br>ISO 4042:2022<br>or hot-dip galvanised<br>EN ISO 10684:2004+AC:2009                                                                                                                                          | 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 898-2:2022<br>zinc plated $\geq 5\mu\text{m}$ ,<br>ISO 4042:2022<br>or hot-dip galvanised<br>EN ISO 10684:2004+AC:2009                                                                                           | Property class 50, 70 or 80<br>EN ISO 3506-2:2020<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 3506-2:2020<br>1.4565; 1.4529<br>EN 10088-1:2023                                                                                                                                      |
| 5    | Internal threaded<br>anchor FIS E                                                        | Property class 5.8;<br>EN 10277-1:2018<br>zinc plated $\geq 5\mu\text{m}$ ,<br>ISO 4042:2022                                                                                                                                                      | 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<br>standard screw or<br>threaded rod for<br>internal threaded<br>anchor FIS E | Property class 4.6, 5.8 or<br>8.8;<br>EN ISO 898-1:2013<br>zinc plated $\geq 5\mu\text{m}$ ,<br>ISO 4042:2022                                                                                                                                     | 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>and centring<br>sleeve                                              | PP / PE                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                             |

fischer injection system FIS V Plus for masonry

**Product description**  
Materials**Annex A5**

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# Specifications of intended use part 1

**Table B1.1:** Overview use and performance categories

| Anchorages subject to                                                                                                     |                                | fischer injection system FIS V Plus for masonry                                                                  |                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hole drilling with hammer drill mode<br> |                                | all bricks;<br>without C28 to C48, C75 to C78                                                                    |                                                                                                                                                                                                                                                    |
| Hole drilling with rotary drill mode<br> |                                | all bricks                                                                                                       |                                                                                                                                                                                                                                                    |
| Hole drilling with special conic drill bit                                                                                |                                | Only C118 to C122                                                                                                |                                                                                                                                                                                                                                                    |
| Static and quasi static load,<br>in masonry                                                                               |                                | all bricks                                                                                                       |                                                                                                                                                                                                                                                    |
| Exposure to fire under tension and<br>shear loading                                                                       |                                | C124 to C127 (Applies only to the conditions of dry masonry)                                                     |                                                                                                                                                                                                                                                    |
| Installation                                                                                                              | Pre-positioned<br>installation | Anchor rod or<br>internal threaded anchor<br>(in solid brick masonry and<br>autoclaved aerated concrete)         | Perforated sleeve with anchor rod<br>or internal threaded anchor<br>(in perforated and solid brick<br>masonry)<br><br>Size: FIS H 12x50 K<br>FIS H 12x85 K<br>FIS H 16x85 K<br>FIS H 16x130 K<br>FIS H 20x85 K<br>FIS H 20x130 K<br>FIS H 20x200 K |
|                                                                                                                           | Push through<br>installation   | Anchor rod;<br>use only in cylindrical drill hole<br>(in solid brick masonry and<br>autoclaved aerated concrete) | Perforated sleeve with anchor rod<br>(in perforated and solid brick<br>masonry)<br><br>Size: FIS H 18x130/200 K<br>FIS H 22x130/200 K                                                                                                              |
| Installation and<br>use conditions                                                                                        | conditions d/d<br>(dry/dry)    | all bricks                                                                                                       |                                                                                                                                                                                                                                                    |
|                                                                                                                           | conditions w/d<br>(wet/dry)    |                                                                                                                  |                                                                                                                                                                                                                                                    |
|                                                                                                                           | conditions w/w<br>(wet/wet)    |                                                                                                                  |                                                                                                                                                                                                                                                    |
| Installation direction                                                                                                    |                                | D3 (downward and horizontal installation)                                                                        |                                                                                                                                                                                                                                                    |
| Installation temperature                                                                                                  |                                | T <sub>i,min</sub> = -10 °C to T <sub>i,max</sub> = +40 °C                                                       |                                                                                                                                                                                                                                                    |
| In-service<br>temperature                                                                                                 | Temperature<br>range Tb        | -40 °C to +80 °C                                                                                                 | (max. short term temperature +80 °C<br>max. long term temperature +50 °C)                                                                                                                                                                          |
|                                                                                                                           | Temperature<br>range Tc        | -40 °C to +120 °C                                                                                                | (max. short term temperature +120 °C;<br>max. long term temperature +72 °C)                                                                                                                                                                        |
|                                                                                                                           |                                |                                                                                                                  |                                                                                                                                                                                                                                                    |
| fischer injection system FIS V Plus for masonry                                                                           |                                |                                                                                                                  | <b>Annex B1</b><br><br>Appendix 7 / 155                                                                                                                                                                                                            |
| Intended Use<br>Specifications part 1                                                                                     |                                |                                                                                                                  |                                                                                                                                                                                                                                                    |

## Specifications of intended use part 2

### Anchorage subject to:

- Static and quasi-static loads
- Exposure to fire

### Base materials:

- Solid brick masonry (base material group b) and autoclaved aerated concrete (base material group d), acc. to Annex B13 / B14.
- Hollow brick masonry (base material group c), according to Annex B13 / B14.
- For minimum thickness of masonry member is  $h_{ef}+30\text{mm}$ .
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2016.
- For other bricks in solid masonry, hollow or perforated masonry and autoclaved aerated concrete, the characteristic resistance of the anchor may be determined by job site tests (not for bricks under fire exposure) according to EOTA Technical Report TR 053:2022-07 under consideration of the  $\beta$ -factor according to Annex C123, Table C123.1.

Note (only applies to solid bricks and autoclaved aerated concrete):

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

### Temperature Range:

- **T<sub>b</sub>**: From - 40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)
- **T<sub>c</sub>**: 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 1993-1-4:2015 corresponding to corrosion resistance classes to Annex A5, Table A5.1.

fischer injection system FIS V Plus for masonry

**Intended Use**  
Specifications part 2

**Annex B2**

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## Specifications of intended use part 3 continued

### Design:

- The anchorages have to be designed in accordance with EOTA Technical Report TR 054:2023-12 (included the dimensioning for fire exposure), Design method A under the responsibility of a designer experienced in anchorages and masonry work.

Applies to all bricks, if no other values are specified:

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

$$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$$

For the calculation of pulling out a brick under tension loading  $N_{Rk,pb}$  or pushing out a brick under shear loading  $V_{Rk,pb}$  see EOTA Technical Report TR 054:2023-12.

$N_{Rk,s}$ ,  $V_{Rk,s}$  and  $M^0_{Rk,s}$  see annexes C1-C3.

Factors for job site tests and displacements see annex C123.

- Verifiable calculation notes and drawings have to be prepared taking into 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 to be indicated on the design drawings.

### Installation:

- Conditions d/d: - Installation and use in dry structures.
- Conditions w/w: - Installation and use in dry and wet structures.
- Conditions w/d: - Installation in wet structures and use in dry structures.
- Hole drilling see Annex C (drilling method).
- In case of aborted hole: The hole shall be filled with injection mortar FIS V Plus.
- Bridging of unbearing layer (e.g., plaster) is permitted for masonry with solid bricks and cylindrical drill hole. 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 mentioned in Annex A5, Table A5.1.
- 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 A5.1

Conformation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN 10204:2004, the documents shall be stored.

Marking of the anchor rod with the envisage embedment depth. This may be done by the manufacturer of the rod or by a person on job site.

fischer injection system FIS V Plus for masonry

**Intended Use**  
Specifications part 3 continued

**Annex B3**

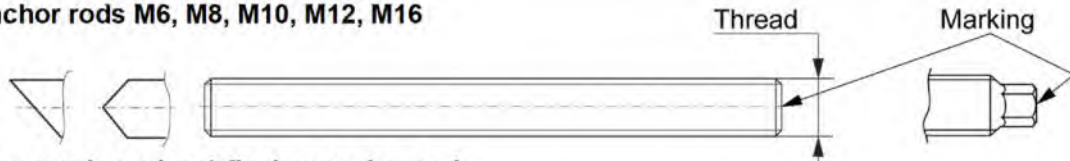
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**Table B4.1:** Installation parameters for anchor rods in solid bricks and autoclaved aerated concrete without perforated sleeves

| Anchor rod                                                      | Thread                           | M6                      | M8           | M10 | M12 | M16 |
|-----------------------------------------------------------------|----------------------------------|-------------------------|--------------|-----|-----|-----|
| Nominal drill hole diameter                                     | $d_0$ [mm]                       | 8                       | 10           | 12  | 14  | 18  |
| Effective anchorage depth $h_{ef}^{1)}$                         | $h_{0,min} \geq h_{ef,min}$ [mm] | 100                     |              |     |     |     |
| in AAC cylindrical drill hole                                   | $h_{0,max} \geq h_{ef,max}$ [mm] | 200                     |              |     |     |     |
| Effective anchorage depth $h_{ef}$<br>in AAC conical drill hole | $h_o$ [mm]                       | -                       | $h_{ef} + 5$ |     |     | -   |
|                                                                 | $h_{ef,1}$ [mm]                  |                         | 75           |     |     |     |
|                                                                 | $h_{ef,2}$ [mm]                  |                         | 95           |     |     |     |
| Effective anchorage depth $h_{ef}^{1)}$                         | $h_{ef,min}$ [mm]                | 50                      |              |     |     |     |
| in solid brick<br>(depth of drill hole $h_o \geq h_{ef}$ )      | $h_{ef,max}$ [mm]                | $h-30, \leq 200$        |              |     |     |     |
| Diameter of clearance<br>hole in the fixture                    | pre-positioning $d_f \leq$ [mm]  | 7                       | 9            | 12  | 14  | 18  |
|                                                                 | push through $d_f \leq$ [mm]     | 9                       | 11           | 14  | 16  | 20  |
| Diameter of cleaning brush                                      | $d_b \geq$ [mm]                  | see Table B8.1          |              |     |     |     |
| Maximum installation torque                                     | $T_{inst}$ [Nm]                  | see parameters of brick |              |     |     |     |

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

**fischer anchor rods M6, M8, M10, M12, M16**



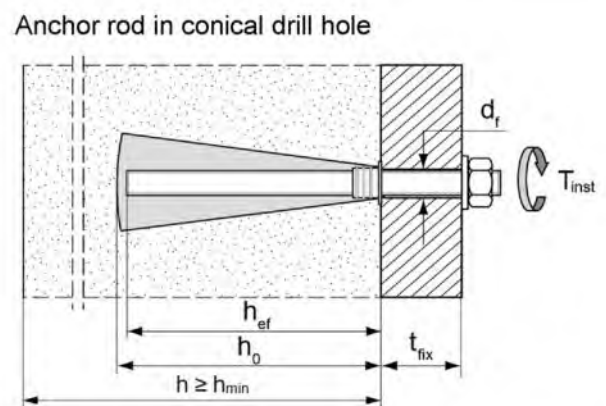
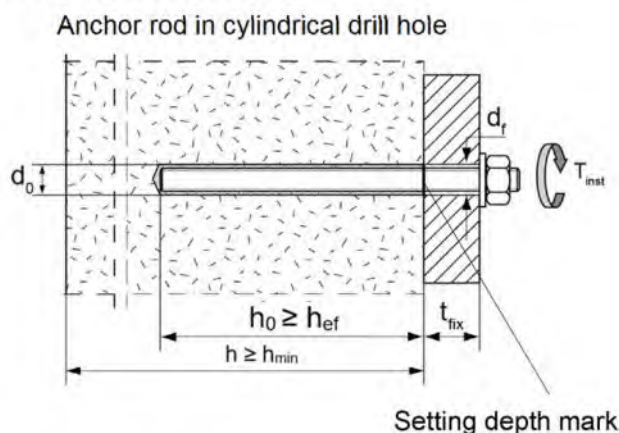
**Marking (on random place) fischer anchor rod:**

|                                                        |        |                                                        |   |
|--------------------------------------------------------|--------|--------------------------------------------------------|---|
| Steel zinc plated PC <sup>1)</sup> 8.8                 | • or + | Steel hot-dip galvanised PC <sup>1)</sup> 8.8          | • |
| High corrosion resistant steel HCR PC <sup>1)</sup> 50 | •      | High corrosion resistant steel HCR PC <sup>1)</sup> 70 | — |
| High corrosion resistant steel HCR PC <sup>1)</sup> 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

<sup>1)</sup> PC = property class

**Installation conditions:**



Figures not to scale

fischer injection system FIS V Plus for masonry

**Intended Use**

Installation parameters for anchor rods without perforated sleeve

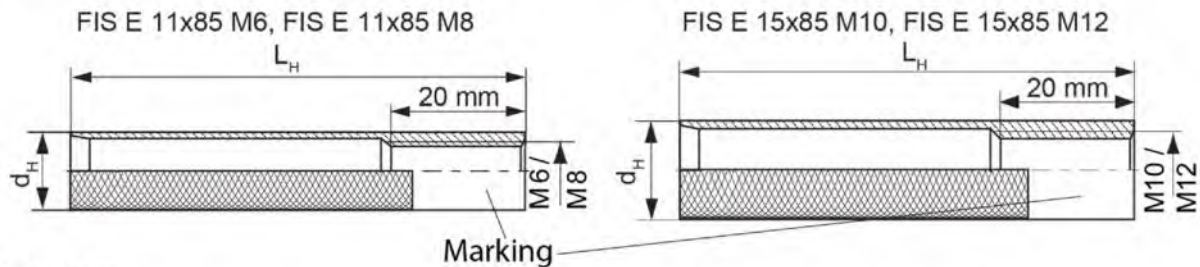
**Annex B4**

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

| Internal threaded anchor FIS E                                           |                                       | 11x85 M6                | 11x85 M8 | 15x85 M10 | 15x85 M12 |
|--------------------------------------------------------------------------|---------------------------------------|-------------------------|----------|-----------|-----------|
| Diameter of anchor                                                       | d <sub>H</sub> [mm]                   | 11                      |          | 15        |           |
| Nominal drill hole diameter                                              | d <sub>0</sub> [mm]                   | 14                      |          | 18        |           |
| Length of anchor                                                         | L <sub>H</sub> [mm]                   | 85                      |          |           |           |
| Effective anchorage depth                                                | h <sub>0</sub> ≥ h <sub>ef</sub> [mm] | 85                      |          |           |           |
| Effective anchorage depth h <sub>ef</sub><br>in AAC (conical drill hole) | h <sub>0</sub> [mm]                   | 100                     |          | -         |           |
|                                                                          | h <sub>ef</sub> [mm]                  | 85                      |          |           |           |
| Diameter of cleaning brush                                               | d <sub>b</sub> ≥ [mm]                 | see Table B8.1          |          |           |           |
| Maximum installation torque                                              | T <sub>inst</sub> [Nm]                | see parameters of brick |          |           |           |
| Diameter of clearance hole<br>in the fixture                             | d <sub>f</sub> [mm]                   | 7                       | 9        | 12        | 14        |
| Screw-in depth                                                           | l <sub>E,min</sub> [mm]               | 6                       | 8        | 10        | 12        |
|                                                                          | l <sub>E,max</sub> [mm]               | 60                      |          |           |           |

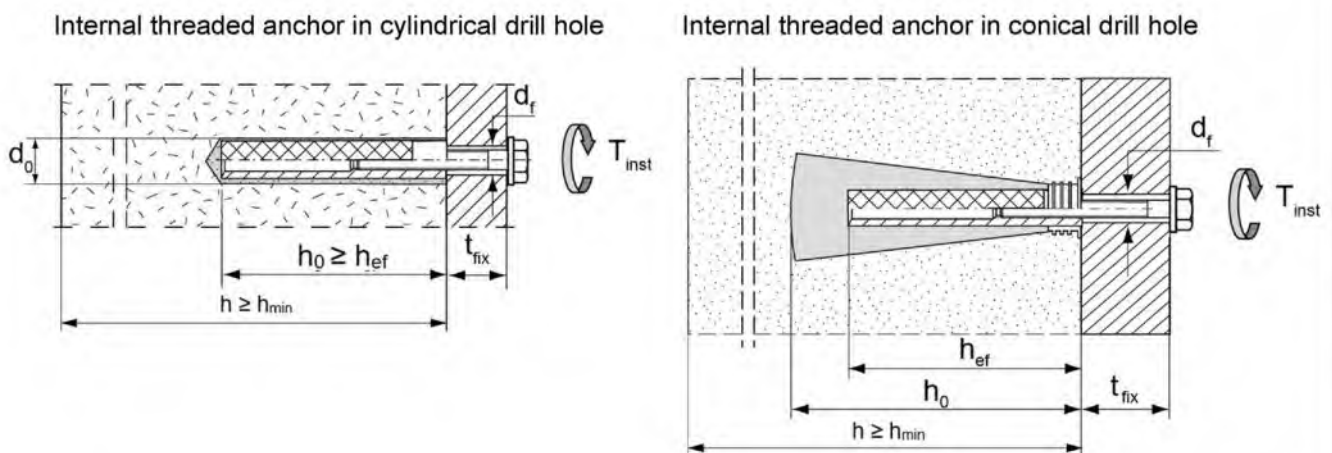
**fischer Internal threaded anchor FIS E**



**Marking:**

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

**Installation conditions:**



Figures not to scale

fischer injection system FIS V Plus for masonry

**Intended Use**

Installation parameters for internal threaded rods FIS E without perforated sleeve

**Annex B5**

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

| perforated sleeve FIS H K                                     |                           | 12x50                   | 12x85 <sup>2)</sup> | 16x85      | 16x130 <sup>2)</sup> | 20x85       | 20x130 <sup>2)</sup> | 20x200 <sup>2)</sup> |
|---------------------------------------------------------------|---------------------------|-------------------------|---------------------|------------|----------------------|-------------|----------------------|----------------------|
| Nominal drill hole diameter<br>$d_0 = D_{\text{sleeve, nom}}$ | $d_0$ [mm]                | 12                      |                     | 16         |                      | 20          |                      |                      |
| Depth of drill hole                                           | $h_0$ [mm]                | 55                      | 90                  | 90         | 135                  | 90          | 135                  | 205                  |
| Effective anchorage depth                                     | $h_{\text{ef, min}}$ [mm] | 50                      | 65                  | 85         | 110                  | 85          | 110                  | 180                  |
|                                                               | $h_{\text{ef, max}}$ [mm] | 50                      | 85                  | 85         | 130                  | 85          | 130                  | 200                  |
| Size of threaded rod                                          | [-]                       | M6 and M8               |                     | M8 and M10 |                      | M12 and M16 |                      |                      |
| Size of internal threaded anchor FIS E                        |                           | -                       | -                   | 11x85      | -                    | 15x85       | -                    | -                    |
| Diameter of cleaning brush <sup>1)</sup>                      | $d_b \geq$ [mm]           | see Table B8.1          |                     |            |                      |             |                      |                      |
| Maximum installation torque                                   | $T_{\text{inst}}$ [Nm]    | see parameters of brick |                     |            |                      |             |                      |                      |

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

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

#### Perforated sleeve

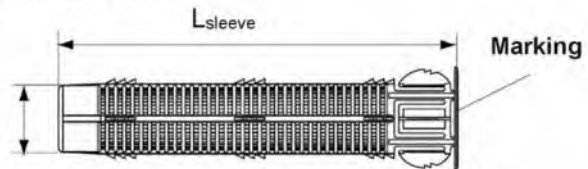
FIS H 12x50 K; FIS H 12x85 K; FIS H 16x85 K; FIS H 16x130 K;  
FIS H 20x85 K; FIS H 20x130 K; FIS H 20x200 K

#### Marking:

Size  $D_{\text{sleeve, nom}} \times L_{\text{sleeve}}$   
(e.g.: 16x85)



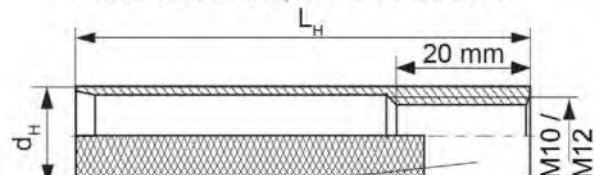
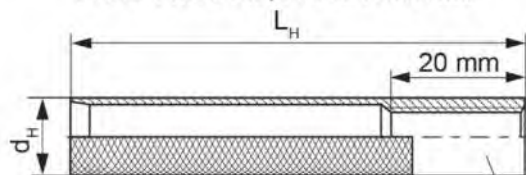
$D_{\text{sleeve, nom}}$



#### fischer Internal threaded anchor FIS E

FIS E 11x85 M6, FIS E 11x85 M8

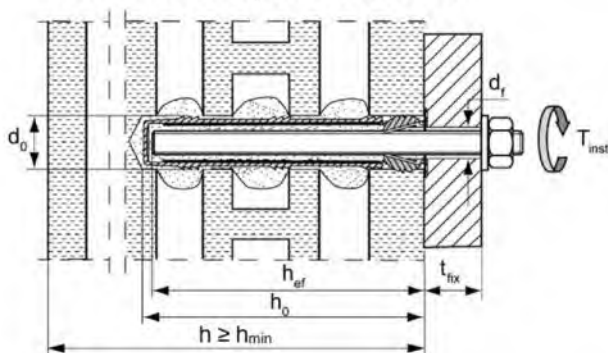
FIS E 15x85 M10, FIS E 15x85 M12



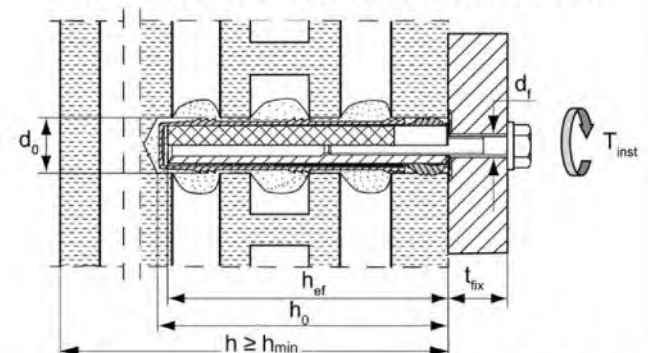
Marking

#### Installation conditions:

Anchor rod with perforated sleeve



Internal threaded anchor with perforated sleeve



Figures not to scale

fischer injection system FIS V Plus for masonry

#### Intended Use

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

#### Annex B6

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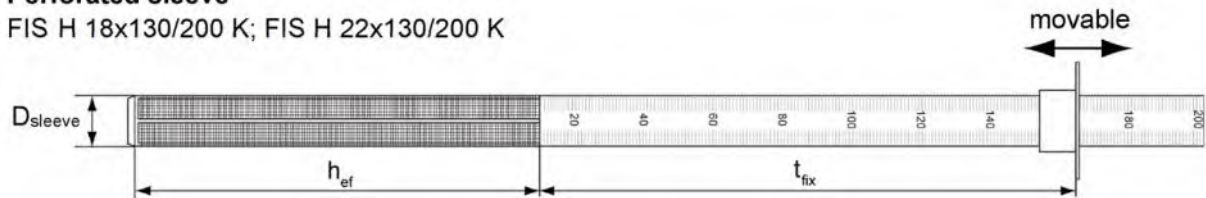
**Table B7.1:** Installation parameters for anchor rods with perforated sleeves  
(push through installation)

| Perforated sleeve FIS H K                |                               | 18x130/200              |     | 22x130/200 |
|------------------------------------------|-------------------------------|-------------------------|-----|------------|
| Nominal sleeve diameter                  | $D_{\text{sleeve, nom}}$ [mm] | 16                      |     | 20         |
| Nominal drill hole diameter              | $d_0$ [mm]                    | 18                      |     | 22         |
| Depth of drill hole                      | $h_0$ [mm]                    | 135                     |     |            |
| Effective anchorage depth                | $h_{\text{ef}}$ [mm]          | $\geq 130$              |     |            |
| Diameter of cleaning brush <sup>1)</sup> | $d_b \geq$ [mm]               | see Table B8.1          |     |            |
| Size of threaded rod                     | [-]                           | M10                     | M12 | M16        |
| Maximum installation torque              | $T_{\text{inst}}$ [Nm]        | see parameters of brick |     |            |
| Thickness of fixture                     | $t_{\text{fix, max}}$ [mm]    | 200                     |     |            |

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

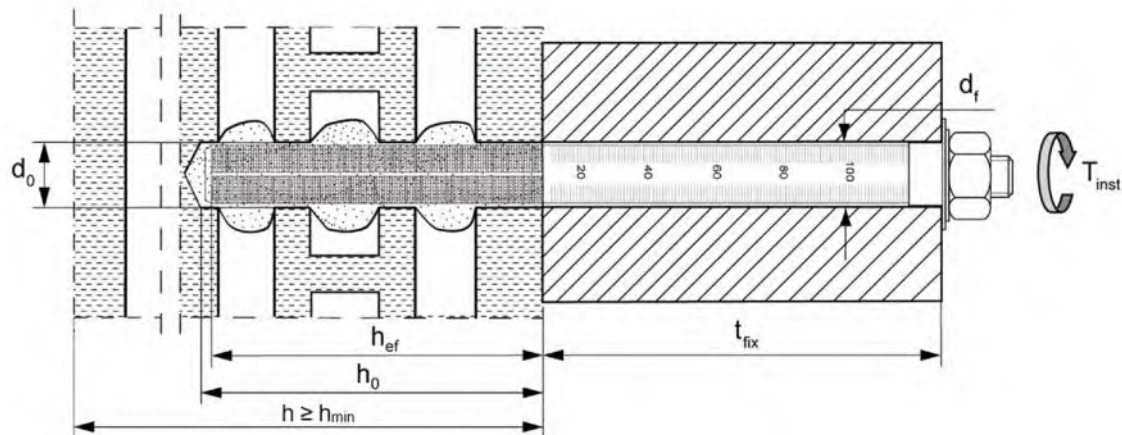
#### Perforated sleeve

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



#### Installation conditions:

Anchor rod with perforated sleeve



Figures not to scale

fischer injection system FIS V Plus for masonry

#### Intended Use

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

#### Annex B7

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**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

|                     |            |   |    |    |    |    |    |    |    |
|---------------------|------------|---|----|----|----|----|----|----|----|
| Drill hole diameter | $d_0$ [mm] | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
| Brush diameter      | $d_b$ [mm] | 9 | 11 | 14 | 16 | 20 | 20 | 25 | 25 |



Only for solid bricks and autoclaved aerated concrete or solid areas of perforated bricks and hollow blocks

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

| Temperature at anchoring base [°C] | Maximum processing time <sup>2)</sup><br>$t_{work}$ |            |                       | Minimum curing time <sup>1), 2)</sup><br>$t_{cure}$ |            |                       |
|------------------------------------|-----------------------------------------------------|------------|-----------------------|-----------------------------------------------------|------------|-----------------------|
|                                    | FIS VW Plus High Speed                              | FIS V Plus | FIS VS Plus Low Speed | FIS VW Plus High Speed                              | FIS V Plus | FIS VS Plus Low Speed |
| -10 to -5                          | -                                                   | -          | -                     | 12 h                                                | -          | -                     |
| > -5 to 0                          | 5 min                                               | -          | -                     | 3 h                                                 | 24 h       | -                     |
| > 0 to 5                           | 5 min                                               | 13 min     | -                     | 3 h                                                 | 3 h        | 6 h                   |
| > 5 to 10                          | 3 min                                               | 9 min      | 20 min                | 50 min                                              | 90 min     | 3 h                   |
| > 10 to 20                         | 1 min                                               | 5 min      | 10 min                | 30 min                                              | 60 min     | 2 h                   |
| > 20 to 30                         | -                                                   | 4 min      | 6 min                 | -                                                   | 45 min     | 60 min                |
| > 30 to 40                         | -                                                   | 2 min      | 4 min                 | -                                                   | 35 min     | 30 min                |

<sup>1)</sup> For wet bricks the curing time must be doubled.

<sup>2)</sup> Minimum cartridge temperature +5°C.

Figures not to scale

fischer injection system FIS V Plus for masonry

#### Intended Use

Cleaning brush (steel brush)

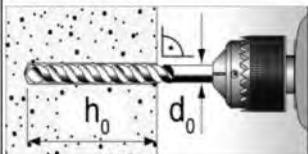
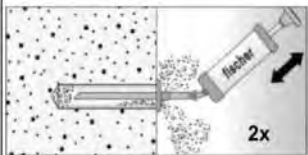
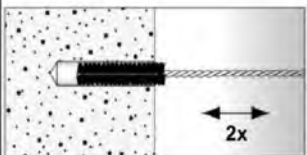
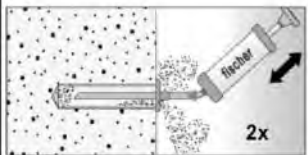
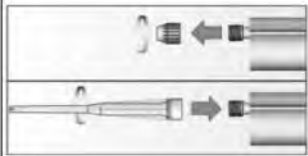
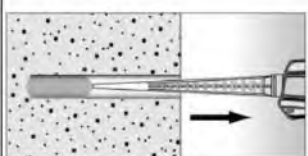
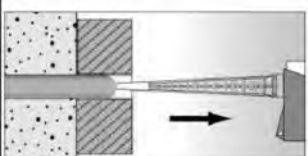
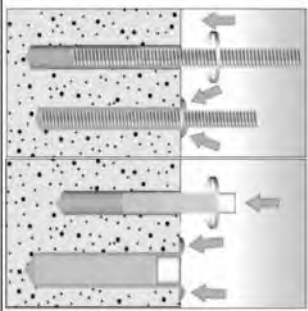
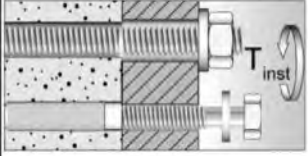
Maximum processing times and minimum curing times

#### Annex B8

Appendix 14 / 155

# Installation instruction part 1

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

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

<sup>1)</sup> Exact volume of mortar see manufacturer's specification.

fischer injection system FIS V Plus for masonry

### Intended Use

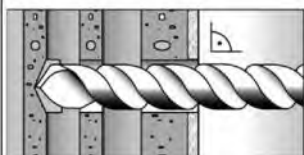
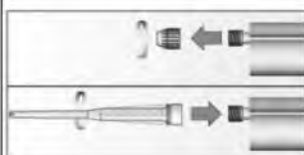
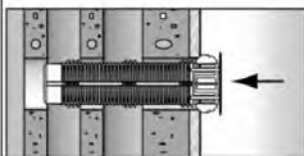
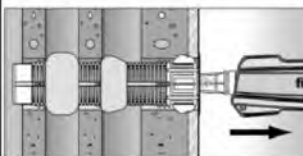
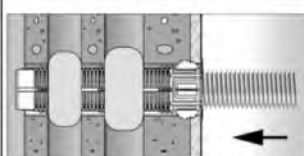
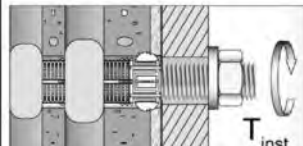
Installation instruction (without perforated sleeve) part 1

### Annex B9

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## Installation instruction part 2

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

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

<sup>1)</sup> Exact volume of mortar see manufacturer's specification.

fischer injection system FIS V Plus for masonry

#### Intended Use

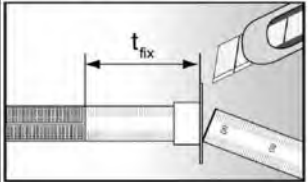
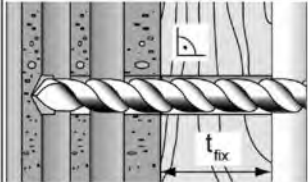
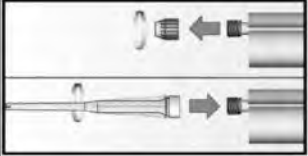
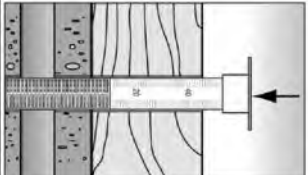
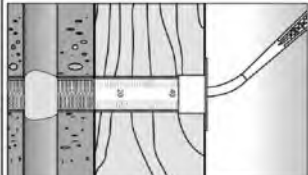
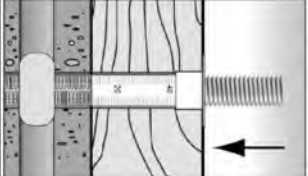
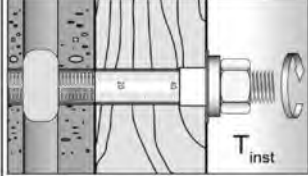
Installation instruction (with perforated sleeve) part 2

#### Annex B10

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### Installation instruction part 3

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

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

<sup>1)</sup> Exact volume of mortar see manufacturer's specification.

fischer injection system FIS V Plus for masonry

#### Intended Use

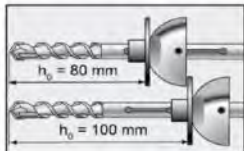
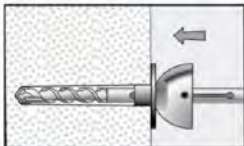
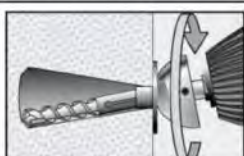
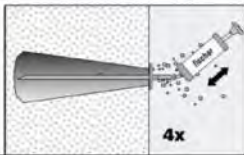
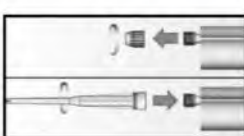
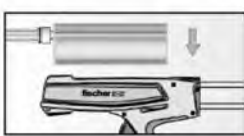
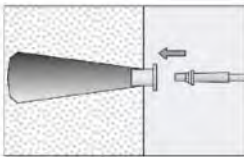
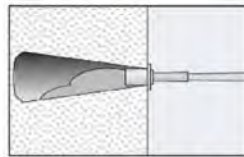
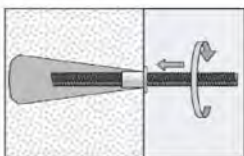
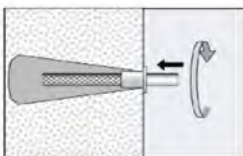
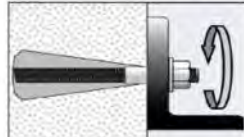
Installation instruction (with perforated sleeve) part 3

#### Annex B11

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## Installation instruction part 4

Installation in autoclaved aerated concrete with special conic drill bit PBB  
(pre-positioned installation)

|   |                                                                                     |                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |
|---|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |    | Position the movable drill bit arrester on the used drill hole depth (see <b>Table B4.1</b> ).<br>For this, unlock the clamp screw and slide the arrester.<br>Now fix the clamp screw. |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |
| 2 |    | Drill the cylindrical hole with rotating drill until the arrester contact the material surface (drilling method see Annex C of the respective brick).                                  |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |
| 3 |    | Deviate the working power drill circulate to generate an conic undercut in the material.                                                                                               |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |
| 4 |    | Blow out the drill hole four times.                                                                                                                                                    |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |
| 5 |    | Remove the sealing cap. Screw on the static mixer.<br>(the spiral in the static mixer must be clearly visible).                                                                        |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |
| 6 |   | Place the cartridge into a suitable dispenser.                                                                                                                                         |                                                                                                                                                                                                         | Press out approximately 10 cm of mortar until the resin is permanently grey in colour. Mortar which is not grey in colour will not cure and must be disposed of. |
| 7 |  | Put the center sleeve into the drill hole and adapt the injection adapter onto the static mixer.                                                                                       |                                                                                                                                                                                                        | Fill the drill hole with injection mortar.                                                                                                                       |
| 8 |  |                                                                                                     | Only use clean and oil-free metal parts.<br>Mark the anchor rod for setting depth.<br>Insert the anchor rod or internal threaded anchor FIS E by hand using light turning motions.<br>When reaching the setting depth marking, excess mortar must emerge from the mouth of the drill hole. |                                                                                                                                                                  |
| 9 |  | Do not touch.<br>Minimum curing time see <b>Table B8.2</b> .                                                                                                                           |                                                                                                                                                                                                        | Mounting the fixture.<br>max T <sub>inst</sub> see parameter of brick in <b>Annex C</b> .                                                                        |

fischer injection system FIS V Plus for masonry

### Intended Use

Installation instruction for autoclaved aerated concrete with special conic drill bit PBB  
(pre-positioned installation) part 4

**Annex B12**

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**Table B13.1: Overview of assessed bricks part 1**

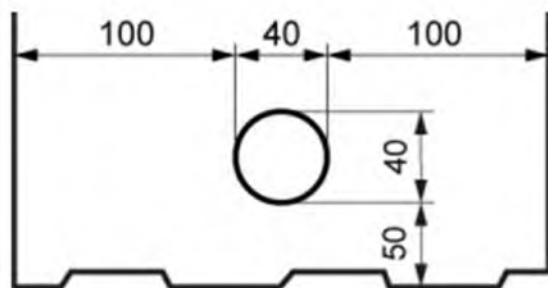
| Kind of masonry                                                                                   | Brick format<br>[mm] | Mean compressive<br>strength<br>[N/mm²] | Main<br>country of<br>origin | Mean gross<br>density ρ<br>[kg/dm³] | Annex     |
|---------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------|------------------------------|-------------------------------------|-----------|
| Solid brick Mz                                                                                    |                      |                                         |                              |                                     |           |
| Solid brick Mz                                                                                    | NF ≥240x115x71       | 15 / 25 / 35                            | Germany                      | ≥1,8                                | C4 – C7   |
|                                                                                                   | 2DF ≥240x115x113     | 12,5 / 20                               | Germany                      | ≥1,8                                | C8 / C9   |
|                                                                                                   | ≥ 245x118x54         | 12,5 / 25                               | Italy                        | ≥1,8                                | C10 / C11 |
|                                                                                                   | ≥ 230x108x55         | 12,5 / 25                               | Denmark                      | ≥1,8                                | C12 / C13 |
| Solid calcium silicate (sand- lime) brick KS / perforated calcium silicate (sand- lime) brick KSL |                      |                                         |                              |                                     |           |
| Solid calcium silicate<br>brick KS                                                                | NF ≥240x115x71       | 15 / 25 / 35                            | Germany                      | ≥2,0                                | C14 / C15 |
|                                                                                                   | 8DF ≥ 250x240x240    | 12,5 / 25 / 35                          | Germany                      | ≥2,0                                | C16 / C17 |
|                                                                                                   | ≥ 997x214x538        | 12,5 / 25 & 45                          | Netherlands                  | ≥1,8 & ≥2,2                         | C18 / C19 |
|                                                                                                   | ≥ 240x115x113        | 12,5 / 25                               | Germany                      | ≥1,8                                | C20 – C23 |
| Perforated calcium<br>silicate brick KSL                                                          | 3DF 240x175x113      | 10 / 12,5 / 15 / 20 / 25                | Germany                      | ≥1,4                                | C24 – C27 |
| Vertical perforated brick HLz                                                                     |                      |                                         |                              |                                     |           |
| Vertical perforated<br>brick HLz                                                                  | 370x240x237          | 5 / 7,5 / 10 / 12,5 / 15                | Germany                      | ≥1,0                                | C28 / C29 |
|                                                                                                   | 500x175x237          | 5 / 7,5 / 10 / 12,5 / 15                | Germany                      | ≥1,0                                | C28 / C29 |
|                                                                                                   | 2DF 240x115x113      | 7,5 / 12,5 / 20 / 25 / 35               | Germany                      | ≥1,4                                | C30 / C31 |
|                                                                                                   | 248x365x248          | 5 / 7,5 / 10                            | Germany                      | ≥0,6                                | C32 – C35 |
|                                                                                                   | 248x365x249          | 10 / 12,5 / 15                          | Germany                      | ≥0,7                                | C36 – C39 |
|                                                                                                   | 248x365x249          | 5 / 8                                   | Germany                      | ≥0,5                                | C40 – C43 |
|                                                                                                   | 248x425x248          | 5 / 8 / 10                              | Germany                      | ≥0,8                                | C44 – C47 |
|                                                                                                   | 248x425x248          | 5 / 7,5 / 10                            | Germany                      | ≥0,8                                | C48 – C51 |
|                                                                                                   | 500x200x315          | 5 / 7,5 / 10                            | Germany                      | ≥0,6                                | C52 – C55 |
|                                                                                                   | 500x200x300          | 5 / 7,5 / 10 / 12,5                     | France                       | ≥0,7                                | C56 – C59 |
|                                                                                                   | 500x200x315          | 2,5 / 5 / 7,5 / 10                      | France                       | ≥0,7                                | C60 – C63 |
|                                                                                                   | 560x200x275          | 5 / 8 / 10                              | France                       | ≥0,7                                | C64 / C65 |
|                                                                                                   | 255x120x118          | 2,5 / 5 / 8 / 10 / 12,5 / 15            | Italy                        | ≥1,0                                | C66 - C68 |
|                                                                                                   | 275x130x94           | 7,5 / 10 / 15 / 20 / 25                 | Spain                        | ≥0,8                                | C69 / C71 |
|                                                                                                   | 220x190x290          | 7,5 / 10 / 12,5                         | Portugal                     | ≥0,7                                | C72 – C75 |
|                                                                                                   | 253x300x240          | 2,5 / 5 / 8                             | Austria                      | ≥0,8                                | C76 – C79 |
|                                                                                                   | 250x440x250          | 8 / 10 / 12,5                           | Austria                      | ≥0,7                                | C80 – C83 |
|                                                                                                   | 230x108x55           | 2,5 / 5 / 8 / 10                        | Denmark                      | ≥1,4                                | C84 / C85 |
|                                                                                                   | 365x248x245          | 10                                      | Austria                      | ≥0,6                                | C86 / C89 |
|                                                                                                   | 240x175x113          | 12,5                                    | Germany                      | ≥0,9                                | C90 / C93 |
| fischer injection system FIS V Plus for masonry                                                   |                      |                                         |                              | Annex B13<br>Appendix 19 / 155      |           |
| Intended Use<br>Overview of assessed bricks part 1                                                |                      |                                         |                              |                                     |           |

**Table B14.1: Overview of assessed bricks part 2**

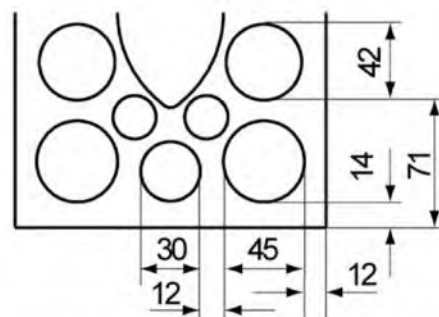
| Kind of masonry                           | Brick format<br>[mm] | Mean<br>compressive<br>strength<br>[N/mm²] | Main country of<br>origin | Mean gross<br>density ρ<br>[kg/dm³] | Annex       |
|-------------------------------------------|----------------------|--------------------------------------------|---------------------------|-------------------------------------|-------------|
| Horizontal perforated brick LLz           |                      |                                            |                           |                                     |             |
| Horizontal perforated<br>brick LLz        | 248x78x250           | 2,5 / 5 / 8                                | Italy                     | ≥0,7                                | C94 / C95   |
|                                           | 128x88x275           | 2,5                                        | Spain                     | ≥0,8                                | C96 / C97   |
| Light-weight concrete hollow block Hbl    |                      |                                            |                           |                                     |             |
| Light-weight concrete<br>hollow block Hbl | 362x240x240          | 2,5 / 5                                    | Germany                   | ≥1,0                                | C98 – C101  |
|                                           | 500x200x200          | 2,5 / 5 / 8                                | France                    | ≥1,0                                | C102 / C103 |
|                                           | 440x215x215          | 5 / 8 / 10 / 12,5                          | Ireland                   | ≥1,2                                | C104 – C107 |
| Light-weight concrete solid block Vbl     |                      |                                            |                           |                                     |             |
| Light-weight concrete<br>solid block Vbl  | ≥ 372x300x254        | 2,5                                        | Germany                   | ≥0,6                                | C108 / C109 |
|                                           | ≥ 250x240x239        | 5 / 8 / 10                                 | Germany                   | ≥1,6                                | C110 – C113 |
|                                           | ≥ 440x100x215        | 5 / 8 / 10 / 12,5                          | Ireland                   | ≥2,0                                | C114 / C115 |
|                                           | ≥ 440x95x215         | 7,5 / 10 / 12,5 / 15                       | England                   | ≥2,0                                | C116 / C117 |
| Autoclaved aerated concrete (AAC)         |                      |                                            |                           |                                     |             |
| PP2 / AAC                                 | -                    | 2,5                                        | Germany                   | 0,35                                | C118 – C122 |
| PP4 / AAC                                 | -                    | 5                                          | Germany                   | 0,5                                 | C118 – C122 |
| PP6 / AAC                                 | -                    | 8                                          | Germany                   | 0,65                                | C118 – C122 |
|                                           |                      |                                            |                           |                                     |             |
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**Table B15.1: Overview dimensions of perforated and hollow bricks part 1**

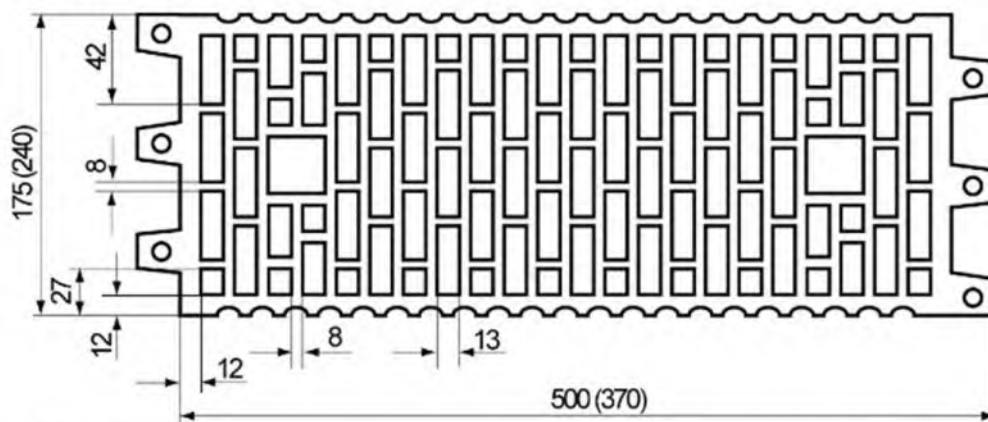
Solid calcium silicate brick KS, 8DF,  
EN 771-2:2011+A1:2015 according to Annex C16



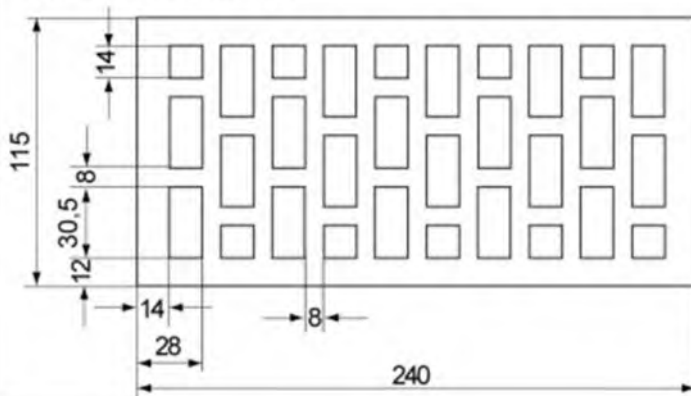
Perforated calcium silicate brick KSL, 3DF,  
EN 771-2:2011+A1:2015; e.g. KS Wemding  
according to Annex C24



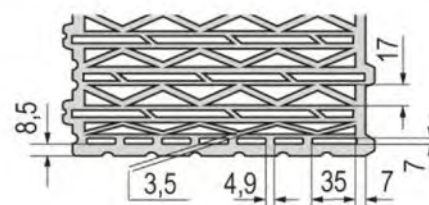
Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Wienerberger, Poroton according to Annex C28



Vertical perforated brick HLz, 2DF,  
EN 771-1:2011+A1:2015; e.g. Wienerberger  
according to Annex C30



Vertical perforated brick HLz, U8,  
EN 771-1:2011+A1:2015; according to Annex C32



Measures in [mm]  
Figures not to scale

fischer injection system FIS V Plus for masonry

**Intended Use**

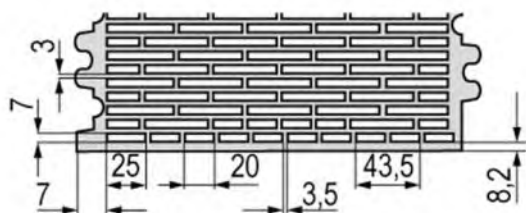
Overview dimensions of perforated and hollow bricks part 1

**Annex B15**

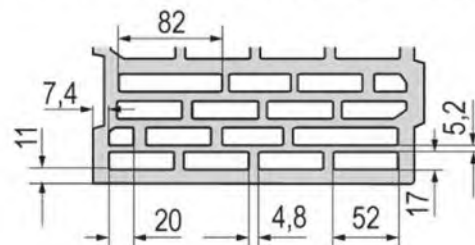
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**Table B16.1: Overview dimensions of perforated and hollow bricks part 2**

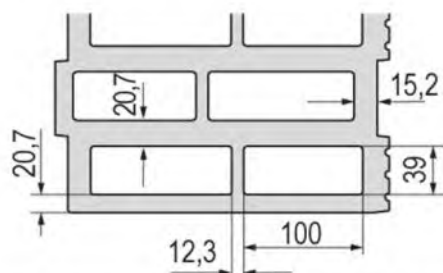
Vertical perforated brick HLz, T10, T11,  
EN 771-1:2011+A1:2015; according to Annex C36



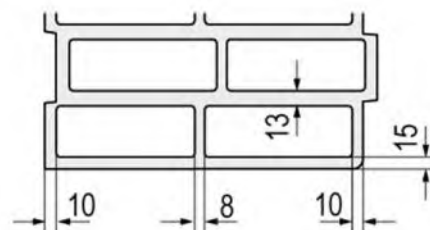
Vertical perforated brick HLz, T7 PF, filled with perlite,  
EN 771-1:2011+A1:2015; according to Annex C40



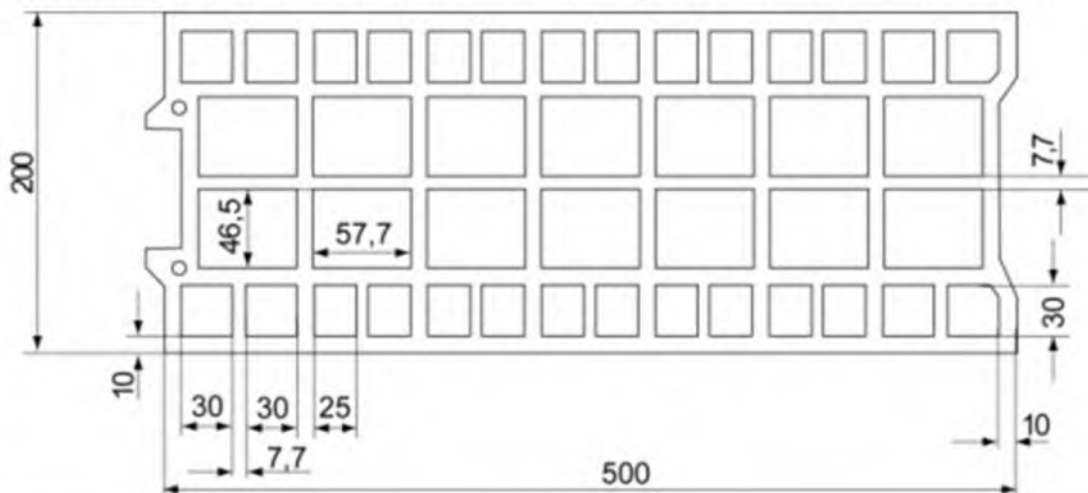
Vertical perforated brick HLz, T9 MW, filled with  
mineral wool, EN 771-1:2011+A1:2015; according to  
Annex C44



Vertical perforated brick HLz, FZ 7, filled with mineral  
wool, EN 771-1:2015; according to Annex C48



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Bouyer Leroux; According to Annex C52



Measures in [mm]  
Figures not to scale

fischer injection system FIS V Plus for masonry

**Intended Use**

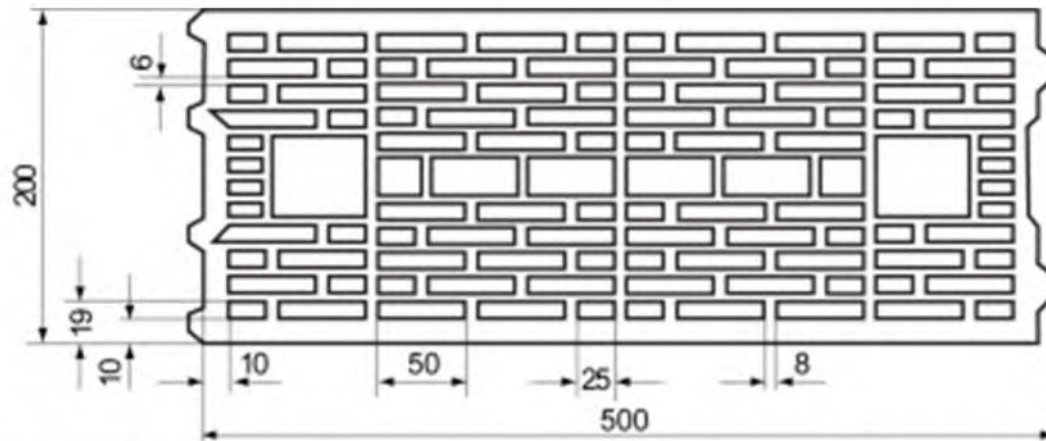
Overview dimensions of perforated and hollow bricks part 2

**Annex B16**

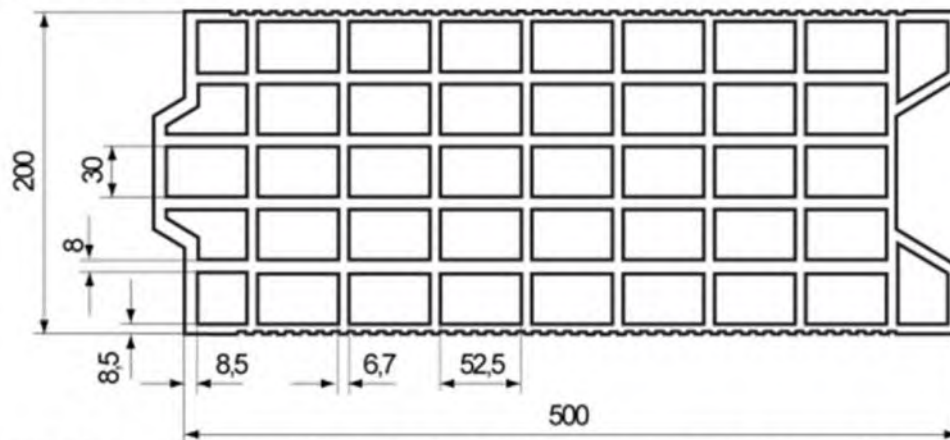
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**Table B17.1: Overview dimensions of perforated and hollow bricks part 3**

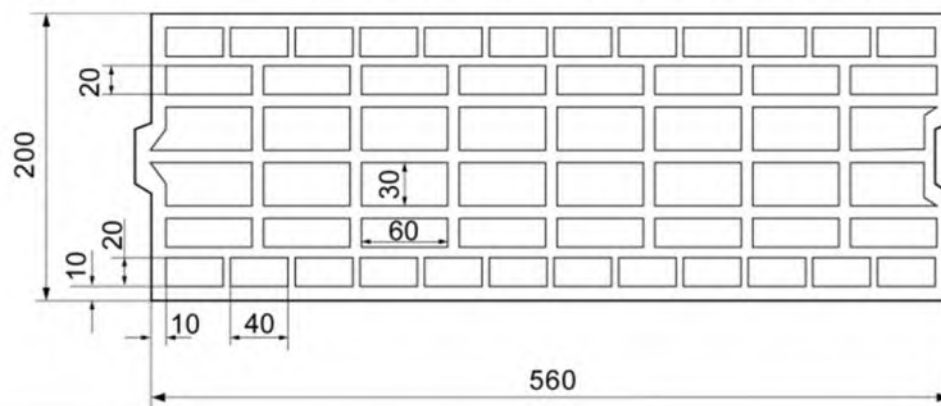
Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Wienerberger according to Annex C56



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Terreal according to Annex C60



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Imery according to Annex C64



Measures in [mm]  
Figures not to scale

fischer injection system FIS V Plus for masonry

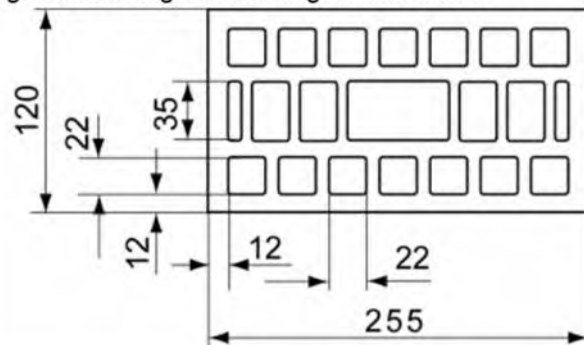
**Intended Use**  
Overview dimensions of perforated and hollow bricks part 3

**Annex B17**

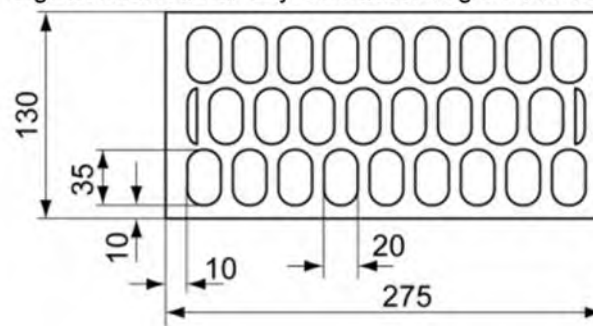
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**Table B18.1: Overview dimensions of perforated and hollow bricks part 4**

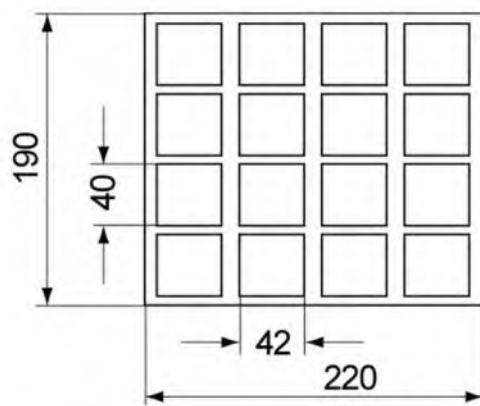
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Wienerberger according to Annex C66



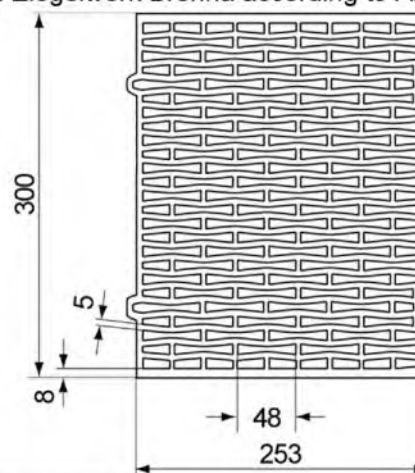
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Cermanica Farreny S.A. according to Annex C69



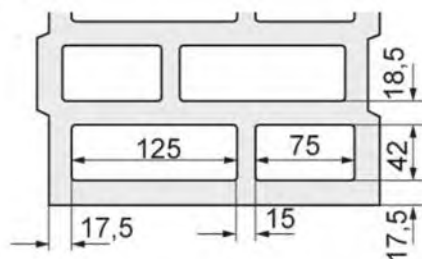
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Perceram according to Annex C72



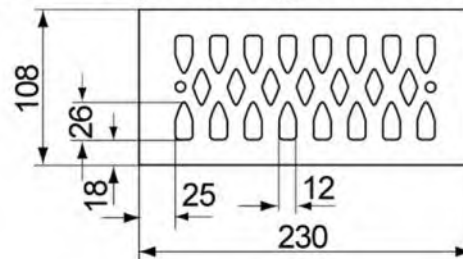
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Ziegelwerk Brenna according to Annex C76



Vertical perforated brick HLz, Porotherm W 44, filled  
with mineral wool, EN 771-1:2011+A1:2015 according  
to Annex C80



Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Wienerberger according to Annex C84



Measures in [mm]  
Figures not to scale

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**Intended Use**

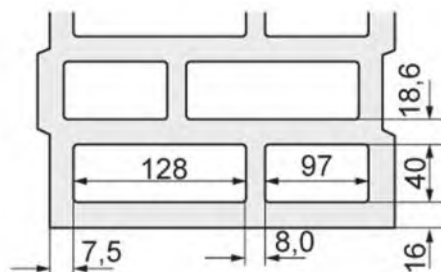
Overview dimensions of perforated and hollow bricks part 4

**Annex B18**

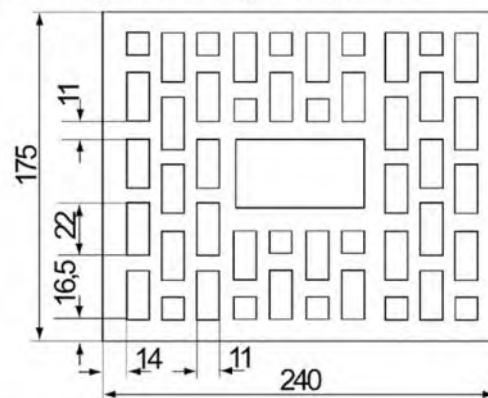
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**Table B19.1: Overview dimensions of perforated and hollow bricks part 5**

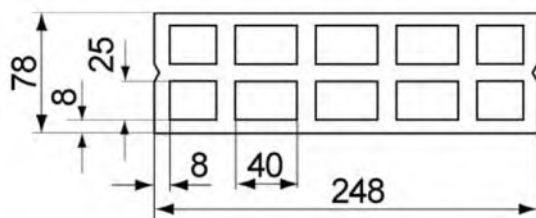
Vertical perforated brick filled with mineral wool,  
EN 771-1:2011+A1:2015; according to Annex C86



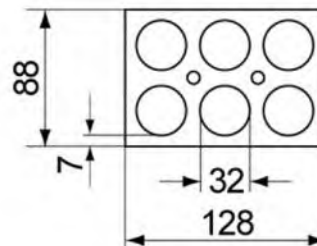
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Wienerberger according to Annex C90



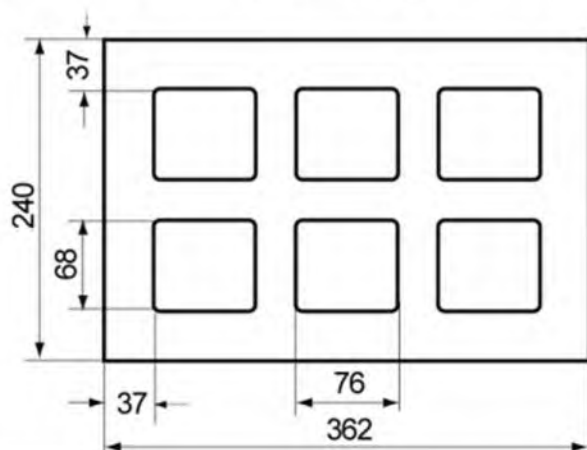
Horizontal perforated brick LLz,  
EN 771-1:2011+A1:2015; according to Annex C94



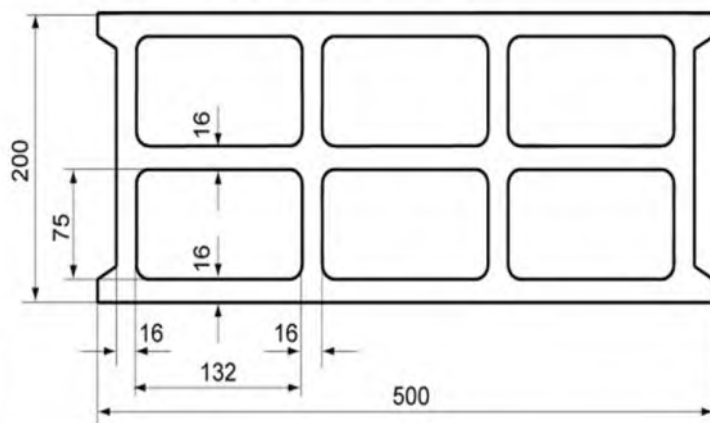
Horizontal perforated brick LLz,  
EN 771-1:2011+A1:2015;  
e.g. Cermanica Farreny S.A according to Annex C96



Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015; according to Annex C98



Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015;  
e.g. Sepa according to Annex C102



Measures in [mm]  
Figures not to scale

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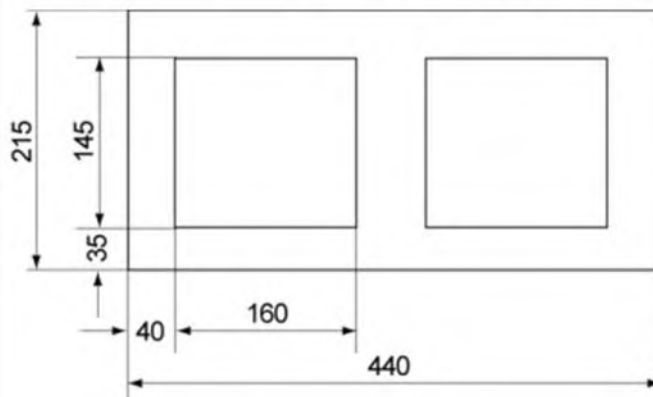
**Intended Use**  
Overview dimensions of perforated and hollow bricks part 5

**Annex B19**

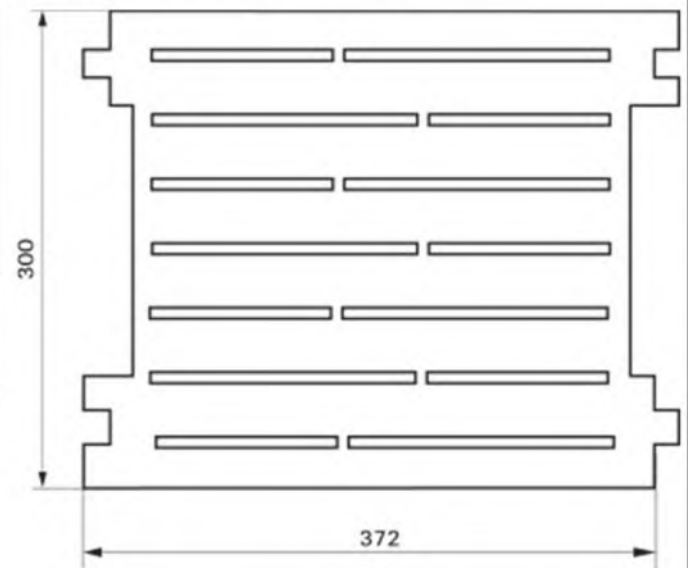
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**Table B20.1: Overview dimensions of perforated and hollow bricks part 6**

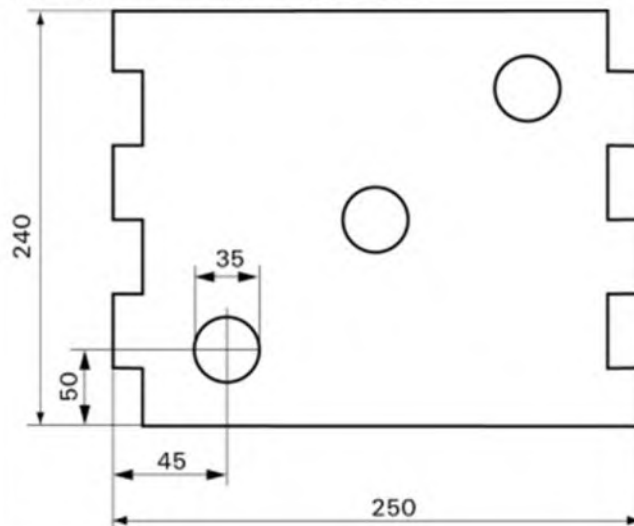
Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015  
e.g. Roadstone wood according to Annex C104



Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015  
e.g. Sepa according to Annex C108



Light-weight concrete solid block Vbl,  
EN 771-3:2011+A1:2015;  
e.g. Sepa according to Annex C110



Measures in [mm]  
Figures not to scale

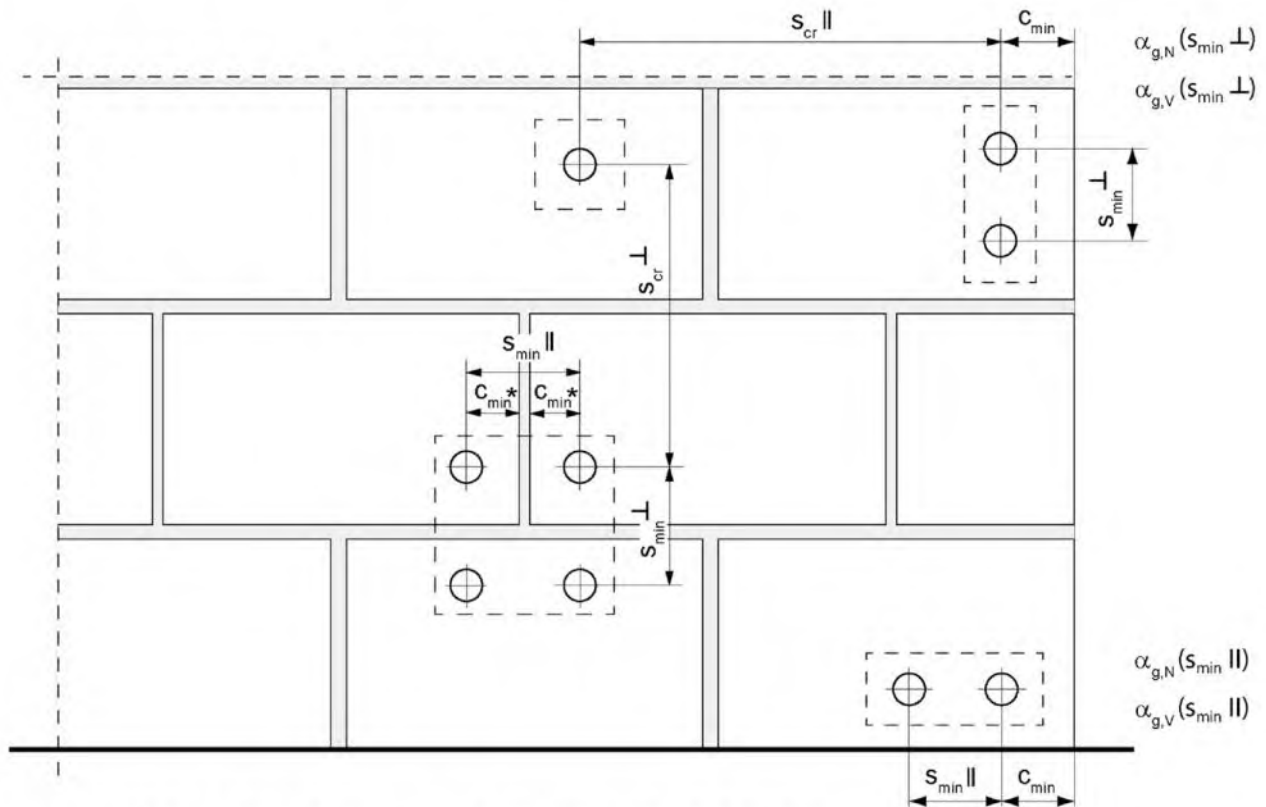
fischer injection system FIS V Plus for masonry

**Intended Use**  
Overview dimensions of perforated and hollow bricks part 6

**Annex B20**

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## Spacing and edge distance part 1



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

|                               |   |                                                                               |
|-------------------------------|---|-------------------------------------------------------------------------------|
| $s_{min II}$                  | = | Minimum spacing parallel to horizontal joint                                  |
| $s_{min \perp}$               | = | Minimum spacing perpendicular to horizontal joint                             |
| $s_{cr II}$                   | = | Characteristic spacing parallel to horizontal joint                           |
| $s_{cr \perp}$                | = | Characteristic spacing perpendicular to horizontal joint                      |
| $C_{cr} = C_{min}$            | = | Edge distance                                                                 |
| $\alpha_{g,N}(s_{min II})$    | = | 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 perpendicular to horizontal joint |
| $\alpha_{g,V}(s_{min \perp})$ | = | Group factor for shear load, anchor group perpendicular to horizontal joint   |

Figures not to scale

fischer injection system FIS V Plus for masonry

**Intended Use**  
Spacing and edge distance part 1

**Annex B21**

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## Spacing and edge distance part 2

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

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

Group of 2 anchors

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

Group of 4 anchors

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

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

with  $N_{Rk}$  and  $\alpha_{g,N}$  depending on  $s_{minII}$  or  $s_{min\perp}$  acc. to Annex C

with  $V_{Rk}$  and  $\alpha_{g,V}$  depending on  $s_{minII}$  or  $s_{min\perp}$  acc. to Annex C

fischer injection system FIS V Plus for masonry

**Intended Use**  
Spacing and edge distance part 2

**Annex B22**

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

| Anchor rod / standard threaded rod                               |                                                          |                | M6   | M8 <sup>3)</sup> | M10 <sup>3)</sup>         | M12        | M16        |      |       |
|------------------------------------------------------------------|----------------------------------------------------------|----------------|------|------------------|---------------------------|------------|------------|------|-------|
| Characteristic resistance to steel failure under tension loading |                                                          |                |      |                  |                           |            |            |      |       |
| Characteristic resistance $N_{Rk,s}$                             | Steel zinc plated                                        | Property class | [kN] | 4.6              | 8,0                       | 14,6(13,2) | 23,2(21,4) | 33,7 | 62,8  |
|                                                                  |                                                          |                |      | 4.8              | 8,0                       | 14,6(13,2) | 23,2(21,4) | 33,7 | 62,8  |
|                                                                  |                                                          |                |      | 5.8              | 10,0                      | 18,3(16,6) | 29,0(26,8) | 42,1 | 78,5  |
|                                                                  |                                                          |                |      | 8.8              | 16,0                      | 29,2(26,5) | 46,4(42,8) | 67,4 | 125,6 |
|                                                                  | Stainless steel R and High corrosion resistant steel HCR |                |      | 50               | 10,0                      | 18,3       | 29,0       | 42,1 | 78,5  |
|                                                                  |                                                          |                |      | 70               | 14,0                      | 25,6       | 40,6       | 59,0 | 109,9 |
|                                                                  |                                                          |                |      | 80               | 16,0                      | 29,2       | 46,4       | 67,4 | 125,6 |
|                                                                  |                                                          |                |      |                  |                           |            |            |      |       |
| Partial factors <sup>1)</sup>                                    |                                                          |                |      |                  |                           |            |            |      |       |
| Partial factors $\gamma_{Ms,N}$                                  | Steel zinc plated                                        | Property class | [-]  | 4.6              | 2,00                      |            |            |      |       |
|                                                                  |                                                          |                |      | 4.8              | 1,50                      |            |            |      |       |
|                                                                  |                                                          |                |      | 5.8              | 1,50                      |            |            |      |       |
|                                                                  |                                                          |                |      | 8.8              | 1,50                      |            |            |      |       |
|                                                                  | Stainless steel R and High corrosion resistant steel HCR |                |      | 50               | 2,86                      |            |            |      |       |
|                                                                  |                                                          |                |      | 70               | 1,50 <sup>2)</sup> / 1,87 |            |            |      |       |
|                                                                  |                                                          |                |      | 80               | 1,60                      |            |            |      |       |
|                                                                  |                                                          |                |      |                  |                           |            |            |      |       |

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

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

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

fischer injection system FIS V Plus for masonry

**Performance**

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

**Annex C1**

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**Table C2.1: Characteristic resistance to steel failure under shear loading of fischer anchor rods and standard threaded rods**

| Anchor rod / standard threaded rod                             |                                                          |     | M6   | M8 <sup>3)</sup>          | M10 <sup>3)</sup> | M12        | M16   |       |
|----------------------------------------------------------------|----------------------------------------------------------|-----|------|---------------------------|-------------------|------------|-------|-------|
| Characteristic resistance to steel failure under shear loading |                                                          |     |      |                           |                   |            |       |       |
| without lever arm                                              |                                                          |     |      |                           |                   |            |       |       |
| Characteristic resistance $V_{Rk,s}$                           | Steel zinc plated                                        | 4.6 | [kN] | 4,8                       | 8,7(7,9)          | 13,9(12,8) | 20,2  | 37,6  |
|                                                                |                                                          | 4.8 |      | 4,8                       | 8,7(7,9)          | 13,9(12,8) | 20,2  | 37,6  |
|                                                                |                                                          | 5.8 |      | 6,0                       | 10,9(9,9)         | 17,4(16,0) | 25,2  | 47,1  |
|                                                                |                                                          | 8.8 |      | 8,0                       | 14,6(13,2)        | 23,2(21,4) | 33,7  | 62,8  |
|                                                                | Stainless steel R and High corrosion resistant steel HCR | 50  |      | 5,0                       | 9,1               | 14,5       | 21,0  | 39,2  |
|                                                                |                                                          | 70  |      | 7,0                       | 12,8              | 20,3       | 29,5  | 54,9  |
|                                                                |                                                          | 80  |      | 8,0                       | 14,6              | 23,2       | 33,7  | 62,8  |
|                                                                |                                                          |     |      |                           |                   |            |       |       |
| with lever arm                                                 |                                                          |     |      |                           |                   |            |       |       |
| Characteristic resistance $M_{Rk,s}^0$                         | Steel zinc plated                                        | 4.6 | [Nm] | 6,1                       | 14,9(12,9)        | 29,9(26,5) | 52,3  | 132,9 |
|                                                                |                                                          | 4.8 |      | 6,1                       | 14,9(12,9)        | 29,9(26,5) | 52,3  | 132,9 |
|                                                                |                                                          | 5.8 |      | 7,6                       | 18,7(16,1)        | 37,3(33,2) | 65,4  | 166,2 |
|                                                                |                                                          | 8.8 |      | 12,2                      | 29,9(25,9)        | 59,8(53,1) | 104,6 | 265,9 |
|                                                                | Stainless steel R and High corrosion resistant steel HCR | 50  |      | 7,6                       | 18,7              | 37,3       | 65,4  | 166,2 |
|                                                                |                                                          | 70  |      | 10,6                      | 26,2              | 52,3       | 91,5  | 232,6 |
|                                                                |                                                          | 80  |      | 12,2                      | 29,9              | 59,8       | 104,6 | 265,9 |
|                                                                |                                                          |     |      |                           |                   |            |       |       |
| Partial factors <sup>1)</sup>                                  |                                                          |     |      |                           |                   |            |       |       |
| Partial factors $\gamma_{Ms,V}$                                | Steel zinc plated                                        | 4.6 | [-]  | 1,67                      |                   |            |       |       |
|                                                                |                                                          | 4.8 |      | 1,25                      |                   |            |       |       |
|                                                                |                                                          | 5.8 |      | 1,25                      |                   |            |       |       |
|                                                                |                                                          | 8.8 |      | 1,25                      |                   |            |       |       |
|                                                                | Stainless steel R and High corrosion resistant steel HCR | 50  |      | 2,38                      |                   |            |       |       |
|                                                                |                                                          | 70  |      | 1,25 <sup>2)</sup> / 1,56 |                   |            |       |       |
|                                                                |                                                          | 80  |      | 1,33                      |                   |            |       |       |
|                                                                |                                                          |     |      |                           |                   |            |       |       |

1) In absence of other national regulations

2) Only for fischer FIS A made of high corrosion resistant steel HCR

3) Values in brackets are valid for undersized threaded rods with smaller stress area  $A_s$  for hot-dip galvanised standard threaded rods (M8 resp. M10) according to EN ISO 10684:2004+AC:2009.

fischer injection system FIS V Plus for masonry

#### Performance

Characteristic resistance to steel failure under shear loading of fischer anchor rods and standard threaded rods

#### Annex C2

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

| fischer internal threaded anchor FIS E                                                                                                      |                                |                       |      | M6   | M8   | M10  | M12  |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|------|------|------|------|------|
| Characteristic resistance to steel failure under tension loading, decisive values of internal threaded anchor FIS E with screw/threaded rod |                                |                       |      |      |      |      |      |
| Characteristic resistance                                                                                                                   | N <sub>Rk,s</sub>              | Property class 4.6    | [kN] | 8,0  | 14,6 | 23,2 | 33,7 |
|                                                                                                                                             |                                | Property class 5.8    |      | 10,0 | 18,3 | 29,0 | 42,1 |
|                                                                                                                                             |                                | Property class R      |      | 14,0 | 25,6 | 40,6 | 59,0 |
|                                                                                                                                             |                                | Property class 70 HCR |      | 14,0 | 25,6 | 40,6 | 59,0 |
| Partial factors <sup>1)</sup>                                                                                                               |                                |                       |      |      |      |      |      |
| Partial factors                                                                                                                             | γ <sub>Ms,N</sub>              | Property class 4.6    | [-]  | 2,00 |      |      |      |
|                                                                                                                                             |                                | Property class 5.8    |      | 1,50 |      |      |      |
|                                                                                                                                             |                                | Property class R      |      | 1,87 |      |      |      |
|                                                                                                                                             |                                | Property class 70 HCR |      | 1,87 |      |      |      |
| Characteristic resistance to steel failure under shear loading; decisive values of internal threaded anchor FIS E with screw/threaded rod   |                                |                       |      |      |      |      |      |
| without lever arm                                                                                                                           |                                |                       |      |      |      |      |      |
| Characteristic resistance                                                                                                                   | V <sub>Rk,s</sub>              | Property class 4.6    | [kN] | 4,8  | 8,7  | 13,9 | 20,2 |
|                                                                                                                                             |                                | Property class 5.8    |      | 5    | 9    | 15   | 21   |
|                                                                                                                                             |                                | Property class R      |      | 7,0  | 12,8 | 20,3 | 29,5 |
|                                                                                                                                             |                                | Property class 70 HCR |      | 7,0  | 12,8 | 20,3 | 29,5 |
| with lever arm                                                                                                                              |                                |                       |      |      |      |      |      |
| Characteristic resistance                                                                                                                   | M <sup>0</sup> <sub>Rk,s</sub> | Property class 4.6    | [Nm] | 6,1  | 14,9 | 29,9 | 52,3 |
|                                                                                                                                             |                                | Property class 5.8    |      | 7,6  | 18,7 | 37,3 | 65,4 |
|                                                                                                                                             |                                | Property class R      |      | 10,6 | 26,2 | 52,3 | 91,5 |
|                                                                                                                                             |                                | Property class 70 HCR |      | 10,6 | 26,2 | 52,3 | 91,5 |
| Partial factors <sup>1)</sup>                                                                                                               |                                |                       |      |      |      |      |      |
| Partial factors                                                                                                                             | γ <sub>Ms,V</sub>              | Property class 4.6    | [-]  | 1,67 |      |      |      |
|                                                                                                                                             |                                | Property class 5.8    |      | 1,25 |      |      |      |
|                                                                                                                                             |                                | Property class R      |      | 1,56 |      |      |      |
|                                                                                                                                             |                                | Property class 70 HCR |      | 1,56 |      |      |      |

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

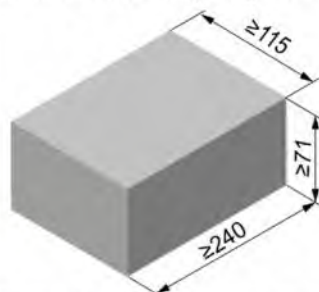
fischer injection system FIS V Plus for masonry

**Performance**

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

**Annex C3**

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


|                                                                                  |                       |                               |         |          |
|----------------------------------------------------------------------------------|-----------------------|-------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                               |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                      | width W | height H |
|                                                                                  |                       | ≥ 240                         | ≥ 115   | ≥ 71     |
| Mean gross dry density ρ                                                         | [kg/dm³]              | ≥ 1,8                         |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm²]               | 15 / 12 or 25 / 20 or 35 / 28 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                               |         |          |

**Table C4.1:** Installation parameters for edge distance  $c=100\text{mm}$ 

| Anchor rod                                                              |      | M6                             | M8  | M10 | M12 | -     |     | -     |     |  |
|-------------------------------------------------------------------------|------|--------------------------------|-----|-----|-----|-------|-----|-------|-----|--|
| Internal threaded anchor FIS E                                          |      | -                              | -   | -   | -   | M6    | M8  | M10   | M12 |  |
|                                                                         |      |                                |     |     |     | 11x85 |     | 15x85 |     |  |
| Anchor rod and internal threaded anchor FIS E without perforated sleeve |      |                                |     |     |     |       |     |       |     |  |
| Effective anchorage depth<br>$h_{ef}$                                   | [mm] | 50                             | 50  | 50  | 50  | 85    |     |       |     |  |
|                                                                         |      | 80                             | 80  | 80  | 80  |       |     |       |     |  |
|                                                                         |      | 200                            | 200 | 200 | 200 |       |     |       |     |  |
| Max. installation torque<br>$\max T_{inst}$                             | [Nm] | 4                              | 10  |     |     | 4     | 10  |       |     |  |
| General installation parameters                                         |      |                                |     |     |     |       |     |       |     |  |
| Edge distance<br>$C_{min} = C_{Cr}$                                     | [mm] | 100                            |     |     |     | 100   |     |       |     |  |
| Edge distance $h_{ef}=200$<br>$C_{min} = C_{Cr}$                        |      | 150                            |     |     |     | 2)    |     |       |     |  |
| Spacing                                                                 |      | $S_{min II,N}$                 | 60  |     |     |       | 60  |       |     |  |
|                                                                         |      | $h_{ef}=200 S_{min II,N}$      | 240 |     |     |       | 2)  |       |     |  |
|                                                                         |      | $S_{min II,V}$                 | 240 |     |     |       | 240 |       |     |  |
|                                                                         |      | $S_{Cr II}$                    | 240 |     |     |       | 240 |       |     |  |
|                                                                         |      | $S_{Cr \perp} = S_{min \perp}$ | 75  |     |     |       | 75  |       |     |  |

**Drilling method**

Hammer drilling with hard metal hammer drill

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

<sup>2)</sup> No performance assessed

**Table C4.2:** Group factors

| Anchor rods                    |                                               | M6   | M8  | M10 | M12 | -     |    | -     |     |
|--------------------------------|-----------------------------------------------|------|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor FIS E |                                               | -    | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                |                                               |      |     |     |     | 11x85 |    | 15x85 |     |
| Edge distance                  | Cmin                                          | [mm] | 100 |     |     |       |    |       |     |
| Group factor                   | $\alpha_{q,N} (s_{min} \parallel)$            | [-]  | 1,5 |     |     |       |    |       |     |
|                                | $\alpha_{q,V} (s_{min} \parallel)$            |      | 2,0 |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{q,N} (s_{min} \parallel)$ |      | 1,5 |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{q,V} (s_{min} \parallel)$ |      | 2,0 |     |     |       |    |       |     |
|                                | $\alpha_{q,N} (s_{min} \perp)$                |      | 2,0 |     |     |       |    |       |     |
|                                | $\alpha_{q,V} (s_{min} \perp)$                |      | 2,0 |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{q,N} (s_{min} \perp)$     |      | 2,0 |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{q,V} (s_{min} \perp)$     |      | 2,0 |     |     |       |    |       |     |

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**Performance**

 Solid brick Mz, NF, dimensions, installation parameters for edge distance  $c=100\text{mm}$ ,  
Group factors

**Annex C4**

**Solid brick Mz, NF, EN 771-1:211+A1:2015**
**Table C5.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading for edge distance  $c=100\text{mm}$ 

| Anchor rod                                                                                                                                        | M6             | M8                                             | M10 | M12 | -     |     | -     |     |     |      |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------|-----|-----|-------|-----|-------|-----|-----|------|-----|
| Internal threaded anchor FIS E                                                                                                                    | -              | -                                              | -   | -   | M6    | M8  | M10   | M12 |     |      |     |
|                                                                                                                                                   |                |                                                |     |     | 11x85 |     | 15x85 |     |     |      |     |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                |                                                |     |     |       |     |       |     |     |      |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                                                  | Use conditions | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |       |     |       |     |     |      |     |
|                                                                                                                                                   |                | ≥50                                            | ≥50 | 50  | 80    | 200 | 50    | 80  | 200 | 85   |     |
| 15 / 12 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d                                            | 2,5 | 2,5 | 2,0   | 3,0 | 7,5   | 2,0 | 3,5 | 5,0  | 3,5 |
|                                                                                                                                                   | d/d            |                                                | 4,0 | 4,0 | 3,5   | 5,0 | 12,0  | 3,0 | 5,5 | 8,0  | 5,5 |
| 25 / 20 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d                                            | 3,5 | 3,5 | 3,0   | 4,5 | 11,0  | 3,0 | 5,0 | 7,0  | 5,0 |
|                                                                                                                                                   | d/d            |                                                | 5,5 | 5,5 | 5,0   | 7,0 | 12,0  | 4,5 | 8,0 | 11,5 | 8,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ\text{C})} = 0,83 \cdot N_{Rk(50/80^\circ\text{C})}$ .

**Table C5.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading for edge distance  $c=100\text{mm}$ 

| Anchor rod                                                                                                                    | M6             | M8                                             | M10 | M12 | -     |     | -     |     |
|-------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------|-----|-----|-------|-----|-------|-----|
| Internal threaded anchor FIS E                                                                                                | -              | -                                              | -   | -   | M6    | M8  | M10   | M12 |
|                                                                                                                               |                |                                                |     |     | 11x85 |     | 15x85 |     |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,⊥</sub> [kN]; temperature range 50/80°C and 72/120°C |                |                                                |     |     |       |     |       |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                              | Use conditions | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |       |     |       |     |
|                                                                                                                               |                | ≥50                                            | ≥50 | ≥50 | 200   | ≥50 | 200   | 85  |
| 15 / 12 N/mm <sup>2</sup>                                                                                                     | w/w            | 2,5                                            | 2,5 | 4,0 | 8,5   | 4,0 | 11,5  | 2,5 |
|                                                                                                                               | w/d            |                                                |     |     |       |     |       |     |
| 25 / 20 N/mm <sup>2</sup>                                                                                                     | w/w            | 4,0                                            | 4,0 | 6,0 | 12,0  | 5,5 | 12,0  | 4,0 |
|                                                                                                                               | w/d            |                                                |     |     |       |     |       |     |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

**Performance**

Solid brick Mz, NF, Characteristic resistance under tension and shear loading, edge distance  $c=100\text{mm}$

**Annex C5**

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**Solid brick Mz, NF, EN 771-1:2011+A1:2015**
**Table C6.1:** Installation parameters for edge distance  $c=60\text{mm}$ 

| Anchor rod                                                              |      | M6          | M8  | M10 | M12 | M16 | -     |    | -     |     |
|-------------------------------------------------------------------------|------|-------------|-----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor FIS E                                          |      | -           | -   | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                                                         |      |             |     |     |     |     | 11x85 |    | 15x85 |     |
| Anchor rod and internal threaded anchor FIS E without perforated sleeve |      |             |     |     |     |     |       |    |       |     |
| Effective anchorage depth $h_{ef}$                                      | [mm] | 50          | 50  | 50  | 50  | 50  | 85    |    |       |     |
|                                                                         |      | 100         | 100 | 100 | 100 | 100 |       |    |       |     |
|                                                                         |      | 200         | 200 | 200 | 200 | 200 |       |    |       |     |
| Max. installation torque $\max T_{inst}$                                | [Nm] | 4           | 10  |     |     |     | 4     | 10 |       |     |
| General installation parameters                                         |      |             |     |     |     |     |       |    |       |     |
| Edge distance $c_{min} = c_{cr}$                                        | [mm] | 60          |     |     |     |     |       |    |       |     |
| Edge distance $c_{min}$<br>$h_{ef}=200$                                 |      | 60          |     |     |     |     |       |    |       |     |
| $s_{min II,N}$                                                          |      | 80          |     |     |     |     |       |    |       |     |
| $h_{ef}=200 s_{min II,N}$                                               |      | 80          |     |     |     |     |       |    |       |     |
| $s_{min II,v}$                                                          |      | 80          |     |     |     |     |       |    |       |     |
| Spacing $s_{cr II}$                                                     |      | $3x h_{ef}$ |     |     |     |     |       |    |       |     |
| $s_{min \perp}$                                                         |      | 80          |     |     |     |     |       |    |       |     |
| $s_{cr \perp}$                                                          |      | $3x h_{ef}$ |     |     |     |     |       |    |       |     |
| Drilling method                                                         |      |             |     |     |     |     |       |    |       |     |
| Hammer drilling with hard metal hammer drill                            |      |             |     |     |     |     |       |    |       |     |

**Table C6.2:** Group factors

| Anchor rods                       |                                                   |      | M6  | M8 | M10 | M12 | M16 | -     |    | -     |     |
|-----------------------------------|---------------------------------------------------|------|-----|----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor<br>FIS E |                                                   |      | -   | -  | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                   |                                                   |      |     |    |     |     |     | 11x85 |    | 15x85 |     |
| Edge distance                     | c <sub>min</sub>                                  | [mm] | 60  |    |     |     |     |       |    |       |     |
| Group factor                      | $\alpha_{g,N}$ (s <sub>min</sub> II)              | [-]  | 0,6 |    |     |     |     |       |    |       |     |
|                                   | $\alpha_{g,V}$ (s <sub>min</sub> II)              |      | 1,3 |    |     |     |     |       |    |       |     |
|                                   | $h_{ef}=200$ $\alpha_{g,N}$ (s <sub>min</sub> II) |      | 1,4 |    |     |     |     |       |    |       |     |
|                                   | $h_{ef}=200$ $\alpha_{g,V}$ (s <sub>min</sub> II) |      | 1,5 |    |     |     |     |       |    |       |     |
|                                   | $\alpha_{g,N}$ (s <sub>min</sub> ⊥)               |      | 0,3 |    |     |     |     |       |    |       |     |
|                                   | $\alpha_{g,V}$ (s <sub>min</sub> ⊥)               |      | 1,3 |    |     |     |     |       |    |       |     |
|                                   | $h_{ef}=200$ $\alpha_{g,N}$ (s <sub>min</sub> ⊥)  |      | 2,0 |    |     |     |     |       |    |       |     |
|                                   | $h_{ef}=200$ $\alpha_{g,V}$ (s <sub>min</sub> ⊥)  |      | 1,1 |    |     |     |     |       |    |       |     |

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**Performance**

 Solid brick Mz, NF, dimensions, installation parameters, edge distance  $c=60\text{mm}$ , Group factors

**Annex C6**

**Solid brick Mz, NF, EN 771-1:2011+A1:2015**
**Table C7.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading for edge distance  $c=60\text{mm}$ 

| Anchor rod                        | M6 | M8 | M10 | M12 | M16 | -           | -           |
|-----------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor<br>FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

 $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>3)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions | Effective anchorage depth $h_{ef}$ [mm] |     |     |     |     |                 |     |     |                 |     |     |                 | 85              |
|----------------------------------------------------------------------------------|----------------|-----------------------------------------|-----|-----|-----|-----|-----------------|-----|-----|-----------------|-----|-----|-----------------|-----------------|
|                                                                                  |                | 50                                      | 100 | 50  | 100 | 50  | 100             | 200 | 50  | 100             | 200 | 50  | 100             | 200             |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w            | 1,5                                     | 2,0 | 2,0 | 2,0 | 2,5 | - <sup>2)</sup> | 2,0 | 2,5 | - <sup>2)</sup> | 2,0 | 5,5 | - <sup>2)</sup> | - <sup>2)</sup> |
|                                                                                  | d/d            | 2,5                                     | 3,0 | 4,0 | 3,0 | 4,0 | 9,5             | 3,0 | 4,0 | 9,5             | 3,0 | 8,5 | 9,5             | - <sup>2)</sup> |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | 2,0                                     | 2,5 | 3,0 | 2,5 | 3,5 | - <sup>2)</sup> | 3,0 | 3,5 | - <sup>2)</sup> | 3,0 | 7,5 | - <sup>2)</sup> | - <sup>2)</sup> |
|                                                                                  | d/d            | 3,5                                     | 4,5 | 5,5 | 4,5 | 5,5 | 12              | 4,5 | 5,5 | 12              | 4,5 | 12  | 12              | - <sup>2)</sup> |
| 35 / 28 N/mm <sup>2</sup>                                                        | w/w            | 2,5                                     | 3,0 | 4,0 | 3,0 | 4,0 | - <sup>2)</sup> | 3,5 | 4,0 | - <sup>2)</sup> | 3,5 | 9,0 | - <sup>2)</sup> | - <sup>2)</sup> |
|                                                                                  | d/d            | 4,0                                     | 5,5 | 6,5 | 5,5 | 6,5 | 12              | 5,5 | 6,5 | 12              | 5,5 | 12  | 12              | - <sup>2)</sup> |

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

<sup>2)</sup> No performance assessed.

<sup>3)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ\text{C})} = 0,83 \cdot N_{Rk(50/80^\circ\text{C})}$ .

**Table C7.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading for edge distance  $c=60\text{mm}$ 

| Anchor rod                        | M6 | M8 | M10 | M12 | M16 | -           | -           |
|-----------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor<br>FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions    | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |     |     |     |     |     |     |     |     |     |                 |
|----------------------------------------------------------------------------------|-------------------|------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
|                                                                                  |                   | 50                                             | 100 | 50  | 100 | 50  | 100 | 200 | 50  | 100 | 200 | 50  | 100 | 200 | 85              |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w<br>w/d<br>d/d | 1,2                                            | 2,5 | 1,2 | 3,0 | 2,0 | 3,0 | 1,5 | 1,5 | 3,0 | 3,0 | 0,6 | 3,0 | 4,5 | - <sub>2)</sub> |
| 25 / 20 N/mm <sup>2</sup>                                                        |                   | 1,5                                            | 3,5 | 1,5 | 4,5 | 3,0 | 4,5 | 2,5 | 2,0 | 4,5 | 4,5 | 0,9 | 4,5 | 6,0 | - <sub>2)</sub> |
| 35 / 28 N/mm <sup>2</sup>                                                        |                   | 2,0                                            | 4,0 | 2,0 | 5,0 | 3,5 | 5,0 | 3,0 | 2,5 | 5,0 | 5,0 | 1,2 | 5,0 | 7,5 | - <sub>2)</sub> |

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

<sup>2)</sup> No performance assessed.

Factor for job site tests and displacements see annex C123.

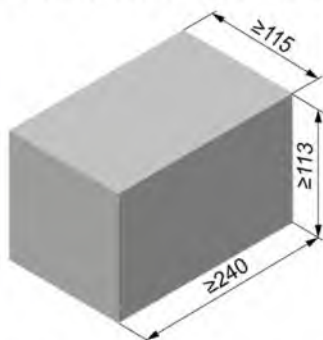
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**Performance**

Solid brick Mz, NF, Characteristic resistance under tension and shear loading, edge distance  $c=60\text{mm}$ 
**Annex C7**

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# Solid brick Mz, 2DF, EN 771-1:2011+A1:2015



|                                                                                  |                       |                      |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                      |         |          |
| Nominal dimensions                                                               | [mm]                  | length L             | width W | height H |
|                                                                                  |                       | ≥ 240                | ≥ 115   | ≥ 113    |
| Mean gross dry density ρ                                                         | [kg/dm³]              | ≥ 1,8                |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm²]               | 12,5 / 10 or 20 / 16 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                      |         |          |

**Table C8.1:** Installation parameters

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

## Anchor rod and internal threaded anchor FIS E without perforated sleeve

|                                          |      |    |     |    |     |    |     |    |     |    |     |    |    |
|------------------------------------------|------|----|-----|----|-----|----|-----|----|-----|----|-----|----|----|
| Effective anchorage depth $h_{ef}$       | [mm] | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 100 | 85 |    |
| Max. installation torque $\max T_{inst}$ | [Nm] | 4  |     | 10 |     |    |     |    |     |    |     | 4  | 10 |

## Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H 16x85 K

|                                          |      |     |    |     |    |     |
|------------------------------------------|------|-----|----|-----|----|-----|
| Effective anchorage depth $h_{ef}$       | [mm] | _2) | 85 | _2) | 85 | _2) |
| Max. installation torque $\max T_{inst}$ | [Nm] |     | 10 |     | 4  | 10  |

## General installation parameters

|                                        |      |     |
|----------------------------------------|------|-----|
| Edge distance $c_{min} = c_{cr}$       | [mm] | 60  |
| Spacing $s_{min II}$                   |      | 120 |
| Spacing $s_{cr II}$                    |      | 240 |
| Spacing $s_{cr \perp} = s_{min \perp}$ |      | 115 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

<sup>2)</sup> No performance assessed.

**Table C8.2:** Group factors

| Anchor rods                    | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

|              |                                |     |     |
|--------------|--------------------------------|-----|-----|
| Group factor | $\alpha_{g,N} (s_{min II})$    | [-] | 1,5 |
|              | $\alpha_{g,V} (s_{min II})$    |     | 1,4 |
|              | $\alpha_{g,N} (s_{min \perp})$ |     | 2,0 |
|              | $\alpha_{g,V} (s_{min \perp})$ |     |     |

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## Performance

Solid brick Mz, 2DF, dimensions, installation parameters, Group factors

## Annex C8

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**Solid brick Mz, 2DF, EN 771-1:2011+A1:2015**
**Table C9.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

|                                                                                                                                                   |                |     |                                                |     |     |     |     |     |     |     |       |     |         |  |       |     |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-------|-----|---------|--|-------|-----|-------|
| Anchor rod                                                                                                                                        | M6             |     | M8                                             |     | M10 |     | M12 |     | M16 |     | -     |     | -       |  | M8    | M10 | -     |
| Internal threaded anchor FIS E                                                                                                                    | -              |     | -                                              |     | -   |     | -   |     | -   |     | M6 M8 |     | M10 M12 |  | -     | -   | M6 M8 |
|                                                                                                                                                   |                |     |                                                |     |     |     |     |     |     |     | 11x85 |     | 15x85   |  |       |     | 11x85 |
| Perforated sleeve FIS H K                                                                                                                         | -              |     | -                                              |     | -   |     | -   |     | -   |     | -     |     | -       |  | 16x85 |     |       |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                |     |                                                |     |     |     |     |     |     |     |       |     |         |  |       |     |       |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                                                  | Use conditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |     |     |     |     |       |     |         |  |       |     |       |
|                                                                                                                                                   |                |     | 50                                             | 100 | 50  | 100 | 50  | 100 | 50  | 100 | 50    | 100 | 85      |  |       |     |       |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       | w/w            | w/d | 1,5                                            | 2,5 | 1,5 | 2,5 | 1,5 | 3,0 | 2,0 | 3,5 | 2,0   | 3,5 | 2,0     |  |       | 1,5 |       |
|                                                                                                                                                   | d/d            |     | 3,0                                            | 4,0 | 3,0 | 4,0 | 3,0 | 4,5 | 3,0 | 5,5 | 3,0   | 5,5 | 3,0     |  |       | 3,0 |       |
| 20 / 16 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d | 2,5                                            | 4,0 | 2,5 | 4,0 | 2,5 | 4,5 | 3,5 | 5,5 | 3,5   | 5,5 | 3,5     |  |       | 2,5 |       |
|                                                                                                                                                   | d/d            |     | 4,5                                            | 7,0 | 4,5 | 7,0 | 4,5 | 7,5 | 5,5 | 8,0 | 5,5   | 8,0 | 5,5     |  |       | 4,5 |       |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

**Table C9.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

|                                                                                                                               |                |                                                |     |     |     |       |     |       |     |       |     |       |     |     |
|-------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------|-----|-----|-----|-------|-----|-------|-----|-------|-----|-------|-----|-----|
| Anchor rod                                                                                                                    | M6             | M8                                             | M10 | M12 | M16 | -     |     | -     |     | M8    | M10 | -     |     |     |
| Internal threaded anchor FIS E                                                                                                | -              | -                                              | -   | -   | -   | M6    | M8  | M10   | M12 | -     | -   | M6    | M8  |     |
|                                                                                                                               |                |                                                |     |     |     | 11x85 |     | 15x85 |     |       |     | 11x85 |     |     |
| Perforated sleeve FIS H K                                                                                                     | -              | -                                              | -   | -   | -   | -     |     | -     |     | 16x85 |     |       |     |     |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,⊥</sub> [kN]; temperature range 50/80°C and 72/120°C |                |                                                |     |     |     |       |     |       |     |       |     |       |     |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                              | Use conditions | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |       |     |       |     |       |     |       |     |     |
|                                                                                                                               |                | ≥ 50                                           |     |     |     |       |     | 85    |     |       |     |       |     |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                   | w/w            | 2,5                                            | 3,0 | 3,0 | 3,5 | 3,0   | 2,5 | 3,0   | 3,0 | 3,0   | 3,0 | 3,5   | 2,5 | 3,0 |
|                                                                                                                               | w/d            |                                                |     |     |     |       |     |       |     |       |     |       |     |     |
| 20 / 16 N/mm <sup>2</sup>                                                                                                     | w/w            | 4,0                                            | 5,0 | 5,5 | 5,5 | 5,0   | 4,0 | 5,0   | 5,0 | 5,0   | 5,0 | 6,0   | 4,0 | 5,0 |
|                                                                                                                               | w/d            |                                                |     |     |     |       |     |       |     |       |     |       |     |     |
|                                                                                                                               | d/d            |                                                |     |     |     |       |     |       |     |       |     |       |     |     |

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

Factor for job site tests and displacements see annex C123.

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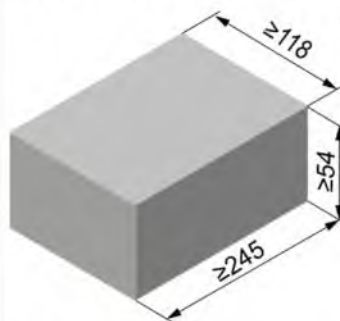
**Performance**

Solid brick Mz, 2DF, Characteristic resistance under tension and shear loading

**Annex C9**

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



|                                                                                  |                       |                      |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------------------|---------|----------|
| Producer                                                                         | e.g. Nigra            |                      |         |          |
| Nominal dimensions                                                               | [mm]                  | length L             | width W | height H |
|                                                                                  |                       | ≥ 245                | ≥ 118   | ≥ 54     |
| Mean gross dry density ρ                                                         | [kg/dm³]              | ≥ 1,8                |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm²]               | 12,5 / 10 or 25 / 20 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                      |         |          |

**Table C10.1:** Installation parameters

| Anchor rod                                                              |                                        | M6   |     | M8  |    | M10 |    | M12 |    | M16 |    | -     |    | -     |    |     |  |     |  |
|-------------------------------------------------------------------------|----------------------------------------|------|-----|-----|----|-----|----|-----|----|-----|----|-------|----|-------|----|-----|--|-----|--|
| Internal threaded anchor<br>FIS E                                       |                                        | -    |     | -   |    | -   |    | -   |    | -   |    | M6    |    | M8    |    | M10 |  | M12 |  |
|                                                                         |                                        |      |     |     |    |     |    |     |    |     |    | 11x85 |    | 15x85 |    |     |  |     |  |
| Anchor rod and internal threaded anchor FIS E without perforated sleeve |                                        |      |     |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |
| Effective anchorage depth                                               | $h_{ef}$                               | [mm] | 50  | 100 | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 100   | 85 |       |    |     |  |     |  |
| Max. installation torque                                                | $\max T_{inst}$                        | [Nm] | 4   |     | 10 |     |    |     |    |     |    |       | 4  |       | 10 |     |  |     |  |
| General installation parameters                                         |                                        |      |     |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |
| Edge distance                                                           | $c_{min} = c_{cr}$                     | [mm] | 60  |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |
| Spacing                                                                 | $s_{cr \parallel} = s_{min \parallel}$ |      | 245 |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |
|                                                                         | $s_{cr \perp} = s_{min \perp}$         |      | 60  |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |
| Drilling method                                                         |                                        |      |     |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |
| Hammer drilling with hard metal hammer drill                            |                                        |      |     |     |    |     |    |     |    |     |    |       |    |       |    |     |  |     |  |

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

**Table C10.2:** Group factors

|                                |                                                                                                                                              |    |     |     |     |             |             |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----|-----|-----|-----|-------------|-------------|
| Anchor rods                    | M6                                                                                                                                           | M8 | M10 | M12 | M16 | -           | -           |
| Internal threaded anchor FIS E | -                                                                                                                                            | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |
| Group factor                   | $\alpha_{g,N} (s_{min \parallel})$<br>$\alpha_{g,V} (s_{min \parallel})$<br>$\alpha_{g,N} (s_{min \perp})$<br>$\alpha_{g,V} (s_{min \perp})$ | 2  |     |     |     |             |             |

fischer injection system FIS V Plus for masonry

## Performance

Solid brick Mz, dimensions, installation parameters, Group factors

## Annex C10

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**Solid brick Mz, EN 771-1:2011+A1:2015****Table C11.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |  |                        | M6                                             | M8   | M10  | M12  | M16  | -     |      | -     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------|------------------------------------------------|------|------|------|------|-------|------|-------|-----|
| Internal threaded anchor FIS E                                                                                                                    |  |                        | -                                              | -    | -    | -    | -    | M6    | M8   | M10   | M12 |
|                                                                                                                                                   |  |                        |                                                |      |      |      |      | 11x85 |      | 15x85 |     |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |  |                        |                                                |      |      |      |      |       |      |       |     |
| Mean compressive strength/<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                             |  | Use<br>con-<br>ditions | Effective anchorage depth h <sub>ef</sub> [mm] |      |      |      |      |       |      |       |     |
|                                                                                                                                                   |  |                        | ≥ 50                                           |      |      |      |      | 85    |      |       |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       |  | w/w                    | w/d                                            | 0,60 | 0,90 | 0,75 | 0,75 | 0,75  | 0,60 | 0,75  |     |
|                                                                                                                                                   |  | d/d                    |                                                | 1,20 | 1,50 | 1,20 | 1,20 | 1,20  | 1,20 | 1,20  |     |
| 25 / 20 N/mm <sup>2</sup>                                                                                                                         |  | w/w                    | w/d                                            | 0,90 | 1,50 | 1,20 | 1,20 | 1,20  | 0,90 | 1,20  |     |
|                                                                                                                                                   |  | d/d                    |                                                | 1,50 | 2,50 | 2,00 | 2,00 | 2,00  | 1,50 | 2,00  |     |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

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

| Anchor rod                                                                                                                    | M6             |     | M8                                             |     | M10 |     | M12 |     | M16 |     | -     |    | -     |     |
|-------------------------------------------------------------------------------------------------------------------------------|----------------|-----|------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor FIS E                                                                                                | -              |     | -                                              |     | -   |     | -   |     | -   |     | M6    | M8 | M10   | M12 |
|                                                                                                                               |                |     |                                                |     |     |     |     |     |     |     | 11x85 |    | 15x85 |     |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,⊥</sub> [kN]; temperature range 50/80°C and 72/120°C |                |     |                                                |     |     |     |     |     |     |     |       |    |       |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                              | Use conditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |     |     |     |     |       |    |       |     |
|                                                                                                                               |                |     | ≥ 50                                           |     |     |     |     | 85  |     |     |       |    |       |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                   | w/w            | w/d | 2,0                                            | 3,0 | 4,0 | 4,5 | 5,5 | 2,0 | 3,0 | 4,0 | 4,5   |    |       |     |
|                                                                                                                               | d/d            |     |                                                |     |     |     |     |     |     |     |       |    |       |     |
| 25 / 20 N/mm <sup>2</sup>                                                                                                     | w/w            | w/d | 2,5                                            | 4,0 | 5,5 | 6,0 | 8,0 | 2,5 | 4,0 | 5,5 | 6,0   |    |       |     |
|                                                                                                                               | d/d            |     |                                                |     |     |     |     |     |     |     |       |    |       |     |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

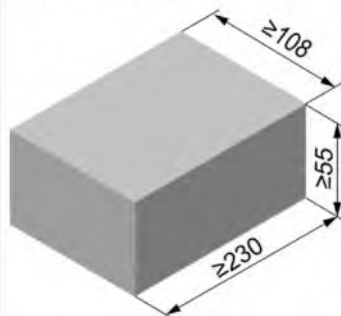
**Performance**

Solid brick Mz, Characteristic resistance under tension and shear loading

**Annex C11**

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



|                                                                                  |                       |                      |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                      |         |          |
| Nominal dimensions                                                               | [mm]                  | length L             | width W | height H |
|                                                                                  |                       | ≥ 230                | ≥ 108   | ≥ 55     |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | ≥ 1,8                |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 12,5 / 10 or 25 / 20 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                      |         |          |

**Table C12.1:** Installation parameters

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

## Anchor rod and internal threaded anchor FIS E without perforated sleeve

|                           |                 |      |    |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|-----------------|------|----|----|----|----|----|----|----|----|----|----|----|----|
| Effective anchorage depth | $h_{ef}$        | [mm] | 50 | 90 | 50 | 90 | 50 | 90 | 50 | 90 | 50 | 90 | 85 |    |
| Max. installation torque  | $\max T_{inst}$ | [Nm] | 4  |    | 10 |    |    |    |    |    |    |    | 4  | 10 |

## General installation parameters

|                                                |      |     |  |  |  |  |  |  |  |  |  |
|------------------------------------------------|------|-----|--|--|--|--|--|--|--|--|--|
| Edge distance $c_{min} = c_{cr}$               | [mm] | 60  |  |  |  |  |  |  |  |  |  |
| Spacing $s_{cr \parallel} = s_{min \parallel}$ |      | 230 |  |  |  |  |  |  |  |  |  |
| $s_{cr \perp} = s_{min \perp}$                 |      | 60  |  |  |  |  |  |  |  |  |  |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C12.2:** Group factors

| Anchor rods                    | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

|              |                                                                                                                                              |     |   |  |  |  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|---|--|--|--|
| Group factor | $\alpha_{g,N} (s_{min \parallel})$<br>$\alpha_{g,V} (s_{min \parallel})$<br>$\alpha_{g,N} (s_{min \perp})$<br>$\alpha_{g,V} (s_{min \perp})$ | [-] | 2 |  |  |  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|---|--|--|--|

fischer injection system FIS V Plus for masonry

### Performance

Solid brick Mz, dimensions, installation parameters, Group factors

### Annex C12

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

**Table C13.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |  |                | M6                                             | M8   | M10  | M12  | M16  | -     |      | -     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------|------------------------------------------------|------|------|------|------|-------|------|-------|-----|
| Internal threaded anchor FIS E                                                                                                                    |  |                | -                                              | -    | -    | -    | -    | M6    | M8   | M10   | M12 |
|                                                                                                                                                   |  |                |                                                |      |      |      |      | 11x85 |      | 15x85 |     |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |  |                |                                                |      |      |      |      |       |      |       |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                                                  |  | Use conditions | Effective anchorage depth h <sub>ef</sub> [mm] |      |      |      |      |       |      |       |     |
|                                                                                                                                                   |  |                | ≥ 50                                           |      |      |      |      | 85    |      |       |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       |  | w/w            | w/d                                            | 0,60 | 0,90 | 0,75 | 0,75 | 0,75  | 0,75 |       |     |
|                                                                                                                                                   |  | d/d            |                                                | 1,20 | 1,50 | 1,20 | 1,20 | 1,20  | 1,20 |       |     |
| 25 / 20 N/mm <sup>2</sup>                                                                                                                         |  | w/w            | w/d                                            | 0,90 | 1,50 | 1,20 | 1,20 | 1,20  | 1,20 |       |     |
|                                                                                                                                                   |  | d/d            |                                                | 1,50 | 2,50 | 2,00 | 2,00 | 2,00  | 2,00 |       |     |

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

<sup>2)</sup> For temperature range 72/120°C: N<sub>Rk</sub> (72/120°C) = 0,83 · N<sub>Rk</sub> (50/80°C).

**Table C13.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                                    |  |                | M6  | M8                                             | M10 | M12 | M16 | -     |     | -     |     |     |
|-------------------------------------------------------------------------------------------------------------------------------|--|----------------|-----|------------------------------------------------|-----|-----|-----|-------|-----|-------|-----|-----|
| Internal threaded anchor FIS E                                                                                                |  |                | -   | -                                              | -   | -   | -   | M6    | M8  | M10   | M12 |     |
|                                                                                                                               |  |                |     |                                                |     |     |     | 11x85 |     | 15x85 |     |     |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,⊥</sub> [kN]; temperature range 50/80°C and 72/120°C |  |                |     |                                                |     |     |     |       |     |       |     |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                              |  | Use conditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |       |     |       |     |     |
|                                                                                                                               |  |                |     | ≥ 50                                           |     |     |     |       | 85  |       |     |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                   |  | w/w            | w/d | 2,0                                            | 3,0 | 4,0 | 4,5 | 5,5   | 2,0 | 3,0   | 4,0 | 4,5 |
|                                                                                                                               |  | d/d            |     |                                                |     |     |     |       |     |       |     |     |
| 25 / 20 N/mm <sup>2</sup>                                                                                                     |  | w/w            | w/d | 2,5                                            | 4,0 | 5,5 | 6,0 | 8,0   | 2,5 | 4,0   | 5,5 | 6,0 |
|                                                                                                                               |  | d/d            |     |                                                |     |     |     |       |     |       |     |     |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

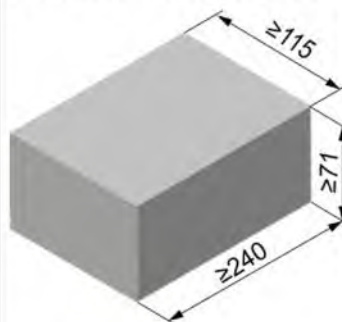
## Performance

Solid brick Mz, Characteristic resistance under tension and shear loading

## Annex C13

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



|                                                                                  |                       |                               |         |          |
|----------------------------------------------------------------------------------|-----------------------|-------------------------------|---------|----------|
| Producer                                                                         | -                     |                               |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                      | width W | height H |
|                                                                                  |                       | ≥ 240                         | ≥ 115   | ≥ 71     |
| Mean gross dry density ρ                                                         | [kg/dm³]              | ≥ 1,8                         |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm²]               | 15 / 12 or 25 / 20 or 35 / 28 |         |          |
| Standard or annex                                                                | EN 771-2:2011+A1:2015 |                               |         |          |

**Table C14.1:** Installation parameters

|                                |    |    |     |     |     |             |             |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -           | -           |
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

## Anchor rod and internal threaded anchor FIS E without perforated sleeve

|                                          |      |    |     |    |     |     |     |     |     |     |     |    |    |
|------------------------------------------|------|----|-----|----|-----|-----|-----|-----|-----|-----|-----|----|----|
| Effective anchorage depth $h_{ef}$       | [mm] | 50 | 100 | 50 | 100 | 50  | 100 | 50  | 100 | 50  | 100 | 85 | 85 |
|                                          |      |    |     |    |     | 200 |     | 200 |     | 200 |     |    |    |
| Max. installation torque $\max T_{inst}$ | [Nm] | 3  | 5   | 15 | 15  | 25  | 3   | 5   | 15  |     |     |    |    |

## General installation parameters

|                                  |                         |             |
|----------------------------------|-------------------------|-------------|
| Edge distance $C_{min} = C_{cr}$ |                         | 60          |
| Spacing $s_{min \parallel}$      |                         | 80          |
|                                  | $s_{cr \parallel}$ [mm] | 80          |
|                                  | $s_{min \perp}$         | 3x $h_{ef}$ |
|                                  | $s_{cr \perp}$          | 3x $h_{ef}$ |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C14.2:** Group factors

|                                                 |     |     |     |     |     |             |             |
|-------------------------------------------------|-----|-----|-----|-----|-----|-------------|-------------|
| Anchor rod                                      | M6  | M8  | M10 | M12 | M16 | -           | -           |
| Internal threaded anchor FIS E                  | -   | -   | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |
| Group factor $\alpha_{g,N} (s_{min \parallel})$ | [-] | 0,7 |     |     |     |             |             |
| $\alpha_{g,V} (s_{min \parallel})$              |     | 1,3 |     |     |     |             |             |
| $\alpha_{g,N} (s_{min \perp})$                  |     | 2,0 |     |     |     |             |             |
| $\alpha_{g,V} (s_{min \perp})$                  |     | 2,0 |     |     |     |             |             |

fischer injection system FIS V Plus for masonry

## Performance

Solid calcium silicate brick KS, NF, dimensions, installation parameters, Group factors

## Annex C14

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

**Table C15.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -     | -       |
|--------------------------------|----|----|-----|-----|-----|-------|---------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6 M8 | M10 M12 |
|                                |    |    |     |     |     | 11x85 | 15x85   |

$N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                                                  |                |     | 50                                             | 100 | 50  | 100 | 50  | 100 | 200 | 50  | 100 | 200 | 50  | 100 | 200 | 85  | 85  |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w            | w/d | 2,0                                            | 3,0 | 2,5 | 4,5 | 2,5 | 3,5 | 7,0 | 2,5 | 3,0 | 6,5 | 2,5 | 3,5 | 8,0 | 2,5 | 2,5 |
|                                                                                  | d/d            |     | 4,0                                            | 5,5 | 4,0 | 8,0 | 4,0 | 5,5 | 12  | 4,0 | 4,5 | 12  | 4,5 | 5,5 | 12  | 4,0 | 4,0 |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | w/d | 3,0                                            | 4,5 | 3,5 | 6,5 | 3,5 | 4,5 | 10  | 3,5 | 4,0 | 9,5 | 4,0 | 5,0 | 11  | 3,5 | 3,5 |
|                                                                                  | d/d            |     | 5,5                                            | 7,5 | 6,0 | 11  | 6,0 | 8,0 | 12  | 6,0 | 6,5 | 12  | 6,5 | 8,0 | 12  | 6,0 | 6,0 |
| 35 / 28 N/mm <sup>2</sup>                                                        | w/w            | w/d | 3,5                                            | 5,0 | 4,0 | 8,0 | 4,5 | 5,5 | 12  | 4,5 | 5,0 | 11  | 4,5 | 5,5 | 12  | 4,5 | 4,5 |
|                                                                                  | d/d            |     | 6,5                                            | 9,0 | 7,0 | 12  | 7,0 | 9,0 | 12  | 7,0 | 7,5 | 12  | 7,5 | 9,5 | 12  | 7,0 | 7,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{RK(72/120°C)} = 0,83 \cdot N_{RK(50/80°C)}$ .

**Table C15.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -     | -       |
|--------------------------------|----|----|-----|-----|-----|-------|---------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6 M8 | M10 M12 |
|                                |    |    |     |     |     | 11x85 | 15x85   |

$V_{RK} = V_{RK,b} = V_{RK,c,II} = V_{RK,c,I}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |     |      |     |      |     |      |     |     |
|----------------------------------------------------------------------------------|----------------|-----|------------------------------------------------|-----|-----|-----|-----|------|-----|------|-----|------|-----|-----|
|                                                                                  |                |     | 50                                             | 100 | 50  | 100 | 50  | ≥100 | 50  | ≥100 | 50  | ≥100 | 85  | 85  |
| 15 / 12 N/mm²                                                                    | w/w            | w/d | 1,5                                            | 3,0 | 1,5 | 3,0 | 1,2 | 2,0  | 1,2 | 2,0  | 1,2 | 2,0  | 1,2 | 1,2 |
|                                                                                  | d/d            |     |                                                |     |     |     |     |      |     |      |     |      |     |     |
| 25 / 20 N/mm²                                                                    | w/w            | w/d | 2,5                                            | 4,0 | 2,5 | 4,0 | 1,5 | 3,0  | 1,5 | 3,0  | 1,5 | 3,0  | 1,5 | 1,5 |
|                                                                                  | d/d            |     |                                                |     |     |     |     |      |     |      |     |      |     |     |
| 35 / 28 N/mm²                                                                    | w/w            | w/d | 3,0                                            | 4,5 | 3,0 | 4,5 | 1,5 | 3,5  | 1,5 | 3,5  | 1,5 | 3,5  | 1,5 | 1,5 |
|                                                                                  | d/d            |     |                                                |     |     |     |     |      |     |      |     |      |     |     |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

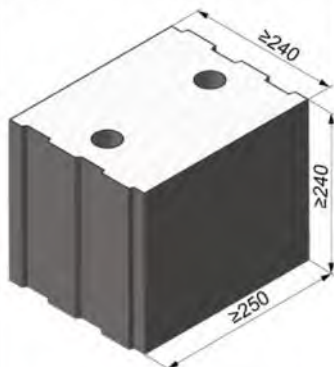
## Performance

Solid calcium silicate brick KS, NF, Characteristic resistance under tension and shear loading

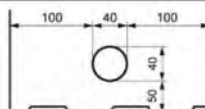
## Annex C15

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# Solid calcium silicate brick KS, 8DF, EN 771-2:2011+A1:2015



|                                                                                  |                       |                                 |         |          |
|----------------------------------------------------------------------------------|-----------------------|---------------------------------|---------|----------|
| Producer                                                                         | -                     |                                 |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                        | width W | height H |
|                                                                                  |                       | ≥ 250                           | ≥ 240   | ≥ 240    |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | ≥ 2,0                           |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 12,5 / 10 or 25 / 20 or 35 / 28 |         |          |
| Standard or annex                                                                | EN 771-2:2011+A1:2015 |                                 |         |          |



Dimension see also Annex B15

**Table C16.1:** Installation parameters

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -     | -     |
|--------------------------------|----|----|-----|-----|-----|-------|-------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6    | M8    |
|                                |    |    |     |     |     | 11x85 | 15x85 |

## Anchor rod and internal threaded anchor FIS E without perforated sleeve

|                           |                 |      |    |     |    |     |    |     |    |     |    |     |    |    |
|---------------------------|-----------------|------|----|-----|----|-----|----|-----|----|-----|----|-----|----|----|
| Effective anchorage depth | $h_{ef}$        | [mm] | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 100 | 85 |    |
| Max. installation torque  | $\max T_{inst}$ | [Nm] | 4  |     | 10 |     |    |     |    |     |    |     | 4  | 10 |

## Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H 16x85 K

|                           |                 |      |     |    |     |    |    |     |
|---------------------------|-----------------|------|-----|----|-----|----|----|-----|
| Effective anchorage depth | $h_{ef}$        | [mm] | _2) | 85 | _2) | 85 |    | _2) |
| Max. installation torque  | $\max T_{inst}$ | [Nm] |     | 10 |     | 4  | 10 |     |

## General installation parameters

|                                  |      |             |  |
|----------------------------------|------|-------------|--|
| Edge distance $c_{min} = c_{cr}$ | [mm] | 60          |  |
| $s_{min II}$                     |      | 80          |  |
| Spacing $s_{cr II}$              |      | 3x $h_{ef}$ |  |
| $s_{min \perp}$                  |      | 80          |  |
| $s_{cr \perp}$                   |      | 3x $h_{ef}$ |  |

## Drilling method

Hammer drilling with hard metal hammer drill

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

<sup>2)</sup> No performance assessed.

**Table C16.2:** Group factors

| Anchor rods                    | M6 | M8 | M10 | M12 | M16 | -     | -     |
|--------------------------------|----|----|-----|-----|-----|-------|-------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6    | M8    |
|                                |    |    |     |     |     | 11x85 | 15x85 |

|               |                                |     |     |  |
|---------------|--------------------------------|-----|-----|--|
| Group factors | $\alpha_{a,N} (s_{min II})$    | [-] | 1,5 |  |
|               | $\alpha_{a,V} (s_{min II})$    |     | 1,2 |  |
|               | $\alpha_{a,N} (s_{min \perp})$ |     | 1,5 |  |
|               | $\alpha_{a,V} (s_{min \perp})$ |     | 1,2 |  |

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## Performance

Solid calcium silicate brick KS, 8DF, dimensions, installation parameters, Group factors

## Annex C16

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# Solid calcium silicate brick KS, 8DF, EN 771-2:2011+A1:2015

**Table C17.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                               | M6             | M8                                      | M10  | M12  | M16  | -     | -   | M8    | M10  | -       |
|--------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------|------|------|------|-------|-----|-------|------|---------|
| Internal threaded anchor FIS E                                                                                           | -              | -                                       | -    | -    | -    | M6    | M8  | M10   | M12  | -       |
|                                                                                                                          |                |                                         |      |      |      | 11x85 |     | 15x85 |      | -       |
| Perforated sleeve FIS H K                                                                                                | -              | -                                       | -    | -    | -    | -     | -   | -     | -    | 16x85   |
| <b><math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN]; temperature range 50/80°C <sup>2)</sup></b> |                |                                         |      |      |      |       |     |       |      |         |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                         | Use conditions | Effective anchorage depth $h_{ef}$ [mm] |      |      |      |       |     |       |      |         |
|                                                                                                                          |                | $\geq 50$                               |      |      |      |       | 85  |       |      |         |
| <b>12,5 / 10 N/mm<sup>2</sup></b>                                                                                        | w/w   w/d      | 3,0                                     | 4,0  | 4,5  | 4,5  | 3,5   | 3,0 | 3,5   | 4,5  | 3,0 4,5 |
|                                                                                                                          | d/d            | 5,0                                     | 7,0  | 7,0  | 7,0  | 5,5   | 5,0 | 5,5   | 8,0  | 5,0 8,0 |
| <b>25 / 20 N/mm<sup>2</sup></b>                                                                                          | w/w   w/d      | 4,5                                     | 6,0  | 6,0  | 6,0  | 5,0   | 4,5 | 5,0   | 6,5  | 4,5 6,5 |
|                                                                                                                          | d/d            | 7,5                                     | 10,0 | 10,0 | 10,0 | 7,5   | 7,5 | 7,5   | 11,0 | 7,5 11  |
| <b>35 / 28 N/mm<sup>2</sup></b>                                                                                          | w/w   w/d      | 5,0                                     | 8,0  | 8,5  | 8,5  | 7,0   | 5,0 | 7,0   | 8,5  | 5,0 8,5 |
|                                                                                                                          | d/d            | 8,5                                     | 12,0 | 12,0 | 12,0 | 11,0  | 8,5 | 11,0  | 12,0 | 8,5 12  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk (72/120^\circ C)} = 0,83 \cdot N_{Rk (50/80^\circ C)}$ .

**Table C17.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                        | M6             | M8                                      | M10 | M12 | M16 | -     | -   | M8    | M10 | -     |
|-------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------|-----|-----|-----|-------|-----|-------|-----|-------|
| Internal threaded anchor FIS E                                                                                    | -              | -                                       | -   | -   | -   | M6    | M8  | M10   | M12 | -     |
|                                                                                                                   |                |                                         |     |     |     | 11x85 |     | 15x85 |     | -     |
| Perforated sleeve FIS H K                                                                                         | -              | -                                       | -   | -   | -   | -     | -   | -     | -   | 16x85 |
| <b><math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}</math> [kN]; temperature range 50/80°C and 72/120°C</b> |                |                                         |     |     |     |       |     |       |     |       |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                  | Use conditions | Effective anchorage depth $h_{ef}$ [mm] |     |     |     |       |     |       |     |       |
|                                                                                                                   |                | $\geq 50$                               |     |     |     |       | 85  |       |     |       |
| <b>12,5 / 10 N/mm<sup>2</sup></b>                                                                                 | w/w   w/d      | 2,5                                     | 4,5 |     |     | 2,5   | 4,5 | 4,5   | 2,5 | 4,5   |
|                                                                                                                   | d/d            |                                         |     |     |     |       |     |       |     |       |
| <b>25 / 20 N/mm<sup>2</sup></b>                                                                                   | w/w   w/d      | 4,0                                     | 6,5 |     |     | 4,0   | 6,5 | 6,5   | 4,0 | 6,5   |
|                                                                                                                   | d/d            |                                         |     |     |     |       |     |       |     |       |
| <b>35 / 28 N/mm<sup>2</sup></b>                                                                                   | w/w   w/d      | 5,0                                     | 9,0 |     |     | 5,0   | 9,0 | 9,0   | 5,0 | 9,0   |
|                                                                                                                   | d/d            |                                         |     |     |     |       |     |       |     |       |

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

Factor for job site tests and displacements see annex C123.

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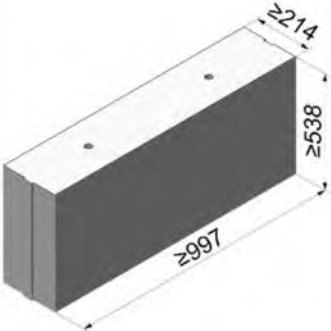
## Performance

Solid calcium silicate brick KS, 8DF, Characteristic resistance under tension and shear loading

## Annex C17

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# Solid calcium silicate brick KS, EN 771-2:2011+A1:2015

|                                                                                   |                                                                                                       |                       |         |          |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------|---------|----------|
|  | Producer                                                                                              | e.g. Calduran         |         |          |
|                                                                                   | Nominal dimensions [mm]                                                                               | length L              | width W | height H |
|                                                                                   |                                                                                                       | ≥ 997                 | ≥ 214   | ≥ 538    |
|                                                                                   | Mean gross dry density $\rho$ [kg/dm <sup>3</sup> ]                                                   | 1,8                   |         | 2,2      |
|                                                                                   | Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> [N/mm <sup>2</sup> ] | 12,5 / 10 or 25 / 20  |         | 45 / 36  |
| Standard or annex                                                                 |                                                                                                       | EN 771-2:2011+A1:2015 |         |          |


**Table C18.1:** Installation parameters

|                                                                         |  |      |             |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
|-------------------------------------------------------------------------|--|------|-------------|-----|----|-----|-----|-----|-----|-----|-----|-----|-------|--|-------|-----|-----|
| Anchor rod                                                              |  |      | M6          |     | M8 |     | M10 |     | M12 |     | M16 |     | -     |  | -     |     |     |
| Internal threaded anchor FIS E                                          |  |      | -           |     | -  |     | -   |     | -   |     | -   |     | M6    |  | M8    | M10 | M12 |
|                                                                         |  |      |             |     |    |     |     |     |     |     |     |     | 11x85 |  | 15x85 |     |     |
| Anchor rod and internal threaded anchor FIS E without perforated sleeve |  |      |             |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
| Effective anchorage depth $h_{ef}$                                      |  | [mm] | 50          | 100 | 50 | 100 | 50  | 100 | 50  | 100 | 50  | 100 | 85    |  |       |     |     |
| Max. installation torque $\max T_{inst}$                                |  | [Nm] | 4           |     | 10 |     |     |     |     |     |     |     | 4     |  | 10    |     |     |
| General installation parameters                                         |  |      |             |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
| Edge distance $C_{min} = C_{cr}$                                        |  | [mm] | 75          |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
| Spacing $s_{cr \parallel} = s_{min \parallel}$                          |  |      | 3x $h_{ef}$ |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
| $s_{cr \perp} = s_{min \perp}$                                          |  |      | 3x $h_{ef}$ |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
| Drilling method                                                         |  |      |             |     |    |     |     |     |     |     |     |     |       |  |       |     |     |
| Hammer drilling with hard metal hammer drill                            |  |      |             |     |    |     |     |     |     |     |     |     |       |  |       |     |     |

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

**Table C18.2:** Group factors

| Anchor rod                        |                                    | M6  | M8 | M10 | M12 | M16 | -     |    | -     |     |
|-----------------------------------|------------------------------------|-----|----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor<br>FIS E |                                    | -   | -  | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                   |                                    |     |    |     |     |     | 11x85 |    | 15x85 |     |
| Group<br>factors                  | $\alpha_{g,N} (s_{min \parallel})$ | [-] | 2  |     |     |     |       |    |       |     |
|                                   | $\alpha_{g,V} (s_{min \parallel})$ |     |    |     |     |     |       |    |       |     |
|                                   | $\alpha_{g,N} (s_{min \perp})$     |     |    |     |     |     |       |    |       |     |
|                                   | $\alpha_{g,V} (s_{min \perp})$     |     |    |     |     |     |       |    |       |     |

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## Performance

Solid calcium silicate brick KS, dimensions, installation parameters, Group factors

## Annex C18

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# Solid calcium silicate brick KS, EN 771-2:2011+A1:2015

**Table C19.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |                |     | M6                                             | M8   | M10  | M12  | M16  | -     |       | -    |      |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|------------------------------------------------|------|------|------|------|-------|-------|------|------|------|
| Internal threaded anchor<br>FIS E                                                                                                                 |                |     | -                                              | -    | -    | -    | -    | M6    | M8    | M10  | M12  |      |
|                                                                                                                                                   |                |     |                                                |      |      |      |      | 11x85 | 15x85 |      |      |      |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                |     |                                                |      |      |      |      |       |       |      |      |      |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                                                  | Use conditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |      |      |      |      |       |       |      |      |      |
|                                                                                                                                                   |                |     | 50                                             | 100  | 50   | 100  | 50   | 100   | 50    | 100  | 50   | 100  |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       | w/w            | w/d | 4,0                                            | 4,0  | 7,0  | 5,0  | 6,0  | 5,0   | 6,0   | 5,5  | 7,5  | 5,5  |
|                                                                                                                                                   | d/d            |     | 7,0                                            | 7,0  | 12,0 | 8,0  | 9,5  | 8,0   | 10,0  | 9,0  | 11,5 | 9,0  |
| 25 / 20 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d | 5,5                                            | 6,0  | 10,0 | 7,0  | 8,5  | 7,0   | 9,0   | 8,0  | 11,0 | 8,0  |
|                                                                                                                                                   | d/d            |     | 8,5                                            | 10,5 | 12,0 | 11,5 | 12,0 | 11,0  | 12,0  | 12,0 | 12,0 | 12,0 |
| 45 / 36 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d | 4,5                                            | 8,0  | 12,0 | 11,5 | 12,0 | 12,0  | 12,0  | 12,0 | 12,0 | 12,0 |
|                                                                                                                                                   | d/d            |     | 8,0                                            | 12,0 | 12,0 | 12,0 | 12,0 | 12,0  | 12,0  | 12,0 | 12,0 | 12,0 |

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

<sup>2)</sup> For temperature range 72/120°C: N<sub>Rk</sub> (72/120°C) = 0,83 · N<sub>Rk</sub> (50/80°C).

**Table C19.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                                    |                | M6                                             | M8  | M10  | M12  | M16  | -     |     | -     |      |
|-------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------|-----|------|------|------|-------|-----|-------|------|
| Internal threaded anchor<br>FIS E                                                                                             |                | -                                              | -   | -    | -    | -    | M6    | M8  | M10   | M12  |
|                                                                                                                               |                |                                                |     |      |      |      | 11x85 |     | 15x85 |      |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,I</sub> [kN]; temperature range 50/80°C and 72/120°C |                |                                                |     |      |      |      |       |     |       |      |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                              | Use conditions | Effective anchorage depth h <sub>ef</sub> [mm] |     |      |      |      |       |     |       |      |
|                                                                                                                               |                | ≥ 50                                           |     |      |      |      | 85    |     |       |      |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                   | w/w            | 3,0                                            | 5,0 | 5,5  | 4,0  | 4,0  | 3,0   | 5,0 | 5,5   | 4,0  |
|                                                                                                                               | w/d            |                                                |     |      |      |      |       |     |       |      |
| 25 / 20 N/mm <sup>2</sup>                                                                                                     | w/w            | 4,5                                            | 7,0 | 7,5  | 6,0  | 6,0  | 4,5   | 7,0 | 7,5   | 6,0  |
|                                                                                                                               | w/d            |                                                |     |      |      |      |       |     |       |      |
| 45 / 36 N/mm <sup>2</sup>                                                                                                     | w/w            | 4,5                                            | 9,0 | 11,0 | 12,0 | 12,0 | 4,5   | 9,0 | 11,0  | 12,0 |
|                                                                                                                               | w/d            |                                                |     |      |      |      |       |     |       |      |

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

Factor for job site tests and displacements see annex C123.

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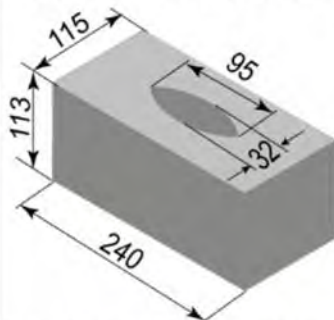
## Performance

Solid calcium silicate brick KS, Characteristic resistance under tension and shear loading

## Annex C19

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# Solid calcium silicate brick KS, EN 771-2:2011+A1:2015



|                                                                                  |                       |                       |         |          |
|----------------------------------------------------------------------------------|-----------------------|-----------------------|---------|----------|
| Producer                                                                         |                       | -                     |         |          |
| Nominal dimensions                                                               | [mm]                  | length L              | width W | height H |
|                                                                                  |                       | ≥ 240                 | ≥ 115   | ≥ 113    |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | 1,8                   |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 12,5 / 10 or 25 / 20  |         |          |
| Standard or annex                                                                |                       | EN 771-2:2011+A1:2015 |         |          |

**Table C20.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |    |       |    |        |    |       |   |        |     |     |     |
|--------------------------------|-------|----|-------|----|--------|----|-------|---|--------|-----|-----|-----|
| Anchor rod                     | M6    | M8 | -     | M8 | M10    | M8 | M10   | - | M12    | M16 | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | M6    | M8 | -      |    | -     |   | M10    | M12 | -   |     |
|                                |       |    | 11x85 |    |        |    |       |   | 15x85  |     |     |     |
| Perforated sleeve FIS H K      | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |   | 20x130 |     |     |     |

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

|                          |                     |   |   |
|--------------------------|---------------------|---|---|
| Max. installation torque | max $T_{inst}$ [Nm] | 2 | 4 |
|--------------------------|---------------------|---|---|

## General installation parameters

|               |                     |      |     |     |     |     |     |
|---------------|---------------------|------|-----|-----|-----|-----|-----|
| Edge distance | $c_{min} = c_{cr}$  | [mm] | 100 |     |     |     |     |
| Spacing       | $s_{min} \parallel$ |      | 255 | 255 | 390 | 255 | 390 |
|               | $s_{cr} \parallel$  |      |     |     |     |     |     |
|               | $s_{min} \perp$     |      |     |     |     |     |     |
|               | $s_{cr} \perp$      |      |     |     |     |     |     |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C20.2:** Group factors

| Anchor rod                |                                      | M6    | M8 | M8    | M10 | M8     | M10 | M12   | M16 | M12    | M16 |
|---------------------------|--------------------------------------|-------|----|-------|-----|--------|-----|-------|-----|--------|-----|
| Perforated sleeve FIS H K |                                      | 12x85 |    | 16x85 |     | 16x130 |     | 20x85 |     | 20x130 |     |
| Group factors             | $\alpha_{g,N} (s_{min \parallel}) =$ | [-]   | 2  |       |     |        |     |       |     |        |     |
|                           | $\alpha_{g,V} (s_{min \parallel})$   |       |    |       |     |        |     |       |     |        |     |
|                           | $\alpha_{g,N} (s_{min \perp}) =$     |       |    |       |     |        |     |       |     |        |     |
|                           | $\alpha_{g,V} (s_{min \perp})$       |       |    |       |     |        |     |       |     |        |     |

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## Performance

Solid calcium silicate brick KS, dimensions, installation parameters, Group factors

## Annex C20

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# Solid calcium silicate brick KS, EN 771-2:2011+A1:2015

**Table C21.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                    | M10        | M12 | M16        |
|----------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                    |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>              | [Nm]       | 4   |            |
| General installation parameters              |                                    |            |     |            |
| Edge distance                                | c <sub>min</sub> = C <sub>cr</sub> | [mm]       | 100 |            |
| Spacing                                      | s <sub>min</sub>                   |            | 390 |            |
|                                              | s <sub>cr</sub>                    |            | 390 |            |
|                                              | s <sub>min</sub> ⊥                 |            | 390 |            |
|                                              | s <sub>cr</sub> ⊥                  |            | 390 |            |
| Drilling method                              |                                    |            |     |            |
| Hammer drilling with hard metal hammer drill |                                    |            |     |            |

**Table C21.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 2   |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            |     |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            |     |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            |     |            |

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## Performance

Solid calcium silicate brick KS, dimensions, installation parameters, Group factors

## Annex C21

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# Solid calcium silicate brick, EN 771-2:2011+A1:2015

**Table C22.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

|                                |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|--------------------------------|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                     | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                |       |    | 11x85 |    |    |     |        |     | 15x85 |     |     |     |        |     |
| Perforated sleeve FIS H K      | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 20x85 |     |     |     | 20x130 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |      |      |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|------|------|--|--|--|--|--|
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 3,5 | 2,0 | 2,0 | 2,0 | 6,5  | 4,5  |  |  |  |  |  |
|                                                                                  | d/d            | 6,0 | 4,0 | 3,5 | 3,5 | 10,5 | 7,0  |  |  |  |  |  |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | 5,0 | 3,0 | 3,0 | 3,0 | 9,5  | 6,0  |  |  |  |  |  |
|                                                                                  | d/d            | 8,5 | 5,5 | 5,5 | 5,5 | 12,0 | 10,0 |  |  |  |  |  |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

**Table C22.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12 | M16        |
|---------------------------|------------|-----|------------|
| Perforated sleeve FIS H K | 18x130/200 |     | 22x130/200 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |
|----------------------------------------------------------------------------------|----------------|-----|------|
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 2,0 | 4,5  |
|                                                                                  | d/d            | 3,5 | 7,0  |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | 3,0 | 6,0  |
|                                                                                  | d/d            | 5,5 | 10,0 |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Solid calcium silicate brick KS, Characteristic resistance under tension loading

## Annex C22

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**Table C23.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

|                                |       |       |       |    |        |     |       |   |     |        |     |     |
|--------------------------------|-------|-------|-------|----|--------|-----|-------|---|-----|--------|-----|-----|
| Anchor rod                     | M6    | M8    | -     | M8 | M10    | M8  | M10   | - | M12 | M16    | M12 | M16 |
| Internal threaded anchor FIS E | -     | M6    | M8    | -  | -      | M10 | M12   | - | -   |        |     |     |
|                                |       | 11x85 | 15x85 |    |        |     |       |   |     |        |     |     |
| Perforated sleeve FIS H K      | 12x85 | 16x85 |       |    | 16x130 |     | 20x85 |   |     | 20x130 |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C <sup>2)</sup>

|                                                                                  |                |     |     |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|--|--|--|--|--|--|--|--|--|
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |  |  |  |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 3,0 | 3,5 |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     |     |  |  |  |  |  |  |  |  |  |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | 4,0 | 5,5 |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     |     |  |  |  |  |  |  |  |  |  |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

**Table C23.2:** 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 | 18x130/200 |     | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C <sup>2)</sup>

|                                                                                  |                |     |     |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|--|--|--|--|--|--|--|--|--|
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |  |  |  |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 3,5 | 3,5 |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     |     |  |  |  |  |  |  |  |  |  |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | 5,5 | 5,5 |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     |     |  |  |  |  |  |  |  |  |  |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

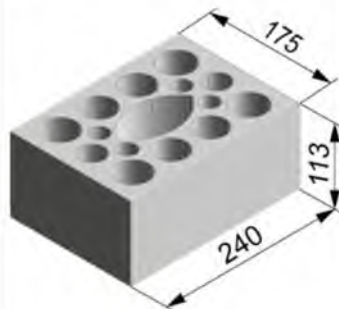
**Performance**

Solid calcium silicate brick KS, Characteristic resistance under shear loading

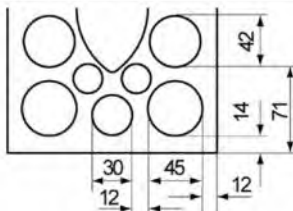
**Annex C23**

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



|                                                                                  |                       |                                                      |         |          |
|----------------------------------------------------------------------------------|-----------------------|------------------------------------------------------|---------|----------|
| Producer                                                                         | -                     |                                                      |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                                             | width W | height H |
|                                                                                  |                       | 240                                                  | 175     | 113      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 1,4                                                |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 10 / 8 or 12,5 / 10 or 15 / 12 or 20 / 16 or 25 / 20 |         |          |
| Standard or annex                                                                | EN 771-2:2011+A1:2015 |                                                      |         |          |



Dimension see also Annex B15

**Table C24.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |    |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                |       |    |       |    | 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 torque | max T <sub>inst</sub> [Nm] | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------------------|----------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|

## General installation parameters

| Edge distance | $C_{min} = C_{cr}$  | [mm] | 60 | 80  |
|---------------|---------------------|------|----|-----|
| Spacing       | $s_{min} \parallel$ |      |    | 100 |
|               | $s_{cr} \parallel$  |      |    | 240 |
|               | $s_{min} \perp$     |      |    | 115 |
|               | $s_{cr} \perp$      |      |    | 115 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C24.2:** Group factors

|                                   |       |    |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|-----------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                        | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor<br>FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                   |       |    |       |    | 11x85 |    |    |     |        |     | 15x85 |     |     |     |        |     |
| Perforated sleeve FIS H K         | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 20x85 |     |     |     | 20x130 |     |

|               |                                                               |     |     |  |  |  |  |  |  |  |  |  |  |  |
|---------------|---------------------------------------------------------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|
| Group factors | $\alpha_{g,N} (s_{min}   ) = \alpha_{g,V} (s_{min}   )$       | [-] | 1,5 |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,N} (s_{min} \perp) = \alpha_{g,V} (s_{min} \perp)$ |     | 2,0 |  |  |  |  |  |  |  |  |  |  |  |

fischer injection system FIS V Plus for masonry

## Performance

Perforated calcium silicate brick KSL, 3DF, dimensions, installation parameters, Group factors

## Annex C24

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

**Table C25.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

|                                              |                                    |            |     |            |
|----------------------------------------------|------------------------------------|------------|-----|------------|
| Anchor rod                                   |                                    | M10        | M12 | M16        |
| Perforated sleeve FIS H K                    |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                    |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>              | [Nm]       | 2   |            |
| General installation parameters              |                                    |            |     |            |
| Edge distance                                | c <sub>min</sub> = C <sub>cr</sub> | [mm]       | 80  |            |
| Spacing                                      | s <sub>min</sub>                   |            | 100 |            |
|                                              | s <sub>cr</sub>                    |            | 240 |            |
|                                              | s <sub>min</sub> ⊥                 |            | 115 |            |
|                                              | s <sub>cr</sub> ⊥                  |            | 115 |            |
| Drilling method                              |                                    |            |     |            |
| Hammer drilling with hard metal hammer drill |                                    |            |     |            |

**Table C25.2:** Group factors

| Anchor rod                |                                           | M10        | M12 | M16        |
|---------------------------|-------------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                           | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\text{min}} \parallel)$ | [-]        | 1,5 |            |
|                           | $\alpha_{g,V} (s_{\text{min}} \parallel)$ |            |     |            |
|                           | $\alpha_{g,N} (s_{\text{min}} \perp)$     |            | 2,0 |            |
|                           | $\alpha_{g,V} (s_{\text{min}} \perp)$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Perforated calcium silicate brick KSL, 3DF, dimensions, installation parameters, Group factors

## Annex C25

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

**Table C26.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8 | M10 | -     | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|----|-----|-------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -   | -  | -   | M10   | M12 | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |     |    |     | 15x85 |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |    |     |       |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength/ Min. comp. strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |
|---------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|
| 10 / 8 N/mm <sup>2</sup>                                                  | w/w   w/d      | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 |
|                                                                           | d/d            | 1,5 | 2,0 | 2,5 | 2,5 | 2,5 |
| 12,5 / 10 N/mm <sup>2</sup>                                               | w/w   w/d      | 2.0 | 2.0 | 2.5 | 2.5 | 2.5 |
|                                                                           | d/d            | 2,0 | 2,5 | 3,0 | 3,0 | 3,0 |
| 15 / 12 N/mm <sup>2</sup>                                                 | w/w   w/d      | 2.5 | 2.5 | 3.0 | 3.0 | 3.0 |
|                                                                           | d/d            | 2,5 | 3,0 | 3,5 | 3,5 | 3,5 |
| 20 / 16 N/mm <sup>2</sup>                                                 | w/w   w/d      | 3.0 | 3.5 | 4.5 | 4.5 | 4.5 |
|                                                                           | d/d            | 3,5 | 4,0 | 4,5 | 4,5 | 4,5 |
| 25 / 20 N/mm <sup>2</sup>                                                 | w/w   w/d      | 4.0 | 4.5 | 5.5 | 5.5 | 5.5 |
|                                                                           | d/d            | 4,5 | 5,0 | 6,0 | 6,0 | 6,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C26.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. comp. strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------|----------------|-----|
| 10 / 8 N/mm <sup>2</sup>                                                   | w/w   w/d      | 2.0 |
|                                                                            | d/d            | 2,5 |
| 12,5 / 10 N/mm <sup>2</sup>                                                | w/w   w/d      | 2.5 |
|                                                                            | d/d            | 3,0 |
| 15 / 12 N/mm <sup>2</sup>                                                  | w/w   w/d      | 3.0 |
|                                                                            | d/d            | 3,5 |
| 20 / 16 N/mm <sup>2</sup>                                                  | w/w   w/d      | 4.5 |
|                                                                            | d/d            | 4,5 |
| 25 / 20 N/mm <sup>2</sup>                                                  | w/w   w/d      | 5.5 |
|                                                                            | d/d            | 6,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Perforated calcium silicate brick KSL, 3DF, Characteristic resistance under tension loading

## Annex C26

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

**Table C27.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8 | M10 | -     | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|----|-----|-------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     |       |        |     |    |     | M10   | M12 |     |     |     |
|                                |       |       | 11x85 |        |       |        |     |    |     | 15x85 |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |    |     |       |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |  |     |  |  |  |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|--|-----|--|--|--|-----|-----|-----|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w<br>d/d     |     |     | 1,5 |     |     |  | 3,0 |  |  |  | 2,5 | 3,0 | 2,5 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w<br>d/d     |     |     | 2,0 |     |     |  | 3,5 |  |  |  |     |     |     |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w<br>d/d     |     |     | 2,5 |     |     |  | 4,5 |  |  |  | 4,0 | 4,5 | 4,0 |
| 20 / 16 N/mm <sup>2</sup>                                                        | w/w<br>d/d     | 3,0 | 3,5 | 3,0 | 3,5 | 3,0 |  | 6,0 |  |  |  | 5,5 | 6,0 | 5,5 |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w<br>d/d     | 4,0 | 4,5 | 4,0 | 4,5 | 4,0 |  | 7,5 |  |  |  | 6,5 | 7,5 | 6,5 |

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

**Table C27.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|
| 10 / 8 N/mm <sup>2</sup>                                                         |                | 3,0 | 2,5 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 3,5 | 3,5 |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/d            | 4,5 | 4,0 |
| 20 / 16 N/mm <sup>2</sup>                                                        | d/d            | 6,0 | 5,5 |
| 25 / 20 N/mm <sup>2</sup>                                                        |                | 7,5 | 6,5 |

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

Factor for job site tests and displacements see annex C123.

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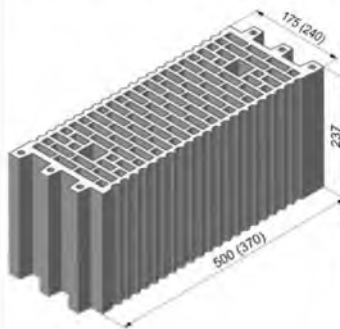
## Performance

Perforated calcium silicate brick KSL, 3DF, Characteristic resistance under shear loading

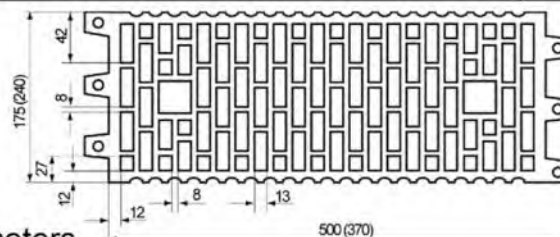
## Annex C27

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                            |                                                    |         |          |
|----------------------------------------------------------------------------------|----------------------------|----------------------------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger, Poroton |                                                    |         |          |
| Nominal dimensions                                                               | [mm]                       | length L                                           | width W | height H |
|                                                                                  |                            | 500                                                | 175     | 237      |
|                                                                                  |                            | 370                                                | 240     | 237      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ]      | ≥ 1,0                                              |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]       | 5 / 4 or 7,5 / 6 or 10 / 8 or 12,5 / 10 or 15 / 12 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015      |                                                    |         |          |



Dimension see also Annex B15

**Table C28.1: Installation parameters**

|                                |       |       |       |       |                |        |        |        |        |                  |       |        |        |        |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 |

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

|                          |                     |   |
|--------------------------|---------------------|---|
| Max. installation torque | max $T_{inst}$ [Nm] | 2 |
|--------------------------|---------------------|---|

## General installation parameters

|               |                         |           |
|---------------|-------------------------|-----------|
| Edge distance | $C_{min} = C_{cr}$      | 100       |
| Spacing       | $s_{min \parallel}$     | 100       |
|               | $s_{cr \parallel}$ [mm] | 500 (370) |
|               | $s_{min \perp}$         | 100       |
|               | $s_{cr \perp}$          | 240       |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C28.2: Group factors**

|                                |       |       |       |       |                |        |        |        |        |                  |       |        |        |        |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 |

|               |                                                                                                                                                     |     |   |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|
| Group factors | $\alpha_{g,N} (s_{min \parallel}) = \frac{\alpha_{g,V} (s_{min \parallel})}{\alpha_{g,N} (s_{min \perp}) = \frac{\alpha_{g,V} (s_{min \perp})}{1}}$ | [-] | 1 |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C28

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C29.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8  | M10 | -     | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|-----|-----|-------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -   | M10 | M12 | -     | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |     |     |     | 15x85 |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |     |     |       |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. comp. strength single brick <sup>1)</sup> | Use conditions |     |      |      |      |
|----------------------------------------------------------------------------|----------------|-----|------|------|------|
| <b>5 / 4 N/mm<sup>2</sup></b>                                              | w/w            | w/d | 0,30 | 0,90 | 1,20 |
|                                                                            | d/d            |     | 0,40 | 0,90 | 1,20 |
| <b>7,5 / 6 N/mm<sup>2</sup></b>                                            | w/w            | w/d | 0,50 | 1,50 | 2,00 |
|                                                                            | d/d            |     | 0,60 | 1,50 | 2,00 |
| <b>10 / 8 N/mm<sup>2</sup></b>                                             | w/w            | w/d | 0,75 | 2,00 | 2,50 |
|                                                                            | d/d            |     | 0,75 | 2,00 | 2,50 |
| <b>12,5 / 10 N/mm<sup>2</sup></b>                                          | w/w            | w/d | 0,90 | 2,50 | 3,00 |
|                                                                            | d/d            |     | 0,90 | 2,50 | 3,50 |
| <b>15 / 12 N/mm<sup>2</sup></b>                                            | w/w            | w/d | 0,90 | 3,00 | 3,50 |
|                                                                            | d/d            |     | 1,20 | 3,00 | 4,00 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

**Table C29.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8  | M10 | -     | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|-----|-----|-------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -   | M10 | M12 | -     | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |     |     |     | 15x85 |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |     |     |       |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. comp. strength single brick <sup>1)</sup> | Use conditions    |  |      |      |      |
|----------------------------------------------------------------------------|-------------------|--|------|------|------|
| <b>5 / 4 N/mm<sup>2</sup></b>                                              | w/w<br>w/d<br>d/d |  | 0,50 | 0,60 | 0,50 |
|                                                                            |                   |  | 0,75 | 0,90 | 0,75 |
|                                                                            |                   |  | 0,90 | 1,20 | 0,90 |
|                                                                            |                   |  | 1,20 | 1,50 | 1,20 |
|                                                                            |                   |  | 1,50 | 2,00 | 1,50 |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

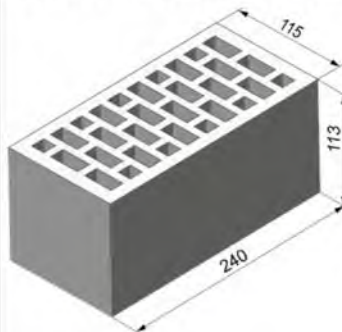
## Performance

Vertical perforated brick HLz, Characteristic resistance under tension and shear loading

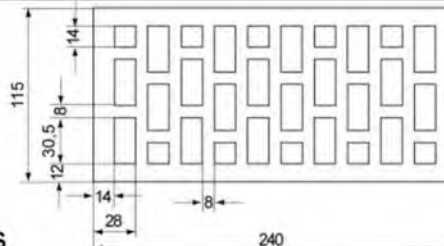
## Annex C29

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# Vertical perforated brick HLz, 2DF, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                                       |         |          |
|----------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                                                       |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                                              | width W | height H |
|                                                                                  |                       | 240                                                   | 115     | 113      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 1,4                                                 |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 7,5 / 6 or 12,5 / 10 or 20 / 16 or 25 / 20 or 35 / 28 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                                                       |         |          |



Dimension see also Annex B15

**Table C30.1: Installation parameters**

|                                |       |       |       |       |       |       |       |       |       |       |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10   | -     | M12   | M16   |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -     | M10   | M12   | -     |
|                                |       |       |       |       | 11x85 |       |       | 15x85 |       |       |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x85 | 20x85 | 20x85 | 20x85 |

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

|                          |                       |      |   |
|--------------------------|-----------------------|------|---|
| Max. installation torque | max T <sub>inst</sub> | [Nm] | 2 |
|--------------------------|-----------------------|------|---|

## General installation parameters

|               |                                          |      |     |
|---------------|------------------------------------------|------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub>       | [mm] | 80  |
| Spacing       | S <sub>cr II</sub> = S <sub>min II</sub> | [mm] | 240 |
|               | S <sub>cr ⊥</sub> = S <sub>min ⊥</sub>   | [mm] | 115 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C30.2: Group factors**

| Anchor rod                     |                                    | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | -     |     | M12 | M16 |
|--------------------------------|------------------------------------|-------|----|-------|----|-------|----|----|-----|-------|-----|-----|-----|
| Internal threaded anchor FIS E |                                    | -     |    | -     |    | M6    | M8 | -  |     | M10   | M12 | -   |     |
|                                |                                    |       |    |       |    | 11x85 |    |    |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K      |                                    | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 20x85 |     |     |     |
| Group factors                  | $\alpha_{g,N} (s_{min} \parallel)$ | [-]   | 2  |       |    |       |    |    |     |       |     |     |     |
|                                | $\alpha_{g,V} (s_{min} \parallel)$ |       |    |       |    |       |    |    |     |       |     |     |     |
|                                | $\alpha_{g,N} (s_{min} \perp)$     |       |    |       |    |       |    |    |     |       |     |     |     |
|                                | $\alpha_{g,V} (s_{min} \perp)$     |       |    |       |    |       |    |    |     |       |     |     |     |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, 2DF, dimensions, installation parameters, Group factors

## Annex C30

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# Vertical perforated brick HLz, 2DF, EN 771-1:2011+A1:2015

**Table C31.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10   | -            | M12   | M16   |
|--------------------------------|-------|-------|-------|-------|-------------|-------|-------|--------------|-------|-------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -     | M10<br>15x85 | M12   | -     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x85 | 16x85 | 20x85        | 20x85 | 20x85 |

$N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |      |      |      |  |
|----------------------------------------------------------------------------------|----------------|-----|------|------|------|------|--|
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 0,75 | 0,90 | 0,75 | 0,90 |  |
|                                                                                  | d/d            |     | 0,75 | 1,20 | 0,75 | 0,90 |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d | 1,20 | 1,50 | 1,20 | 1,50 |  |
|                                                                                  | d/d            |     | 1,20 | 2,00 | 1,20 | 1,50 |  |
| 20 / 16 N/mm <sup>2</sup>                                                        | w/w            | w/d | 2,00 | 2,50 | 2,00 | 2,00 |  |
|                                                                                  | d/d            |     | 2,00 | 3,00 | 2,00 | 2,50 |  |
| 25 / 20 N/mm <sup>2</sup>                                                        | w/w            | w/d | 2,50 | 3,50 | 2,50 | 3,00 |  |
|                                                                                  | d/d            |     | 2,50 | 4,00 | 2,50 | 3,00 |  |
| 35 / 28 N/mm <sup>2</sup>                                                        | w/w            | w/d | 3,00 | 5,00 | 3,50 | 4,00 |  |
|                                                                                  | d/d            |     | 3,50 | 5,50 | 3,50 | 4,50 |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{RK(72/120^{\circ}C)} = 0,83 \cdot N_{RK(50/80^{\circ}C)}$ .

**Table C31.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10   | -            | M12   | M16   |
|--------------------------------|-------|-------|-------|-------|-------------|-------|-------|--------------|-------|-------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -     | M10<br>15x85 | M12   | -     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x85 | 16x85 | 20x85        | 20x85 | 20x85 |

$V_{RK} = V_{RK,b} = V_{RK,c,II} = V_{RK,c,I}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions    |     |     |     |     |     |     |      |  |
|----------------------------------------------------------------------------------|-------------------|-----|-----|-----|-----|-----|-----|------|--|
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w<br>w/d<br>d/d | 1,2 | 1,5 | 1,2 | 2,0 | 1,2 | 1,5 | 2,5  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      |                   | 2,0 | 2,5 | 2,0 | 4,0 | 2,0 | 2,5 | 4,5  |  |
| 20 / 16 N/mm <sup>2</sup>                                                        |                   | 3,0 | 3,5 | 3,0 | 6,0 | 3,0 | 3,5 | 7,0  |  |
| 25 / 20 N/mm <sup>2</sup>                                                        |                   | 4,0 | 4,5 | 4,0 | 7,5 | 4,0 | 4,5 | 8,5  |  |
| 35 / 28 N/mm <sup>2</sup>                                                        |                   | 5,0 | 6,5 | 5,0 | 9,5 | 5,0 | 6,5 | 12,0 |  |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

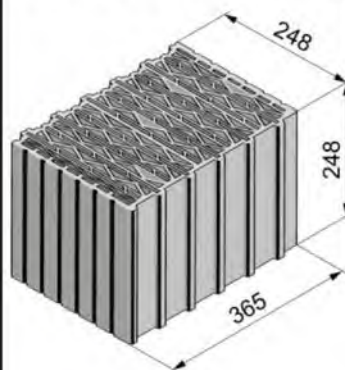
## Performance

Vertical perforated brick HLz, 2DF,  
Characteristic resistance under tension and shear loading

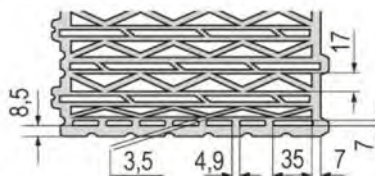
**Annex C31**

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# Vertical perforated brick HLz, U8, EN 771-1:2011+A1:2015



|                                                                                  |                       |                            |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                            |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                   | width W | height H |
|                                                                                  |                       | 248                        | 365     | 248      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,6                        |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 7,5 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                            |         |          |



Dimension see also Annex B15

**Table C32.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |    |       |    |       |    |     |        |     |       |       |     |        |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|-----|--------|-----|-------|-------|-----|--------|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | M8     | M10 | -     | M12   | M16 | M12    | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6    | M8 | -   | -      | -   | M10   | M12   | -   | -      | -   | -      | -   |
|                                |       |    |       |    | 11x85 |    |     |        |     | 15x85 |       |     |        |     |        |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |     | 16x130 |     |       | 20x85 |     | 20x130 |     | 20x200 |     |

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

|                                              |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |
|----------------------------------------------|---|---|---|---|---|---|---|--|--|--|--|--|--|--|--|--|
| Max. installation torque max $T_{inst}$ [Nm] | 3 | 5 | 3 | 5 | 3 | 5 | 5 |  |  |  |  |  |  |  |  |  |
|----------------------------------------------|---|---|---|---|---|---|---|--|--|--|--|--|--|--|--|--|

## General installation parameters

|                                  |                         |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------|-------------------------|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Edge distance $C_{min} = C_{cr}$ | 60                      |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing                          | $S_{min} \parallel$     | 80  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                  | $S_{cr} \parallel$ [mm] | 250 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                  | $S_{min} \perp$         | 80  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                  | $S_{cr} \perp$          | 250 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Drilling method

Rotary drilling with carbide drill

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

**Table C32.2:** Group factors

|                                |       |    |       |    |       |    |     |        |     |       |       |     |        |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|-----|--------|-----|-------|-------|-----|--------|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | M8     | M10 | -     | M12   | M16 | M12    | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6    | M8 | -   | -      | -   | M10   | M12   | -   | -      | -   | -      | -   |
|                                |       |    |       |    | 11x85 |    |     |        |     | 15x85 |       |     |        |     |        |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |     | 16x130 |     |       | 20x85 |     | 20x130 |     | 20x200 |     |

|               |                                    |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|------------------------------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Group factors | $\alpha_{g,N} (S_{min} \parallel)$ | [-] | 1,3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (S_{min} \parallel)$ |     | 1,2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,N} (S_{min} \perp)$     |     | 1,3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (S_{min} \perp)$     |     | 1,0 |  |  |  |  |  |  |  |  |  |  |  |  |  |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, U8, dimensions, installation parameters, Group factors

## Annex C32

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# Vertical perforated brick HLz, U8, EN 771-1:2011+A1:2015

**Table C33.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                |                                    | M10        | M12 | M16        |
|-------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                 |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                    |            |     |            |
| Max. installation torque                  | max T <sub>inst</sub>              | [Nm]       | 5   |            |
| General installation parameters           |                                    |            |     |            |
| Edge distance                             | C <sub>min</sub> = C <sub>cr</sub> | [mm]       | 60  |            |
| Spacing                                   | S <sub>min</sub>                   |            | 80  |            |
|                                           | S <sub>cr</sub>                    |            | 250 |            |
|                                           | S <sub>min</sub> ⊥                 |            | 80  |            |
|                                           | S <sub>cr</sub> ⊥                  |            | 250 |            |
| Drilling method                           |                                    |            |     |            |
| Rotary drilling with carbide drill        |                                    |            |     |            |

**Table C33.2:** Group factors

| Anchor rod                |                                        | M10        | M12 | M16        |
|---------------------------|----------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                        | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\text{min II}})$     | [-]        | 1,3 |            |
|                           | $\alpha_{g,V} (s_{\text{min II}})$     |            | 1,2 |            |
|                           | $\alpha_{g,N} (s_{\text{min } \perp})$ |            | 1,3 |            |
|                           | $\alpha_{g,V} (s_{\text{min } \perp})$ |            | 1,0 |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, U8, dimensions, installation parameters, Group factors

## Annex C33

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# Vertical perforated brick HLz, U8, EN 771-1:2011+A1:2015

**Table C34.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10    | M8 | M10 | -     | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|--------|----|-----|-------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -      | -  | -   | M10   | M12 | -   | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |        |    |     | 15x85 |     |     |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 | 20x200 |    |     |       |     |     |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w   w/d      | 1,2 |
|                                                                                  | d/d            | 1,5 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w   w/d      | 1,5 |
|                                                                                  | d/d            | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w   w/d      | 2,0 |
|                                                                                  | d/d            | 2,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C34.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w   w/d      | 1,2 |
|                                                                                  | d/d            | 1,5 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w   w/d      | 1,5 |
|                                                                                  | d/d            | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w   w/d      | 2,0 |
|                                                                                  | d/d            | 2,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, U8, Characteristic resistance under tension loading

## Annex C34

# Vertical perforated brick HLz, U8, EN 771-1:2011+A1:2015

**Table C35.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10    | M8     | M10 | -            | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|-------|-------------|-------|--------|--------|-----|--------------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -      | -      | -   | M10<br>15x85 | M12 | -   | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 16x85 | 16x130      | 20x85 | 20x130 | 20x200 |     |              |     |     |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |
|----------------------------------------------------------------------------------------|------------------------|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d<br>d/d       | 1,2 |
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d<br>d/d       | 1,5 |

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

**Table C35.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |
|----------------------------------------------------------------------------------------|------------------------|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d<br>d/d       | 1,2 |
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d<br>d/d       | 1,5 |

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

Factor for job site tests and displacements see annex C123.

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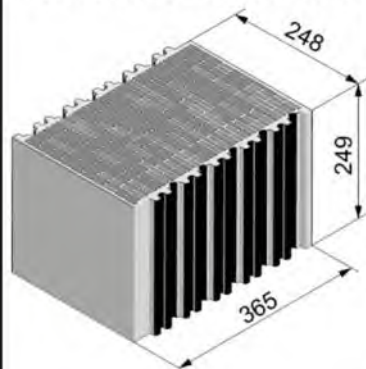
## Performance

Vertical perforated brick HLz, U8, Characteristic resistance under shear loading

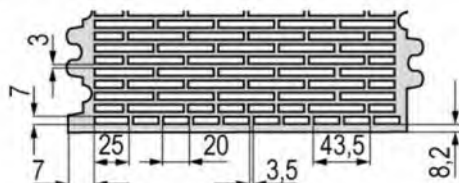
## Annex C35

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# Vertical perforated brick HLz, T10, T11, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                |         |          |
|----------------------------------------------------------------------------------|-----------------------|--------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                                |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                       | width W | height H |
|                                                                                  |                       | 248                            | 365     | 249      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,7                            |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 10 / 8 or 12,5 / 10 or 15 / 12 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                                |         |          |



Dimension see also Annex B16

**Table C36.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |    |       |    |       |    |     |        |     |       |       |     |        |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|-----|--------|-----|-------|-------|-----|--------|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | M8     | M10 | -     | M12   | M16 | M12    | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6    | M8 | -   | -      | -   | M10   | M12   | -   | -      | -   | -      | -   |
|                                |       |    |       |    | 11x85 |    |     |        |     | 15x85 |       |     |        |     |        |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |     | 16x130 |     |       | 20x85 |     | 20x130 |     | 20x200 |     |

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

|                          |                     |   |  |  |   |   |   |  |  |
|--------------------------|---------------------|---|--|--|---|---|---|--|--|
| Max. installation torque | max $T_{inst}$ [Nm] | 3 |  |  | 5 | 3 | 5 |  |  |
|--------------------------|---------------------|---|--|--|---|---|---|--|--|

## General installation parameters

|               |                         |     |  |  |
|---------------|-------------------------|-----|--|--|
| Edge distance | $C_{min} = C_{cr}$      | 60  |  |  |
| Spacing       | $s_{min} \parallel$     | 80  |  |  |
|               | $s_{cr} \parallel$ [mm] | 250 |  |  |
|               | $s_{min} \perp$         | 80  |  |  |
|               | $s_{cr} \perp$          | 250 |  |  |

## Drilling method

Rotary drilling with carbide drill

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

**Table C36.2:** Group factors

|                                |       |    |       |    |       |    |     |        |     |       |       |     |        |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|-----|--------|-----|-------|-------|-----|--------|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | M8     | M10 | -     | M12   | M16 | M12    | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6    | M8 | -   | -      | -   | M10   | M12   | -   | -      | -   | -      | -   |
|                                |       |    |       |    | 11x85 |    |     |        |     | 15x85 |       |     |        |     |        |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |     | 16x130 |     |       | 20x85 |     | 20x130 |     | 20x200 |     |

|               |                                    |     |     |  |  |
|---------------|------------------------------------|-----|-----|--|--|
| Group factors | $\alpha_{g,N} (s_{min} \parallel)$ | [-] | 1,7 |  |  |
|               | $\alpha_{g,V} (s_{min} \parallel)$ |     | 0,5 |  |  |
|               | $\alpha_{g,N} (s_{min} \perp)$     |     | 1,3 |  |  |
|               | $\alpha_{g,V} (s_{min} \perp)$     |     | 0,5 |  |  |

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## Performance

Vertical perforated brick HLz, T10, T11, dimensions, installation parameters, Group factors

## Annex C36

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# Vertical perforated brick HLz, T10, T11, EN 771-1:2011+A1:2015

**Table C37.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

|                                           |                                    |            |     |            |
|-------------------------------------------|------------------------------------|------------|-----|------------|
| Anchor rod                                |                                    | M10        | M12 | M16        |
| Perforated sleeve FIS H K                 |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                    |            |     |            |
| Max. installation torque                  | max T <sub>inst</sub>              | [Nm]       | 5   |            |
| General installation parameters           |                                    |            |     |            |
| Edge distance                             | c <sub>min</sub> = c <sub>cr</sub> | [mm]       | 60  |            |
| Spacing                                   | s <sub>min</sub>                   |            | 80  |            |
|                                           | s <sub>cr</sub>                    |            | 250 |            |
|                                           | s <sub>min</sub> ⊥                 |            | 80  |            |
|                                           | s <sub>cr</sub> ⊥                  |            | 250 |            |
| Drilling method                           |                                    |            |     |            |
| Rotary drilling with carbide drill        |                                    |            |     |            |

**Table C37.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 1,7 |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            | 0,5 |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            | 1,3 |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            | 0,5 |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, T10, T11, dimensions, installation parameters, Group factors

## Annex C37

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# Vertical perforated brick HLz, T10, T11, EN 771-1:2011+A1:2015

**Table C38.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10    | M8 | M10   | - | M12    | M16 | M12    | M16 | M12 | M16 |
|--------------------------------|-------|----|-------|----|-------|----|--------|----|-------|---|--------|-----|--------|-----|-----|-----|
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -      |    | -     |   | M10    | M12 | -      |     | -   |     |
|                                |       |    |       |    | 11x85 |    |        |    |       |   | 15x85  |     |        |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |   | 20x130 |     | 20x200 |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 1,5 | 1,5 |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     | 1,5 | 2,0 |  |  |  |  |  |  |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d | 1,5 | 2,0 |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     | 2,0 | 2,0 |  |  |  |  |  |  |  |  |  |  |  |  |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w            | w/d | 2,0 | 2,0 |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            |     | 2,0 | 2,5 |  |  |  |  |  |  |  |  |  |  |  |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C38.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12 | M16        |
|---------------------------|------------|-----|------------|
| Perforated sleeve FIS H K | 18x130/200 |     | 22x130/200 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |  |  |  |  |  |  |     |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 1,5 |  |  |  |  |  |  | 1,5 |  |  |  |  |  |  |
|                                                                                  | d/d            |     | 2,0 |  |  |  |  |  |  | 2,0 |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d | 2,0 |  |  |  |  |  |  | 2,0 |  |  |  |  |  |  |
|                                                                                  | d/d            |     | 2,0 |  |  |  |  |  |  | 2,0 |  |  |  |  |  |  |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w            | w/d | 2,0 |  |  |  |  |  |  | 2,0 |  |  |  |  |  |  |
|                                                                                  | d/d            |     | 2,5 |  |  |  |  |  |  | 2,5 |  |  |  |  |  |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Vertical perforated brick HLz, T10, T11, Characteristic resistance under tension loading

## Annex C38

# Vertical perforated brick HLz, T10, T11, EN 771-1:2011+A1:2015

**Table C39.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10    | M8  | M10 | -     | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|--------|-----|-----|-------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | 11x85 | -      | -      | M10 | M12 | 15x85 | -   | -   | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 | 20x200 |     |     |       |     |     |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions   |     |     |     |
|----------------------------------------------------------------------------------|------------------|-----|-----|-----|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w   w/d<br>d/d | 0,9 | 1,5 | 2,0 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w   w/d<br>d/d | 0,9 | 1,5 | 2,0 |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w   w/d<br>d/d | 1,2 | 2,0 | 2,0 |

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

**Table C39.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions   |     |     |
|----------------------------------------------------------------------------------|------------------|-----|-----|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w   w/d<br>d/d | 1,5 | 2,0 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w   w/d<br>d/d | 1,5 | 2,0 |
| 15 / 12 N/mm <sup>2</sup>                                                        | w/w   w/d<br>d/d | 2,0 | 2,0 |

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

Factor for job site tests and displacements see annex C123.

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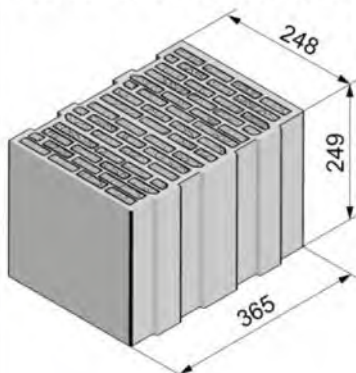
## Performance

Vertical perforated brick HLz, T10, T11, Characteristic resistance under shear loading

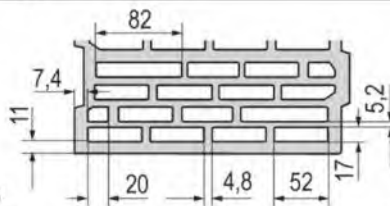
## Annex C39

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# Vertical perforated brick HLz, T7 PF, filled with perlite, EN 771-1:2011+A1:2015



|                                                                                  |                       |                       |         |          |
|----------------------------------------------------------------------------------|-----------------------|-----------------------|---------|----------|
| <b>Producer</b>                                                                  |                       | e.g. Wienerberger     |         |          |
| Nominal dimensions                                                               | [mm]                  | length L              | width W | height H |
|                                                                                  |                       | 248                   | 365     | 249      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,5                   |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 8 / 6        |         |          |
| Standard or annex                                                                |                       | EN 771-1:2011+A1:2015 |         |          |



Dimension see also Annex B16

**Table C40.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                       |       |    |       |    |       |    |     |        |     |       |       |     |        |     |        |     |
|---------------------------------------|-------|----|-------|----|-------|----|-----|--------|-----|-------|-------|-----|--------|-----|--------|-----|
| <b>Anchor rod</b>                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | M8     | M10 | -     | M12   | M16 | M12    | M16 | M12    | M16 |
| <b>Internal threaded anchor FIS E</b> | -     | -  | -     | -  | M6    | M8 | -   | -      | -   | M10   | M12   | -   | -      | -   | -      | -   |
|                                       |       |    |       |    | 11x85 |    |     |        |     | 15x85 |       |     |        |     |        |     |
| <b>Perforated sleeve FIS H K</b>      | 12x50 |    | 12x85 |    | 16x85 |    |     | 16x130 |     |       | 20x85 |     | 20x130 |     | 20x200 |     |

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

|                          |                     |   |  |   |   |   |  |
|--------------------------|---------------------|---|--|---|---|---|--|
| Max. installation torque | max $T_{inst}$ [Nm] | 2 |  | 5 | 2 | 5 |  |
|--------------------------|---------------------|---|--|---|---|---|--|

## General installation parameters

|               |                         |     |  |
|---------------|-------------------------|-----|--|
| Edge distance | $C_{min} = C_{cr}$      | 60  |  |
| Spacing       | $s_{min} \parallel$     | 80  |  |
|               | $s_{cr} \parallel$ [mm] | 250 |  |
|               | $s_{min} \perp$         | 80  |  |
|               | $s_{cr} \perp$          | 250 |  |

## Drilling method

Rotary drilling with carbide drill

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

**Table C40.2:** Group factors

|                                       |       |    |       |    |       |    |     |        |     |       |       |     |        |     |        |     |
|---------------------------------------|-------|----|-------|----|-------|----|-----|--------|-----|-------|-------|-----|--------|-----|--------|-----|
| <b>Anchor rod</b>                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | M8     | M10 | -     | M12   | M16 | M12    | M16 | M12    | M16 |
| <b>Internal threaded anchor FIS E</b> | -     | -  | -     | -  | M6    | M8 | -   | -      | -   | M10   | M12   | -   | -      | -   | -      | -   |
|                                       |       |    |       |    | 11x85 |    |     |        |     | 15x85 |       |     |        |     |        |     |
| <b>Perforated sleeve FIS H K</b>      | 12x50 |    | 12x85 |    | 16x85 |    |     | 16x130 |     |       | 20x85 |     | 20x130 |     | 20x200 |     |

|               |                                    |     |     |  |
|---------------|------------------------------------|-----|-----|--|
| Group factors | $\alpha_{g,N} (s_{min} \parallel)$ | [-] | 1,1 |  |
|               | $\alpha_{g,V} (s_{min} \parallel)$ |     | 1,2 |  |
|               | $\alpha_{g,N} (s_{min} \perp)$     |     | 1,1 |  |
|               | $\alpha_{g,V} (s_{min} \perp)$     |     | 1,2 |  |

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## Performance

Vertical perforated brick HLz, T7 PF, filled with perlite, dimensions, installation parameters, Group factors

## Annex C40

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# Vertical perforated brick HLz, T7 PF, filled with perlite, EN 771-1:2011+A1:2015

**Table C41.1:** Installation parameters

(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                |                                    | M10        | M12 | M16        |
|-------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                 |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                    |            |     |            |
| Max. installation torque                  | max T <sub>inst</sub>              | [Nm]       | 5   |            |
| General installation parameters           |                                    |            |     |            |
| Edge distance                             | c <sub>min</sub> = c <sub>cr</sub> | [mm]       | 60  |            |
| Spacing                                   | s <sub>min</sub>                   |            | 80  |            |
|                                           | s <sub>cr</sub>                    |            | 250 |            |
|                                           | s <sub>min</sub> ⊥                 |            | 80  |            |
|                                           | s <sub>cr</sub> ⊥                  |            | 250 |            |
| Drilling method                           |                                    |            |     |            |
| Rotary drilling with carbide drill        |                                    |            |     |            |

**Table C41.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 1,1 |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            | 1,2 |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            | 1,1 |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            | 1,2 |            |

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## Performance

Vertical perforated brick HLz, T7 PF, filled with perlite,  
dimensions, installation parameters, Group factors

**Annex C41**

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**Vertical perforated brick HLz, T7 PF, filled with perlite, EN 771-1:2011+A1:2015**
**Table C42.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10    | M8     | M10 | -            | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|-------|-------------|-------|--------|--------|-----|--------------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -      | -      | -   | M10<br>15x85 | M12 | -   | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 16x85 | 16x130      | 20x85 | 20x130 | 20x200 |     |              |     |     |     |     |     |     |

 $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |     |     |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 1,2 | 1,2 | 1,2 | 1,2 | 2,0 |
|                                                                                        | d/d                    |     | 1,5 | 1,5 | 1,5 | 1,5 | 2,0 |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 1,5 | 1,5 | 1,5 | 1,5 | 2,5 |
|                                                                                        | d/d                    |     | 1,5 | 2,0 | 1,5 | 2,0 | 3,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C42.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

 $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 1,2 |
|                                                                                        | d/d                    |     | 1,5 |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 1,5 |
|                                                                                        | d/d                    |     | 2,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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**Performance**

Vertical perforated brick HLz, T7 PF, filled with perlite,  
Characteristic resistance under tension loading

**Annex C42**

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**Vertical perforated brick HLz, T7 PF, filled with perlite, EN 771-1:2011+A1:2015**
**Table C43.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10    | M8  | M10 | -     | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|--------|-----|-----|-------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | 11x85 | -      | -      | M10 | M12 | 15x85 | -   | -   | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 | 20x200 |     |     |       |     |     |     |     |     |     |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions   |     |     |     |
|----------------------------------------------------------------------------------|------------------|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w   w/d<br>d/d | 0,9 | 1,5 | 1,2 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w   w/d<br>d/d | 1,2 | 2,0 | 1,5 |

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

**Table C43.2:** 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 | 18x130/200 | 22x130/200 |     |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions   |     |     |
|----------------------------------------------------------------------------------|------------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w   w/d<br>d/d | 1,5 | 1,2 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w   w/d<br>d/d | 2,0 | 1,5 |

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

Factor for job site tests and displacements see annex C123.

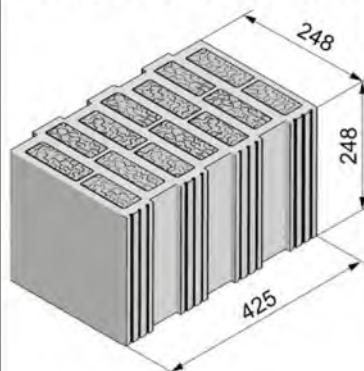
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**Performance**

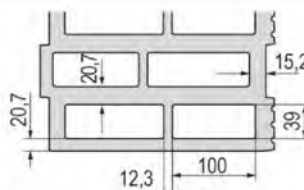
Vertical perforated brick HLz, T7 PF, filled with perlite,  
Characteristic resistance under shear loading

**Annex C43**

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**Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1:2011+A1:2015**


|                                                                                  |                       |                          |         |          |
|----------------------------------------------------------------------------------|-----------------------|--------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                          |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                 | width W | height H |
|                                                                                  |                       | 248                      | 425     | 248      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,8                      |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 8 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                          |         |          |



Dimension see also Annex B16

**Table C44.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |       |       |       |       |       |        |        |        |       |       |        |        |        |        |        |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    | M12    | M16    |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -      | -      | -      | M10   | M12   | -      | -      | -      | -      | -      |
|                                |       |       |       |       | 11x85 |       |        |        |        | 15x85 |       |        |        |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x200 | 20x200 | 20x200 |

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

|                          |                            |   |   |   |   |
|--------------------------|----------------------------|---|---|---|---|
| Max. installation torque | max T <sub>inst</sub> [Nm] | 3 | 5 | 3 | 5 |
|--------------------------|----------------------------|---|---|---|---|

**General installation parameters**

|               |                                    |     |
|---------------|------------------------------------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub> | 60  |
| Spacing       | S <sub>min</sub>                   | 80  |
|               | S <sub>cr</sub>    [mm]            | 250 |
|               | S <sub>min</sub> ⊥                 | 80  |
|               | S <sub>cr</sub> ⊥                  | 250 |

**Drilling method**

Rotary drilling with carbide drill

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

**Table C44.2:** Group factors

|                                |       |       |       |       |       |       |        |        |        |       |       |        |        |        |        |        |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    | M12    | M16    |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -      | -      | -      | M10   | M12   | -      | -      | -      | -      | -      |
|                                |       |       |       |       | 11x85 |       |        |        |        | 15x85 |       |        |        |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x200 | 20x200 | 20x200 |

|               |                                      |     |     |
|---------------|--------------------------------------|-----|-----|
| Group factors | $\alpha_{g,N}$ (S <sub>min</sub>   ) | [-] | 1,3 |
|               | $\alpha_{g,V}$ (S <sub>min</sub>   ) |     | 1,2 |
|               | $\alpha_{g,N}$ (S <sub>min</sub> ⊥)  |     | 0,6 |
|               | $\alpha_{g,V}$ (S <sub>min</sub> ⊥)  |     | 1,2 |

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**Performance**

Vertical perforated brick HLz, T9 MW, filled with mineral wool, dimensions, installation parameters, Group factors

**Annex C44**

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**Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1:2011+A1:2015**
**Table C45.1: Installation parameters**

(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                |                                    | M10        | M12 | M16        |
|-------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                 |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                    |            |     |            |
| Max. installation torque                  | max T <sub>inst</sub>              | [Nm]       | 5   |            |
| General installation parameters           |                                    |            |     |            |
| Edge distance                             | c <sub>min</sub> = C <sub>cr</sub> | [mm]       | 60  |            |
| Spacing                                   | s <sub>min</sub>                   |            | 80  |            |
|                                           | s <sub>cr</sub>                    |            | 250 |            |
|                                           | s <sub>min</sub> ⊥                 |            | 80  |            |
|                                           | s <sub>cr</sub> ⊥                  |            | 250 |            |
| Drilling method                           |                                    |            |     |            |
| Rotary drilling with carbide drill        |                                    |            |     |            |

**Table C45.2: Group factors**

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 1,3 |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            | 1,2 |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            | 0,6 |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            | 1,2 |            |

fischer injection system FIS V Plus for masonry

**Performance**

Vertical perforated brick HLz, T9 MW, filled with mineral wool, dimensions, installation parameters, Group factors

**Annex C45**

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**Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1:2011+A1:2015**
**Table C46.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8     | M10    | M8     | M10    | -            | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------------|--------|--------|--------|--------|--------------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | -      | -      | -      | -      | M10<br>15x85 | -     | -      | -      | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x130 | 16x130 | 16x130 | 16x130 | 20x85        | 20x85 | 20x130 | 20x130 | 20x130 | 20x200 | 20x200 |

 $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |     |  |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|-----|--|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d              | 1,5 | 2,0 | 3,0 | 2,5 | 4,0 |  |
|                                                                                        | d/d                    | 2,0 | 2,5 | 3,0 | 2,5 | 4,5 |  |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w   w/d              | 2,0 | 2,5 | 3,5 | 3,0 | 5,0 |  |
|                                                                                        | d/d                    | 2,0 | 3,0 | 4,0 | 3,0 | 5,5 |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d              | 2,5 | 3,0 | 4,0 | 3,5 | 6,0 |  |
|                                                                                        | d/d                    | 2,5 | 3,0 | 4,5 | 3,5 | 6,5 |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

**Table C46.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16        |
|---------------------------|------------|------------|------------|
| Perforated sleeve FIS H K | 18x130/200 | 18x130/200 | 22x130/200 |

 $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d              | 3,0 | 4,0 |
|                                                                                        | d/d                    | 3,0 | 4,5 |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w   w/d              | 3,5 | 5,0 |
|                                                                                        | d/d                    | 4,0 | 5,5 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d              | 4,0 | 6,0 |
|                                                                                        | d/d                    | 4,5 | 6,5 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

Factor for job site tests and displacements see annex C123.

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**Performance**

Vertical perforated brick HLz, T9 MW, filled with mineral wool;  
Characteristic resistance under tension loading

**Annex C46**

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**Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1:2011+A1:2015**
**Table C47.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8     | M10    | M8     | M10    | -            | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------------|--------|--------|--------|--------|--------------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | -      | -      | -      | -      | M10<br>15x85 | -     | -      | -      | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x130 | 16x130 | 16x130 | 16x130 | 20x85        | 20x85 | 20x130 | 20x130 | 20x130 | 20x200 | 20x200 |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |     |     |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|-----|-----|--|--|--|--|--|--|--|--|--|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 2,0 | 2,0 | 2,5 | 2,0 | 1,5 |  |  |  |  |  |  |  |  |  |
|                                                                                        | d/d                    | d/d |     |     |     |     |     |  |  |  |  |  |  |  |  |  |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 2,5 | 2,5 | 3,0 | 2,5 | 2,0 |  |  |  |  |  |  |  |  |  |
|                                                                                        | d/d                    | d/d |     |     |     |     |     |  |  |  |  |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w                    | w/d | 2,5 | 3,0 | 4,0 | 3,0 | 2,5 |  |  |  |  |  |  |  |  |  |
|                                                                                        | d/d                    | d/d |     |     |     |     |     |  |  |  |  |  |  |  |  |  |

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

**Table C47.2:** 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 | 18x130/200 | 18x130/200 | 22x130/200 |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |     |     |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|-----|-----|--|--|--|--|--|--|--|--|--|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 2,5 | 2,5 | 3,0 | 2,5 | 2,0 |  |  |  |  |  |  |  |  |  |
|                                                                                        | d/d                    | d/d |     |     |     |     |     |  |  |  |  |  |  |  |  |  |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w                    | w/d | 3,0 | 3,0 | 4,0 | 3,0 | 2,5 |  |  |  |  |  |  |  |  |  |
|                                                                                        | d/d                    | d/d |     |     |     |     |     |  |  |  |  |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w                    | w/d | 4,0 | 4,0 | 5,0 | 4,0 | 3,0 |  |  |  |  |  |  |  |  |  |
|                                                                                        | d/d                    | d/d |     |     |     |     |     |  |  |  |  |  |  |  |  |  |

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

Factor for job site tests and displacements see annex C123.

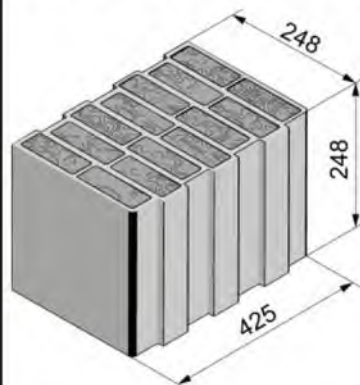
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**Performance**

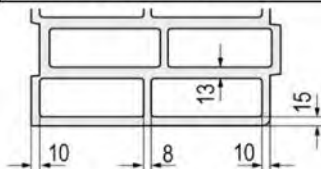
Vertical perforated brick HLz, T9 MW, filled with mineral wool;  
Characteristic resistance under shear loading

**Annex C47**

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**Vertical perforated brick HLz, FZ 7, filled with mineral wool, EN 771-1:2011+A1:2015**


|                                                                                  |                       |                            |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                            |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                   | width W | height H |
|                                                                                  |                       | 248                        | 425     | 248      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,8                        |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 7,5 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                            |         |          |



Dimension see also Annex B16

**Table C48.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |    |       |    |                |    |     |        |     |                  |     |     |        |     |        |     |
|--------------------------------|-------|----|-------|----|----------------|----|-----|--------|-----|------------------|-----|-----|--------|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -              | M8 | M10 | M8     | M10 | -                | M12 | M16 | M12    | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6 M8<br>11x85 | -  | -   | -      | -   | M10 M12<br>15x85 | -   | -   | -      | -   | -      | -   |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85          |    |     | 16x130 |     | 20x85            |     |     | 20x130 |     | 20x200 |     |

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

|                          |                |      |   |  |  |   |   |   |  |  |  |  |  |  |  |  |
|--------------------------|----------------|------|---|--|--|---|---|---|--|--|--|--|--|--|--|--|
| Max. installation torque | max $T_{inst}$ | [Nm] | 2 |  |  | 5 | 2 | 5 |  |  |  |  |  |  |  |  |
|--------------------------|----------------|------|---|--|--|---|---|---|--|--|--|--|--|--|--|--|

**General installation parameters**

|               |                    |      |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|--------------------|------|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Edge distance | $c_{min} = c_{cr}$ | [mm] | 60  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing       | $s_{min II}$       |      | 80  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $s_{cr II}$        |      | 250 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $s_{min \perp}$    |      | 80  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $s_{cr \perp}$     |      | 250 |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Drilling method**

Rotary drilling with carbide drill

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

**Table C48.2:** Group factors

|                                |       |    |       |    |                |    |     |        |     |                  |     |     |        |     |        |     |
|--------------------------------|-------|----|-------|----|----------------|----|-----|--------|-----|------------------|-----|-----|--------|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -              | M8 | M10 | M8     | M10 | -                | M12 | M16 | M12    | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6 M8<br>11x85 | -  | -   | -      | -   | M10 M12<br>15x85 | -   | -   | -      | -   | -      | -   |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85          |    |     | 16x130 |     | 20x85            |     |     | 20x130 |     | 20x200 |     |

|               |                                |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|--------------------------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Group factors | $\alpha_{g,N} (s_{min II})$    | [-] | 1,9 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (s_{min II})$    |     | 0,9 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,N} (s_{min \perp})$ |     | 1,0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (s_{min \perp})$ |     | 0,7 |  |  |  |  |  |  |  |  |  |  |  |  |  |

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**Performance**

Vertical perforated brick HLz, FZ 7, filled with mineral wool;  
dimensions, installation parameters, Group factors

**Annex C48**

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**Vertical perforated brick HLz, FZ 7, filled with mineral wool, EN 771-1:2011+A1:2015**
**Table C49.1: Installation parameters**

(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                |                                    | M10        | M12 | M16        |
|-------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                 |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                    |            |     |            |
| Max. installation torque                  | T <sub>inst</sub>                  | [Nm]       | 5   |            |
| General installation parameters           |                                    |            |     |            |
| Edge distance                             | c <sub>min</sub> = c <sub>cr</sub> | [mm]       | 60  |            |
| Spacing                                   | s <sub>min</sub>                   |            | 80  |            |
|                                           | s <sub>cr</sub>                    |            | 250 |            |
|                                           | s <sub>min</sub> ⊥                 |            | 80  |            |
|                                           | s <sub>cr</sub> ⊥                  |            | 250 |            |
| Drilling method                           |                                    |            |     |            |
| Rotary drilling with carbide drill        |                                    |            |     |            |

**Table C49.2: Group factors**

| Anchor rod                |                                    | M10        | M12 | M16        |
|---------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                    | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{min \parallel})$ | [-]        | 1,9 |            |
|                           | $\alpha_{g,V} (s_{min \parallel})$ |            | 0,9 |            |
|                           | $\alpha_{g,N} (s_{min \perp})$     |            | 1,0 |            |
|                           | $\alpha_{g,V} (s_{min \perp})$     |            | 0,7 |            |

fischer injection system FIS V Plus for masonry

**Performance**

 Vertical perforated brick HLz, FZ 7, filled with mineral wool;  
 dimensions, installation parameters, Group factors

**Annex C49**

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# Vertical perforated brick HLz, FZ 7, filled with mineral wool, EN 771-1:2011+A1:2015

**Table C50.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8     | M10    | M8     | M10    | -            | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------------|--------|--------|--------|--------|--------------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | -      | -      | -      | -      | M10<br>15x85 | -     | -      | -      | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x130 | 16x130 | 16x130 | 16x130 | 20x85        | 20x85 | 20x130 | 20x130 | 20x130 | 20x130 | 20x200 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----------------------------------------------------------------------------------|----------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 0,60 | 0,75 | 1,50 | 2,00 | 1,20 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 |
|                                                                                  | d/d            | d/d | 0,60 | 0,90 | 1,50 | 2,00 | 1,50 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,50 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 0,75 | 0,90 | 1,50 | 2,00 | 1,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 |
|                                                                                  | d/d            | d/d | 0,90 | 0,90 | 2,00 | 2,50 | 2,00 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 3,00 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 0,90 | 1,20 | 2,00 | 2,50 | 2,00 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 2,50 | 3,00 |
|                                                                                  | d/d            | d/d | 0,90 | 1,20 | 2,00 | 3,00 | 2,00 | 3,00 | 3,00 | 3,00 | 3,00 | 3,00 | 3,00 | 3,00 | 3,00 | 3,50 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C50.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16        |
|---------------------------|------------|------------|------------|
| Perforated sleeve FIS H K | 18x130/200 | 18x130/200 | 22x130/200 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
|                                                                                  | d/d            | d/d | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
|                                                                                  | d/d            | d/d | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
|                                                                                  | d/d            | d/d | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 | 3,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Vertical perforated brick HLz, FZ 7, filled with mineral wool;  
Characteristic resistance under tension loading

## Annex C50

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**Vertical perforated brick HLz, FZ 7, filled with mineral wool, EN 771-1:2011+A1:2015**
**Table C51.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8     | M10    | M8     | M10    | -            | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------------|--------|--------|--------|--------|--------------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8     | -      | -      | -      | M10<br>15x85 | M12   | -      | -      | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x130 | 16x130 | 16x130 | 16x130 | 20x85        | 20x85 | 20x130 | 20x130 | 20x130 | 20x200 | 20x200 |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d<br>d/d       | 1,2 | 1,5 | 1,5 |
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 1,5 | 2,0 | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d<br>d/d       | 1,5 | 2,5 | 2,0 |

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

**Table C51.2:** 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 | 18x130/200 | 18x130/200 | 22x130/200 |

 $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d<br>d/d       | 1,5 | 1,5 |
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 2,0 | 2,0 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d<br>d/d       | 2,5 | 2,5 |

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

Factor for job site tests and displacements see annex C123.

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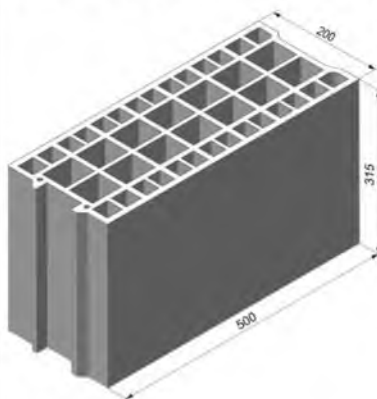
**Performance**

Vertical perforated brick HLz, FZ 7, filled with mineral wool;  
Characteristic resistance under shear loading

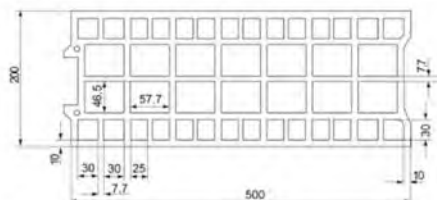
**Annex C51**

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                            |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------------------------|---------|----------|
| Producer                                                                         | e.g. Bouyer Leroux    |                            |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                   | width W | height H |
|                                                                                  |                       | 500                        | 200     | 315      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 0,6                      |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 7,5 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                            |         |          |



Dimension see also Annex B16

**Table C52.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -      | -      | -      | M10   | M12   | -      | -      | -      |
|                                |       |       |       |       | 11x85 |       |        |        |        | 15x85 |       |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x130 |

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

|                          |                            |   |
|--------------------------|----------------------------|---|
| Max. installation torque | max T <sub>inst</sub> [Nm] | 2 |
|--------------------------|----------------------------|---|

## General installation parameters

|               |                                        |     |
|---------------|----------------------------------------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub>     | 120 |
| Spacing       | S <sub>min</sub>                       | 120 |
|               | S <sub>cr</sub>                        | 500 |
|               | S <sub>min</sub> ⊥ = S <sub>cr</sub> ⊥ | 315 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C52.2:** Group factors

| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -      | -      | -      | M10   | M12   | -      | -      | -      |
|                                |       |       |       |       | 11x85 |       |        |        |        | 15x85 |       |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x130 |

|               |                                      |     |     |
|---------------|--------------------------------------|-----|-----|
| Group factors | $\alpha_{g,N}$ (S <sub>min</sub>   ) | [-] | 1,3 |
|               | $\alpha_{g,V}$ (S <sub>min</sub>   ) |     | 1,7 |
|               | $\alpha_{g,N}$ (S <sub>min</sub> ⊥)  |     | 2,0 |
|               | $\alpha_{g,V}$ (S <sub>min</sub> ⊥)  |     |     |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C52

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C53.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                        | M10        | M12 | M16        |
|----------------------------------------------|----------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                        | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                        |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>                  | [Nm]       | 2   |            |
| General installation parameters              |                                        |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub>     | [mm]       | 120 |            |
| Spacing                                      | s <sub>min</sub>                       |            | 120 |            |
|                                              | s <sub>cr</sub>                        |            | 500 |            |
|                                              | s <sub>min</sub> ⊥ = s <sub>cr</sub> ⊥ |            | 315 |            |
| Drilling method                              |                                        |            |     |            |
| Hammer drilling with hard metal hammer drill |                                        |            |     |            |

**Table C53.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | 1,3        |     |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ | 1,7        |     |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     | 2,0        |     |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C53

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C54.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8    | M10 | - | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|-------|-----|---|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -   | M10   | M12 | - | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |     | 15x85 |     |   |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |       |     |   |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |      |      |      |      |      |  |
|----------------------------------------------------------------------------------|----------------|------|------|------|------|------|--|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,50 | 1,50 | 0,75 | 1,50 | 1,50 |  |
|                                                                                  | d/d            | 0,60 | 1,50 | 0,90 | 1,50 | 2,00 |  |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d        | 0,75 | 2,00 | 1,20 | 2,00 | 2,50 |  |
|                                                                                  | d/d            | 0,90 | 2,50 | 1,20 | 2,50 | 2,50 |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d        | 0,90 | 3,00 | 1,50 | 3,00 | 3,50 |  |
|                                                                                  | d/d            | 1,20 | 3,00 | 2,00 | 3,00 | 3,50 |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C54.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |      |      |
|----------------------------------------------------------------------------------|----------------|------|------|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,75 | 1,50 |
|                                                                                  | d/d            | 0,90 | 2,00 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d        | 1,20 | 2,50 |
|                                                                                  | d/d            | 1,20 | 2,50 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d        | 1,50 | 3,50 |
|                                                                                  | d/d            | 2,00 | 3,50 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C54

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C55.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8    | M10 | - | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|-------|-----|---|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -   | M10   | M12 | - | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |     | 15x85 |     |   |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |       |     |   |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 1,5 | 0,9 | 1,5 | 2,5 | 0,9 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d<br>d/d | 2,5 | 1,5 | 2,5 | 3,5 | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d<br>d/d | 3,5 | 2,0 | 3,5 | 4,5 | 2,0 |

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

**Table C55.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 0,9 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d<br>d/d | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d<br>d/d | 2,0 |

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

Factor for job site tests and displacements see annex C123.

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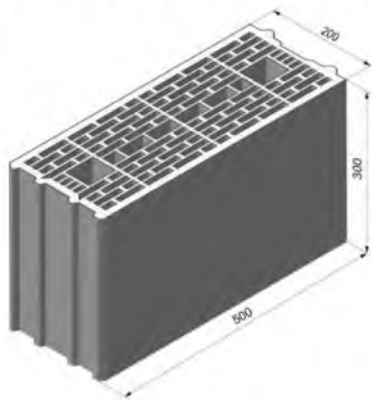
## Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

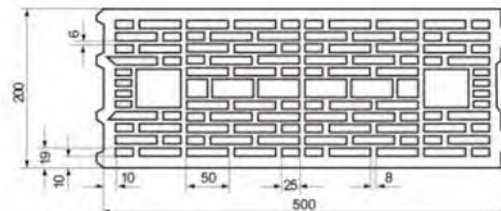
## Annex C55

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                         |         |          |
|----------------------------------------------------------------------------------|-----------------------|-----------------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                                         |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                                | width W | height H |
|                                                                                  |                       | 500                                     | 200     | 300      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 0,7                                   |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 7,5 / 6 or 10 / 8<br>12,5 / 10 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                                         |         |          |



Dimension see also Annex B17

**Table C56.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 |

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

|                                               |   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Max. installation torque $\max T_{inst}$ [Nm] | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|

## General installation parameters

|                                        |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Edge distance $C_{min} = C_{cr}$       | 50  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing $S_{min} \parallel$            | 100 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing $S_{cr} \parallel$             | 500 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing $S_{min} \perp = S_{cr} \perp$ | 300 |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C56.2:** Group factors

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 |

|                                                  |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------------------------------------------|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Group factors $\alpha_{g,N} (S_{min} \parallel)$ | 1,4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Group factors $\alpha_{g,V} (S_{min} \parallel)$ | 1,4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Group factors $\alpha_{g,N} (S_{min} \perp)$     | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Group factors $\alpha_{g,V} (S_{min} \perp)$     | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C56

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C57.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                        | M10        | M12 | M16        |
|----------------------------------------------|----------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                        | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                        |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>                  | [Nm]       | 2   |            |
| General installation parameters              |                                        |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub>     | [mm]       | 80  |            |
| Spacing                                      | s <sub>min</sub>                       |            | 100 |            |
|                                              | s <sub>cr</sub>                        |            | 500 |            |
|                                              | s <sub>min</sub> ⊥ = s <sub>cr</sub> ⊥ |            | 300 |            |
| Drilling method                              |                                        |            |     |            |
| Hammer drilling with hard metal hammer drill |                                        |            |     |            |

**Table C57.2:** Group factors

| Anchor rod                |                                        | M10        | M12 | M16        |
|---------------------------|----------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                        | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\text{min II}})$     | 1,4        |     |            |
|                           | $\alpha_{g,V} (s_{\text{min II}})$     | 2          |     |            |
|                           | $\alpha_{g,N} (s_{\text{min } \perp})$ |            |     |            |
|                           | $\alpha_{g,V} (s_{\text{min } \perp})$ |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C57

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C58.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

|                                |       |       |       |       |   |        |     |     |       |   |     |        |     |     |
|--------------------------------|-------|-------|-------|-------|---|--------|-----|-----|-------|---|-----|--------|-----|-----|
| Anchor rod                     | M6    | M8    | M6    | M8    | - | M8     | M10 | M8  | M10   | - | M12 | M16    | M12 | M16 |
| Internal threaded anchor FIS E | -     | -     | M6    | M8    | - | -      | -   | M10 | M12   | - | -   |        |     |     |
|                                |       |       | 11x85 | 15x85 |   |        |     |     |       |   |     |        |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 |       |   | 16x130 |     |     | 20x85 |   |     | 20x130 |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |      |      |      |
|----------------------------------------------------------------------------------|----------------|-----|------|------|------|------|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 0,50 | 0,60 | 1,20 | 0,75 |
|                                                                                  | d/d            |     | 0,60 | 0,75 | 1,20 | 0,90 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 0,75 | 0,90 | 1,50 | 1,20 |
|                                                                                  | d/d            |     | 0,90 | 1,20 | 2,00 | 1,20 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 0,90 | 1,20 | 2,00 | 1,50 |
|                                                                                  | d/d            |     | 1,20 | 1,50 | 2,50 | 1,50 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d | 1,20 | 1,50 | 2,50 | 2,00 |
|                                                                                  | d/d            |     | 1,50 | 2,00 | 3,00 | 2,00 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C58.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 1,2 |
|                                                                                  | d/d            |     | 1,2 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 1,5 |
|                                                                                  | d/d            |     | 2,0 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 2,0 |
|                                                                                  | d/d            |     | 2,5 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d | 2,5 |
|                                                                                  | d/d            |     | 3,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C58

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C59.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

|                                |       |       |       |       |   |        |       |     |     |        |     |     |     |     |
|--------------------------------|-------|-------|-------|-------|---|--------|-------|-----|-----|--------|-----|-----|-----|-----|
| Anchor rod                     | M6    | M8    | M6    | M8    | - | M8     | M10   | M8  | M10 | -      | M12 | M16 | M12 | M16 |
| Internal threaded anchor FIS E | -     | -     | M6    | M8    | - | -      | M10   | M12 | -   | -      |     |     |     |     |
|                                |       |       | 11x85 | 15x85 |   |        |       |     |     |        |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 |       |   | 16x130 | 20x85 |     |     | 20x130 |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 0,9 | 1,2 | 0,9 | 1,2 | 0,6 | 2,0 | 0,6 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d<br>d/d | 1,2 | 1,5 | 1,2 | 1,5 | 0,9 | 3,0 | 0,9 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d<br>d/d | 1,5 | 2,0 | 1,5 | 2,0 | 1,2 | 4,0 | 1,2 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w w/d<br>d/d | 2,0 | 3,0 | 2,0 | 3,0 | 1,5 | 5,0 | 1,5 |

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

**Table C59.2:** 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 | 18x130/200 |     | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 0,6 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d<br>d/d | 0,9 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d<br>d/d | 1,2 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w w/d<br>d/d | 1,5 |

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

Factor for job site tests and displacements see annex C123.

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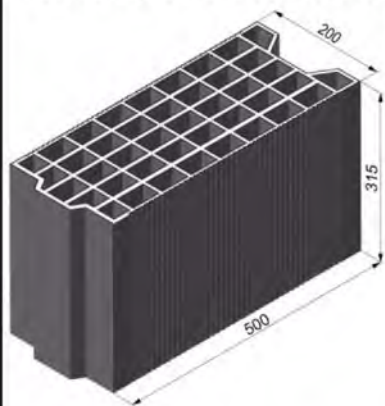
## Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

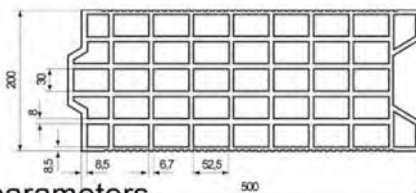
## Annex C59

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                          |         |          |
|----------------------------------------------------------------------------------|-----------------------|------------------------------------------|---------|----------|
| Producer                                                                         | e.g. Terreal          |                                          |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                                 | width W | height H |
|                                                                                  |                       | 500                                      | 200     | 315      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 0,7                                    |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 or 5 / 4 or<br>7,5 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                                          |         |          |



Dimension see also Annex B17

**Table C60.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |       |       |       |   |        |     |       |     |   |        |     |     |     |
|--------------------------------|-------|-------|-------|-------|---|--------|-----|-------|-----|---|--------|-----|-----|-----|
| Anchor rod                     | M6    | M8    | M6    | M8    | - | M8     | M10 | M8    | M10 | - | M12    | M16 | M12 | M16 |
| Internal threaded anchor FIS E | -     | -     | M6    | M8    | - | -      | -   | M10   | M12 | - | -      |     |     |     |
|                                |       |       | 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 torque | max $T_{inst}$ [Nm] | 2 |
|--------------------------|---------------------|---|

## General installation parameters

|               |                         |     |    |    |    |
|---------------|-------------------------|-----|----|----|----|
| Edge distance | $C_{min} = C_{cr}$      | 50  | 80 | 50 | 80 |
| Spacing       | $s_{min} \parallel$     | 100 |    |    |    |
|               | $s_{cr} \parallel$ [mm] | 500 |    |    |    |
|               | $s_{min} \perp$         | 100 |    |    |    |
|               | $s_{cr} \perp$          | 315 |    |    |    |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C60.2:** Group factors

|                                |       |    |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                |       |    |       |    | 11x85 |    |    |     |        |     | 15x85 |     |     |     |        |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 20x85 |     |     |     | 20x130 |     |

|               |                                    |     |     |  |  |  |  |  |  |  |  |  |  |  |
|---------------|------------------------------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|
| Group factors | $\alpha_{g,N} (s_{min} \parallel)$ | [-] | 1,1 |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (s_{min} \parallel)$ |     | 1,2 |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,N} (s_{min} \perp)$     |     | 1,1 |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (s_{min} \perp)$     |     | 1,2 |  |  |  |  |  |  |  |  |  |  |  |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C61.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                    | M10        | M12 | M16        |
|----------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                    |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>              | [Nm]       | 2   |            |
| General installation parameters              |                                    |            |     |            |
| Edge distance                                | c <sub>min</sub> = C <sub>cr</sub> | [mm]       | 80  |            |
| Spacing                                      | s <sub>min</sub>                   |            | 100 |            |
|                                              | s <sub>cr</sub>                    |            | 500 |            |
|                                              | s <sub>min</sub> ⊥                 |            | 100 |            |
|                                              | s <sub>cr</sub> ⊥                  |            | 315 |            |
| Drilling method                              |                                    |            |     |            |
| Hammer drilling with hard metal hammer drill |                                    |            |     |            |

**Table C61.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 1,1 |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            | 1,2 |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            | 1,1 |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            | 1,2 |            |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C61

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C62.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10 | M8    | M10 | - | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|-----|-------|-----|---|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -     | -      | -   | M10   | M12 | - | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |     | 15x85 |     |   |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 |     |       |     |   |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w w/d        | 0,5 |
|                                                                                  | d/d            | 0,5 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,9 |
|                                                                                  | d/d            | 0,9 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d        | 1,5 |
|                                                                                  | d/d            | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d        | 2,0 |
|                                                                                  | d/d            | 2,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C62.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w w/d        | 0,5 |
|                                                                                  | d/d            | 0,6 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,9 |
|                                                                                  | d/d            | 1,2 |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d        | 1,5 |
|                                                                                  | d/d            | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d        | 2,0 |
|                                                                                  | d/d            | 2,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C62

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C63.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10    | M8 | M10   | -       | M12    | M16 | M12 | M16 |
|--------------------------------|-------|----|-------|----|-------|----|--------|----|-------|---------|--------|-----|-----|-----|
| Internal threaded anchor FIS E | -     |    | -     |    | M6 M8 | -  |        | -  |       | M10 M12 | -      |     | -   |     |
|                                |       |    |       |    | 11x85 |    |        |    |       | 15x85   |        |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |         | 20x130 |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |      |     |      |      |      |      |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|------|------|-----|------|------|------|------|--|--|--|--|--|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w            | w/d | 0,30 | 0,60 | 0,3 | 0,60 | 0,60 | 0,90 | 0,75 |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |     |      |      |      |      |  |  |  |  |  |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 0,75 | 1,20 | 0,7 | 1,20 | 1,20 | 2,00 | 1,50 |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |     |      |      |      |      |  |  |  |  |  |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 0,90 | 2,00 | 0,9 | 2,00 | 1,50 | 3,00 | 2,00 |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |     |      |      |      |      |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 1,50 | 2,50 | 1,5 | 2,50 | 2,00 | 4,00 | 3,00 |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |     |      |      |      |      |  |  |  |  |  |

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

**Table C63.2:** 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 | 18x130/200 |     | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |      |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|------|------|--|--|--|--|--|--|--|--|--|--|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w            | w/d | 0,60 | 0,75 |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |  |  |  |  |  |  |  |  |  |  |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 1,20 | 1,50 |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |  |  |  |  |  |  |  |  |  |  |
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w            | w/d | 1,50 | 2,00 |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |  |  |  |  |  |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 2,00 | 3,00 |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |  |  |  |  |  |  |  |  |  |  |

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

Factor for job site tests and displacements see annex C123.

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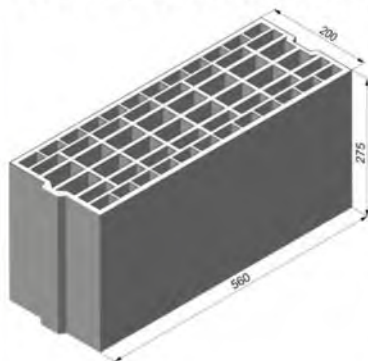
## Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

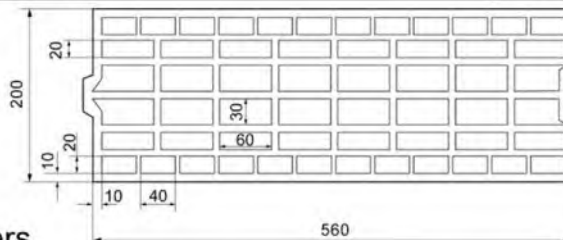
## Annex C63

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                          |         |          |
|----------------------------------------------------------------------------------|-----------------------|--------------------------|---------|----------|
| Producer                                                                         | e.g. Imery            |                          |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                 | width W | height H |
|                                                                                  |                       | 560                      | 200     | 275      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 0,7                    |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 8 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                          |         |          |



Dimension  
see also  
Annex B17

**Table C64.1: Installation parameters**

|                                           |                                        |      |            |     |        |     |            |
|-------------------------------------------|----------------------------------------|------|------------|-----|--------|-----|------------|
| Anchor rod                                | M8                                     | M10  | M10        | M12 | M12    | M16 | M16        |
| Perforated sleeve FIS H K                 | 16x130                                 |      | 18x130/200 |     | 20x130 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                        |      |            |     |        |     |            |
| Max. installation torque                  | max T <sub>inst</sub>                  | [Nm] | 2          |     |        |     |            |
| General installation parameters           |                                        |      |            |     |        |     |            |
| Edge distance                             | C <sub>min</sub> = C <sub>cr</sub>     | [mm] | 80         |     |        |     |            |
| Spacing                                   | S <sub>min</sub>    = S <sub>cr</sub>  |      | 560        |     |        |     |            |
|                                           | S <sub>min</sub> ⊥ = S <sub>cr</sub> ⊥ |      | 275        |     |        |     |            |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C64.2: Group factors**

| Anchor rod                |                                | M8     | M10 | M10        | M12 | M12    | M16 | M16        |
|---------------------------|--------------------------------|--------|-----|------------|-----|--------|-----|------------|
| Perforated sleeve FIS H K |                                | 16x130 |     | 18x130/200 |     | 20x130 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{min}   )$    | [-]    | 2   |            |     |        |     |            |
|                           | $\alpha_{g,V} (s_{min}   )$    |        |     |            |     |        |     |            |
|                           | $\alpha_{g,N} (s_{min} \perp)$ |        |     |            |     |        |     |            |
|                           | $\alpha_{g,V} (s_{min} \perp)$ |        |     |            |     |        |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C64

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C65.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |                        | M8     | M10 | M10        | M12 | M12    | M16 | M16        |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------|-----|------------|-----|--------|-----|------------|
| Perforated sleeve FIS H K                                                                                                                         |                        | 16x130 |     | 18x130/200 |     | 20x130 |     | 22x130/200 |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                        |        |     |            |     |        |     |            |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                            | Use<br>con-<br>ditions |        |     |            |     |        |     |            |
| 5 / 4 N/mm <sup>2</sup>                                                                                                                           | w/w   w/d              | 0,9    |     |            |     | 1,2    |     |            |
|                                                                                                                                                   | d/d                    | 1,2    |     |            |     | 1,5    |     |            |
| 8 / 6 N/mm <sup>2</sup>                                                                                                                           | w/w   w/d              | 1,5    |     |            |     | 2,0    |     |            |
|                                                                                                                                                   | d/d                    | 1,5    |     |            |     | 2,0    |     |            |
| 10 / 8 N/mm <sup>2</sup>                                                                                                                          | w/w   w/d              | 2,0    |     |            |     | 2,5    |     |            |
|                                                                                                                                                   | d/d                    | 2,5    |     |            |     | 3,0    |     |            |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{RK(72/120^{\circ}C)} = 0,83 \cdot N_{RK(50/80^{\circ}C)}$ .

**Table C65.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                                    | M8                     | M10 | M10        | M12 | M12    | M16 | M16        |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|------------|-----|--------|-----|------------|
| Perforated sleeve FIS H K                                                                                                     | 16x130                 |     | 18x130/200 |     | 20x130 |     | 22x130/200 |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,I</sub> [kN]; temperature range 50/80°C and 72/120°C |                        |     |            |     |        |     |            |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                        | Use<br>con-<br>ditions |     | 0,9        |     |        |     |            |
| 5 / 4 N/mm <sup>2</sup>                                                                                                       | w/w                    | w/d |            |     |        |     |            |
|                                                                                                                               | d/d                    |     |            |     |        |     |            |
| 8 / 6 N/mm <sup>2</sup>                                                                                                       | w/w                    | w/d | 1,5        |     |        |     |            |
|                                                                                                                               | d/d                    |     |            |     |        |     |            |
| 10 / 8 N/mm <sup>2</sup>                                                                                                      | w/w                    | w/d | 2,0        |     |        |     |            |
|                                                                                                                               | d/d                    |     |            |     |        |     |            |

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

Factor for job site tests and displacements see annex C123.

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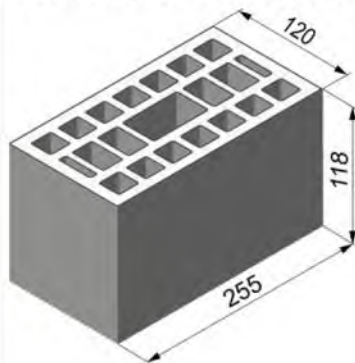
## Performance

Vertical perforated brick HLz, Characteristic resistance under tension and shear loading

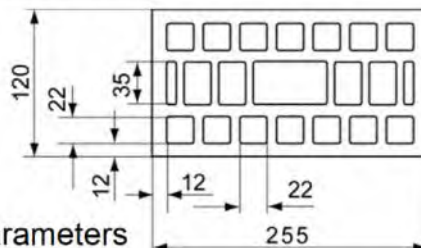
## Annex C65

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                                             |         |          |
|----------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                                                             |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                                                    | width W | height H |
|                                                                                  |                       | 255                                                         | 120     | 118      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 1,0                                                       |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 or 5 / 4 or 8 / 6 or 10 / 8 or 12,5 / 10 or 15 / 12 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                                                             |         |          |



Dimension see also Annex B18

**Table C66.1: Installation parameters**

|                                |       |       |       |       |       |       |       |       |       |       |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10   | -     | M12   | M16   |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -     | M10   | M12   | -     |
|                                |       |       |       |       | 11x85 |       |       | 15x85 |       |       |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x85 | 20x85 | 20x85 | 20x85 |

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

|                          |                       |      |   |
|--------------------------|-----------------------|------|---|
| Max. installation torque | max T <sub>inst</sub> | [Nm] | 2 |
|--------------------------|-----------------------|------|---|

## General installation parameters

|               |                                          |      |     |
|---------------|------------------------------------------|------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub>       | [mm] | 60  |
| Spacing       | S <sub>cr II</sub> = S <sub>min II</sub> | [mm] | 255 |
|               | S <sub>cr ⊥</sub> = S <sub>min ⊥</sub>   | [mm] | 120 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C66.2: Group factors**

|                                |                             |                             |                            |                            |       |       |       |       |       |       |
|--------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-------|-------|-------|-------|-------|-------|
| Anchor rod                     | M6                          | M8                          | M6                         | M8                         | -     | M8    | M10   | -     | M12   | M16   |
| Internal threaded anchor FIS E | -                           | -                           | -                          | -                          | M6    | M8    | -     | M10   | M12   | -     |
|                                |                             |                             |                            |                            | 11x85 |       |       | 15x85 |       |       |
| Perforated sleeve FIS H K      | 12x50                       | 12x85                       | 12x85                      | 12x85                      | 16x85 | 16x85 | 16x85 | 20x85 | 20x85 | 20x85 |
| Group factors                  | $\alpha_{g,N} (S_{min II})$ | $\alpha_{g,V} (S_{min II})$ | $\alpha_{g,N} (S_{min ⊥})$ | $\alpha_{g,V} (S_{min ⊥})$ | 2     |       |       |       |       |       |
|                                | [-]                         |                             |                            |                            |       |       |       |       |       |       |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C66

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C67.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        | M6             | M8  | M6    | M8 | -     |    | M8 | M10 | -               |     | M12 | M16 |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|-------|----|-------|----|----|-----|-----------------|-----|-----|-----|
| Internal threaded anchor FIS E                                                                                                                    | -              |     | -     |    | M6    | M8 | -  |     | M10             | M12 | -   |     |
|                                                                                                                                                   |                |     |       |    | 11x85 |    |    |     | 15x85           |     |     |     |
| Perforated sleeve FIS H K                                                                                                                         | 12x50          |     | 12x85 |    | 16x85 |    |    |     | 20x85           |     |     |     |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>1)</sup> |                |     |       |    |       |    |    |     |                 |     |     |     |
| Mean compressive strength / Min. compressive strength single brick <sup>2)</sup>                                                                  | Use conditions |     |       |    |       |    |    |     |                 |     |     |     |
| 2,5 / 2 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d | 0,40  |    | 0,50  |    |    |     | _ <sup>3)</sup> |     |     |     |
|                                                                                                                                                   | d/d            |     | 0,50  |    | 0,50  |    |    |     | _ <sup>3)</sup> |     |     |     |
| 5 / 4 N/mm <sup>2</sup>                                                                                                                           | w/w            | w/d | 0,90  |    | 0,90  |    |    |     | 0,50            |     |     |     |
|                                                                                                                                                   | d/d            |     | 0,90  |    | 1,20  |    |    |     | 0,50            |     |     |     |
| 8 / 6 N/mm <sup>2</sup>                                                                                                                           | w/w            | w/d | 1,20  |    | 1,50  |    |    |     | 0,75            |     |     |     |
|                                                                                                                                                   | d/d            |     | 1,50  |    | 1,50  |    |    |     | 0,75            |     |     |     |
| 10 / 8 N/mm <sup>2</sup>                                                                                                                          | w/w            | w/d | 1,50  |    | 2,00  |    |    |     | 0,90            |     |     |     |
|                                                                                                                                                   | d/d            |     | 2,00  |    | 2,00  |    |    |     | 0,90            |     |     |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       | w/w            | w/d | 2,00  |    | 2,50  |    |    |     | 1,20            |     |     |     |
|                                                                                                                                                   | d/d            |     | 2,50  |    | 2,50  |    |    |     | 1,20            |     |     |     |
| 15 / 12 N/mm <sup>2</sup>                                                                                                                         | w/w            | w/d | 2,50  |    | 3,00  |    |    |     | 1,50            |     |     |     |
|                                                                                                                                                   | d/d            |     | 3,00  |    | 3,50  |    |    |     | 1,50            |     |     |     |

<sup>1)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

<sup>2)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength.

<sup>3)</sup> No performance assessed.

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C67

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C68.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

|                                |       |    |       |    |       |    |    |     |       |     |     |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|-------|-----|-----|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | -     |     | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | M10   | M12 | -   |     |
|                                |       |    |       |    | 11x85 |    |    |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 20x85 |     |     |     |

$V_{RK} = V_{RK,b} = V_{RK,c,II} = V_{RK,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>dition |     |      |      |      |      |      |  |  |  |
|----------------------------------------------------------------------------------------|-----------------------|-----|------|------|------|------|------|--|--|--|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w                   | w/d | 0,60 | 0,75 | 0,60 | 0,75 | 0,90 |  |  |  |
|                                                                                        | d/d                   | d/d |      |      |      |      |      |  |  |  |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w                   | w/d | 1,20 | 1,50 | 1,20 | 1,50 | 2,00 |  |  |  |
|                                                                                        | d/d                   | d/d |      |      |      |      |      |  |  |  |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w                   | w/d | 2,00 | 2,00 | 2,00 | 2,00 | 2,50 |  |  |  |
|                                                                                        | d/d                   | d/d |      |      |      |      |      |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w                   | w/d | 2,50 | 3,00 | 2,50 | 3,00 | 3,50 |  |  |  |
|                                                                                        | d/d                   | d/d |      |      |      |      |      |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                            | w/w                   | w/d | 3,00 | 3,50 | 3,00 | 3,50 | 4,50 |  |  |  |
|                                                                                        | d/d                   | d/d |      |      |      |      |      |  |  |  |
| 15 / 12 N/mm <sup>2</sup>                                                              | w/w                   | w/d | 4,00 | 4,50 | 4,00 | 4,50 | 5,50 |  |  |  |
|                                                                                        | d/d                   | d/d |      |      |      |      |      |  |  |  |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

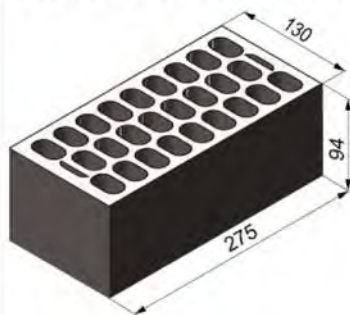
## Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

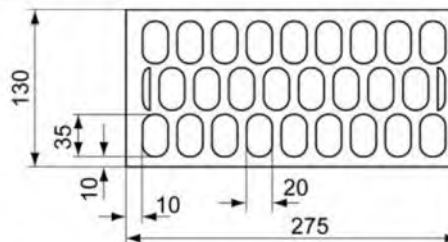
## Annex C68

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                             |                                                    |         |          |
|----------------------------------------------------------------------------------|-----------------------------|----------------------------------------------------|---------|----------|
| Producer                                                                         | e.g. Cermanica Farreny S.A. |                                                    |         |          |
| Nominal dimensions                                                               | [mm]                        | length L                                           | width W | height H |
|                                                                                  |                             | 275                                                | 130     | 94       |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ]       | ≥ 0,8                                              |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]        | 7,5 / 6 or 10 / 8 or 15 / 12 or 20 / 16 or 25 / 20 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015       |                                                    |         |          |



Dimension see also Annex B18

**Table C69.1: Installation parameters**

|                                |       |       |       |       |       |       |       |       |       |       |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10   | -     | M12   | M16   |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -     | M10   | M12   | -     |
|                                |       |       |       |       | 11x85 |       |       | 15x85 |       |       |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x85 | 20x85 | 20x85 | 20x85 |

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

|                          |                       |      |   |
|--------------------------|-----------------------|------|---|
| Max. installation torque | max T <sub>inst</sub> | [Nm] | 2 |
|--------------------------|-----------------------|------|---|

## General installation parameters

|               |                                          |      |     |     |
|---------------|------------------------------------------|------|-----|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub>       | [mm] | 100 | 120 |
| Spacing       | S <sub>cr II</sub> = S <sub>min II</sub> | [mm] | 275 |     |
|               | S <sub>cr ⊥</sub> = S <sub>min ⊥</sub>   | [mm] | 95  |     |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C69.2: Group factors**

|                                |                             |                             |                            |                            |       |       |       |       |       |       |
|--------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-------|-------|-------|-------|-------|-------|
| Anchor rod                     | M6                          | M8                          | M6                         | M8                         | -     | M8    | M10   | -     | M12   | M16   |
| Internal threaded anchor FIS E | -                           | -                           | -                          | -                          | M6    | M8    | -     | M10   | M12   | -     |
|                                |                             |                             |                            |                            | 11x85 |       |       | 15x85 |       |       |
| Perforated sleeve FIS H K      | 12x50                       | 12x85                       | 12x85                      | 12x85                      | 16x85 | 16x85 | 16x85 | 20x85 | 20x85 | 20x85 |
| Group factors                  | $\alpha_{g,N} (S_{min II})$ | $\alpha_{g,V} (S_{min II})$ | $\alpha_{g,N} (S_{min ⊥})$ | $\alpha_{g,V} (S_{min ⊥})$ | 2     |       |       |       |       |       |
|                                | [-]                         |                             |                            |                            |       |       |       |       |       |       |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C69

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C70.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        | M6                  | M8  | M6    | M8 | -     |    | M8 | M10 | -     |     | M12 | M16 |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----|-------|----|-------|----|----|-----|-------|-----|-----|-----|
| Internal threaded anchor FIS E                                                                                                                    | -                   |     | -     |    | M6    | M8 | -  |     | M10   | M12 | -   |     |
|                                                                                                                                                   |                     |     |       |    | 11x85 |    |    |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K                                                                                                                         | 12x50               |     | 12x85 |    | 16x85 |    |    |     | 20x85 |     |     |     |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                     |     |       |    |       |    |    |     |       |     |     |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                                                  | Use con-<br>ditions |     |       |    |       |    |    |     |       |     |     |     |
| 7,5 / 6 N/mm <sup>2</sup>                                                                                                                         | w/w                 | w/d | 0,40  |    | 0,90  |    |    |     |       |     |     |     |
|                                                                                                                                                   | d/d                 |     | 0,40  |    | 0,90  |    |    |     |       |     |     |     |
| 10 / 8 N/mm <sup>2</sup>                                                                                                                          | w/w                 | w/d | 0,50  |    | 1,20  |    |    |     |       |     |     |     |
|                                                                                                                                                   | d/d                 |     | 0,60  |    | 1,20  |    |    |     |       |     |     |     |
| 15 / 12 N/mm <sup>2</sup>                                                                                                                         | w/w                 | w/d | 0,75  |    | 1,50  |    |    |     |       |     |     |     |
|                                                                                                                                                   | d/d                 |     | 0,90  |    | 2,00  |    |    |     |       |     |     |     |
| 20 / 16 N/mm <sup>2</sup>                                                                                                                         | w/w                 | w/d | 0,90  |    | 2,00  |    |    |     |       |     |     |     |
|                                                                                                                                                   | d/d                 |     | 1,20  |    | 2,50  |    |    |     |       |     |     |     |
| 25 / 20 N/mm <sup>2</sup>                                                                                                                         | w/w                 | w/d | 1,20  |    | 3,00  |    |    |     |       |     |     |     |
|                                                                                                                                                   | d/d                 |     | 1,50  |    | 3,00  |    |    |     |       |     |     |     |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{RK(72/120^{\circ}C)} = 0,83 \cdot N_{RK(50/80^{\circ}C)}$ .

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C70

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C71.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10 | -     | M12 | M16 |
|--------------------------------|-------|----|-------|----|-------|----|-----|-------|-----|-----|
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -   | M10   | M12 | -   |
|                                |       |    |       |    | 11x85 |    |     | 15x85 |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |     | 20x85 |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |
|----------------------------------------------------------------------------------------|------------------------|-----|
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 1,2 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d<br>d/d       | 1,5 |
| 15 / 12 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 2,0 |
| 20 / 16 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 3,0 |
| 25 / 20 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 4,0 |

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

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

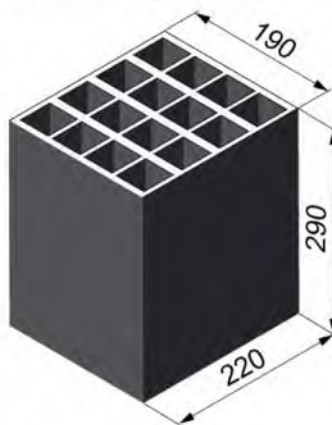
## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

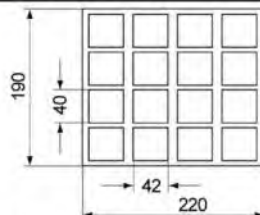
## Annex C71

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                |         |          |
|----------------------------------------------------------------------------------|-----------------------|--------------------------------|---------|----------|
| Producer                                                                         |                       | e.g. Perceram                  |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                       | width W | height H |
|                                                                                  |                       | 220                            | 190     | 290      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 0,7                          |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 7,5 / 6 or 10 / 8 or 12,5 / 10 |         |          |
| Standard or annex                                                                |                       | EN 771-1:2011+A1:2015          |         |          |



Dimension see also Annex B18

**Table C72.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 |

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

|                                               |   |
|-----------------------------------------------|---|
| Max. installation torque $\max T_{inst}$ [Nm] | 2 |
|-----------------------------------------------|---|

## General installation parameters

|                                                     |     |
|-----------------------------------------------------|-----|
| Edge distance $c_{min} = c_{cr}$                    | 110 |
| Spacing $s_{min \parallel} = s_{cr \parallel}$ [mm] | 220 |
| $s_{min \perp} = s_{cr \perp}$                      | 290 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C72.2:** Group factors

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 |

|               |                                                                                                                                              |     |   |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|---|
| Group factors | $\alpha_{g,N} (s_{min \parallel})$<br>$\alpha_{g,V} (s_{min \parallel})$<br>$\alpha_{g,N} (s_{min \perp})$<br>$\alpha_{g,V} (s_{min \perp})$ | [-] | 2 |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|---|

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C72

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C73.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                        | M10        | M12 | M16        |
|----------------------------------------------|----------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                        | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                        |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>                  | [Nm]       | 2   |            |
| General installation parameters              |                                        |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub>     | [mm]       | 110 |            |
| Spacing                                      | s <sub>min</sub>    = s <sub>cr</sub>  |            | 220 |            |
|                                              | s <sub>min</sub> ⊥ = s <sub>cr</sub> ⊥ |            | 290 |            |
| Drilling method                              |                                        |            |     |            |
| Hammer drilling with hard metal hammer drill |                                        |            |     |            |

**Table C73.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 2   |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            |     |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            |     |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C73

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C74.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8    | M10    | M8 | M10 | -                | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|-------|----------------|-------|--------|----|-----|------------------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -     | -      | -  | -   | M10 M12<br>15x85 | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 16x85 | 16x130         | 20x85 | 20x130 |    |     |                  |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |     |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|-----|--|
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d        | 0,3 | 1,2 | 1,2 | 1,5 | 1,2 | 1,5 |  |
|                                                                                  | d/d            | 0,4 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d        | 0,5 | 1,5 | 1,5 | 2,0 | 1,5 | 2,0 |  |
|                                                                                  | d/d            | 0,5 | 2,0 | 2,0 | 2,5 | 2,0 | 2,5 |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w w/d        | 0,6 | 2,0 | 2,0 | 2,5 | 2,0 | 2,5 |  |
|                                                                                  | d/d            | 0,6 | 2,5 | 2,5 | 3,0 | 2,5 | 3,0 |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C74.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 7,5 / 6 N/mm <sup>2</sup>                                                        | w/w w/d        | 1,5 |
|                                                                                  | d/d            | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w w/d        | 2,0 |
|                                                                                  | d/d            | 2,5 |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w w/d        | 2,5 |
|                                                                                  | d/d            | 3,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C74

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C75.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8    | M10    | M8 | M10 | -                | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|-------|----------------|-------|--------|----|-----|------------------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -     | -      | -  | -   | M10 M12<br>15x85 | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 16x85 | 16x130         | 20x85 | 20x130 |    |     |                  |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |     |     |  |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|-----|-----|--|
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w<br>d/d             | 1,5 | 1,5 | 1,5 | 2,5 | 1,5 | 2,0 |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w<br>d/d             | 2,0 | 2,0 | 2,0 | 3,5 | 2,0 | 3,0 |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                            | w/w<br>d/d             | 2,5 | 3,0 | 3,0 | 4,5 | 3,0 | 3,5 |  |

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

**Table C75.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |
|----------------------------------------------------------------------------------------|------------------------|-----|
| 7,5 / 6 N/mm <sup>2</sup>                                                              | w/w<br>d/d             | 2,0 |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w<br>d/d             | 3,0 |
| 12,5 / 10 N/mm <sup>2</sup>                                                            | w/w<br>d/d             | 3,5 |

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

Factor for job site tests and displacements see annex C123.

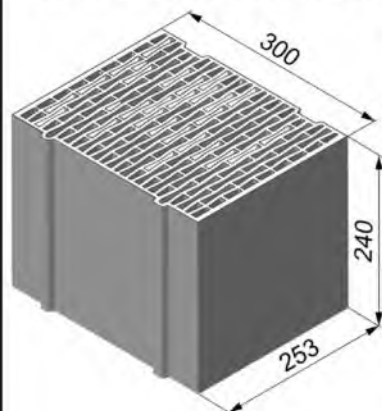
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## Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

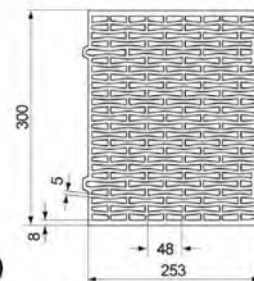
## Annex C75

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                        |                           |         |          |
|----------------------------------------------------------------------------------|------------------------|---------------------------|---------|----------|
| Producer                                                                         | e.g. Ziegelwerk Brenna |                           |         |          |
| Nominal dimensions                                                               | [mm]                   | length L                  | width W | height H |
|                                                                                  |                        | 253                       | 300     | 240      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ]  | ≥ 0,8                     |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]   | 2,5 / 2 or 5 / 4 or 8 / 6 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015  |                           |         |          |

Dimension see also Annex B18



**Table C76.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8     | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8     | -      | -      | -      | M10   | M12   | -      | -      | -      |
|                                |       |       |       |       | 11x85 |        |        |        |        | 15x85 |       |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x130 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x130 |

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

|                                               |   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Max. installation torque $\max T_{inst}$ [Nm] | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|

## General installation parameters

|                                  |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Edge distance $C_{min} = C_{cr}$ | 60  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing $S_{min}$                | 255 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                  | 240 |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C76.2:** Group factors

| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8     | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8     | -      | -      | -      | M10   | M12   | -      | -      | -      |
|                                |       |       |       |       | 11x85 |        |        |        |        | 15x85 |       |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x130 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x130 |

|               |                                    |     |   |  |  |  |  |  |  |  |  |  |  |  |
|---------------|------------------------------------|-----|---|--|--|--|--|--|--|--|--|--|--|--|
| Group factors | $\alpha_{g,N} (S_{min} \parallel)$ | [-] | 2 |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (S_{min} \parallel)$ |     |   |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,N} (S_{min} \perp)$     |     |   |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (S_{min} \perp)$     |     |   |  |  |  |  |  |  |  |  |  |  |  |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C76

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C77.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

|                                              |                                        |            |     |            |
|----------------------------------------------|----------------------------------------|------------|-----|------------|
| Anchor rod                                   |                                        | M10        | M12 | M16        |
| Perforated sleeve FIS H K                    |                                        | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                        |            |     |            |
| Max. installation torque                     | $T_{inst}$                             | [Nm]       | 2   |            |
| General installation parameters              |                                        |            |     |            |
| Edge distance                                | $c_{min} = c_{cr}$                     | [mm]       | 60  |            |
| Spacing                                      | $s_{min \parallel} = s_{cr \parallel}$ |            | 255 |            |
|                                              | $s_{min \perp} = s_{cr \perp}$         |            | 240 |            |
| Drilling method                              |                                        |            |     |            |
| Hammer drilling with hard metal hammer drill |                                        |            |     |            |

**Table C77.2:** Group factors

| Anchor rod                |                                    | M10        | M12 | M16        |
|---------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                    | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{min \parallel})$ | [-]        | 2   |            |
|                           | $\alpha_{g,V} (s_{min \parallel})$ |            |     |            |
|                           | $\alpha_{g,N} (s_{min \perp})$     |            |     |            |
|                           | $\alpha_{g,V} (s_{min \perp})$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C77

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C78.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

|                                |       |       |       |       |   |        |     |     |       |   |     |        |     |     |
|--------------------------------|-------|-------|-------|-------|---|--------|-----|-----|-------|---|-----|--------|-----|-----|
| Anchor rod                     | M6    | M8    | M6    | M8    | - | M8     | M10 | M8  | M10   | - | M12 | M16    | M12 | M16 |
| Internal threaded anchor FIS E | -     | -     | M6    | M8    | - | -      | -   | M10 | M12   | - | -   |        |     |     |
|                                |       |       | 11x85 | 15x85 |   |        |     |     |       |   |     |        |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 |       |   | 16x130 |     |     | 20x85 |   |     | 20x130 |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |                 |      |      |      |      |      |
|----------------------------------------------------------------------------------|----------------|-----------------|------|------|------|------|------|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w w/d        | - <sup>3)</sup> | 0,50 | 0,50 | 0,40 | 0,50 | 0,40 |
|                                                                                  | d/d            | 0,30            | 0,50 | 0,50 | 0,50 | 0,50 | 0,50 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,50            | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 |
|                                                                                  | d/d            | 0,60            | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,75            | 1,50 | 1,50 | 1,20 | 1,50 | 1,20 |
|                                                                                  | d/d            | 0,90            | 1,50 | 1,50 | 1,50 | 1,50 | 1,50 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

<sup>3)</sup> No performance assessed.

**Table C78.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12 | M16        |
|---------------------------|------------|-----|------------|
| Perforated sleeve FIS H K | 18x130/200 |     | 22x130/200 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w w/d        | 0,4 |
|                                                                                  | d/d            | 0,5 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d        | 0,9 |
|                                                                                  | d/d            | 0,9 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w w/d        | 1,2 |
|                                                                                  | d/d            | 1,5 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C78

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C79.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

|                                |       |       |       |       |   |        |     |     |       |   |     |        |     |     |
|--------------------------------|-------|-------|-------|-------|---|--------|-----|-----|-------|---|-----|--------|-----|-----|
| Anchor rod                     | M6    | M8    | M6    | M8    | - | M8     | M10 | M8  | M10   | - | M12 | M16    | M12 | M16 |
| Internal threaded anchor FIS E | -     | -     | M6    | M8    | - | -      | -   | M10 | M12   | - | -   |        |     |     |
|                                |       |       | 11x85 | 15x85 |   |        |     |     |       |   |     |        |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 |       |   | 16x130 |     |     | 20x85 |   |     | 20x130 |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |            |
|----------------------------------------------------------------------------------|----------------|------------|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w w/d<br>d/d | 0,5<br>0,6 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 0,9<br>1,2 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 1,5<br>1,5 |

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

**Table C79.2:** 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 | 18x130/200 |     | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |            |
|----------------------------------------------------------------------------------|----------------|------------|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w w/d<br>d/d | 0,5<br>0,6 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 0,9<br>1,2 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w w/d<br>d/d | 1,5<br>1,5 |

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

Factor for job site tests and displacements see annex C123.

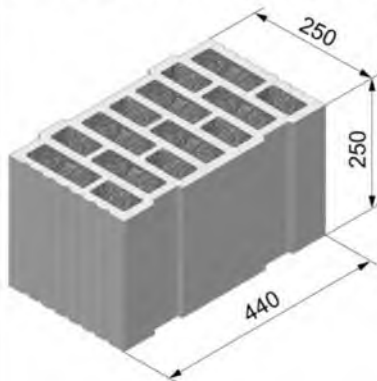
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## Performance

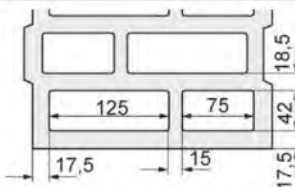
Vertical perforated brick HLz, Characteristic resistance under shear loading

## Annex C79

**Vertical perforated brick HLz, Porothersm W 44, filled with mineral wool,  
EN 771-1:2011+A1:2015**



|                                                                                  |                       |                              |         |          |
|----------------------------------------------------------------------------------|-----------------------|------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |                              |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                     | width W | height H |
|                                                                                  |                       | 250                          | 440     | 250      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,7                          |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 8 / 6 or 10 / 8 or 12,5 / 10 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                              |         |          |



Dimension see also  
Annex B18

**Table C80.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |       |       |       |       |       |        |        |        |       |       |        |        |        |        |        |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    | M12    | M16    |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -      | -      | -      | M10   | M12   | -      | -      | -      | -      | -      |
|                                |       |       |       |       | 11x85 |       |        |        |        | 15x85 |       |        |        |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x200 | 20x200 | 20x200 |

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

|                          |                            |   |   |   |   |   |
|--------------------------|----------------------------|---|---|---|---|---|
| Max. installation torque | max T <sub>inst</sub> [Nm] | 2 | 5 | 2 | 5 | 6 |
|--------------------------|----------------------------|---|---|---|---|---|

**General installation parameters**

|               |                                    |     |
|---------------|------------------------------------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub> | 60  |
| Spacing       | S <sub>min</sub>                   | 80  |
|               | S <sub>cr</sub>    [mm]            | 250 |
|               | S <sub>min</sub> ⊥                 | 80  |
|               | S <sub>cr</sub> ⊥                  | 250 |

**Drilling method**

Rotary drilling with carbide drill

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

**Table C80.2:** Group factors

|                                |       |       |       |       |       |       |        |        |        |       |       |        |        |        |        |        |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8    | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    | M12    | M16    |
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8    | -      | -      | -      | M10   | M12   | -      | -      | -      | -      | -      |
|                                |       |       |       |       | 11x85 |       |        |        |        | 15x85 |       |        |        |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x85 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x200 | 20x200 | 20x200 |

|               |                                      |     |     |
|---------------|--------------------------------------|-----|-----|
| Group factors | $\alpha_{g,N}$ (S <sub>min</sub>   ) | [-] | 1,3 |
|               | $\alpha_{g,V}$ (S <sub>min</sub>   ) |     | 1,3 |
|               | $\alpha_{g,N}$ (S <sub>min</sub> ⊥)  |     | 0,8 |
|               | $\alpha_{g,V}$ (S <sub>min</sub> ⊥)  |     | 1,3 |

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**Performance**

Vertical perforated brick HLz, Porothersm W 44, filled with mineral wool;  
dimensions, installation parameters, Group factors

**Annex C80**

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**Vertical perforated brick HLz, Porothersm W 44, filled with mineral wool,  
EN 771-1:2011+A1:2015**

**Table C81.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                |                                    | M10        | M12 | M16        |
|-------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                 |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K |                                    |            |     |            |
| Max. installation torque                  | max T <sub>inst</sub>              | [Nm]       | 5   | 6          |
| General installation parameters           |                                    |            |     |            |
| Edge distance                             | C <sub>min</sub> = C <sub>cr</sub> | [mm]       | 60  |            |
| Spacing                                   | S <sub>min</sub>                   |            | 80  |            |
|                                           | S <sub>cr</sub>                    |            | 250 |            |
|                                           | S <sub>min</sub> ⊥                 |            | 80  |            |
|                                           | S <sub>cr</sub> ⊥                  |            | 250 |            |
| Drilling method                           |                                    |            |     |            |
| Rotary drilling with carbide drill        |                                    |            |     |            |

**Table C81.2:** Group factors

| Anchor rod                |                                           | M10        | M12 | M16        |
|---------------------------|-------------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                           | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\text{min}} \parallel)$ | [-]        | 1,3 |            |
|                           | $\alpha_{g,V} (s_{\text{min}} \parallel)$ |            | 1,3 |            |
|                           | $\alpha_{g,N} (s_{\text{min}} \perp)$     |            | 0,8 |            |
|                           | $\alpha_{g,V} (s_{\text{min}} \perp)$     |            | 1,3 |            |

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**Performance**

Vertical perforated brick HLz, Porothersm W 44, filled with mineral wool;  
dimensions, installation parameters, Group factors

**Annex C81**

**Vertical perforated brick HLz, PoroTherm W 44, filled with mineral wool,  
EN 771-1:2011+A1:2015**

**Table C82.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

|                                                                                                                                                   |                        |       |       |       |      |        |       |      |     |        |        |     |     |     |     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|-------|-------|------|--------|-------|------|-----|--------|--------|-----|-----|-----|-----|-----|
| Anchor rod                                                                                                                                        | M6                     | M8    | M6    | M8    | -    | M8     | M10   | M8   | M10 | -      | M12    | M16 | M12 | M16 | M12 | M16 |
| Internal threaded anchor FIS E                                                                                                                    | -                      | -     | M6    | M8    | -    | -      | M10   | M12  | -   | -      | -      |     |     |     |     |     |
|                                                                                                                                                   |                        |       | 11x85 | 15x85 |      |        |       |      |     |        |        |     |     |     |     |     |
| Perforated sleeve FIS H K                                                                                                                         | 12x50                  | 12x85 | 16x85 |       |      | 16x130 | 20x85 |      |     | 20x130 | 20x200 |     |     |     |     |     |
| N <sub>RK</sub> = N <sub>RK,p</sub> = N <sub>RK,b</sub> = N <sub>RK,p,c</sub> = N <sub>RK,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                        |       |       |       |      |        |       |      |     |        |        |     |     |     |     |     |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                            | Use<br>con-<br>ditions |       |       |       |      |        |       |      |     |        |        |     |     |     |     |     |
| 8 / 6 N/mm <sup>2</sup>                                                                                                                           | w/w                    | w/d   | 0,75  | 1,50  | 1,20 |        |       | 1,50 |     |        | 2,50   |     |     |     |     |     |
|                                                                                                                                                   | d/d                    |       | 0,90  | 1,50  | 1,20 |        |       | 1,50 |     |        | 2,50   |     |     |     |     |     |
| 10 / 8 N/mm <sup>2</sup>                                                                                                                          | w/w                    | w/d   | 0,90  | 1,50  | 1,20 |        |       | 1,50 |     |        | 2,50   |     |     |     |     |     |
|                                                                                                                                                   | d/d                    |       | 0,90  | 2,00  | 1,50 |        |       | 2,00 |     |        | 3,00   |     |     |     |     |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       | w/w                    | w/d   | 0,90  | 2,00  | 1,50 |        |       | 2,00 |     |        | 3,00   |     |     |     |     |     |
|                                                                                                                                                   | d/d                    |       | 1,20  | 2,00  | 1,50 |        |       | 2,00 |     |        | 3,50   |     |     |     |     |     |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

**Table C82.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                                                                                                                                        |  | M10                    |     | M12 |  | M16        |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------|-----|-----|--|------------|--|
| Perforated sleeve FIS H K                                                                                                                         |  | 18x130/200             |     |     |  | 22x130/200 |  |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |  |                        |     |     |  |            |  |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                            |  | Use<br>con-<br>ditions |     |     |  |            |  |
| 8 / 6 N/mm <sup>2</sup>                                                                                                                           |  | w/w                    | w/d | 1,5 |  |            |  |
|                                                                                                                                                   |  | d/d                    |     | 1,5 |  |            |  |
| 10 / 8 N/mm <sup>2</sup>                                                                                                                          |  | w/w                    | w/d | 1,5 |  |            |  |
|                                                                                                                                                   |  | d/d                    |     | 2,0 |  |            |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       |  | w/w                    | w/d | 2,0 |  |            |  |
|                                                                                                                                                   |  | d/d                    |     | 2,0 |  |            |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

Factor for job site tests and displacements see annex C123.

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**Performance**

Vertical perforated brick HLz, PoroTherm W 44, filled with mineral wool,  
Characteristic resistance under tension loading

**Annex C82**

**Vertical perforated brick HLz, Porothersm W 44, filled with mineral wool,  
EN 771-1:2011+A1:2015**

**Table C83.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 | 20x200 | 20x200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w<br>d/d     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w<br>d/d     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w<br>d/d     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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

**Table C83.2:** 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 | 18x130/200 | 18x130/200 | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w<br>d/d     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w<br>d/d     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w<br>d/d     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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

Factor for job site tests and displacements see annex C123.

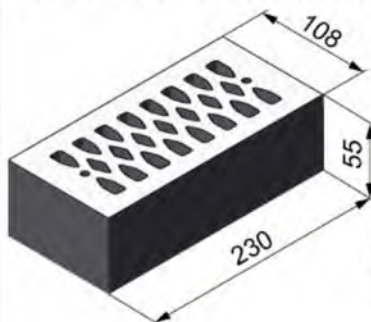
fischer injection system FIS V Plus for masonry

**Performance**

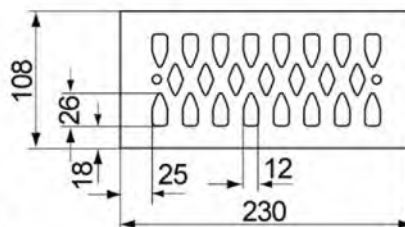
Vertical perforated brick HLz, Porothersm W 44, filled with mineral wool;  
Characteristic resistance under shear loading

**Annex C83**

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                                     |         |          |
|----------------------------------------------------------------------------------|-----------------------|-------------------------------------|---------|----------|
| Producer                                                                         | e.g. Wienerberger.    |                                     |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                            | width W | height H |
|                                                                                  |                       | 230                                 | 108     | 55       |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | $\geq 1,4$                          |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 or 5 / 4 or 8 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                                     |         |          |



Dimension see also Annex B18

**Table C84.1: Installation parameters**

|                                |       |    |       |    |       |    |    |     |       |     |     |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|-------|-----|-----|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | -     |     | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | M10   | M12 | -   |     |
|                                |       |    |       |    | 11x85 |    |    |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 20x85 |     |     |     |

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

|                          |                |      |   |
|--------------------------|----------------|------|---|
| Max. installation torque | max $T_{inst}$ | [Nm] | 2 |
|--------------------------|----------------|------|---|

## General installation parameters

|               |                     |      |     |
|---------------|---------------------|------|-----|
| Edge distance | $c_{min} = c_{cr}$  | [mm] | 60  |
|               | $s_{min \parallel}$ |      | 80  |
|               | $s_{cr \parallel}$  |      | 230 |
|               | $s_{min \perp}$     |      | 60  |
|               | $s_{cr \perp}$      |      | 60  |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C84.2: Group factors**

|                                |       |    |       |    |       |    |    |     |       |     |     |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|-------|-----|-----|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | -     |     | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | M10   | M12 | -   |     |
|                                |       |    |       |    | 11x85 |    |    |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 20x85 |     |     |     |

|               |                                    |     |   |
|---------------|------------------------------------|-----|---|
| Group factors | $\alpha_{g,N} (s_{min \parallel})$ | [-] | 2 |
|               | $\alpha_{g,V} (s_{min \parallel})$ |     |   |
|               | $\alpha_{g,N} (s_{min \perp})$     |     |   |
|               | $\alpha_{g,V} (s_{min \perp})$     |     |   |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C84

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C85.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading <sup>1)</sup>

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10   | -            | M12   | M16   |
|--------------------------------|-------|-------|-------|-------|-------------|-------|-------|--------------|-------|-------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -     | M10<br>15x85 | M12   | -     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x85 | 16x85 | 20x85        | 20x85 | 20x85 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>3)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>2)</sup> | Use<br>con-<br>ditions |      |      |      |      |  |  |  |  |  |
|----------------------------------------------------------------------------------------|------------------------|------|------|------|------|--|--|--|--|--|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w   w/d              | 0,30 | 0,90 | 0,75 | 0,50 |  |  |  |  |  |
|                                                                                        | d/d                    | 0,30 | 0,90 | 0,90 | 0,60 |  |  |  |  |  |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d              | 0,60 | 1,50 | 1,50 | 0,90 |  |  |  |  |  |
|                                                                                        | d/d                    | 0,75 | 2,00 | 1,50 | 1,20 |  |  |  |  |  |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w   w/d              | 0,90 | 2,50 | 2,50 | 1,50 |  |  |  |  |  |
|                                                                                        | d/d                    | 0,90 | 3,00 | 2,50 | 1,50 |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d              | 1,20 | 3,50 | 3,00 | 2,00 |  |  |  |  |  |
|                                                                                        | d/d                    | 1,50 | 4,00 | 3,50 | 2,50 |  |  |  |  |  |

<sup>1)</sup> If the fixing is in a solid area, for use condition w/w, the characteristic value shall be reduced with the factor 0,64.

<sup>2)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength.

<sup>3)</sup> For temperature range 72/120°C:  $N_{Rk}(72/120^{\circ}\text{C}) = 0,83 \cdot N_{Rk}(50/80^{\circ}\text{C})$ .

**Table C85.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10   | -            | M12   | M16   |
|--------------------------------|-------|-------|-------|-------|-------------|-------|-------|--------------|-------|-------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -     | M10<br>15x85 | M12   | -     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85       | 16x85 | 16x85 | 20x85        | 20x85 | 20x85 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |  |  |     |  |  |  |  |     |  |
|----------------------------------------------------------------------------------------|------------------------|--|--|-----|--|--|--|--|-----|--|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w   w/d              |  |  | 0,6 |  |  |  |  | 0,4 |  |
|                                                                                        | d/d                    |  |  |     |  |  |  |  |     |  |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d              |  |  | 1,2 |  |  |  |  | 0,9 |  |
|                                                                                        | d/d                    |  |  |     |  |  |  |  |     |  |
| 8 / 6 N/mm <sup>2</sup>                                                                | w/w   w/d              |  |  | 1,5 |  |  |  |  | 1,2 |  |
|                                                                                        | d/d                    |  |  |     |  |  |  |  |     |  |
| 10 / 8 N/mm <sup>2</sup>                                                               | w/w   w/d              |  |  | 2,5 |  |  |  |  | 1,5 |  |
|                                                                                        | d/d                    |  |  |     |  |  |  |  |     |  |

<sup>1)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength. Factor for job site tests and displacements see annex C123.

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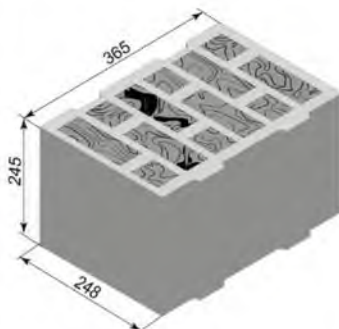
## Performance

Vertical perforated brick HLz, Characteristic resistance under tension and shear loading

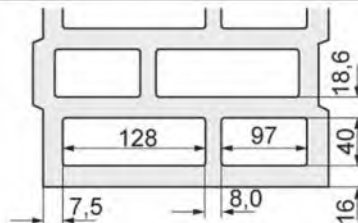
## Annex C85

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# Vertical perforated brick HLz filled with mineral wool, EN 771-1:2011+A1:2015



|                                                                                  |                       |          |         |          |
|----------------------------------------------------------------------------------|-----------------------|----------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |          |         |          |
| Nominal dimensions                                                               | [mm]                  | length L | width W | height H |
|                                                                                  |                       | ≥ 365    | ≥ 248   | ≥ 245    |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | 0,6      |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 10 / 8   |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |          |         |          |



Dimension see also Annex B19

**Table C86.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8 | -     | M8 | M10    | M8 | M10   | -     | M12    | M16 | M12 | M16 |
|--------------------------------|-------|----|-------|----|--------|----|-------|-------|--------|-----|-----|-----|
| Internal threaded anchor FIS E | -     |    | M6    | M8 | -      |    | -     | M10   | M12    | -   |     | -   |
|                                |       |    | 11x85 |    |        |    |       | 15x85 |        |     |     |     |
| Perforated sleeve FIS H K      | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |       | 20x130 |     |     |     |

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

|                          |                            |   |   |
|--------------------------|----------------------------|---|---|
| Max. installation torque | max T <sub>inst</sub> [Nm] | 2 | 4 |
|--------------------------|----------------------------|---|---|

## General installation parameters

|               |                                    |     |
|---------------|------------------------------------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub> | 100 |
| Spacing       | S <sub>min</sub>                   | 250 |
|               | S <sub>cr</sub>    [mm]            |     |
|               | S <sub>min</sub> ⊥                 | 245 |
|               | S <sub>cr</sub> ⊥                  |     |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C86.2:** Group factors

| Anchor rod                | M6                                                                                                                                    | M8 | M8    | M10 | M8     | M10 | M12   | M16 | M12    | M16 |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----|-------|-----|--------|-----|-------|-----|--------|-----|
| Perforated sleeve FIS H K | 12x85                                                                                                                                 |    | 16x85 |     | 16x130 |     | 20x85 |     | 20x130 |     |
| Group factors             | $\alpha_{g,N} (S_{min}   ) = \frac{\alpha_{g,V} (S_{min}   )}{\alpha_{g,N} (S_{min} \perp) = \frac{\alpha_{g,V} (S_{min} \perp)}{2}}$ |    | [-]   |     | 2      |     |       |     |        |     |

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## Performance

Vertical perforated brick HLz filled with mineral wool, dimensions, installation parameters, Group factors

## Annex C86

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# Vertical perforated brick HLz filled with mineral wool, EN 771-1:2011+A1:2015

**Table C87.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

|                                              |                                    |            |     |            |
|----------------------------------------------|------------------------------------|------------|-----|------------|
| Anchor rod                                   |                                    | M10        | M12 | M16        |
| Perforated sleeve FIS H K                    |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                    |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>              | [Nm]       | 4   |            |
| General installation parameters              |                                    |            |     |            |
| Edge distance                                | c <sub>min</sub> = C <sub>cr</sub> | [mm]       | 100 |            |
| Spacing                                      | s <sub>min</sub>                   |            | 250 |            |
|                                              | s <sub>cr</sub>                    |            | 245 |            |
|                                              | s <sub>min</sub> ⊥                 |            | 245 |            |
|                                              | s <sub>cr</sub> ⊥                  |            |     |            |
| Drilling method                              |                                    |            |     |            |
| Hammer drilling with hard metal hammer drill |                                    |            |     |            |

**Table C87.2:** Group factors

|                                  |                                           |                   |            |                   |
|----------------------------------|-------------------------------------------|-------------------|------------|-------------------|
| <b>Anchor rod</b>                |                                           | <b>M10</b>        | <b>M12</b> | <b>M16</b>        |
| <b>Perforated sleeve FIS H K</b> |                                           | <b>18x130/200</b> |            | <b>22x130/200</b> |
| Group factors                    | $\alpha_{g,N} (s_{\text{min}} \parallel)$ | [-]               | 2          |                   |
|                                  | $\alpha_{g,V} (s_{\text{min}} \parallel)$ |                   |            |                   |
|                                  | $\alpha_{g,N} (s_{\text{min}} \perp)$     |                   |            |                   |
|                                  | $\alpha_{g,V} (s_{\text{min}} \perp)$     |                   |            |                   |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz filled with mineral wool, dimensions, installation parameters, Group factors

## Annex C87

# Vertical perforated brick HLz filled with mineral wool, EN 771-1:2011+A1:2015

**Table C88.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

|                                |       |    |       |    |    |        |    |     |       |     |     |        |     |        |     |     |
|--------------------------------|-------|----|-------|----|----|--------|----|-----|-------|-----|-----|--------|-----|--------|-----|-----|
| Anchor rod                     | M6    | M8 | -     |    | M8 | M10    | M8 | M10 | -     |     | M12 | M16    | M12 | M16    | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | M6    | M8 | -  |        | -  |     | M10   | M12 | -   |        | -   |        | -   |     |
|                                |       |    | 11x85 |    |    |        |    |     | 15x85 |     |     |        |     |        |     |     |
| Perforated sleeve FIS H K      | 12x85 |    | 16x85 |    |    | 16x130 |    |     | 20x85 |     |     | 20x130 |     | 20x200 |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |   |     |     |  |     |  |     |  |     |  |     |  |  |
|----------------------------------------------------------------------------------|----------------|---|-----|-----|--|-----|--|-----|--|-----|--|-----|--|--|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | 2 | 1,5 | 2,5 |  | 2,0 |  | 2,0 |  | 2,0 |  | 3,0 |  |  |
|                                                                                  | d/d            | 2 | 2,0 | 3,0 |  | 2,0 |  | 2,0 |  | 2,0 |  | 3,0 |  |  |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

**Table C88.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12 | M16        |
|---------------------------|------------|-----|------------|
| Perforated sleeve FIS H K | 18x130/200 |     | 22x130/200 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |  |
|----------------------------------------------------------------------------------|----------------|-----|--|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | 1,5 |  |
|                                                                                  | d/d            | 2,0 |  |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz filled with mineral wool, Characteristic resistance under tension loading

## Annex C88

# Vertical perforated brick HLz filled with mineral wool, EN 771-1:2011+A1:2015

**Table C89.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | -      | M8    | M10    | M8     | M10 | -     | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|--------|-------|--------|--------|-----|-------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | M6    | M8     | -     | -      | -      | -   | M10   | M12 | -   | -   | -   | -   | -   |
|                                |       | 11x85 |        |       |        |        |     | 15x85 |     |     |     |     |     |     |
| Perforated sleeve FIS H K      | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 | 20x200 |     |       |     |     |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | 2,5 | 3,0 | 3,0 | 3,0 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
|                                                                                  | d/d            | 2,5 | 3,0 | 3,0 | 3,0 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

**Table C89.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | 3,0 | 1,5 |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                  | d/d            | 3,0 | 1,5 |  |  |  |  |  |  |  |  |  |  |  |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C123.

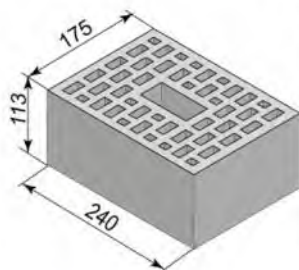
fischer injection system FIS V Plus for masonry

## Performance

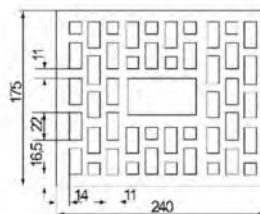
Vertical perforated brick HLz filled with mineral wool, Characteristic resistance under shear loading

## Annex C89

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |           |         |          |
|----------------------------------------------------------------------------------|-----------------------|-----------|---------|----------|
| Producer                                                                         | e.g. Wienerberger     |           |         |          |
| Nominal dimensions                                                               | [mm]                  | length L  | width W | height H |
|                                                                                  |                       | ≥ 240     | ≥ 175   | ≥ 113    |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | 0,9       |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 12,5 / 10 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |           |         |          |



Dimension see also Annex B19

**Table C90.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8 | -     | M8 | M10    | M8 | M10   | -     | M12    | M16 | M12 | M16 |
|--------------------------------|-------|----|-------|----|--------|----|-------|-------|--------|-----|-----|-----|
| Internal threaded anchor FIS E | -     |    | M6    | M8 | -      |    | -     | M10   | M12    | -   |     | -   |
|                                |       |    | 11x85 |    |        |    |       | 15x85 |        |     |     |     |
| Perforated sleeve FIS H K      | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |       | 20x130 |     |     |     |

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

|                          |                     |   |   |
|--------------------------|---------------------|---|---|
| Max. installation torque | max $T_{inst}$ [Nm] | 2 | 4 |
|--------------------------|---------------------|---|---|

## General installation parameters

|               |                     |      |     |
|---------------|---------------------|------|-----|
| Edge distance | $c_{min} = c_{cr}$  | [mm] | 100 |
| Spacing       | $s_{min \parallel}$ |      | 240 |
|               | $s_{cr \parallel}$  |      |     |
|               | $s_{min \perp}$     |      | 115 |
|               | $s_{cr \perp}$      |      |     |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C90.2:** Group factors

| Anchor rod                |                                      | M6    | M8 | M8    | M10 | M8     | M10 | M12   | M16 | M12    | M16 |
|---------------------------|--------------------------------------|-------|----|-------|-----|--------|-----|-------|-----|--------|-----|
| Perforated sleeve FIS H K |                                      | 12x85 |    | 16x85 |     | 16x130 |     | 20x85 |     | 20x130 |     |
| Group factors             | $\alpha_{g,N} (s_{min \parallel}) =$ | [-]   | 2  |       |     |        |     |       |     |        |     |
|                           | $\alpha_{g,V} (s_{min \parallel})$   |       |    |       |     |        |     |       |     |        |     |
|                           | $\alpha_{g,N} (s_{min \perp}) =$     |       |    |       |     |        |     |       |     |        |     |
|                           | $\alpha_{g,V} (s_{min \perp})$       |       |    |       |     |        |     |       |     |        |     |

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## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C90

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C91.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                    | M10        | M12 | M16        |
|----------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                    |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>              | [Nm]       | 4   |            |
| General installation parameters              |                                    |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub> | [mm]       | 100 |            |
| Spacing                                      | s <sub>min</sub>                   |            | 240 |            |
|                                              | s <sub>cr</sub>                    |            |     |            |
|                                              | s <sub>min</sub> ⊥                 |            | 115 |            |
| s <sub>cr</sub> ⊥                            |                                    |            |     |            |
| Drilling method                              |                                    |            |     |            |
| Hammer drilling with hard metal hammer drill |                                    |            |     |            |

**Table C91.2:** Group factors

| Anchor rod                |                                    | M10        | M12 | M16        |
|---------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                    | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{min} \parallel)$ | 2          |     |            |
|                           | $\alpha_{g,V} (s_{min} \parallel)$ |            |     |            |
|                           | $\alpha_{g,N} (s_{min} \perp)$     |            |     |            |
|                           | $\alpha_{g,V} (s_{min} \perp)$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, dimensions, installation parameters, Group factors

## Annex C91

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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C92.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8          | -      | M8    | M10    | M8 | M10          | -   | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------------|--------|-------|--------|----|--------------|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | M6<br>11x85 | M8     | -     | -      | -  | M10<br>15x85 | M12 | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x85 | 16x85       | 16x130 | 20x85 | 20x130 |    |              |     |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength/<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |     |
|---------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|-----|
| 12,5 / 10 N/mm <sup>2</sup>                                                           | w/w                    | 3,5 | 4,0 | 4,5 | 4,5 | 4,0 |
|                                                                                       | d/d                    | 4   | 4,5 | 5,0 | 5,0 | 4,0 |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

**Table C92.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength/<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |
|---------------------------------------------------------------------------------------|------------------------|-----|-----|
| 12,5 / 10 N/mm <sup>2</sup>                                                           | w/w                    | 4,5 | 4,0 |
|                                                                                       | d/d                    | 5,0 | 4,0 |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

## Annex C92

# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C93.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8          | -      | M8    | M10    | M8 | M10 | -            | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------------|--------|-------|--------|----|-----|--------------|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | M6<br>11x85 | M8     | -     | -      | -  | -   | M10<br>15x85 | M12 | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x85 | 16x85       | 16x130 | 20x85 | 20x130 |    |     |              |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 4,0 | 5,5 | 4,0 | 5,5 | 5,5 | 7,0 | 5,5 | 7,0 | 7,0 | 6,0 | 6,0 | 8,0 | 6,0 | 8,0 |
|                                                                                  | d/d            | 4,0 | 5,5 | 4,0 | 5,5 | 5,5 | 7,0 | 5,5 | 7,0 | 7,0 | 6,0 | 6,0 | 8,0 | 6,0 | 8,0 |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

**Table C93.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | 7,0 | 6,0 | 8,0 |
|                                                                                  | d/d            | 7,0 | 6,0 | 8,0 |

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

<sup>2)</sup> For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C123

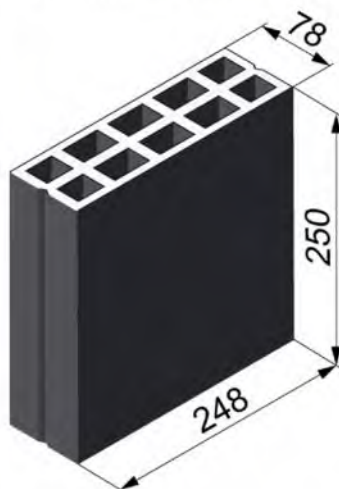
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## Performance

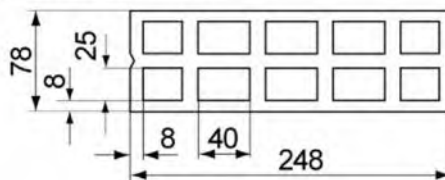
Vertical perforated brick HLz, Characteristic resistance under shear loading

## Annex C93

# Horizontal perforated brick LLz, EN 771-1:2011+A1:2015



|                                                                                  |                       |                           |         |          |
|----------------------------------------------------------------------------------|-----------------------|---------------------------|---------|----------|
| Producer                                                                         | -                     |                           |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                  | width W | height H |
|                                                                                  |                       | 250                       | 78      | 248      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 0,7                     |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 or 5 / 4 or 8 / 6 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                           |         |          |



Dimension see also Annex B19

**Table C94.1: Installation parameters**

|                                              |                                        |      |     |
|----------------------------------------------|----------------------------------------|------|-----|
| Anchor rod                                   | M6                                     |      | M8  |
| Perforated sleeve FIS H K                    | 12x50                                  |      |     |
| Anchor rod with perforated sleeve FIS H K    |                                        |      |     |
| Max. installation torque                     | max T <sub>inst</sub>                  | [Nm] | 2   |
| General installation parameters              |                                        |      |     |
| Edge distance                                | C <sub>min</sub> = C <sub>cr</sub>     | [mm] | 100 |
| Spacing                                      | S <sub>min</sub>                       |      | 75  |
|                                              | S <sub>cr</sub>                        |      | 250 |
|                                              | S <sub>min</sub> ⊥ = S <sub>cr</sub> ⊥ |      | 250 |
| Drilling method                              |                                        |      |     |
| Hammer drilling with hard metal hammer drill |                                        |      |     |

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

**Table C94.2: Group factors**

|                           |                                |     |     |
|---------------------------|--------------------------------|-----|-----|
| Anchor rod                | M6                             |     | M8  |
| Perforated sleeve FIS H K | 12x50                          |     |     |
| Group factors             | $\alpha_{g,N} (S_{min}   )$    | [-] | 1,6 |
|                           | $\alpha_{g,V} (S_{min}   )$    |     | 1,1 |
|                           | $\alpha_{g,N} (S_{min} \perp)$ |     | 2,0 |
|                           | $\alpha_{g,V} (S_{min} \perp)$ |     |     |

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## Performance

Horizontal perforated brick LLz, dimensions, installation parameters, Group factors

## Annex C94

# Horizontal perforated brick LLz, EN 771-1:2011+A1:2015

**Table C95.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |                        | M6    | M8 |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|----|
| Perforated sleeve FIS H K                                                                                                                         |                        | 12x50 |    |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                        |       |    |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                            | Use<br>con-<br>ditions |       |    |
| 2,5 / 2 N/mm <sup>2</sup>                                                                                                                         | w/w   w/d              | 0,5   |    |
|                                                                                                                                                   | d/d                    | 0,6   |    |
| 5 / 4 N/mm <sup>2</sup>                                                                                                                           | w/w   w/d              | 0,9   |    |
|                                                                                                                                                   | d/d                    | 1,2   |    |
| 8 / 6 N/mm <sup>2</sup>                                                                                                                           | w/w   w/d              | 1,5   |    |
|                                                                                                                                                   | d/d                    | 1,5   |    |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk (72/120^{\circ}C)} = 0,83 \cdot N_{Rk (50/80^{\circ}C)}$ .

**Table C95.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                                    |                        | M6    |  | M8 |  |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|--|----|--|
| Perforated sleeve FIS H K                                                                                                     |                        | 12x50 |  |    |  |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,I</sub> [kN]; temperature range 50/80°C and 72/120°C |                        |       |  |    |  |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                        | Use<br>con-<br>ditions |       |  |    |  |
| 2,5 / 2 N/mm <sup>2</sup>                                                                                                     | w/w   w/d              | 0,5   |  |    |  |
|                                                                                                                               | d/d                    |       |  |    |  |
| 5 / 4 N/mm <sup>2</sup>                                                                                                       | w/w   w/d              | 0,9   |  |    |  |
|                                                                                                                               | d/d                    |       |  |    |  |
| 8 / 6 N/mm <sup>2</sup>                                                                                                       | w/w   w/d              | 1,5   |  |    |  |
|                                                                                                                               | d/d                    |       |  |    |  |

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

Factor for job site tests and displacements see annex C123.

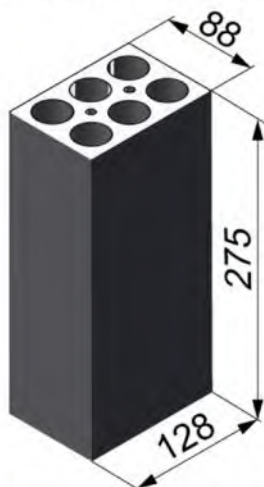
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## Performance

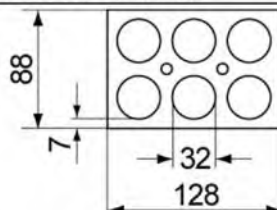
Horizontal perforated brick LLz, Characteristic resistance under tension and shear loading

## Annex C95

# Horizontal perforated brick LLz, EN 771-1:2011+A1:2015



|                                                                                  |                             |          |         |          |
|----------------------------------------------------------------------------------|-----------------------------|----------|---------|----------|
| Producer                                                                         | e.g. Cermanica Farreny S.A. |          |         |          |
| Nominal dimensions                                                               | [mm]                        | length L | width W | height H |
|                                                                                  |                             | 275      | 88      | 128      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ]       | ≥ 0,8    |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]        | 2,5 / 2  |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015       |          |         |          |



Dimension see also Annex B19

**Table C96.1: Installation parameters**

|                                           |                                    |       |     |
|-------------------------------------------|------------------------------------|-------|-----|
| Anchor rod                                |                                    | M6    | M8  |
| Perforated sleeve FIS H K                 |                                    | 12x50 |     |
| Anchor rod with perforated sleeve FIS H K |                                    |       |     |
| Max. installation torque                  | T <sub>inst</sub>                  | [Nm]  | 2   |
| General installation parameters           |                                    |       |     |
| Edge distance                             | C <sub>min</sub> = C <sub>cr</sub> | [mm]  | 60  |
| Spacing                                   | s <sub>min</sub>                   |       | 75  |
|                                           | s <sub>cr</sub>                    |       | 275 |
|                                           | s <sub>min</sub> ⊥                 |       | 75  |
|                                           | s <sub>cr</sub> ⊥                  |       | 130 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C96.2: Group factors**

|                           |                                    |     |     |
|---------------------------|------------------------------------|-----|-----|
| Anchor rod                | M6                                 |     | M8  |
| Perforated sleeve FIS H K | 12x50                              |     |     |
| Group factors             | $\alpha_{g,N} (s_{min \parallel})$ | [-] | 1,3 |
|                           | $\alpha_{g,V} (s_{min \parallel})$ |     | 1,5 |
|                           | $\alpha_{g,N} (s_{min \perp})$     |     | 1,3 |
|                           | $\alpha_{g,V} (s_{min \perp})$     |     | 1,5 |

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## Performance

Horizontal perforated brick LLz, dimensions, installation parameters, Group factors

## Annex C96

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**Horizontal perforated brick LLz, EN 771-1:2011+A1:2015****Table C97.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

|                                                                                                                                                   |                        |       |  |    |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|--|----|--|
| Anchor rod                                                                                                                                        |                        | M6    |  | M8 |  |
| Perforated sleeve FIS H K                                                                                                                         |                        | 12x50 |  |    |  |
| N <sub>RK</sub> = N <sub>RK,p</sub> = N <sub>RK,b</sub> = N <sub>RK,p,c</sub> = N <sub>RK,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                        |       |  |    |  |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                            | Use<br>con-<br>ditions |       |  |    |  |
| 2,5 / 2 N/mm <sup>2</sup>                                                                                                                         | w/w   w/d              | 1,5   |  |    |  |
|                                                                                                                                                   | d/d                    |       |  |    |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{RK (72/120^{\circ}C)} = 0,83 \cdot N_{RK (50/80^{\circ}C)}$ .

**Table C97.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

|                                                                                                                               |                        |     |    |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|----|
| Anchor rod                                                                                                                    | M6                     |     | M8 |
| Perforated sleeve FIS H K                                                                                                     | 12x50                  |     |    |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,⊥</sub> [kN]; temperature range 50/80°C and 72/120°C |                        |     |    |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                        | Use<br>con-<br>ditions |     |    |
| 2,5 / 2 N/mm <sup>2</sup>                                                                                                     | w/w   w/d              | 1,2 |    |
|                                                                                                                               | d/d                    |     |    |

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

Factor for job site tests and displacements see annex C123.

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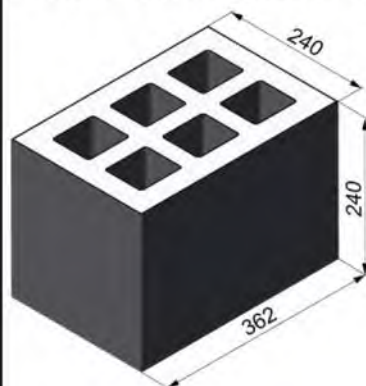
**Performance**

Horizontal perforated brick LLz, Characteristic resistance under tension and shear loading

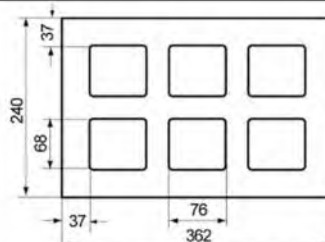
**Annex C97**

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015



|                                                                                  |                       |                  |         |          |
|----------------------------------------------------------------------------------|-----------------------|------------------|---------|----------|
| Producer                                                                         | -                     |                  |         |          |
| Nominal dimensions                                                               | [mm]                  | length L         | width W | height H |
|                                                                                  |                       | 362              | 240     | 240      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 1,0            |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 or 5 / 4 |         |          |
| Standard or annex                                                                | EN 771-3:2011+A1:2015 |                  |         |          |



Dimension see also Annex B19

**Table C98.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8     | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8     | -      | -      | -      | M10   | M12   | -      | -      | -      | -      | -      |
|                                |       |       |       |       | 11x85 |        |        |        |        | 15x85 |       |        |        |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x130 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x200 | 20x200 | 20x200 |

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

|                          |                            |   |
|--------------------------|----------------------------|---|
| Max. installation torque | max T <sub>inst</sub> [Nm] | 2 |
|--------------------------|----------------------------|---|

## General installation parameters

|               |                                        |     |
|---------------|----------------------------------------|-----|
| Edge distance | C <sub>min</sub> = C <sub>cr</sub>     | 60  |
| Spacing       | S <sub>min</sub>                       | 100 |
|               | S <sub>cr</sub>                        | 362 |
|               | S <sub>min</sub> ⊥ = S <sub>cr</sub> ⊥ | 240 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C98.2:** Group factors

| Anchor rod                     | M6    | M8    | M6    | M8    | -     | M8     | M10    | M8     | M10    | -     | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6    | M8     | -      | -      | -      | M10   | M12   | -      | -      | -      | -      | -      |
|                                |       |       |       |       | 11x85 |        |        |        |        | 15x85 |       |        |        |        |        |        |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85 | 16x130 | 16x130 | 16x130 | 16x130 | 20x85 | 20x85 | 20x130 | 20x130 | 20x200 | 20x200 | 20x200 |

|               |                                |     |
|---------------|--------------------------------|-----|
| Group factors | $\alpha_{g,N} (S_{min}   )$    | 1,2 |
|               | $\alpha_{g,V} (S_{min}   )$    | 1,1 |
|               | $\alpha_{g,N} (S_{min} \perp)$ | 2,0 |
|               | $\alpha_{g,V} (S_{min} \perp)$ |     |

fischer injection system FIS V Plus for masonry

## Performance

Light-weight concrete hollow block Hbl, dimensions, installation parameters, Group factors

## Annex C98

# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C99.1:** Installation parameters  
(Push through installation with perforated sleeve FIS H K)

|                                              |                                        |            |     |            |
|----------------------------------------------|----------------------------------------|------------|-----|------------|
| Anchor rod                                   |                                        | M10        | M12 | M16        |
| Perforated sleeve FIS H K                    |                                        | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                        |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>                  | [Nm]       | 2   |            |
| General installation parameters              |                                        |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub>     | [mm]       | 60  |            |
| Spacing                                      | s <sub>min</sub>                       |            | 100 |            |
|                                              | s <sub>cr</sub>                        |            | 362 |            |
|                                              | s <sub>min</sub> ⊥ = s <sub>cr</sub> ⊥ |            | 240 |            |
| Drilling method                              |                                        |            |     |            |
| Hammer drilling with hard metal hammer drill |                                        |            |     |            |

**Table C99.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | 1,2        |     |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ | 1,1        |     |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     | 2,0        |     |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Light-weight concrete hollow block Hbl, dimensions, installation parameters, Group factors

## Annex C99

# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C100.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -           | M8     | M10    | M8 | M10 | -            | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------------|--------|--------|----|-----|--------------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | -     | -      | M6<br>11x85 | -      | -      | -  | -   | M10<br>15x85 | -   | -   | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85       | 20x130 | 20x200 |    |     |              |     |     |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |
|----------------------------------------------------------------------------------------|------------------------|-----|-----|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w   w/d              | 1,2 | 1,5 | 2,5 |
|                                                                                        | d/d                    | 1,2 | 1,5 | 2,5 |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d              | 2,0 | 3,0 | 5,0 |
|                                                                                        | d/d                    | 2,5 | 3,0 | 5,5 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C100.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |  |
|----------------------------------------------------------------------------------------|------------------------|-----|--|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w   w/d              | 1,5 |  |
|                                                                                        | d/d                    | 1,5 |  |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d              | 3,0 |  |
|                                                                                        | d/d                    | 3,0 |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Light-weight concrete hollow block Hbl, Characteristic resistance under tension loading

## Annex C100

# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C101.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -           | M8    | M10    | M8     | M10 | -            | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|-------|-------------|-------|--------|--------|-----|--------------|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6<br>11x85 | M8    | -      | -      | -   | M10<br>15x85 | M12 | -   | -   | -   | -   | -   |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 16x85 | 16x130      | 20x85 | 20x130 | 20x200 |     |              |     |     |     |     |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |
|----------------------------------------------------------------------------------------|------------------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 0,9 |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d<br>d/d       | 2,0 |

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

**Table C101.2:** 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 | 18x130/200 | 22x130/200 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |
|----------------------------------------------------------------------------------------|------------------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                              | w/w   w/d<br>d/d       | 0,9 |
| 5 / 4 N/mm <sup>2</sup>                                                                | w/w   w/d<br>d/d       | 2,0 |

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

Factor for job site tests and displacements see annex C123.

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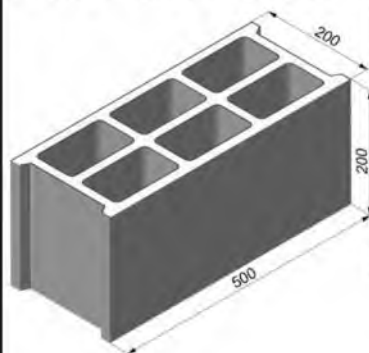
## Performance

Light-weight concrete hollow block Hbl, Characteristic resistance under shear loading

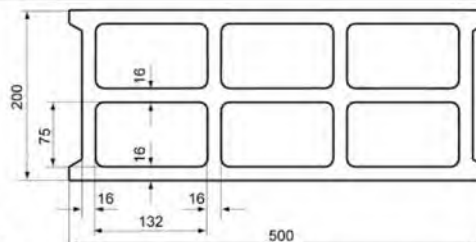
## Annex C101

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015



|                                                                                  |                       |                           |         |          |
|----------------------------------------------------------------------------------|-----------------------|---------------------------|---------|----------|
| Producer                                                                         | e.g. Sepa             |                           |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                  | width W | height H |
|                                                                                  |                       | 500                       | 200     | 200      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 1,0                     |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 or 5 / 4 or 8 / 6 |         |          |
| Standard or annex                                                                | EN 771-1:2011+A1:2015 |                           |         |          |



Dimension see also Annex B19

**Table C102.1: Installation parameters**

|                                |       |    |       |    |       |    |    |     |        |     |            |     |       |     |     |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|------------|-----|-------|-----|-----|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | M10        | M12 | -     |     | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | -          |     | M10   | M12 | -   |     |
|                                |       |    |       |    | 11x85 |    |    |     |        |     |            |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 18x130/200 |     | 20x85 |     |     |     |

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

|                          |                       |      |   |   |
|--------------------------|-----------------------|------|---|---|
| Max. installation torque | max T <sub>inst</sub> | [Nm] | 1 | 2 |
|--------------------------|-----------------------|------|---|---|

## General installation parameters

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

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C102.2: Group factors**

|                                |       |    |       |    |       |    |    |     |        |     |            |     |       |     |     |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|------------|-----|-------|-----|-----|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | M10        | M12 | -     |     | M12 | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | -          |     | M10   | M12 | -   |     |
|                                |       |    |       |    | 11x85 |    |    |     |        |     |            |     | 15x85 |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 18x130/200 |     | 20x85 |     |     |     |

|               |                                |     |   |
|---------------|--------------------------------|-----|---|
| Group factors | $\alpha_{g,N} (S_{min}   )$    | [-] | 2 |
|               | $\alpha_{g,V} (S_{min}   )$    |     |   |
|               | $\alpha_{g,N} (S_{min} \perp)$ |     |   |
|               | $\alpha_{g,V} (S_{min} \perp)$ |     |   |

fischer injection system FIS V Plus for masonry

## Performance

Light-weight concrete hollow block Hbl, dimensions, installation parameters, Group factors

## Annex C102

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C103.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                     | M6    | M8    | M6    | M8     | -          | M8    | M10 | M8 | M10 | M10 | M12 | -     | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|------------|-------|-----|----|-----|-----|-----|-------|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -          | -     | -   | -  | -   | -   | -   | M10   | M12 | -   |
|                                |       |       | 11x85 |        |            |       |     |    |     |     |     | 15x85 |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 18x130/200 | 20x85 |     |    |     |     |     |       |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w   w/d      | 0,4 |
|                                                                                  | d/d            | 0,5 |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w   w/d      | 0,9 |
|                                                                                  | d/d            | 0,9 |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w   w/d      | 1,2 |
|                                                                                  | d/d            | 1,5 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C103.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6    | M8    | M6    | M8     | -          | M8    | M10 | M8 | M10 | M10 | M12 | -     | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|------------|-------|-----|----|-----|-----|-----|-------|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -          | -     | -   | -  | -   | -   | -   | M10   | M12 | -   |
|                                |       |       | 11x85 |        |            |       |     |    |     |     |     | 15x85 |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 18x130/200 | 20x85 |     |    |     |     |     |       |     |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |
|----------------------------------------------------------------------------------|----------------|-----|
| 2,5 / 2 N/mm <sup>2</sup>                                                        | w/w   w/d      | 0,9 |
|                                                                                  | d/d            |     |
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w   w/d      | 1,5 |
|                                                                                  | d/d            |     |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w   w/d      | 2,5 |
|                                                                                  | d/d            |     |

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

Factor for job site tests and displacements see annex C123.

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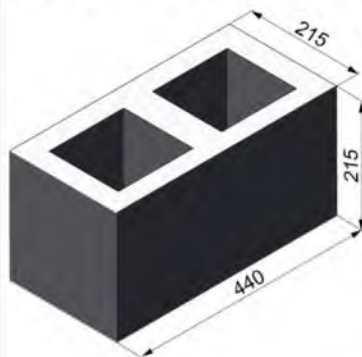
## Performance

Light-weight concrete hollow block Hbl,  
Characteristic resistance under tension and shear loading

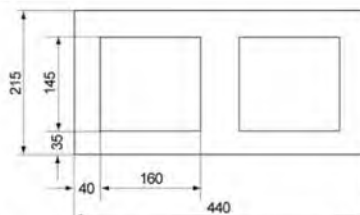
**Annex C103**

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015



|                                                                                  |                       |                                       |         |          |
|----------------------------------------------------------------------------------|-----------------------|---------------------------------------|---------|----------|
| Producer                                                                         | e.g. Roadstone wood   |                                       |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                              | width W | height H |
|                                                                                  |                       | 440                                   | 215     | 215      |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | ≥ 1,2                                 |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 8 / 6 or 10 / 8 or 12,5 / 10 |         |          |
| Standard or annex                                                                | EN 771-3:2011+A1:2015 |                                       |         |          |



Dimension see also Annex B20

**Table C104.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

|                                |       |    |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                |       |    |       |    | 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 torque | max $T_{inst}$ [Nm] | 2 |
|--------------------------|---------------------|---|

## General installation parameters

|               |                         |     |
|---------------|-------------------------|-----|
| Edge distance | $C_{min} = C_{cr}$      | 110 |
|               | $S_{min} \parallel$     | 100 |
|               | $S_{cr} \parallel$ [mm] | 440 |
|               | $S_{min} \perp$         | 100 |
|               | $S_{cr} \perp$          | 215 |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C104.2:** Group factors

|                                   |       |    |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|-----------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                        | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor<br>FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                   |       |    |       |    | 11x85 |    |    |     |        |     | 15x85 |     |     |     |        |     |
| Perforated sleeve FIS H K         | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 20x85 |     |     |     | 20x130 |     |

|               |                                    |     |     |
|---------------|------------------------------------|-----|-----|
| Group factors | $\alpha_{g,N} (S_{min} \parallel)$ | [-] | 1,4 |
|               | $\alpha_{g,V} (S_{min} \parallel)$ |     | 2,0 |
|               | $\alpha_{g,N} (S_{min} \perp)$     |     | 1,4 |
|               | $\alpha_{g,V} (S_{min} \perp)$     |     | 1,2 |

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## Performance

Light-weight concrete hollow block Hbl, dimensions, installation parameters, Group factors

## Annex C104

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C105.1:** Installation parameters

(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                    | M10        | M12 | M16        |
|----------------------------------------------|------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                    | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                    |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub> [Nm]         | 2          |     |            |
| General installation parameters              |                                    |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub> | [mm]       | 110 |            |
| Spacing                                      | s <sub>min</sub>                   |            | 100 |            |
|                                              | s <sub>cr</sub>                    |            | 440 |            |
|                                              | s <sub>min</sub> ⊥                 |            | 100 |            |
|                                              | s <sub>cr</sub> ⊥                  |            | 215 |            |
| Drilling method                              |                                    |            |     |            |
| Hammer drilling with hard metal hammer drill |                                    |            |     |            |

**Table C105.2:** Group factors

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 1,4 |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            | 2,0 |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            | 1,4 |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            | 1,2 |            |

fischer injection system FIS V Plus for masonry

## Performance

Light-weight concrete hollow block Hbl, dimensions, installation parameters, Group factors

## Annex C105

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C106.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -          | M8    | M10 | M8 | M10 | M10 | M12 | -     | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|------------|-------|-----|----|-----|-----|-----|-------|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     | -          | -     | -   | -  | -   | -   | -   | M10   | M12 | -   |
|                                |       |       | 11x85 |        |            |       |     |    |     |     |     | 15x85 |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 18x130/200 | 20x85 |     |    |     |     |     |       |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. comp. strength single brick <sup>1)</sup> | Use conditions |     |     |     |
|----------------------------------------------------------------------------|----------------|-----|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                    | w/w   w/d      | 0,9 | 1,2 | 2,0 |
|                                                                            | d/d            | 1,2 | 1,5 | 2,0 |
| 8 / 6 N/mm <sup>2</sup>                                                    | w/w   w/d      | 1,5 | 2,0 | 3,0 |
|                                                                            | d/d            | 1,5 | 2,0 | 3,0 |
| 10 / 8 N/mm <sup>2</sup>                                                   | w/w   w/d      | 2,0 | 2,5 | 3,5 |
|                                                                            | d/d            | 2,0 | 3,0 | 4,0 |
| 12,5 / 10 N/mm <sup>2</sup>                                                | w/w   w/d      | 2,5 | 3,0 | 4,5 |
|                                                                            | d/d            | 3,0 | 3,5 | 5,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C106.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength / Min. comp. strength single brick <sup>1)</sup> | Use conditions |     |     |
|----------------------------------------------------------------------------|----------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                    | w/w   w/d      | 1,2 | 2,0 |
|                                                                            | d/d            | 1,5 | 2,0 |
| 8 / 6 N/mm <sup>2</sup>                                                    | w/w   w/d      | 2,0 | 3,0 |
|                                                                            | d/d            | 2,0 | 3,0 |
| 10 / 8 N/mm <sup>2</sup>                                                   | w/w   w/d      | 2,5 | 3,5 |
|                                                                            | d/d            | 3,0 | 4,0 |
| 12,5 / 10 N/mm <sup>2</sup>                                                | w/w   w/d      | 3,0 | 4,5 |
|                                                                            | d/d            | 3,5 | 5,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Light-weight concrete hollow block Hbl, Characteristic resistance under tension loading

## Annex C106

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

**Table C107.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

|                                |       |    |       |    |       |    |    |     |        |     |       |     |     |     |        |     |
|--------------------------------|-------|----|-------|----|-------|----|----|-----|--------|-----|-------|-----|-----|-----|--------|-----|
| Anchor rod                     | M6    | M8 | M6    | M8 | -     |    | M8 | M10 | M8     | M10 | -     |     | M12 | M16 | M12    | M16 |
| Internal threaded anchor FIS E | -     |    | -     |    | M6    | M8 | -  |     | -      |     | M10   | M12 | -   |     | -      |     |
|                                |       |    |       |    | 11x85 |    |    |     |        |     | 15x85 |     |     |     |        |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    |    |     | 16x130 |     | 20x85 |     |     |     | 20x130 |     |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |      |      |      |      |      |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|----------------|-----|------|------|------|------|------|--|--|--|--|--|--|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d | 0,75 | 1,20 | 0,75 | 1,20 | 0,75 |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |      |      |      |  |  |  |  |  |  |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w            | w/d | 1,20 | 2,00 | 1,20 | 2,00 | 1,20 |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |      |      |      |  |  |  |  |  |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d | 1,50 | 2,50 | 1,50 | 2,50 | 1,50 |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |      |      |      |  |  |  |  |  |  |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d | 2,00 | 3,00 | 2,00 | 3,00 | 2,00 |  |  |  |  |  |  |
|                                                                                  | d/d            | d/d |      |      |      |      |      |  |  |  |  |  |  |

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

**Table C107.2:** 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 | 18x130/200 |     | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |  |  |  |  |  |  |  |  |  |  |     |
|----------------------------------------------------------------------------------|----------------|-----|--|--|--|--|--|--|--|--|--|--|-----|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w            | w/d |  |  |  |  |  |  |  |  |  |  | 1,2 |
|                                                                                  | d/d            | d/d |  |  |  |  |  |  |  |  |  |  |     |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w            | w/d |  |  |  |  |  |  |  |  |  |  | 2,0 |
|                                                                                  | d/d            | d/d |  |  |  |  |  |  |  |  |  |  |     |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w            | w/d |  |  |  |  |  |  |  |  |  |  | 2,5 |
|                                                                                  | d/d            | d/d |  |  |  |  |  |  |  |  |  |  |     |
| 12,5 / 10 N/mm <sup>2</sup>                                                      | w/w            | w/d |  |  |  |  |  |  |  |  |  |  | 3,0 |
|                                                                                  | d/d            | d/d |  |  |  |  |  |  |  |  |  |  |     |

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

Factor for job site tests and displacements see annex C123.

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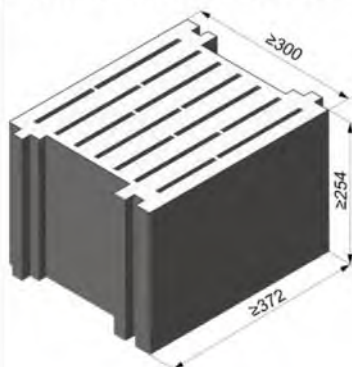
## Performance

Light-weight concrete hollow block Hbl, Characteristic resistance under shear loading

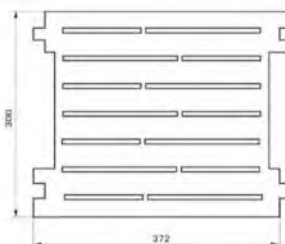
## Annex C107

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015



|                                                                                          |                       |         |          |
|------------------------------------------------------------------------------------------|-----------------------|---------|----------|
| Producer                                                                                 | e.g. Sepa             |         |          |
| Nominal dimensions [mm]                                                                  | length L              | width W | height H |
|                                                                                          | ≥ 372                 | ≥ 300   | ≥ 254    |
| Mean gross dry density ρ [kg/dm³]                                                        | ≥ 0,6                 |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> [N/mm²] | 2,5 / 2               |         |          |
| Standard or annex                                                                        | EN 771-3:2011+A1:2015 |         |          |



Dimension see also Annex B20

**Table C108.1: Installation parameters**

|                                           |                                        |      |            |     |        |     |            |     |        |
|-------------------------------------------|----------------------------------------|------|------------|-----|--------|-----|------------|-----|--------|
| Anchor rod                                | M8                                     | M10  | M10        | M12 | M12    | M16 | M16        | M12 | M16    |
| Perforated sleeve FIS H K                 | 16x130                                 |      | 18x130/200 |     | 20x130 |     | 22x130/200 |     | 20x200 |
| Anchor rod with perforated sleeve FIS H K |                                        |      |            |     |        |     |            |     |        |
| Max. installation torque                  | max T <sub>inst</sub>                  | [Nm] | 4          |     |        |     |            |     |        |
| General installation parameters           |                                        |      |            |     |        |     |            |     |        |
| Edge distance                             | C <sub>min</sub> = C <sub>cr</sub>     | [mm] | 130        |     |        |     |            |     |        |
| Spacing                                   | S <sub>min</sub>    = S <sub>cr</sub>  |      | 370        |     |        |     |            |     |        |
|                                           | S <sub>min</sub> ⊥ = S <sub>cr</sub> ⊥ |      | 250        |     |        |     |            |     |        |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C108.2: Group factors**

| Anchor rod                |                                | M8     | M10 | M10        | M12 | M12    | M16 | M16        | M12 | M16    |  |
|---------------------------|--------------------------------|--------|-----|------------|-----|--------|-----|------------|-----|--------|--|
| Perforated sleeve FIS H K |                                | 16x130 |     | 18x130/200 |     | 20x130 |     | 22x130/200 |     | 20x200 |  |
| Group factors             | $\alpha_{g,N} (s_{min}   )$    | [-]    | 2   |            |     |        |     |            |     |        |  |
|                           | $\alpha_{g,V} (s_{min}   )$    |        |     |            |     |        |     |            |     |        |  |
|                           | $\alpha_{g,N} (s_{min} \perp)$ |        |     |            |     |        |     |            |     |        |  |
|                           | $\alpha_{g,V} (s_{min} \perp)$ |        |     |            |     |        |     |            |     |        |  |

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## Performance

Light-weight concrete solid block Vbl, dimensions, installation parameters, Group factors

## Annex C108

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C109.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |  |  | M8             | M10 | M10        | M12 | M12    | M16 | M16        | M12 | M16    |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--|--|----------------|-----|------------|-----|--------|-----|------------|-----|--------|
| Perforated sleeve FIS H K                                                                                                                         |  |  | 16x130         |     | 18x130/200 |     | 20x130 |     | 22x130/200 |     | 20x200 |
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |  |  |                |     |            |     |        |     |            |     |        |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                                                  |  |  | Use conditions |     |            |     |        |     |            |     |        |
| 2,5 / 2 N/mm <sup>2</sup>                                                                                                                         |  |  | w/w            | w/d | 2,0        |     |        | 2,5 |            |     | 3,0    |
|                                                                                                                                                   |  |  | d/d            |     | 2,0        |     |        | 3,0 |            |     | 4,0    |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^{\circ}C)} = 0,83 \cdot N_{Rk(50/80^{\circ}C)}$ .

**Table C109.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

|                                                                                                                               |                |     |            |     |        |     |            |     |        |
|-------------------------------------------------------------------------------------------------------------------------------|----------------|-----|------------|-----|--------|-----|------------|-----|--------|
| Anchor rod                                                                                                                    | M8             | M10 | M10        | M12 | M12    | M16 | M16        | M12 | M16    |
| Perforated sleeve FIS H K                                                                                                     | 16x130         |     | 18x130/200 |     | 20x130 |     | 22x130/200 |     | 20x200 |
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,I</sub> [kN]; temperature range 50/80°C and 72/120°C |                |     |            |     |        |     |            |     |        |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                              | Use conditions |     |            |     |        |     |            |     |        |
| 2,5 / 2 N/mm²                                                                                                                 | w/w            | w/d | 4,5        |     |        |     | 6,5        |     |        |
|                                                                                                                               | d/d            |     |            |     |        |     |            |     |        |

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

Factor for job site tests and displacements see annex C123.

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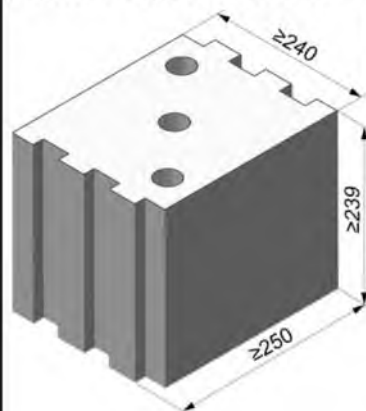
## Performance

Light-weight concrete solid block Vbl,  
Characteristic resistance under tension and shear loading

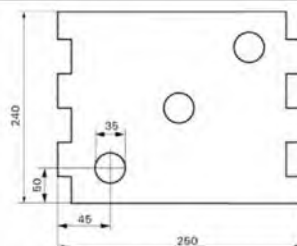
## Annex C109

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015



|                                                                                  |                       |                          |         |          |
|----------------------------------------------------------------------------------|-----------------------|--------------------------|---------|----------|
| Producer                                                                         | KLB                   |                          |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                 | width W | height H |
|                                                                                  |                       | ≥ 250                    | ≥ 240   | ≥ 239    |
| Mean gross dry density ρ                                                         | [kg/dm³]              | ≥ 1,6                    |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm²]               | 5 / 4 or 8 / 6 or 10 / 8 |         |          |
| Standard or annex                                                                | EN 771-3:2011+A1:2015 |                          |         |          |



Dimension see also Annex B20

**Table C110.1:** Installation parameters  
(Pre-positioned installation with perforated sleeve FIS H K)

| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10    | M8 | M10   | -       | M12    | M16 | M12    | M16 | M12 | M16 |
|--------------------------------|-------|----|-------|----|-------|----|--------|----|-------|---------|--------|-----|--------|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6 M8 | -  | -      | -  | -     | M10 M12 | -      | -   | -      | -   | -   | -   |
|                                |       |    |       |    | 11x85 |    |        |    |       | 15x85   |        |     |        |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |         | 20x130 |     | 20x200 |     |     |     |

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

|                                               |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Max. installation torque $\max T_{inst}$ [Nm] | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

## General installation parameters

|                                  |                                        |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------|----------------------------------------|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Edge distance $C_{min} = C_{cr}$ | 130                                    |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spacing                          | $S_{min} \parallel = S_{cr} \parallel$ | 250 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                  | $S_{min} \perp = S_{cr} \perp$         | 250 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C110.2:** Group factors

| Anchor rod                     | M6    | M8 | M6    | M8 | -     | M8 | M10    | M8 | M10   | -       | M12    | M16 | M12    | M16 | M12 | M16 |
|--------------------------------|-------|----|-------|----|-------|----|--------|----|-------|---------|--------|-----|--------|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -  | -     | -  | M6 M8 | -  | -      | -  | -     | M10 M12 | -      | -   | -      | -   | -   | -   |
|                                |       |    |       |    | 11x85 |    |        |    |       | 15x85   |        |     |        |     |     |     |
| Perforated sleeve FIS H K      | 12x50 |    | 12x85 |    | 16x85 |    | 16x130 |    | 20x85 |         | 20x130 |     | 20x200 |     |     |     |

|               |                                    |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|------------------------------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Group factors | $\alpha_{g,N} (S_{min} \parallel)$ | [-] | 2,0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (S_{min} \parallel)$ |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,N} (S_{min} \perp)$     |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               | $\alpha_{g,V} (S_{min} \perp)$     |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |

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## Performance

Light-weight concrete solid block Vbl, dimensions, installation parameters, Group factors

## Annex C110

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C111.1: Installation parameters**

(Push through installation with perforated sleeve FIS H K)

| Anchor rod                                   |                                        | M10        | M12 | M16        |
|----------------------------------------------|----------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K                    |                                        | 18x130/200 |     | 22x130/200 |
| Anchor rod with perforated sleeve FIS H K    |                                        |            |     |            |
| Max. installation torque                     | max T <sub>inst</sub>                  | [Nm]       | 2,0 |            |
| General installation parameters              |                                        |            |     |            |
| Edge distance                                | c <sub>min</sub> = c <sub>cr</sub>     | [mm]       | 130 |            |
| Spacing                                      | s <sub>min</sub>    = s <sub>cr</sub>  |            | 250 |            |
|                                              | s <sub>min</sub> ⊥ = s <sub>cr</sub> ⊥ |            | 250 |            |
| Drilling method                              |                                        |            |     |            |
| Hammer drilling with hard metal hammer drill |                                        |            |     |            |

**Table C111.2: Group factors**

| Anchor rod                |                                     | M10        | M12 | M16        |
|---------------------------|-------------------------------------|------------|-----|------------|
| Perforated sleeve FIS H K |                                     | 18x130/200 |     | 22x130/200 |
| Group factors             | $\alpha_{g,N} (s_{\min \parallel})$ | [-]        | 2,0 |            |
|                           | $\alpha_{g,V} (s_{\min \parallel})$ |            |     |            |
|                           | $\alpha_{g,N} (s_{\min \perp})$     |            |     |            |
|                           | $\alpha_{g,V} (s_{\min \perp})$     |            |     |            |

fischer injection system FIS V Plus for masonry

## Performance

Light-weight concrete solid block Vbl, dimensions, installation parameters, Group factors

## Annex C111

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C112.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8     | -     | M8     | M10    | M8    | M10 | - | M12 | M16 | M12 | M16 | M12 | M16 |
|--------------------------------|-------|-------|-------|--------|-------|--------|--------|-------|-----|---|-----|-----|-----|-----|-----|-----|
| Internal threaded anchor FIS E | -     | -     | M6    | M8     |       | -      | -      | M10   | M12 |   | -   | -   | -   | -   | -   | -   |
|                                |       |       | 11x85 |        |       |        |        | 15x85 |     |   |     |     |     |     |     |     |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 16x85 | 16x130 | 20x85 | 20x130 | 20x200 |       |     |   |     |     |     |     |     |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength/<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |     |     |  |
|---------------------------------------------------------------------------------------|------------------------|-----|-----|-----|-----|--|
| 5 / 4 N/mm <sup>2</sup>                                                               | w/w   w/d              | 1,2 | 2,0 | 2,5 | 3,0 |  |
|                                                                                       | d/d                    | 2,0 | 3,5 | 4,0 | 5,0 |  |
| 8 / 6 N/mm <sup>2</sup>                                                               | w/w   w/d              | 1,5 | 3,0 | 4,0 | 5,0 |  |
|                                                                                       | d/d                    | 3,0 | 5,0 | 6,5 | 7,5 |  |
| 10 / 8 N/mm <sup>2</sup>                                                              | w/w   w/d              | 2,0 | 4,0 | 5,0 | 6,5 |  |
|                                                                                       | d/d                    | 4,0 | 7,0 | 8,5 | 9,0 |  |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk (72/120^{\circ}C)} = 0,83 \cdot N_{Rk (50/80^{\circ}C)}$ .

**Table C112.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through installation)

| Anchor rod                | M10        | M12        | M16 |
|---------------------------|------------|------------|-----|
| Perforated sleeve FIS H K | 18x130/200 | 22x130/200 |     |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C <sup>2)</sup>

| Mean compressive strength/<br>Min. compressive strength<br>single brick <sup>1)</sup> | Use<br>con-<br>ditions |     |     |
|---------------------------------------------------------------------------------------|------------------------|-----|-----|
| 5 / 4 N/mm <sup>2</sup>                                                               | w/w   w/d              | 2,5 | 3,0 |
|                                                                                       | d/d                    | 4,0 | 5,0 |
| 8 / 6 N/mm <sup>2</sup>                                                               | w/w   w/d              | 4,0 | 5,0 |
|                                                                                       | d/d                    | 6,5 | 7,5 |
| 10 / 8 N/mm <sup>2</sup>                                                              | w/w   w/d              | 5,0 | 6,5 |
|                                                                                       | d/d                    | 8,5 | 9,0 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk (72/120^{\circ}C)} = 0,83 \cdot N_{Rk (50/80^{\circ}C)}$ .

Factor for job site tests and displacements see annex C123.

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## Performance

Light-weight concrete solid block Vbl, Characteristic resistance under tension loading

## Annex C112

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C113.1:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading (Pre-positioned installation)

| Anchor rod                     | M6    | M8    | M6    | M8    | -              | M8     | M10    | M8     | M10    | -                | M12   | M16    | M12    | M16    | M12    | M16    |
|--------------------------------|-------|-------|-------|-------|----------------|--------|--------|--------|--------|------------------|-------|--------|--------|--------|--------|--------|
| Internal threaded anchor FIS E | -     | -     | -     | -     | M6 M8<br>11x85 | -      | -      | -      | -      | M10 M12<br>15x85 | -     | -      | -      | -      | -      | -      |
| Perforated sleeve FIS H K      | 12x50 | 12x85 | 12x85 | 12x85 | 16x85          | 16x130 | 16x130 | 16x130 | 16x130 | 20x85            | 20x85 | 20x130 | 20x130 | 20x130 | 20x200 | 20x200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |     |     |     |     |     |  |     |  |  |  |  |  |  |     |  |
|----------------------------------------------------------------------------------|----------------|-----|-----|-----|-----|-----|--|-----|--|--|--|--|--|--|-----|--|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w<br>d/d     | 2,0 | 3,0 | 2,0 | 3,0 | 2,0 |  | 3,5 |  |  |  |  |  |  | 4,5 |  |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w<br>d/d     | 3,0 | 4,5 | 3,0 | 4,5 | 3,0 |  | 5,5 |  |  |  |  |  |  | 6,5 |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w<br>d/d     | 4,0 | 6,0 | 4,0 | 6,0 | 4,0 |  | 7,0 |  |  |  |  |  |  | 8,5 |  |

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

**Table C113.2:** 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 | 18x130/200 | 18x130/200 | 22x130/200 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | Use conditions |  |  |  |  |  |  |     |  |  |  |  |  |  |     |  |
|----------------------------------------------------------------------------------|----------------|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|
| 5 / 4 N/mm <sup>2</sup>                                                          | w/w<br>d/d     |  |  |  |  |  |  | 3,5 |  |  |  |  |  |  | 4,5 |  |
| 8 / 6 N/mm <sup>2</sup>                                                          | w/w<br>d/d     |  |  |  |  |  |  | 5,5 |  |  |  |  |  |  | 6,5 |  |
| 10 / 8 N/mm <sup>2</sup>                                                         | w/w<br>d/d     |  |  |  |  |  |  | 7,0 |  |  |  |  |  |  | 8,5 |  |

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

Factor for job site tests and displacements see annex C123.

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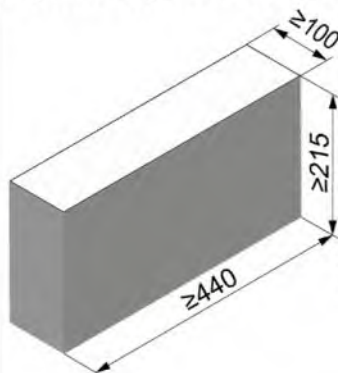
## Performance

Light-weight concrete solid block Vbl, Characteristic resistance under shear loading

## Annex C113

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015



|                                                                                  |                       |                                       |         |          |
|----------------------------------------------------------------------------------|-----------------------|---------------------------------------|---------|----------|
| Producer                                                                         | Roadstone wood        |                                       |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                              | width W | height H |
|                                                                                  |                       | ≥ 440                                 | ≥ 100   | ≥ 215    |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | ≥ 2,0                                 |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 5 / 4 or 8 / 6 or 10 / 8 or 12,5 / 10 |         |          |
| Standard or annex                                                                | EN 771-3:2011+A1:2015 |                                       |         |          |

**Table C114.1: Installation parameters**

| Anchor rod                           |                     |      | M6          |    | M8 |    | M10 |    | M12 |    | M16 |    |
|--------------------------------------|---------------------|------|-------------|----|----|----|-----|----|-----|----|-----|----|
| Anchor rod without perforated sleeve |                     |      |             |    |    |    |     |    |     |    |     |    |
| Effective anchorage depth            | $h_{ef}$            | [mm] | 50          | 70 | 50 | 70 | 50  | 70 | 50  | 70 | 50  | 70 |
| Max. installation torque             | $\max T_{inst}$     | [Nm] | 4           |    | 10 |    |     |    |     |    |     |    |
| General installation parameters      |                     |      |             |    |    |    |     |    |     |    |     |    |
| Edge distance                        | $c_{min} = c_{cr}$  | [mm] | 100         |    |    |    |     |    |     |    |     |    |
| Spacing                              | $s_{min} \parallel$ |      | 75          |    |    |    |     |    |     |    |     |    |
|                                      | $s_{cr} \parallel$  |      | 3x $h_{ef}$ |    |    |    |     |    |     |    |     |    |
|                                      | $s_{min} \perp$     |      | 75          |    |    |    |     |    |     |    |     |    |
|                                      | $s_{cr} \perp$      |      | 3x $h_{ef}$ |    |    |    |     |    |     |    |     |    |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C114.2: Group factors**

| Anchor rod    |                                    | M6  | M8 | M10 | M12 | M16 |
|---------------|------------------------------------|-----|----|-----|-----|-----|
| Group factors | $\alpha_{g,N} (s_{min \parallel})$ | 1,6 |    |     |     |     |
|               | $\alpha_{g,V} (s_{min \parallel})$ | 1,3 |    |     |     |     |
|               | $\alpha_{g,N} (s_{min \perp})$     | 1,4 |    |     |     |     |
|               | $\alpha_{g,V} (s_{min \perp})$     | 1,3 |    |     |     |     |

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## Performance

Light-weight concrete solid block Vbl, dimensions, installation parameters, Group factors

## Annex C114

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C115.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                               |                | M6                                              | M8  | M10 | M12 | M16 |
|--------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------|-----|-----|-----|-----|
| <b><math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN]; temperature range 50/80°C <sup>2)</sup></b> |                |                                                 |     |     |     |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                                         | Use conditions | Effective anchorage depth $h_{ef}$ [mm]<br>≥ 50 |     |     |     |     |
| <b>5 / 4 N/mm<sup>2</sup></b>                                                                                            | w/w w/d        | 1,2                                             | 1,2 |     |     |     |
|                                                                                                                          | d/d            | 2,0                                             | 2,0 |     |     |     |
| <b>8 / 6 N/mm<sup>2</sup></b>                                                                                            | w/w w/d        | 1,5                                             | 2,0 |     |     |     |
|                                                                                                                          | d/d            | 3,0                                             | 3,5 |     |     |     |
| <b>10 / 8 N/mm<sup>2</sup></b>                                                                                           | w/w w/d        | 2,0                                             | 2,5 |     |     |     |
|                                                                                                                          | d/d            | 4,0                                             | 4,5 |     |     |     |
| <b>12,5 / 10 N/mm<sup>2</sup></b>                                                                                        | w/w w/d        | 3,0                                             | 3,5 |     |     |     |
|                                                                                                                          | d/d            | 5,0                                             | 5,5 |     |     |     |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120°C)} = 0,83 \cdot N_{Rk(50/80°C)}$ .

**Table C115.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                    |                | M6                                              | M8  | M10 | M12 | M16 |
|---------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------|-----|-----|-----|-----|
| <b><math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}</math> [kN]; temperature range 50/80°C and 72/120°C</b> |                |                                                 |     |     |     |     |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>                              | Use conditions | Effective anchorage depth $h_{ef}$ [mm]<br>≥ 50 |     |     |     |     |
| <b>5 / 4 N/mm<sup>2</sup></b>                                                                                 | w/w w/d        | 1,2                                             | 1,5 | 1,5 | 1,5 | 1,5 |
|                                                                                                               | d/d            |                                                 |     |     |     |     |
| <b>8 / 6 N/mm<sup>2</sup></b>                                                                                 | w/w w/d        | 2,0                                             | 2,0 | 2,5 | 2,5 | 2,5 |
|                                                                                                               | d/d            |                                                 |     |     |     |     |
| <b>10 / 8 N/mm<sup>2</sup></b>                                                                                | w/w w/d        | 2,5                                             | 2,5 | 3,0 | 3,0 | 3,5 |
|                                                                                                               | d/d            |                                                 |     |     |     |     |
| <b>12,5 / 10 N/mm<sup>2</sup></b>                                                                             | w/w w/d        | 3,0                                             | 3,5 | 4,0 | 4,0 | 4,5 |
|                                                                                                               | d/d            |                                                 |     |     |     |     |

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

Factor for job site tests and displacements see annex C123.

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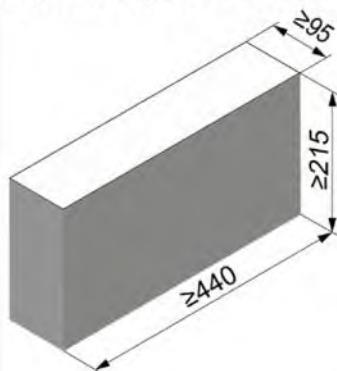
## Performance

Light-weight concrete solid block Vbl,  
Characteristic resistance under tension and shear loading

## Annex C115

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015



|                                                                                  |                       |                                           |         |          |
|----------------------------------------------------------------------------------|-----------------------|-------------------------------------------|---------|----------|
| Producer                                                                         |                       | Tramac                                    |         |          |
| Nominal dimensions                                                               | [mm]                  | length L                                  | width W | height H |
|                                                                                  |                       | ≥ 440                                     | ≥ 95    | ≥ 215    |
| Mean gross dry density ρ                                                         | [kg/dm <sup>3</sup> ] | ≥ 2,0                                     |         |          |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 7,5 / 6 or 10 / 8 or 12,5 / 10 or 15 / 12 |         |          |
| Standard or annex                                                                |                       | EN 771-3:2011+A1:2015                     |         |          |

**Table C116.1: Installation parameters**

| Anchor rod                           |                     |      | M6          |    | M8 |    | M10 |    | M12 |    | M16 |    |
|--------------------------------------|---------------------|------|-------------|----|----|----|-----|----|-----|----|-----|----|
| Anchor rod without perforated sleeve |                     |      |             |    |    |    |     |    |     |    |     |    |
| Effective anchorage depth            | $h_{ef}$            | [mm] | 50          | 70 | 50 | 70 | 50  | 70 | 50  | 70 | 50  | 70 |
| Max. installation torque             | $\max T_{inst}$     | [Nm] | 4           |    | 10 |    |     |    |     |    |     |    |
| General installation parameters      |                     |      |             |    |    |    |     |    |     |    |     |    |
| Edge distance                        | $c_{min} = c_{cr}$  | [mm] | 60          |    |    |    |     |    |     |    |     |    |
| Spacing                              | $s_{min \parallel}$ |      | 75          |    |    |    |     |    |     |    |     |    |
|                                      | $s_{cr \parallel}$  |      | 3x $h_{ef}$ |    |    |    |     |    |     |    |     |    |
|                                      | $s_{min \perp}$     |      | 75          |    |    |    |     |    |     |    |     |    |
|                                      | $s_{cr \perp}$      |      | 3x $h_{ef}$ |    |    |    |     |    |     |    |     |    |

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C116.2: Group factors**

| Anchor rod    |                                    | M6  | M8 | M10 | M12 | M16 |
|---------------|------------------------------------|-----|----|-----|-----|-----|
| Group factors | $\alpha_{g,N} (s_{min \parallel})$ | 1,9 |    |     |     |     |
|               | $\alpha_{g,V} (s_{min \parallel})$ | 1,4 |    |     |     |     |
|               | $\alpha_{g,N} (s_{min \perp})$     | 1,9 |    |     |     |     |
|               | $\alpha_{g,V} (s_{min \perp})$     | 1,4 |    |     |     |     |

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## Performance

Light-weight concrete solid block Vbl, dimensions, installation parameters, Group factors

## Annex C116

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C117.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                                                                        |                        |     | M6                                             |     | M8  |     | M10 |     | M12 |     | M16 |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| N <sub>Rk</sub> = N <sub>Rk,p</sub> = N <sub>Rk,b</sub> = N <sub>Rk,p,c</sub> = N <sub>Rk,b,c</sub> [kN]; temperature range 50/80°C <sup>2)</sup> |                        |     |                                                |     |     |     |     |     |     |     |     |     |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                                            | Use<br>con-<br>ditions |     | Effective anchorage depth h <sub>ef</sub> [mm] |     |     |     |     |     |     |     |     |     |
|                                                                                                                                                   |                        |     | 50                                             | 70  | 50  | 70  | 50  | 70  | 50  | 70  | 50  | 70  |
| 7,5 / 6 N/mm <sup>2</sup>                                                                                                                         | w/w                    | w/d | 1,5                                            | 2,0 | 1,5 | 2,0 | 1,5 | 2,0 | 1,5 | 2,0 | 1,5 | 2,0 |
|                                                                                                                                                   | d/d                    |     | 2,5                                            | 3,5 | 2,5 | 3,5 | 2,5 | 3,5 | 2,5 | 3,5 | 2,5 | 3,5 |
| 10 / 8 N/mm <sup>2</sup>                                                                                                                          | w/w                    | w/d | 2,0                                            | 2,5 | 2,0 | 2,5 | 2,0 | 3,0 | 2,0 | 3,0 | 2,0 | 3,0 |
|                                                                                                                                                   | d/d                    |     | 3,5                                            | 4,5 | 3,5 | 4,5 | 3,5 | 5,0 | 3,5 | 5,0 | 3,5 | 5,0 |
| 12,5 / 10 N/mm <sup>2</sup>                                                                                                                       | w/w                    | w/d | 2,5                                            | 3,5 | 2,5 | 3,5 | 2,5 | 3,5 | 2,5 | 3,5 | 2,5 | 3,5 |
|                                                                                                                                                   | d/d                    |     | 4,5                                            | 6,0 | 4,5 | 6,0 | 4,5 | 6,0 | 4,5 | 6,0 | 4,5 | 6,0 |
| 15 / 12 N/mm <sup>2</sup>                                                                                                                         | w/w                    | w/d | 3,0                                            | 4,0 | 3,0 | 4,0 | 3,0 | 4,5 | 3,0 | 4,5 | 3,0 | 4,5 |
|                                                                                                                                                   | d/d                    |     | 5,0                                            | 7,0 | 5,0 | 7,0 | 5,0 | 7,5 | 5,0 | 7,5 | 5,0 | 7,5 |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120°C)} = 0,83 \cdot N_{Rk(50/80°C)}$ .

**Table C117.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                                                    |                             |            | M6                                                         | M8  | M10 | M12 | M16 |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------|------------------------------------------------------------|-----|-----|-----|-----|
| V <sub>Rk</sub> = V <sub>Rk,b</sub> = V <sub>Rk,c,II</sub> = V <sub>Rk,c,⊥</sub> [kN]; temperature range 50/80°C and 72/120°C |                             |            |                                                            |     |     |     |     |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                                        | Use<br>con-<br>ditions      |            | Effective anchorage depth h <sub>ef</sub> [mm]<br><br>≥ 50 |     |     |     |     |
|                                                                                                                               | 7,5 / 6 N/mm <sup>2</sup>   | w/w<br>d/d | 2,0                                                        | 2,0 | 2,0 | 1,5 | 1,5 |
| 10 / 8 N/mm <sup>2</sup>                                                                                                      | w/w<br>d/d                  | 2,5        | 2,5                                                        | 3,0 | 2,5 | 2,5 |     |
|                                                                                                                               | 12,5 / 10 N/mm <sup>2</sup> | w/w<br>d/d | 3,5                                                        | 3,5 | 4,0 | 3,0 | 3,0 |
| 15 / 12 N/mm <sup>2</sup>                                                                                                     | w/w<br>d/d                  | 4,0        | 4,0                                                        | 4,5 | 3,5 | 3,5 |     |

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

Factor for job site tests and displacements see annex C123.

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## Performance

Light-weight concrete solid block Vbl,  
Characteristic resistance under tension and shear loading

## Annex C117

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



|                                                                                  |                       |         |       |       |
|----------------------------------------------------------------------------------|-----------------------|---------|-------|-------|
| Producer                                                                         | e.g. Ytong            |         |       |       |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,35    | 0,5   | 0,65  |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 | 5 / 4 | 8 / 6 |
| Standard or annex                                                                | EN 771-4:2011+A1:2015 |         |       |       |

**Table C118.1: Installation parameters**

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

## Anchor rod and internal threaded anchor FIS E without perforated sleeve

|                           |                 |      |     |     |     |     |     |     |     |     |     |     |    |   |
|---------------------------|-----------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|---|
| Effective anchorage depth | $h_{ef}$        | [mm] | 100 | 200 | 100 | 200 | 100 | 200 | 100 | 200 | 100 | 200 | 85 |   |
| Max. installation torque  | $\max T_{inst}$ | [Nm] | 1   | 4   | 1   | 8   | 2   | 12  | 2   | 16  | 2   | 20  | 1  | 2 |

## General installation parameters

|                                        |      |             |
|----------------------------------------|------|-------------|
| Edge distance $C_{min} = C_{cr}$       |      | 100         |
| $s_{cr \parallel} = s_{min \parallel}$ |      | 250         |
| $h_{ef}=200mm$<br>$s_{min \parallel}$  | [mm] | 80          |
| $h_{ef}=200mm$<br>$s_{cr \parallel}$   |      | 3x $h_{ef}$ |
| $s_{cr \perp} = s_{min \perp}$         |      | 250         |
| $h_{ef}=200mm$<br>$s_{min \perp}$      |      | 80          |
| $h_{ef}=200mm$<br>$s_{cr \perp}$       |      | 3x $h_{ef}$ |

## Drilling method

Hammer drilling with hard metal hammer drill

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

fischer injection system FIS V Plus for masonry

### Performance

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

### Annex C118

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**Table C119.1:** Group factors for autoclaved aerated concrete  
(Min. compressive strength single brick = 2 N/mm<sup>2</sup>)

| Anchor rod                     |                                                            | M6  | M8  | M10 | M12 | M16 | -     |    | -     |     |
|--------------------------------|------------------------------------------------------------|-----|-----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor FIS E |                                                            | -   | -   | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                |                                                            |     |     |     |     |     | 11x85 |    | 15x85 |     |
| Group factors                  | $h_{ef}=200 \alpha_{g,N} (s_{min} \parallel)$              | [-] | 1,6 |     |     |     | _1)   |    | _1)   |     |
|                                | $h_{ef}=200 \alpha_{g,V} (s_{min} \parallel)$              |     | 1,1 |     |     |     | _1)   |    | _1)   |     |
|                                | $\alpha_{g,N} \parallel, \alpha_{g,V} (s_{min} \parallel)$ |     | 2,0 |     |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{g,N} (s_{min} \perp)$                  |     | 1,6 |     |     |     | _1)   |    | _1)   |     |
|                                | $h_{ef}=200 \alpha_{g,V} (s_{min} \perp)$                  |     | 0,8 |     |     |     | _1)   |    | _1)   |     |
|                                | $\alpha_{g,N} \perp, \alpha_{g,V} (s_{min} \perp)$         |     | 2,0 |     |     |     |       |    |       |     |

<sup>1)</sup> No performance assessed.

**Table C119.2:** Group factors for autoclaved aerated concrete  
(Min. compressive strength single brick = 4 N/mm<sup>2</sup>)

| Anchor rod                     |                                                           | M6  | M8  | M10 | M12 | M16 | -     |    | -     |     |
|--------------------------------|-----------------------------------------------------------|-----|-----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor FIS E |                                                           | -   | -   | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                |                                                           |     |     |     |     |     | 11x85 |    | 15x85 |     |
| Group factors                  | $h_{ef}=200 \alpha_{g,N} (s_{min} \parallel)$             | [-] | 0,7 |     |     |     | _1)   |    | _1)   |     |
|                                | $h_{ef}=200 \alpha_{gV} (s_{min} \parallel)$              |     | 2,0 |     |     |     | _1)   |    | _1)   |     |
|                                | $\alpha_{g,N} \parallel, \alpha_{gV} (s_{min} \parallel)$ |     | 2,0 |     |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{g,N} (s_{min} \perp)$                 |     | 0,7 |     |     |     | _1)   |    | _1)   |     |
|                                | $h_{ef}=200 \alpha_{g,V} (s_{min} \perp)$                 |     | 1,2 |     |     |     | _1)   |    | _1)   |     |
|                                | $\alpha_{g,N} \perp, \alpha_{gV} (s_{min} \perp)$         |     | 2,0 |     |     |     |       |    |       |     |

<sup>1)</sup> No performance assessed.

**Table C119.3:** Group factors for autoclaved aerated concrete  
(Min. compressive strength single brick = 6 N/mm<sup>2</sup>)

| Anchor rod                     |                                                            | M6  | M8  | M10 | M12 | M16 | -     |    | -     |     |
|--------------------------------|------------------------------------------------------------|-----|-----|-----|-----|-----|-------|----|-------|-----|
| Internal threaded anchor FIS E |                                                            | -   | -   | -   | -   | -   | M6    | M8 | M10   | M12 |
|                                |                                                            |     |     |     |     |     | 11x85 |    | 15x85 |     |
| Group factors                  | $h_{ef}=200 \alpha_{g,N} (s_{min} \parallel)$              | [-] | 0,7 |     |     |     | _1)   |    | _1)   |     |
|                                | $h_{ef}=200 \alpha_{g,V} (s_{min} \parallel)$              |     | 2,0 |     |     |     | _1)   |    | _1)   |     |
|                                | $\alpha_{g,N} \parallel, \alpha_{g,V} (s_{min} \parallel)$ |     | 2,0 |     |     |     |       |    |       |     |
|                                | $h_{ef}=200 \alpha_{g,N} (s_{min} \perp)$                  |     | 0,7 |     |     |     | _1)   |    | _1)   |     |
|                                | $h_{ef}=200 \alpha_{g,V} (s_{min} \perp)$                  |     | 1,2 |     |     |     | _1)   |    | _1)   |     |
|                                | $\alpha_{g,N} \perp, \alpha_{g,V} (s_{min} \perp)$         |     | 2,0 |     |     |     |       |    |       |     |

<sup>1)</sup> No performance assessed.

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**Performance**

Autoclaved aerated concrete (cylindrical drill hole), Group factors

**Annex C119**

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

**Table C120.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN]; temperature range 50/80°C<sup>3)</sup>

| Mean compressive strength / Min. compressive strength single brick <sup>2)</sup> | Use conditions | Effective anchorage depth $h_{ef}$ [mm] |                 |     |     |     |     |     |     |     |      |     |     |
|----------------------------------------------------------------------------------|----------------|-----------------------------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|
|                                                                                  |                | 100                                     | 200             | 100 | 200 | 100 | 200 | 100 | 200 | 100 | 200  | 85  |     |
| <b>2,5 / 2 N/mm<sup>2</sup></b>                                                  | w/w            | 1,2                                     | 1,2             | 1,5 | 2,0 | 1,5 | 3,0 | 1,5 | 3,0 | 2,0 | 3,0  | 1,5 | 1,5 |
|                                                                                  | d/d            | 1,5                                     | 3,0             | 1,5 | 3,0 | 1,5 | 3,5 | 2,0 | 4,0 | 2,0 | 4,0  | 1,5 | 1,5 |
| <b>5 / 4 N/mm<sup>2</sup></b>                                                    | w/w            | 1,2                                     | - <sup>1)</sup> | 2,0 | 1,5 | 2,5 | 3,5 | 2,5 | 3,5 | 2,0 | 3,5  | 2,0 | 1,5 |
|                                                                                  | d/d            | 1,5                                     | - <sup>1)</sup> | 2,0 | 3,0 | 3,0 | 5,0 | 2,5 | 5,0 | 2,0 | 5,0  | 2,0 | 1,5 |
| <b>8 / 6 N/mm<sup>2</sup></b>                                                    | w/w            | 1,5                                     | - <sup>1)</sup> | 3,0 | 2,5 | 4,5 | 5,0 | 4,5 | 7,0 | 3,0 | 8,5  | 3,5 | 2,5 |
|                                                                                  | d/d            | 1,5                                     | - <sup>1)</sup> | 3,5 | 4,0 | 5,0 | 7,0 | 5,0 | 9,0 | 3,0 | 11,5 | 3,5 | 2,5 |

<sup>1)</sup> No performance assessed.

<sup>2)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength.

<sup>3)</sup> For temperature range 72/120°C:  $N_{Rk}(72/120^\circ\text{C}) = 0,83 \cdot N_{Rk}(50/80^\circ\text{C})$ .

**Table C120.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                     | M6 | M8 | M10 | M12 | M16 | -           | -           |
|--------------------------------|----|----|-----|-----|-----|-------------|-------------|
| Internal threaded anchor FIS E | -  | -  | -   | -   | -   | M6<br>11x85 | M8<br>15x85 |

$V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN]; temperature range 50/80°C and 72/120°C

| Mean compressive strength / Min. compressive strength single brick <sup>2)</sup> | Use conditions | Effective anchorage depth $h_{ef}$ [mm] |                 |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------|----------------|-----------------------------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                                                  |                | 100                                     | 200             | 100 | 200 | 100 | 200 | 100 | 200 | 100 | 200 | 85  |     |
| <b>2,5 / 2 N/mm<sup>2</sup></b>                                                  | w/w            | 1,2                                     | 1,2             | 1,2 | 1,2 | 1,2 | 1,2 | 1,5 | 1,2 | 1,2 | 1,2 | 1,2 | 1,5 |
|                                                                                  | d/d            | 1,2                                     | 1,2             | 1,2 | 1,2 | 1,2 | 1,2 | 1,5 | 1,2 | 1,2 | 1,2 | 1,2 | 1,5 |
| <b>5 / 4 N/mm<sup>2</sup></b>                                                    | w/w            | 2,0                                     | - <sup>1)</sup> | 2,5 | 2,0 | 2,0 | 2,0 | 2,5 | 2,0 | 2,0 | 2,0 | 2,0 | 2,5 |
|                                                                                  | d/d            | 2,0                                     | - <sup>1)</sup> | 2,5 | 2,0 | 2,0 | 2,0 | 2,5 | 2,0 | 2,0 | 2,0 | 2,0 | 2,5 |
| <b>8 / 6 N/mm<sup>2</sup></b>                                                    | w/w            | 2,5                                     | - <sup>1)</sup> | 3,0 | 2,5 | 3,0 | 3,0 | 3,5 | 4,0 | 4,5 | 4,5 | 2,5 | 3,5 |
|                                                                                  | d/d            | 2,5                                     | - <sup>1)</sup> | 3,0 | 2,5 | 3,0 | 3,0 | 3,5 | 4,0 | 4,5 | 4,5 | 2,5 | 3,5 |

<sup>1)</sup> No performance assessed.

<sup>2)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength

Factor for job site tests and displacements see annex C123.

fischer injection system FIS V Plus for masonry

## Performance

Autoclaved aerated concrete (cylindrical drill hole),  
Characteristic resistance under tension and shear loading

## Annex C120

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**Autoclaved aerated concrete (conical drill hole with special drill bit PBB),  
EN 771-4:2011+A1:2015**



|                                                                                  |                       |         |       |       |
|----------------------------------------------------------------------------------|-----------------------|---------|-------|-------|
| Producer                                                                         | e.g. Ytong            |         |       |       |
| Mean gross dry density $\rho$                                                    | [kg/dm <sup>3</sup> ] | 0,35    | 0,5   | 0,65  |
| Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> | [N/mm <sup>2</sup> ]  | 2,5 / 2 | 5 / 4 | 8 / 6 |
| Standard or annex                                                                | EN 771-4:2011+A1:2015 |         |       |       |

**Table C121.1: Installation parameters**

| Anchor rod                                                              |                                        | M8   |     | M10 |     | M12 |     | -     |     |
|-------------------------------------------------------------------------|----------------------------------------|------|-----|-----|-----|-----|-----|-------|-----|
| Internal threaded anchor FIS E                                          |                                        | -    | -   | -   | -   | -   | -   | M6    | M8  |
|                                                                         |                                        |      |     |     |     |     |     | 11x85 |     |
| Anchor rod and internal threaded anchor FIS E without perforated sleeve |                                        |      |     |     |     |     |     |       |     |
| Effective anchorage depth                                               | $h_{ef}$                               | [mm] | 75  | 95  | 75  | 95  | 75  | 95    | 85  |
| Max. installation torque                                                | $\max T_{inst}$                        | [Nm] | 2   |     |     |     |     |       |     |
| General installation parameters                                         |                                        |      |     |     |     |     |     |       |     |
| Edge distance                                                           | $c_{min} = c_{cr}$                     |      | 120 | 150 | 120 | 150 | 120 | 150   | 150 |
| Spacing                                                                 | $s_{cr \parallel} = s_{min \parallel}$ |      | 240 | 300 | 240 | 300 | 240 | 300   | 300 |
|                                                                         | $s_{cr \perp} = s_{min \perp}$         |      | 240 | 250 | 240 | 250 | 240 | 250   | 250 |

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C121.2: Group factors**

| Anchor rod                     | M8                                                                                                                                           |     | M10 |   | M12 |   | -  |       |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|-----|---|----|-------|
| Internal threaded anchor FIS E | -                                                                                                                                            | -   | -   | - | -   | - | M6 | M8    |
|                                |                                                                                                                                              |     |     |   |     |   |    | 11x85 |
| Group factors                  | $\alpha_{g,N} (s_{min \parallel})$<br>$\alpha_{g,V} (s_{min \parallel})$<br>$\alpha_{g,N} (s_{min \perp})$<br>$\alpha_{g,V} (s_{min \perp})$ | [-] | 2   |   |     |   |    |       |

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**Performance**

Autoclaved aerated concrete (conical drill hole with special drill bit PBB),  
dimensions, installation parameters, Group factors

**Annex C121**

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**Autoclaved aerated concrete (conical drill hole with special drill bit PBB),  
EN 771-4:2011+A1:2015**

**Table C122.1:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

| Anchor rod                                                                                             |                        | M8                                      |     | M10 |     | M12 |     | -     |
|--------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------|-----|-----|-----|-----|-----|-------|
| Internal threaded anchor FIS E                                                                         |                        | -                                       | -   | -   | -   | -   | -   | M6 M8 |
|                                                                                                        |                        |                                         |     |     |     |     |     | 11x85 |
| $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]; temperature range 50/80°C <sup>2)</sup> |                        |                                         |     |     |     |     |     |       |
| Mean compressive strength /<br>Min. compressive strength<br>single brick <sup>1)</sup>                 | Use<br>con-<br>ditions | Effective anchorage depth $h_{ef}$ [mm] |     |     |     |     |     |       |
|                                                                                                        |                        | 75                                      | 95  | 75  | 95  | 75  | 95  | 85    |
| <b>2,5 / 2 N/mm<sup>2</sup></b>                                                                        | w/w   w/d              | 2,0                                     | 2,5 | 2,0 | 2,5 | 2,0 | 2,5 | 2,0   |
|                                                                                                        | d/d                    | 2,0                                     | 2,5 | 2,0 | 2,5 | 2,0 | 2,5 | 2,0   |
| <b>5 / 4 N/mm<sup>2</sup></b>                                                                          | w/w   w/d              | 3,0                                     | 3,5 | 3,0 | 3,5 | 3,0 | 3,5 | 3,0   |
|                                                                                                        | d/d                    | 3,0                                     | 3,5 | 3,0 | 3,5 | 3,0 | 3,5 | 3,0   |
| <b>8 / 6 N/mm<sup>2</sup></b>                                                                          | w/w   w/d              | 3,5                                     | 4,0 | 3,5 | 4,0 | 3,5 | 4,0 | 3,5   |
|                                                                                                        | d/d                    | 4,0                                     | 4,5 | 4,0 | 4,5 | 4,0 | 4,5 | 4,0   |

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

<sup>2)</sup> For temperature range 72/120°C:  $N_{Rk(72/120^\circ C)} = 0,83 \cdot N_{Rk(50/80^\circ C)}$ .

**Table C122.2:** Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

| Anchor rod                                                                                      |                        | M8                                      |    | M10 |    | M12 |    | -     |
|-------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------|----|-----|----|-----|----|-------|
| Internal threaded anchor FIS E                                                                  |                        | -                                       | -  | -   | -  | -   | -  | M6 M8 |
|                                                                                                 |                        |                                         |    |     |    |     |    | 11x85 |
| $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN]; temperature range 50/80°C and 72/120°C |                        |                                         |    |     |    |     |    |       |
| Mean compressive strength /<br>Min. com-pressive strength<br>single brick <sup>1)</sup>         | Use<br>con-<br>ditions | Effective anchorage depth $h_{ef}$ [mm] |    |     |    |     |    |       |
|                                                                                                 |                        | 75                                      | 95 | 75  | 95 | 75  | 95 | 85    |
| <b>2,5 / 2 N/mm<sup>2</sup></b>                                                                 | w/w   w/d              | 2,5                                     |    |     |    |     |    |       |
|                                                                                                 | d/d                    |                                         |    |     |    |     |    |       |
| <b>5 / 4 N/mm<sup>2</sup></b>                                                                   | w/w   w/d              | 4,5                                     |    |     |    |     |    |       |
|                                                                                                 | d/d                    |                                         |    |     |    |     |    |       |
| <b>8 / 6 N/mm<sup>2</sup></b>                                                                   | w/w   w/d              | 6,0                                     |    |     |    |     |    |       |
|                                                                                                 | d/d                    |                                         |    |     |    |     |    |       |

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

Factor for job site tests and displacements see annex C123.

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**Performance**

Autoclaved aerated concrete (conical drill hole with special drill bit PBB),  
Characteristic resistance under tension and shear loading

**Annex C122**

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## β-factors for job site tests; displacements

**Table C123.1: β-factors for job site tests**

| use conditions                                        |                    | w/w and w/d |        | d/d   |        |
|-------------------------------------------------------|--------------------|-------------|--------|-------|--------|
| temperature range [°C]                                |                    | 50/80       | 72/120 | 50/80 | 72/120 |
| Material                                              | Size               | β-factors   |        |       |        |
| solid units                                           | M6                 | 0,55        | 0,46   | 0,96  | 0,80   |
|                                                       | M8                 | 0,57        | 0,51   |       |        |
|                                                       | M10                | 0,59        | 0,52   |       |        |
|                                                       | M12<br>FIS E 11x85 | 0,60        | 0,54   |       |        |
|                                                       | M16<br>FIS E 15x85 | 0,62        | 0,52   |       |        |
|                                                       | FIS H 16x85 K      | 0,55        | 0,46   |       |        |
| hollow units                                          | all sizes          | 0,86        | 0,72   | 0,96  | 0,80   |
| Autoclaved aerated concrete<br>cylindrical drill hole | all sizes          | 0,73        | 0,73   | 0,81  | 0,81   |
| Autoclaved aerated concrete<br>conical drill hole     | all sizes          | 0,66        | 0,59   | 0,73  | 0,66   |

**Table C123.2: Displacements**

| Material                                                              | N<br>[kN]                              | δN <sub>0</sub><br>[mm] | δN <sub>∞</sub><br>[mm] | V<br>[kN]                              | δV <sub>0</sub><br>[mm] | δV <sub>∞</sub><br>[mm] |
|-----------------------------------------------------------------------|----------------------------------------|-------------------------|-------------------------|----------------------------------------|-------------------------|-------------------------|
| solid units and autoclaved<br>aerated concrete h <sub>ef</sub> =100mm | $\frac{N_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,03                    | 0,06                    | $\frac{V_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,82                    | 0,88                    |
| hollow units                                                          | $\frac{N_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,48                    | 0,06                    | $\frac{V_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 1,71                    | 2,56                    |
| solid brick Mz NF<br>Annex C4 - C7                                    | $\frac{N_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,74                    | 1,48                    | $\frac{V_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 1,23                    | 1,85                    |
| solid brick KS NF<br>Annex C14 / C15                                  | $\frac{N_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,20                    | 0,40                    | $\frac{V_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,91                    | 1,37                    |
| AAC h <sub>ef</sub> =200 mm<br>Annex C118 - C120                      | $\frac{N_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 1,03                    | 2,06                    | $\frac{V_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 1,25                    | 1,88                    |
| brick<br>Annex C102 / C103                                            | $\frac{N_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 0,03                    | 0,06                    | $\frac{V_{Rk}}{1,4 \cdot \gamma_{Mm}}$ | 6,44                    | 9,66                    |

For anchorage in autoclaved aerated concrete (AAC), the partial factor  $\gamma_{MAAC}$  shall be used instead of  $\gamma_{Mm}$ .

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**Performance**  
β-factors for job site tests; displacements

**Annex C123**

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**Table C124.1:** Characteristic values under tension and shear loading under fire exposure; considering all failure modes

| Brick                                                                               |      | Solid brick<br>Mz, NF,<br>acc. to<br>Annex C4 |     |     | Solid calcium<br>silicate brick<br>KS, NF, acc.<br>to Annex C14 |    |    | Perforated<br>calcium silicate<br>brick KSL, acc.<br>to Annex C24 |        |        | Vertical<br>perforated<br>brick HLz, acc.<br>to Annex C28 |        |        | Vertical<br>perforated<br>brick HLz, acc.<br>to Annex C30 |     |     | Autoclaved aerated<br>concrete, acc. to<br>Annex C118 |     |     |     |
|-------------------------------------------------------------------------------------|------|-----------------------------------------------|-----|-----|-----------------------------------------------------------------|----|----|-------------------------------------------------------------------|--------|--------|-----------------------------------------------------------|--------|--------|-----------------------------------------------------------|-----|-----|-------------------------------------------------------|-----|-----|-----|
| Mean compressive<br>strength /<br>Min. comp. strength<br>single brick <sup>3)</sup> |      | ≥ 15 / ≥ 12                                   |     |     | ≥ 15 / ≥ 12                                                     |    |    | ≥ 10 / ≥ 8                                                        |        |        | ≥ 5 / ≥ 4                                                 |        |        | ≥ 7,5 / ≥ 6                                               |     |     | ≥ 2,5 / ≥ 2                                           |     |     |     |
| Size                                                                                |      | M8                                            | M10 | M12 | M8                                                              | M8 | M8 | M8                                                                | M10    | M12    | M8                                                        | M10    | M12    | M8                                                        | M10 | M12 | M8                                                    | M10 | M12 | M16 |
| Perforated Sleeve                                                                   |      | -                                             |     |     | -                                                               |    |    | 16x130                                                            | 16x130 | 16x130 | 20x130                                                    | 16x85  | 20x85  | -                                                         |     |     |                                                       |     |     |     |
| Perforated Sleeve<br>for bridging of<br>unbearing layer                             |      | -                                             |     |     | -                                                               |    |    | -                                                                 | -      | -      | 20x200                                                    | 16x130 | 20x130 | -                                                         |     |     |                                                       |     |     |     |
| h <sub>ef</sub>                                                                     | [mm] | ≥ 80                                          |     |     | ≥ 50                                                            |    |    | ≥ 130                                                             |        |        | ≥ 130                                                     |        |        | ≥ 85                                                      |     |     | ≥ 100                                                 |     |     |     |

Characteristic resistance to failure under tension loading

[illegible]

**Characteristic resistance to failure under shear loading <sup>2)</sup>**

## without lever arm

[illegible]

with lever arm

[illegible]

### General installation Parameters

|                           |             |      |     |     |     |     |     |     |
|---------------------------|-------------|------|-----|-----|-----|-----|-----|-----|
| Edge distance and spacing | $C_{cr,fi}$ | [mm] | 100 | 60  | 80  | 80  | 100 | 200 |
|                           | $S_{cr,fi}$ |      | 320 | 200 | 520 | 340 | 520 | 400 |

1) No performance assessed.

$$2) V_{Rk,b,fi} = N_{Rk,b,fi}$$

<sup>3)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength.

In absence of national regulations, the recommended partial factor  $\gamma_{M,fi} = 1,0$ .

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## Performance

Characteristic values under tension and shear loading under fire exposure (single anchor)

## Annex C124

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# Chracteristic values under tension loading under fire exposure (anchor group)

**Table C125.1:** Characteristic values under tension loading under fire exposure; brick breakout failure <sup>3)</sup>

| Brick                                                             | Mean compressive strength / Min. comp. strength single brick <sup>2)</sup> | h <sub>ef</sub> | Spacing  | M8                                     |     |                                         |     | M10                                    |     |                                         |     | M12                                    |     |                                         |     | M16                                    |     |                                         |     |
|-------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------|----------|----------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|-----------------------------------------|-----|
|                                                                   |                                                                            |                 |          | N <sup>gr</sup> <sub>Rk,b,fi(90)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(120)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(90)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(120)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(90)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(120)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(90)</sub> |     | N <sup>gr</sup> <sub>Rk,b,fi(120)</sub> |     |
| No. of anchors in a group:                                        |                                                                            |                 |          | 2                                      | 4   | 2                                       | 4   | 2                                      | 4   | 2                                       | 4   | 2                                      | 4   | 2                                       | 4   | 2                                      | 4   | 2                                       | 4   |
| [-]                                                               | [N/mm <sup>2</sup> ]                                                       | [mm]            | [-]      | [kN]                                   |     |                                         |     |                                        |     |                                         |     |                                        |     |                                         |     |                                        |     |                                         |     |
| Solid brick<br>MZ, NF acc.<br>to Annex C4                         | ≥ 15 / ≥ 12                                                                | ≥ 80            | Scr,fi   | 1,1                                    | 2,1 | 0,8                                     | 1,7 | 1,3                                    | 2,5 | 1,0                                     | 2,0 | 1,5                                    | 2,9 | 1,2                                     | 2,4 | - <sup>1)</sup>                        |     |                                         |     |
|                                                                   |                                                                            |                 | Scr,fi ⊥ | 1,4                                    |     | 1,1                                     |     | 1,7                                    |     | 1,3                                     |     | 2,0                                    |     | 1,6                                     |     |                                        |     |                                         |     |
| Solid calcium<br>silicate brick<br>KS, NF, acc.<br>to Annex C14   | ≥ 15 / ≥ 12                                                                | ≥ 50            | Scr,fi   | 0,3                                    | 0,6 | 0,2                                     | 0,5 | 0,3                                    | 0,6 | 0,2                                     | 0,5 | 0,3                                    | 0,6 | 0,2                                     | 0,5 | - <sup>1)</sup>                        |     |                                         |     |
|                                                                   |                                                                            |                 | Scr,fi ⊥ | 0,9                                    |     | 0,7                                     |     | 0,9                                    |     | 0,7                                     |     | 0,9                                    |     | 0,7                                     |     |                                        |     |                                         |     |
| Perforated<br>calcium silicate<br>brick KSL, acc.<br>to Annex C24 | ≥ 10 / ≥ 8                                                                 | ≥ 130           | Scr,fi   | 1,4                                    | 2,7 | 1,1                                     | 2,2 | 1,4                                    | 2,7 | 1,1                                     | 2,2 | 1,4                                    | 2,7 | 1,1                                     | 2,2 | - <sup>1)</sup>                        |     |                                         |     |
|                                                                   |                                                                            |                 | Scr,fi ⊥ | 1,8                                    |     | 1,5                                     |     | 1,8                                    |     | 1,5                                     |     | 1,8                                    |     | 1,5                                     |     |                                        |     |                                         |     |
| Vertical<br>perforated<br>brick HLz, acc.<br>to Annex C30         | ≥ 7,5 / ≥ 6                                                                | ≥ 85            | Scr,fi   | 0,4                                    | 0,9 | 0,4                                     | 0,7 | 0,4                                    | 0,9 | 0,4                                     | 0,7 | 0,5                                    | 1,1 | 0,4                                     | 0,9 | - <sup>1)</sup>                        |     |                                         |     |
|                                                                   |                                                                            |                 | Scr,fi ⊥ | 0,4                                    |     | 0,4                                     |     | 0,4                                    |     | 0,4                                     |     | 0,5                                    |     | 0,4                                     |     |                                        |     |                                         |     |
| Vertical<br>perforated<br>brick HLz, acc.<br>to Annex C28         | ≥ 5 / ≥ 4                                                                  | ≥ 130           | Scr,fi   | 0,4                                    | 0,4 | 0,3                                     | 0,3 | 0,4                                    | 0,4 | 0,3                                     | 0,3 | 0,5                                    | 0,5 | 0,4                                     | 0,4 | - <sup>1)</sup>                        |     |                                         |     |
|                                                                   |                                                                            |                 | Scr,fi ⊥ | 0,4                                    |     | 0,3                                     |     | 0,4                                    |     | 0,3                                     |     | 0,5                                    |     | 0,4                                     |     |                                        |     |                                         |     |
| Autoclaved<br>aerated<br>concrete acc.<br>to Annex<br>C118        | Anchor rod                                                                 |                 |          | M8                                     |     |                                         |     | M10                                    |     |                                         |     | M12                                    |     |                                         |     | M16                                    |     |                                         |     |
|                                                                   | ≥ 2,5 / ≥ 2                                                                | ≥ 100           | Scr,fi   | 1,1                                    | 2,1 | 0,8                                     | 1,7 | 1,1                                    | 2,1 | 0,8                                     | 1,7 | 1,1                                    | 2,1 | 0,8                                     | 1,7 | 1,4                                    | 2,8 | 1,1                                     | 2,2 |
|                                                                   |                                                                            |                 | Scr,fi ⊥ | 1,1                                    |     | 0,8                                     |     | 1,1                                    |     | 0,8                                     |     | 1,1                                    |     | 0,8                                     |     | 1,4                                    |     | 1,1                                     |     |
|                                                                   | Internal threaded<br>anchor FIS E                                          |                 |          | 11x85 M8                               |     |                                         |     | 15x85 M10                              |     |                                         |     | 15x85 M12                              |     |                                         |     | -                                      |     |                                         |     |
|                                                                   | ≥ 2,5 / ≥ 2                                                                | ≥ 85            | Scr,fi   | 0,9                                    | 1,8 | 0,7                                     | 1,4 | 0,9                                    | 1,8 | 0,7                                     | 1,4 | 0,9                                    | 1,8 | 0,7                                     | 1,4 | - <sup>1)</sup>                        |     |                                         |     |
| Scr,fi ⊥                                                          |                                                                            |                 | 0,9      | 0,7                                    |     | 0,9                                     |     | 0,7                                    |     | 0,9                                     |     | 0,7                                    |     |                                         |     |                                        |     |                                         |     |

<sup>1)</sup> No performance assessed.

<sup>2)</sup> The minimum compressive strength of the single brick must not be less than 80% of the mean compressive strength.

<sup>3)</sup> All other proofs have to be conducted with the single anchor in accordance with TR 054.

In absence of national regulations, the recommended partial factor  $\gamma_{M,fi} = 1,0$ .

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## Performance

Chracteristic values under tension loading under fire exposure (anchor group)

**Annex C125**

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# Spacing and edge distance under fire exposure (anchor group)

**Table C126.1: Spacing and Edge distance under fire exposure, brick breakout failure**

## **Solid brick MZ, NF acc. to Annex C4**

mean compressive strength / Min. compressive strength single brick  $\geq 15 / \geq 12 \text{ N/mm}^2$

| Anchor rod                |                       |      | M8  |     | M10 |     | M12 |     |
|---------------------------|-----------------------|------|-----|-----|-----|-----|-----|-----|
| Effective anchorage depth | $h_{ef}$              | [mm] | 80  | 200 | 80  | 200 | 80  | 200 |
| Characteristic spacing    | $s_{cr,fi} \parallel$ |      | 80  | 320 | 80  | 320 | 80  | 320 |
|                           | $s_{cr,fi} \perp$     |      | 100 | 100 | 100 | 100 | 100 | 100 |
| Edge distance             | $c_{cr,fi}$           |      | 160 | 400 | 160 | 400 | 160 | 400 |

## **Solid calcium silicate brick KS, NF, acc. to Annex C14**

mean compressive strength / Min. compressive strength single brick  $\geq 15 / \geq 12 \text{ N/mm}^2$

| Anchor rod                |                       |      | M8  |     | M10 |     | M12 |     |
|---------------------------|-----------------------|------|-----|-----|-----|-----|-----|-----|
| Effective anchorage depth | $h_{ef}$              | [mm] | 50  | 100 | 50  | 200 | 50  | 200 |
| Characteristic spacing    | $s_{cr,fi} \parallel$ |      | 107 | 107 | 107 | 107 | 107 | 107 |
|                           | $s_{cr,fi} \perp$     |      | 200 | 400 | 200 | 800 | 200 | 800 |
| Edge distance             | $c_{cr,fi}$           |      | 100 | 200 | 100 | 400 | 100 | 400 |

## **Perforated calcium silicate brick KSL, acc. to Annex C24**

mean compressive strength / Min. compressive strength single brick  $\geq 10 / \geq 8 \text{ N/mm}^2$

| Anchor rod / perforated sleeve |                       |      | M8 / 16x130 | M10 / 16x130 | M12 / 20x130 |
|--------------------------------|-----------------------|------|-------------|--------------|--------------|
| Effective anchorage depth      | $h_{ef}$              | [mm] | 130         | 130          | 130          |
| Characteristic spacing         | $s_{cr,fi} \parallel$ |      | 133         | 133          | 133          |
|                                | $s_{cr,fi} \perp$     |      | 153         | 153          | 153          |
| Edge distance                  | $c_{cr,fi}$           |      | 260         | 260          | 260          |

## **Vertical perforated brick HLz, acc. to Annex C30**

mean compressive strength / Min. compressive strength single brick  $\geq 7,5 / \geq 6 \text{ N/mm}^2$

| Anchor rod / perforated sleeve |                       |      | M8 / 16x85 | M10 / 16x85 | M12 / 20x85 |
|--------------------------------|-----------------------|------|------------|-------------|-------------|
| Effective anchorage depth      | $h_{ef}$              | [mm] | 85         | 85          | 85          |
| Characteristic spacing         | $s_{cr,fi} \parallel$ |      | 320        | 320         | 320         |
|                                | $s_{cr,fi} \perp$     |      | 153        | 153         | 153         |
| Edge distance                  | $c_{cr,fi}$           |      | 170        | 170         | 170         |

## **Vertical perforated brick HLz, acc. to Annex C28**

mean compressive strength / Min. compressive strength single brick  $\geq 5 / \geq 4 \text{ N/mm}^2$

| Anchor rod / perforated sleeve |                       |      | M8 / 16x130 | M10 / 16x130 | M12 / 20x130 |
|--------------------------------|-----------------------|------|-------------|--------------|--------------|
| Effective anchorage depth      | $h_{ef}$              | [mm] | 130         | 130          | 130          |
| Characteristic spacing         | $s_{cr,fi} \parallel$ |      | 133         | 133          | 133          |
|                                | $s_{cr,fi} \perp$     |      | 133         | 133          | 133          |
| Edge distance                  | $c_{cr,fi}$           |      | 260         | 260          | 260          |

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### **Performance**

Spacing and edge distance under fire exposure (anchor group)

**Annex C126**

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## Spacing and edge distance under fire exposure (anchor group)

**Table C127.1:** Spacing and Edge distance under fire exposure, brick breackout failure

### Autoclaved aerated concrete acc. to Annex C118

mean compressive strength / Min. compressive strength single brick  $\geq 2,5 / \geq 2 \text{ N/mm}^2$

| Anchor rod                |                       |      | M8  |     | M10 |     | M12 |     | M16 |     |
|---------------------------|-----------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| Effective anchorage depth | $h_{ef}$              | [mm] | 100 | 200 | 100 | 200 | 100 | 200 | 100 | 200 |
| Characteristic spacing    | $s_{cr,fi} \parallel$ |      | 333 | 107 | 333 | 107 | 333 | 107 | 333 | 107 |
|                           | $s_{cr,fi} \perp$     |      | 333 | 107 | 333 | 107 | 333 | 107 | 333 | 107 |
| Edge distance             | $c_{cr,fi}$           |      | 200 | 400 | 200 | 400 | 200 | 400 | 200 | 400 |

### Autoclaved aerated concrete acc. to Annex C118

mean compressive strength / Min. compressive strength single brick  $\geq 2,5 / \geq 2 \text{ N/mm}^2$

| Internal threaded anchor FIS E |                       |      | 11x85 M8 | 15x85 M10 | 15x85 M12 |
|--------------------------------|-----------------------|------|----------|-----------|-----------|
| Effective anchorage depth      | $h_{ef}$              | [mm] | 85       | 85        | 85        |
| Characteristic spacing         | $s_{cr,fi} \parallel$ |      | 333      | 333       | 333       |
|                                | $s_{cr,fi} \perp$     |      | 333      | 333       | 333       |
| Edge distance                  | $c_{cr,fi}$           |      | 170      | 170       | 170       |

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#### Performance

Spacing and edge distance under fire exposure (anchor group)

#### Annex C127

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