

## DECLARAȚIA DE PERFORMANȚĂ

### DoP 0354

pentru sistem de injecție fischer FIS V Plus (Ancore din metal pentru utilizare în zidărie)

RO

1. Cod unic de identificare al produsului-tip: **DoP 0354**
2. Utilizare (utilizări) preconizată (preconizate): **Fixare post-instalată în zidărie, Consultați suplimentul, în special anexele B1 - B22.**
3. Fabricant: **fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Germany**
4. Reprezentant autorizat: **-**
5. Sistemul (sistemele) de evaluare și de verificare a constantei performanței: **1**
6. Documentul de evaluare european: **EAD 330076-01-0604, Edition 10/2022**  
 Evaluarea tehnică europeană: **ETA-20/0729; 2023-10-31**  
 Organismul de evaluare tehnică: **DIBt- Deutsches Institut für Bautechnik**  
 Organism (organisme) notificat(e): **2873 TU Darmstadt**
7. Performanța (performanțe) declarată (declarate):  
**Rezistență mecanică și stabilitate (BWR 1)**  
 Rezistența caracteristică sub încărcări statice și cvasistatice:
  - 1 Rezistența caracteristică a unei singure ancore la cedarea oțelului sub sarcină de întindere: Consultați suplimentul, în special anexele C1, C3
  - 2 Rezistența caracteristică a unei singure ancore la cedarea oțelului sub sarcină de forfecare cu și fără braț de levier: Consultați suplimentul, în special anexele C2, C3
  - 3 Rezistența caracteristică a unei singure ancore la smulgere sau la cedarea zidăriei sub sarcină de întindere, factor de reducere: Consultați suplimentul, în special anexele 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 Rezistența caracteristică a unei singure ancore la ruperea locală a cărămizilor sau la cedarea zidăriei sub sarcină de forfecare: Consultați suplimentul, în special anexele 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
  - 5 Rezistența caracteristică a unui grup de ancore la cedarea zidăriei sub sarcină de întindere: Consultați suplimentul, în special anexele 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 Rezistența caracteristică a unui grup de ancore la cedarea locală a cărămizii sau la ruperea cărămizii sub sarcină de forfecare: Consultați suplimentul, în special anexele 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 Distanța față de margine, distanța între ancore, grosimea elementului: Consultați suplimentul, în special anexele 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 Deplasări sub sarcină de întindere și forfecare: consultați suplimentul, în special anexa C123
  - 9 Cuplu maxim de instalare: Consultați suplimentul, în special anexele B4-B7, B9-B12, 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

Rezistență caracteristică și Deplasări

  - 10 Rezistența la întindere, deplasări: NPD
  - 11 Rezistența la forfecare, deplasări: NPD
  - 12 Factor gol circular: NPD

**Siguranța în caz de incendiu (BWR 2)**

  - 13 Reacție la foc: Clasa (A1)
  - 14 Rezistența la foc sub sarcină de întindere și de forfecare cu și fără braț de levier, distanțele minime față de margine și între ancore: consultați suplimentul, în special anexa C124

**Igienă, sănătate și mediu (BWR 3)**

  - 15 Conținutul, emisia și / sau eliberarea de substanțe periculoase: NPD
8. Documentație tehnică adecvată și/sau documentație tehnică specifică: **-**

Performanța produsului identificat mai sus este în conformitate cu setul de performanțe declarate. Această declarație de performanță este eliberată în conformitate cu Regulamentul (UE) nr. 305/2011, pe răspunderea exclusivă a fabricantului identificat mai sus.

Semnată pentru și în numele fabricantului de către:



Dr.-Ing. Oliver Geibig, Director Executiv Departament Business & Inginerie  
 Tumlingen, 2023-11-14



Jürgen Grün, Director Executiv Departament Chimic & Calitate

Această declarație de performanță a fost întocmită în mai multe limbi. În cazul unei divergențe de interpretare, versiunea în limba engleză prevalează întotdeauna.

Suplimentul include informații voluntare și complementare în limba engleză, în afara cerințelor legale (specificate neutru din punct de vedere al limbii).

Translation guidance Essential Characteristics and Performance Parameters for Annexes

**Ghid de traducere a caracteristicilor esențiale și a parametrilor de performanță pentru anexe**

Mechanical resistance and stability (BWR 1)	
Rezistență mecanică și stabilitate (BWR 1)	
Characteristic resistance for static and quasi-static loading: Rezistența caracteristică sub încărcări statice și cvasistatice:	
1 Characteristic resistance to steel failure of a single anchor under tension loading: Rezistența caracteristică a unei singure ancore la cedarea oțelului sub sarcină de întindere:	$N_{Rk,s}$ [kN]
2 Characteristic resistance to steel failure of a single anchor under shear loading with and without level arm: Rezistența caracteristică a unei singure ancore la cedarea oțelului sub sarcină de forfecare cu și fără braț de levier:	$V_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm]
3 Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading, Reduction factor: Rezistența caracteristică a unei singure ancore la smulgere sau la cedarea zidăriei sub sarcină de întindere, factor de reducere:	$N_{Rk,p}$ , $N_{Rk,b}$ [kN] $N_{Rk,p,c}$ , $N_{Rk,b,c}$ [kN], $\beta$ [-]
4 Characteristic resistance to local brick failure or brick breakout failure of a single anchor under shear loading: Rezistența caracteristică a unei singure ancore la ruperea locală a cărămizilor sau la cedarea zidăriei sub sarcină de forfecare:	$V_{Rk,b}$ , $V_{Rk,c,II}$ , $V_{Rk,c,I}$ [kN]
5 Characteristic resistance to brick breakout failure of an anchor group under tension loading: Rezistența caracteristică a unui grup de ancore la cedarea zidăriei sub sarcină de întindere:	$N^a_{Rk}$ [kN], $\alpha_{g,N}$ [-]
6 Characteristic resistance to local brick failure or brick breakout failure of an anchor group under shear loading: Rezistența caracteristică a unui grup de ancore la cedarea locală a cărămizii sau la ruperea cărămizii sub sarcină de forfecare:	$V^a_{Rk,b}$ , $V^a_{Rk,c,II}$ , $V^a_{Rk,c,I}$ [kN]; $\alpha_{g,V,II}$ , $\alpha_{g,V,I}$ [-]
7 Edge distances, spacing, member thickness: Distanța față de margine, distanța între ancore, grosimea elementului:	$c_{cr}$ , $s_{cr}$ , $c_{min}$ , $s_{min,II}$ , $s_{min,I}$ , $h_{min}$ [mm]
8 Displacements under tension and shear loading: Deplasări sub sarcină de întindere și forfecare:	$\delta_{N0}$ , $\delta_{N\infty}$ , $\delta_{V0}$ , $\delta_{V\infty}$ [mm]
9 Maximum installation torque: Cuplu maxim de instalare:	max. $T_{inst}$ [Nm]
Characteristic resistance and displacements for seismic loading: Rezistență caracteristică și Deplasări	
10 Resistance to tension load, displacements: Rezistența la întindere, deplasări:	$N_{Rk,s,eq}$ , $N_{Rk,eq}$ [kN], $\alpha_{N,seis}$ [-]; $\delta_{N,eq}$ [mm]
11 Resistance to shear load, displacements: Rezistența la forfecare, deplasări:	$V_{Rk,s,eq}$ , $V_{Rk,b,eq}$ [kN], $\alpha_{V,seis}$ [-]; $\delta_{V,eq}$ [mm]
12 Factor annular gap: Factor gol circular:	$\alpha_{gap}$ [-]
Safety in case of fire (BWR 2)	
Siguranța în caz de incendiu (BWR 2)	
13 Reaction to fire: Reacție la foc:	-
14 Resistance to fire under tension and shear loading with and without level arm, minimum edge distances and spacing: Rezistența la foc sub sarcină de întindere și de forfecare cu și fără braț de levier, distanțele minime față de margine și între ancore:	$N_{Rk,s,fi}$ , $N_{Rk,p,fi}$ [kN], $N_{Rk,b,fi}$ , $V_{Rk,s,fi}$ [kN], $M^0_{Rk,s}$ [Nm], $c_{cr,fi}$ , $s_{cr,fi}$ [mm]
Hygiene, health and the environment (BWR 3)	
Igienă, sănătate și mediu (BWR 3)	
15 Content, emission and/or release of dangerous substances: Conținutul, emisia și / sau eliberarea de substanțe periculoase:	-

## 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 B 4 to B 7, B 21, B 22, C 1 to C 123
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 C 124

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

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

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

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

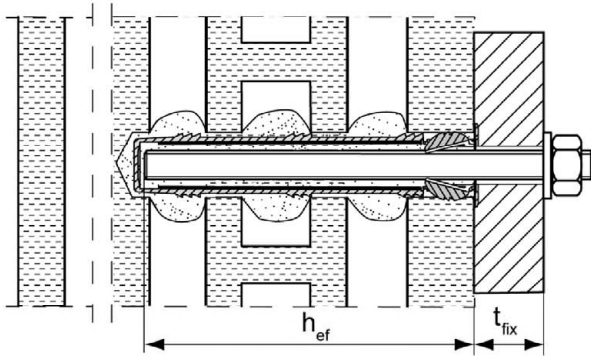
The system to be applied is: 1



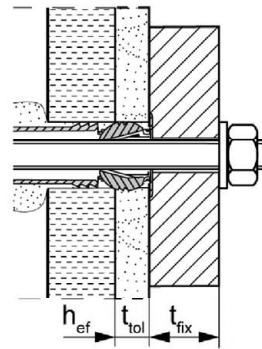
# Installation conditions part 1

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

### Pre-positioned anchorage:



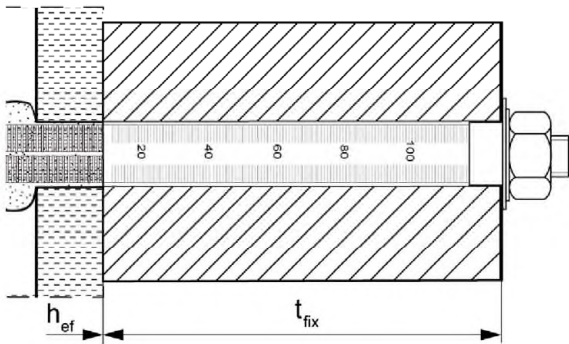
### Installation with render bridge



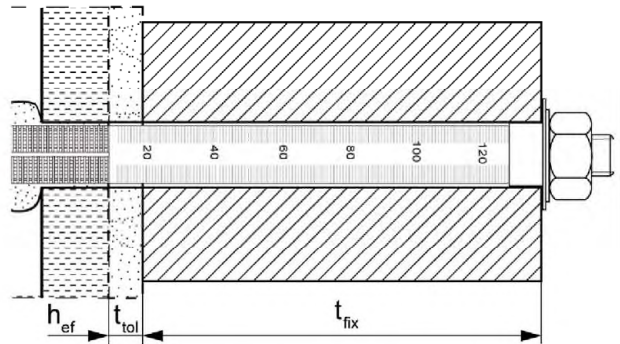
### Size of the perforated sleeve:

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 anchorage:



### Installation with render bridge

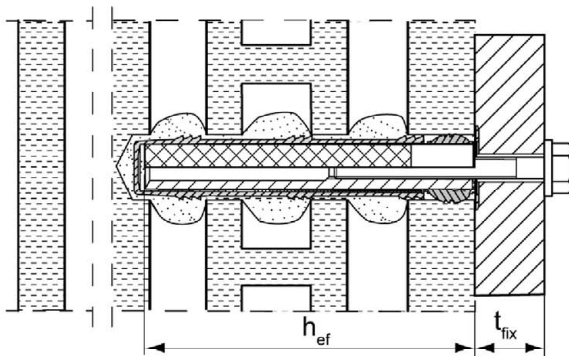


### Size of the perforated sleeve:

FIS H 18x130/200 K	FIS H 22x130/200 K
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## Internal threaded anchor FIS E with perforated sleeve FIS H K; Installation in perforated and solid brick masonry

### Pre-positioned anchorage:



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

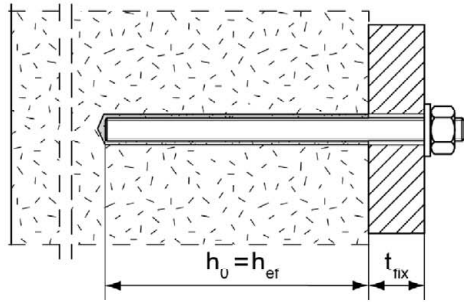
**Annex A 1**

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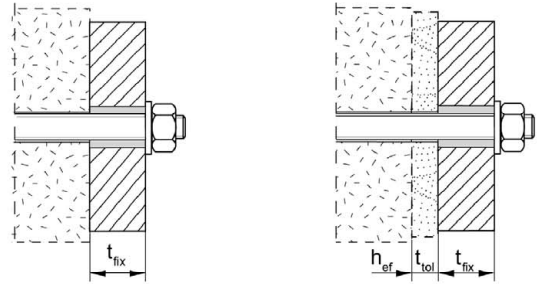
## Installation conditions part 2

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

**Pre-positioned anchorage:**



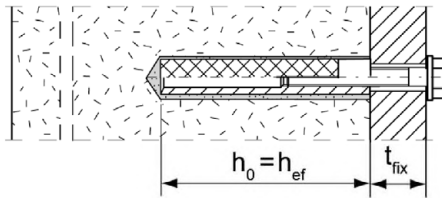
**Push through anchorage: Annular gap filled with mortar**



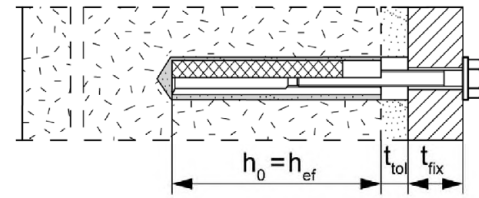
Installation with  
render bridge

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

**Pre-positioned anchorage:**



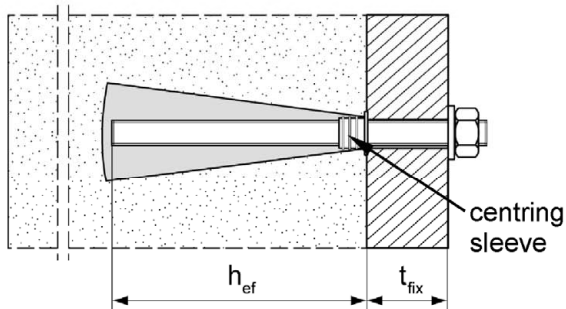
Installation with render bridge



**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)**

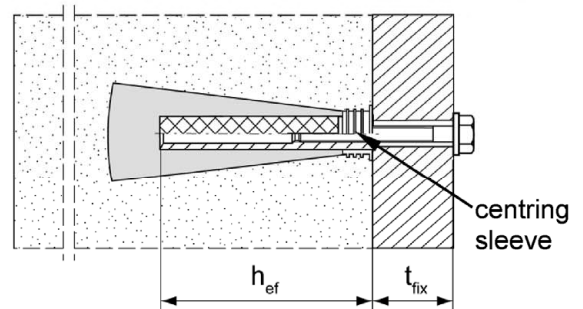
**Pre-positioned anchorage:**

anchor rods M8, M10, M12



**Pre-positioned anchorage:**

Internal threaded anchor FIS E 11x85 M6 / M8



Figures not to scale

$h_0$  = depth of drill hole

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

$h_{ef}$  = effective anchorage depth

$t_{fix}$  = 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 A 2**

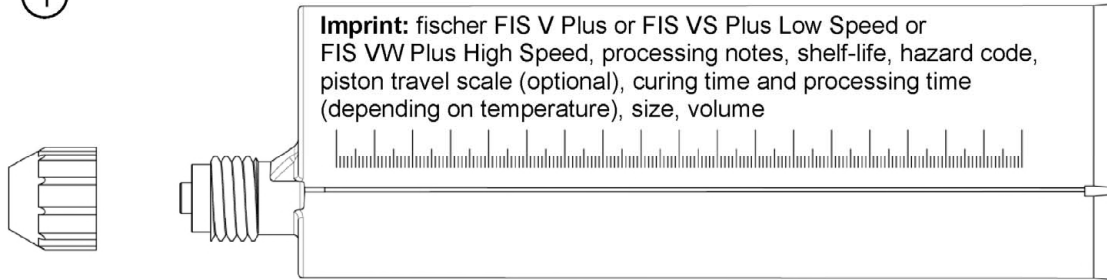
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# Overview system components part 1

## Mortar cartridge (shuttle cartridge) with sealing cap

①

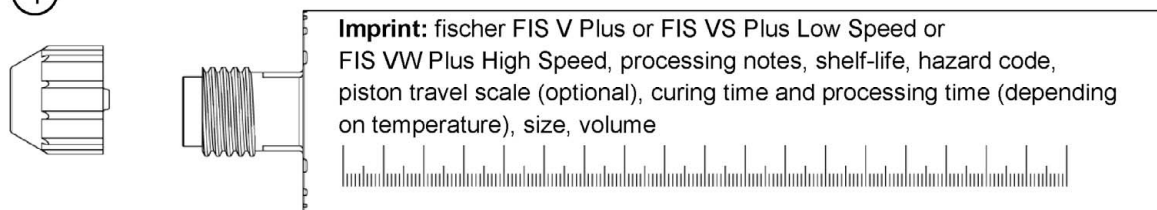
Size: 360 ml, 825 ml



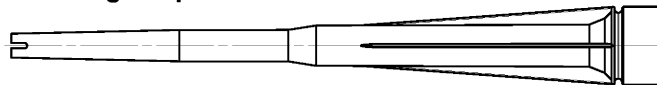
## Mortar cartridge (coaxial cartridge) with sealing cap

①

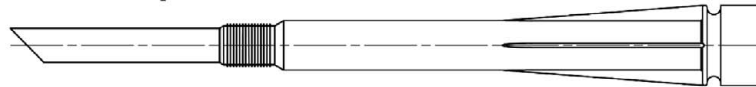
Size: 100 ml, 150 ml, 300 ml, 380 ml, 400 ml, 410 ml



## 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 AB-G



## 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

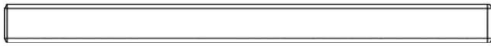
**Annex A 3**

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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

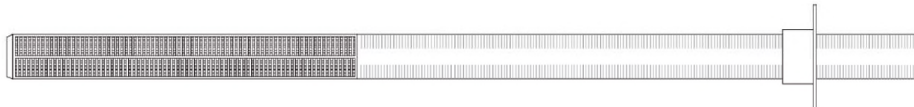
⑦



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

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

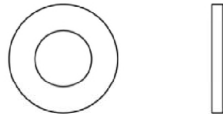
⑦



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

### Washer

③

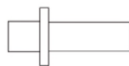


### Hexagon nut

④



### Injection adapter

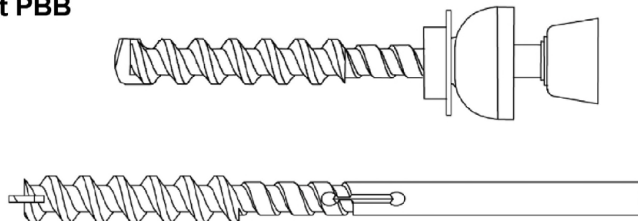


### centring sleeve PBZ

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 A 4**

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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 10088-1:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015	acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006+A1:2015
2	Anchor rod	Property class 4.6; 4.8; 5.8 or 8.8; EN ISO 898-1: 2013 zinc plated $\geq 5\mu\text{m}$ , ISO 4042:2022 or hot-dip galvanised EN ISO 10684:2004+AC:2009 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 8\%$ fracture elongation	Property class 50, 70 or 80 EN ISO 3506-1:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062; 1.4662; 1.4462; EN 10088-1:2014 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 8\%$ fracture elongation	Property class 50 or 80 EN ISO 3506-1:2020 or property class 70 with $f_{yk} = 560 \text{ N/mm}^2$ 1.4565; 1.4529 EN 10088-1:2014 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 8\%$ fracture elongation
3	Washer ISO 7089:2000	zinc plated $\geq 5\mu\text{m}$ , ISO 4042:2018 or hot-dip galvanised EN ISO 10684:2004+AC:2009	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565; 1.4529 EN 10088-1:2014
4	Hexagon nut	Property class 5 or 8; EN ISO 898-2:2012 zinc plated $\geq 5\mu\text{m}$ , ISO 4042:2018 or hot-dip galvanised EN ISO 10684:2004+AC:2009	Property class 50, 70 or 80 EN ISO 3506-2:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 50, 70 or 80 EN ISO 3506-2:2020 1.4565; 1.4529 EN 10088-1:2014
5	Internal threaded anchor FIS E	Property class 5.8; EN 10277-1:2008-06 zinc plated $\geq 5\mu\text{m}$ , ISO 4042:2018	Property class 70 EN ISO 3506-1:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 70 EN ISO 3506-1:2020 1.4565; 1.4529 EN 10088-1:2014
6	Commercial standard screw or threaded rod for internal threaded anchor FIS E	Property class 4.6, 5.8 or 8.8; EN ISO 898-1:2013 zinc plated $\geq 5\mu\text{m}$ , ISO 4042:2018	Property class 70 EN ISO 3506-1:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 70 EN ISO 3506-1:2020 1.4565; 1.4529 EN 10088-1:2014
7	Perforated sleeve and centring sleeve	PP / PE		

fischer injection system FIS V Plus for masonry



**Product description**  
Materials**Annex A 5**

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# Specifications of intended use part 1

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

Anchorages subject to		fischer injection system FIS V Plus for masonry	
Hole drilling with hammer drill mode 		all bricks; without C 28 to C 48, C 75 to C 78	
Hole drilling with rotary drill mode 		all bricks	
Hole drilling with special conic drill bit		Only C 118 to C 122	
Static and quasi static load, in masonry		all bricks	
Resistance to fire under tension and shear loading		C 124 (Applies only to the conditions of dry masonry)	
Installation	Pre-positioned anchorage	Anchor rod or internal threaded anchor (in solid brick masonry and autoclaved aerated concrete)	Perforated sleeve with anchor rod or internal threaded anchor (in perforated and solid brick masonry)  Size: FIS H 12x50 K FIS H 12x85 K FIS H 16x85 K FIS H 16x130 K FIS H 20x85 K FIS H 20x130 K FIS H 20x200 K
	Push through anchorage	Anchor rod; use only in cylindrical drill hole (in solid brick masonry and autoclaved aerated concrete)	Perforated sleeve with anchor rod (in perforated and solid brick masonry)  Size: FIS H 18x130/200 K FIS H 22x130/200 K
Installation and use conditions	conditions d/d (dry/dry)	all bricks	
	conditions w/d (wet/dry)		
	conditions w/w (wet/wet)		
Installation direction	D3 (downward and horizontal installation)		
Installation temperature	$T_{i,min} = -10\text{ °C}$ to $T_{i,max} = +40\text{ °C}$		
In-service temperature	Temperature range Tb	-40 °C to +80 °C	(max. short term temperature +80 °C max. long term temperature +50 °C)
	Temperature range Tc	-40 °C to +120 °C	(max. short term temperature +120 °C; max. long term temperature +72 °C)

fischer injection system FIS V Plus for masonry		<b>Annex B 1</b> Appendix 8 / 153
<b>Intended Use</b> Specifications part 1		

## Specifications of intended use part 2

### Anchorage subject to:

- Static and quasi-static loads
- Resistance to fire under tension and shear loading

### Base materials:

- Solid brick masonry (base material group b) and autoclaved aerated concrete (base material group d), acc. to Annex B 13 / B 14.
- Hollow brick masonry (base material group c), according to Annex B 13 / B 14
- 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, Annex B under consideration of the  $\beta$ -factor according to Annex C 123, 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:

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

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc plated steel, stainless steel or high corrosion resistant steel)
- For all other conditions according to EN 1993-1-4:2015 corresponding to corrosion resistance classes to Annex A 5, Table A5.1.

fischer injection system FIS V Plus for masonry

**Intended Use**  
Specifications part 2

**Annex B 2**

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## Specifications of intended use part 2 continued

### Design:

- The anchorages have to be designed in accordance with EOTA Technical Report TR 054:2022-07 (included the dimensioning for fire exposure), Design method A under the responsibility of an engineer experienced in anchorages and masonry work.

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

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

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

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 054:2022-07.

$N_{RK,s}$ ,  $V_{RK,s}$  and  $M^0_{RK,s}$  see annexes C 1-C 3

Factors for job site tests and displacements see annex C 123.

- Verifiable calculation notes and drawings have to be prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings.

### Installation:

- 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 mortar.
- Bridging of unbearing layer (e.g., plaster) masonry with solid bricks and cylindrical drill hole. At perforated brick masonry see Annex B 6, Table B6.1.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Fastening screws or anchor rods (including nut and washer) must comply with the appropriate material and property class of the fischer internal threaded anchor FIS E.
- Minimum curing time see Annex B 8, Table B8.2.
- Commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:

Material dimensions and mechanical properties of the metal parts according to the specifications are given in Annex A 5, Table 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 2 continued

**Annex B 3**

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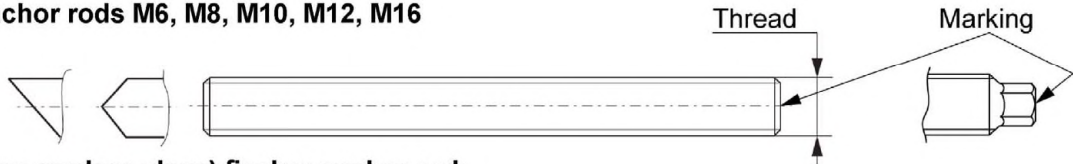


**Table B4.1:** Installation parameters for anchor rods in solid bricks and autoclaved aerated concrete without perforated sleeves

Anchor rod	Thread	M6	M8	M10	M12	M16
Nominal drill hole diameter	$d_0$ [mm]	8	10	12	14	18
Effective anchorage depth $h_{ef}^{1)}$ in AAC cylindrical drill hole	$h_{0,min}=h_{ef,min}$ [mm]	100				
	$h_{0,max}=h_{ef,max}$ [mm]	200				
Effective anchorage depth $h_{ef}^{1)}$ in AAC conical drill hole	$h_0$ [mm]	-	$h_{ef} + 5$			-
	$h_{ef,1}$ [mm]		75			
	$h_{ef,2}$ [mm]		95			
Effective anchorage depth $h_{ef}^{1)}$ in solid brick (depth of drill hole $h_0 = h_{ef}$ )	$h_{ef,min}$ [mm]	50				
	$h_{ef,max}$ [mm]	$h-30, \leq 200$				
Diameter of clearance hole in the fixture	pre-position $d_f \leq$ [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**



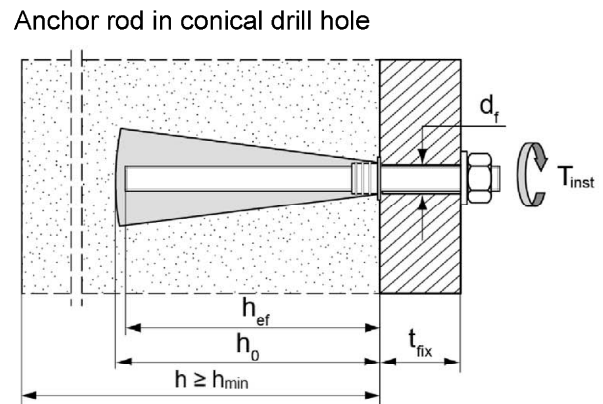
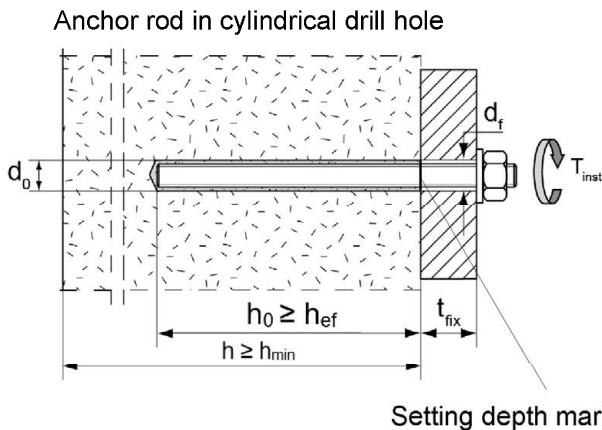
**Marking (on random place) fischer anchor rod:**

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

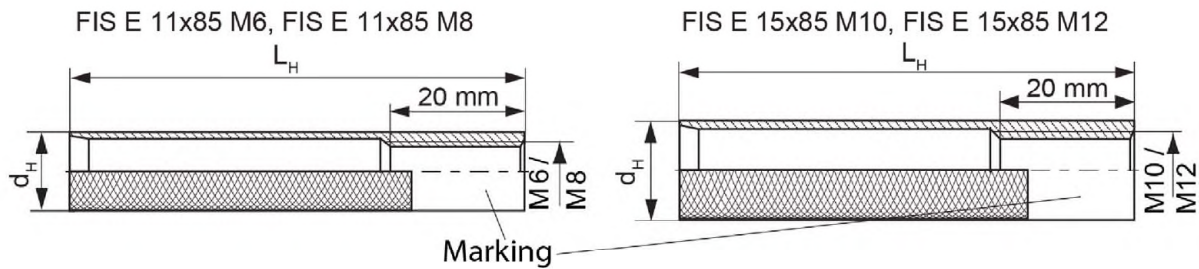
**Annex B 4**

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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	$d_H$ [mm]	11		15	
Nominal drill hole diameter	$d_0$ [mm]	14		18	
Length of anchor	$L_H$ [mm]	85			
Effective anchorage depth	$h_0 = h_{ef}$ [mm]	85			
Effective anchorage depth $h_{ef}$ in AAC (conical drill hole)	$h_0$ [mm]	100		-	
	$h_{ef}$ [mm]	85			
Diameter of cleaning brush	$d_b \geq$ [mm]	see Table B8.1			
Maximum installation torque	$T_{inst}$ [Nm]	see parameters of brick			
Diameter of clearance hole in the fixture	$d_f$ [mm]	7	9	12	14
Screw-in depth	$l_{E,min}$ [mm]	6	8	10	12
	$l_{E,max}$ [mm]	60			

**fischer Internal threaded anchor FIS E**

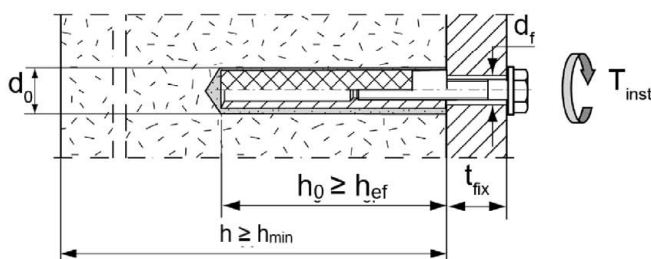


**Marking:**

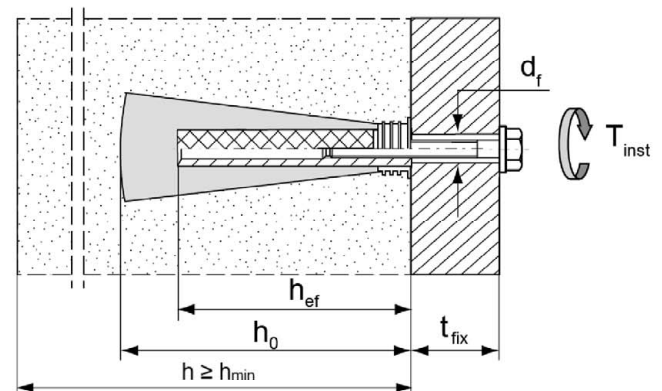
Size, e.g. **M8**, Stainless steel: R, e.g. **M8 R**, High corrosion resistant steel: HCR, e.g. **M8 HCR**

**Installation conditions:**

Internal threaded anchor in cylindrical drill hole



Internal threaded anchor in conical drill hole



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 B 5**

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

perforated sleeve FIS H K		12x50	12x85 <sup>2)</sup>	16x85	16x130 <sup>2)</sup>	20x85	20x130 <sup>2)</sup>	20x200 <sup>2)</sup>
Nominal drill hole diameter $d_0 = D_{\text{sleeve, nom}}$	$d_0$ [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.

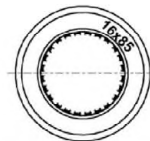
<sup>2)</sup> Bridging of unbearing layer (e.g. plaster) is possible. When reducing the effective anchorage depth  $h_{\text{ef, min}}$ , the values of the next shorter perforated sleeve of the same diameter must be used. The smaller value of characteristic resistance must be taken.

**Perforated sleeve**

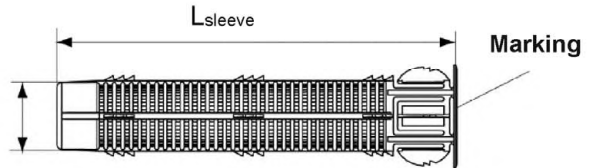
FIS H 12x50 K; FIS H 12x85 K; FIS H 16x85 K; FIS H 16x130 K;  
FIS H 20x85 K; FIS H 20x130 K; FIS H 20x200 K

**Marking:**

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



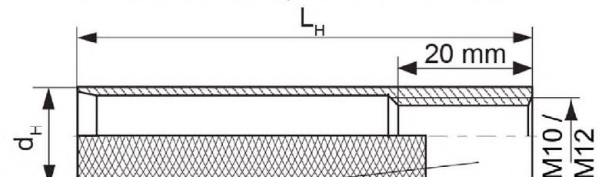
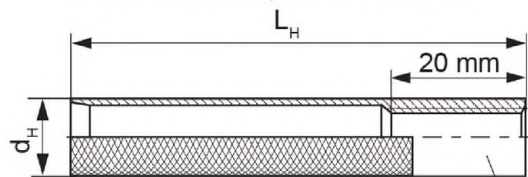
$D_{\text{sleeve, nom}}$



**fischer Internal threaded anchor FIS E**

FIS E 11x85 M6, FIS E 11x85 M8

FIS E 15x85 M10, FIS E 15x85 M12

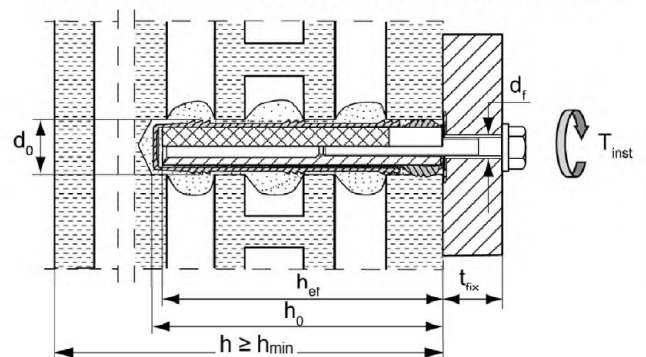
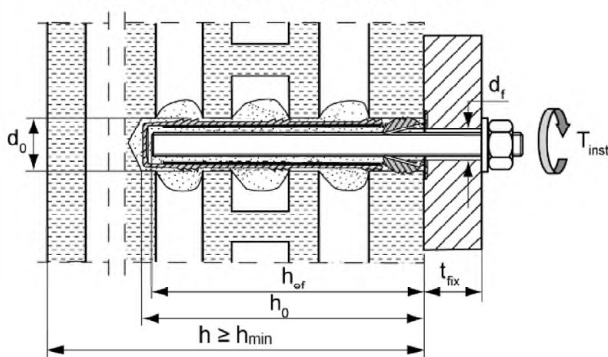


Marking

**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 anchorage)

**Annex B 6**

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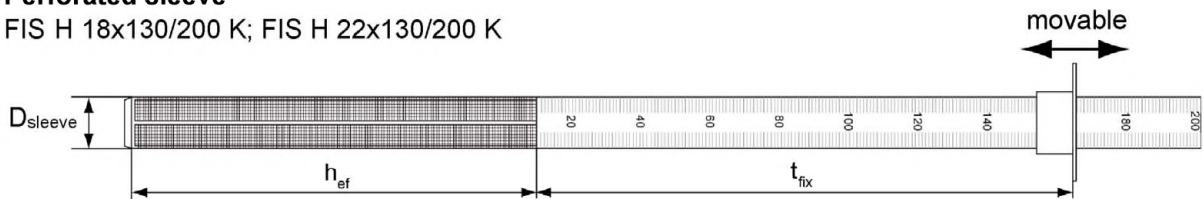
**Table B7.1:** Installation parameters for anchor rods with perforated sleeves (push through anchorage)

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.

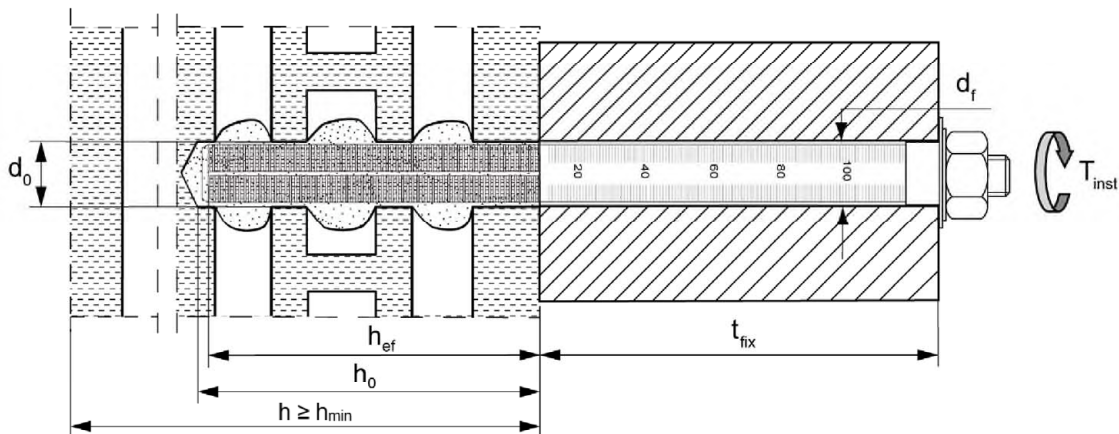
**Perforated sleeve**

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 anchorage)

**Annex B 7**

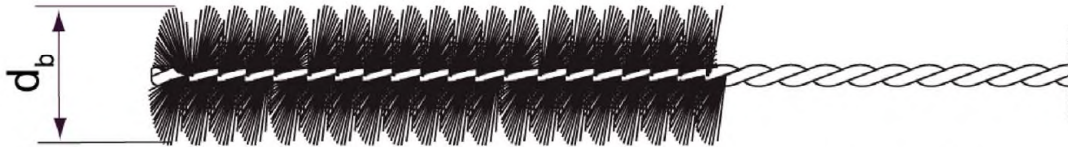
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**Table B8.1: Parameters of the cleaning brush BS (steel brush with steel bristles)**

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> $t_{work}$			Minimum curing time <sup>1), 2)</sup> $t_{cure}$		
	FIS VW Plus High Speed	FIS V Plus	FIS VS Plus Low Speed	FIS VW Plus High Speed	FIS V Plus <sup>1)</sup>	FIS VS Plus Low Speed
-10 to -5	>5 min	-	-	12 h	-	-
> -5 to 0	5 min	>13 min	-	3 h	24 h	-
> 0 to 5	5 min	13 min	>20 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

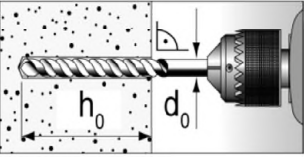
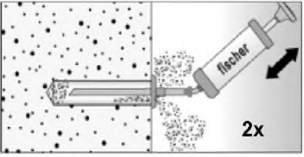
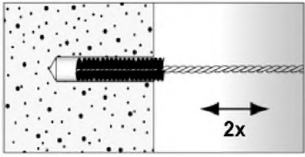
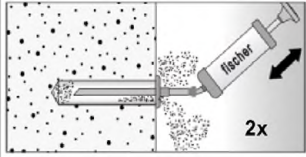
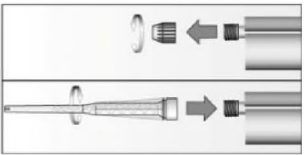
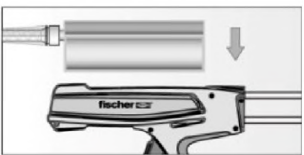

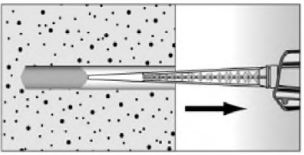
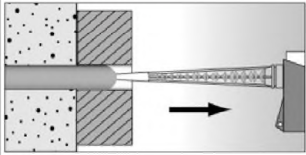
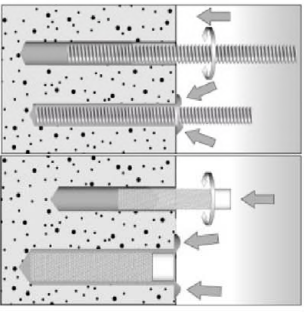

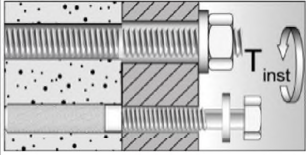
**Intended Use**  
Cleaning brush (steel brush)  
Maximum processing times and minimum curing times

**Annex B 8**

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# Installation instruction part 1

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

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

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

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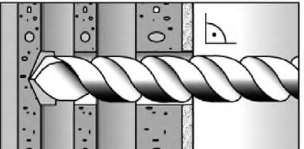
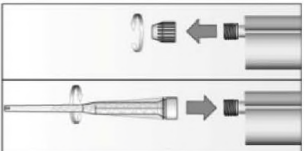


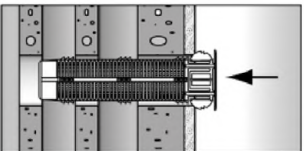
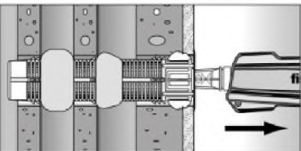
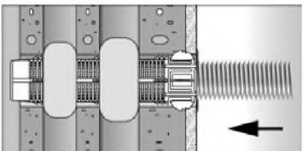

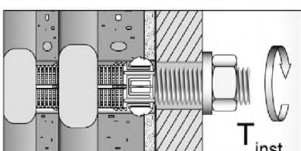
**Intended Use**  
Installation instruction (without perforated sleeve) part 1

**Annex B 9**

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## Installation instruction part 2

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

1		<p>Drill the hole (drilling method see Annex C of the respective brick). depth of drill hole <math>h_0</math> and drill hole diameter <math>d_0</math> see <b>Table B6.1</b></p>	<p>When install perforated sleeves in solid bricks or solid areas of hollow bricks, also clean the hole by blowing out and brushing.</p>	
2		<p>Remove the sealing cap. Screw on the static mixer. (the spiral in the static mixer must be clearly visible).</p>		
3		<p>Place the cartridge into a suitable dispenser.</p>		<p>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.</p>
4		<p>Insert the perforated sleeve flush with the surface of the masonry or plaster.</p>		<p>Fill the perforated sleeve completely with mortar beginning from the bottom of the hole<sup>1)</sup>.</p>
5		<p>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).</p>		
6		<p>Do not touch. Minimum curing time see <b>Table B8.2</b></p>		<p>Mounting the fixture. max <math>T_{inst}</math> see parameter of brick in <b>Annex C</b>.</p>

<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

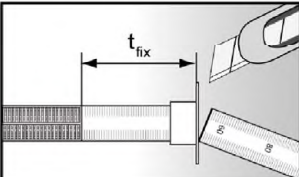
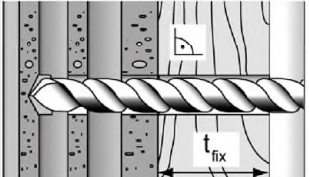
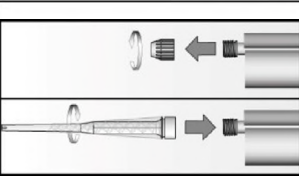
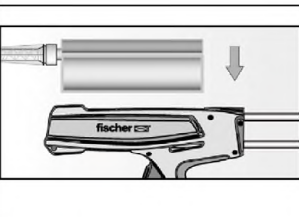
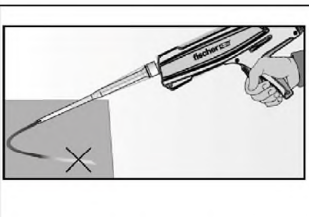
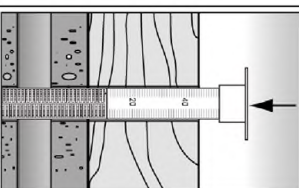
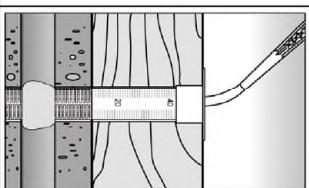
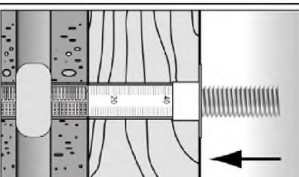
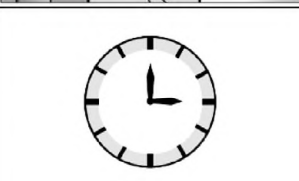
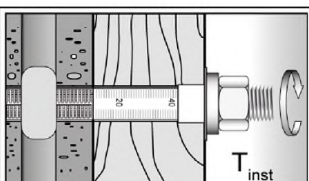
**Annex B 10**

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### Installation instruction part 3

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

1		<p>Push the movable stop up to the correct thickness of fixture and cut the overlap.</p>		<p>Drill the hole through the fixture. Depth of drill hole (<math>h_0 + t_{fix}</math>) and drill hole diameter see <b>Table B7.1</b>.</p>
2		<p>Remove the sealing cap. Screw on the static mixer. (the spiral in the static mixer must be clearly visible).</p>		
3		<p>Place the cartridge into a suitable dispenser.</p>		<p>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.</p>
4		<p>Insert the perforated sleeve flush with the surface of the fixture into the drill hole.</p>		<p>Fill the sleeve with mortar beginning from the bottom of the hole.<sup>1)</sup> For deep drill holes use an extension tube.</p>
5		<p>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).</p>		
6		<p>Do not touch. Minimum curing time see <b>Table B8.2</b>.</p>		<p>Mounting the fixture. max <math>T_{inst}</math> see parameter of brick in <b>Annex C</b>.</p>

<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

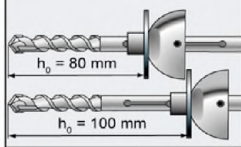
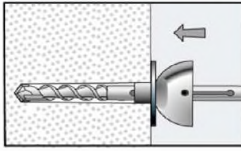
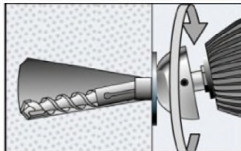
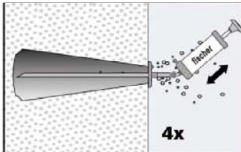
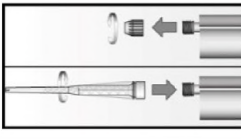


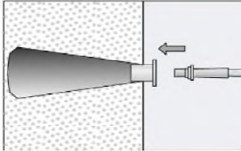
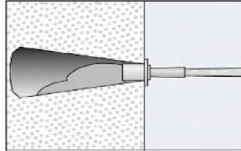
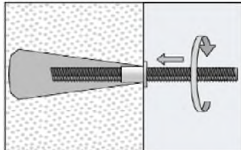
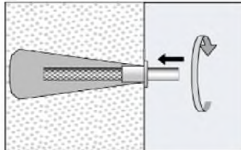

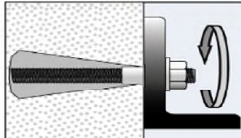
**Annex B 11**

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## Installation instruction part 4

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

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

fischer injection system FIS V Plus for masonry

#### Intended Use

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

**Annex B 12**

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

Kind of masonry	Brick format [mm]	Mean compressive strength [N/mm <sup>2</sup> ]	Main country of origin	Mean gross density ρ [kg/dm <sup>3</sup> ]	Annex
<b>Solid brick Mz</b>					
Solid brick Mz	NF ≥240x115x71	12 / 20 / 28	Germany	≥1,8	C 4 – C 7
	2DF ≥240x115x113	10 / 16	Germany	≥1,8	C 8 / C 9
	≥ 245x118x54	10 / 20	Italy	≥1,8	C 10 / C 11
	≥ 230x108x55	10 / 20	Denmark	≥1,8	C 12 / C 13
<b>Solid calcium silicate (sand- lime) brick KS / perforated calcium silicate (sand- lime) brick KSL</b>					
Solid calcium silicate brick KS	NF ≥240x115x71	12 - 28	Germany	≥2,0	C 14 / C 15
	8DF ≥ 250x240x240	10 - 28	Germany	≥2,0	C 16 / C 17
	≥ 997x214x538	10 - 36	Netherlands	≥1,8	C 18 / C 19
	≥ 240x115x113	10 / 20	Germany	≥1,8	C 20 – C 23
Perforated calcium silicate brick KSL	3DF 240x175x113	8 - 20	Germany	≥1,4	C 24 – C 27
<b>Vertical perforated brick HLz</b>					
Vertical perforated brick HLz	370x240x237	4 - 12	Germany	≥1,0	C 28 / C 29
	500x175x237	4 - 12	Germany	≥1,0	C 28 / C 29
	2DF 240x115x113	6 - 28	Germany	≥1,4	C 30 / C 31
	248x365x248	4 - 8	Germany	≥0,6	C 32 – C 35
	248x365x249	8 - 12	Germany	≥0,7	C 36 – C 39
	248x365x249	4 / 6	Germany	≥0,5	C 40 – C 43
	248x425x248	4 - 8	Germany	≥0,8	C 44 – C 47
	248x425x248	4 - 8	Germany	≥0,8	C 48 – C 51
	500x200x315	4 - 8	Germany	≥0,6	C 52 – C 55
	500x200x300	4 - 10	France	≥0,7	C 56 – C 59
	500x200x315	2 - 8	France	≥0,7	C 60 – C 63
	560x200x275	4 - 8	France	≥0,7	C 64 / C 65
	255x120x118	2 - 12	Italy	≥1,0	C66 - C68
	275x130x94	6 - 20	Spain	≥0,8	C 69 / C 71
	220x190x290	6 - 10	Portugal	≥0,7	C 72 – C 75
	253x300x240	2 - 6	Austria	≥0,8	C 76 – C 79
	250x440x250	6 - 10	Austria	≥0,7	C 80 – C 83
	230x108x55	2 - 8	Denmark	≥1,4	C 84 / C 85
	365x248x245	8	Austria	≥0,6	C 86 / C 89
	240x175x113	10	Germany	≥0,9	C 90 / C 93

fischer injection system FIS V Plus for masonry

**Intended Use**  
Overview of assessed bricks part 1

**Annex B 13**

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

Kind of masonry	Brick format [mm]	Mean compressive strength [N/mm <sup>2</sup> ]	Main country of origin	Mean gross density $\rho$ [kg/dm <sup>3</sup> ]	Annex
<b>Horizontal perforated brick LLz</b>					
Horizontal perforated brick LLz	248x78x250	2 - 6	Italy	≥0,7	C 94 / C 95
	128x88x275	2	Spain	≥0,8	C 96 / C 97
<b>Light-weight concrete hollow block Hbl</b>					
Light-weight concrete hollow block Hbl	362x240x240	2 / 4	Germany	≥1,0	C 98 – C 101
	500x200x200	2 - 6	France	≥1,0	C 102 / C 103
	440x215x215	4 - 10	Ireland	≥1,2	C 104 – C 107
<b>Light-weight concrete solid block Vbl</b>					
Light-weight concrete solid block Vbl	≥ 372x300x254	2	Germany	≥0,6	C 108 / C 109
	≥ 250x240x239	4 - 8	Germany	≥1,6	C 110 – C 113
	≥ 440x100x215	4 - 10	Ireland	≥2,0	C 114 / C 115
	≥ 440x95x215	6 - 12	England	≥2,0	C 116 / C 117
<b>Autoclaved aerated concrete (AAC)</b>					
PP2 / AAC	-	2	Germany	0,35	C 118 – C 122
PP4 / AAC	-	4	Germany	0,5	C 118 – C 122
PP6 / AAC	-	6	Germany	0,65	C 118 – C 122

fischer injection system FIS V Plus for masonry

**Intended Use**  
Overview of assessed bricks part 2

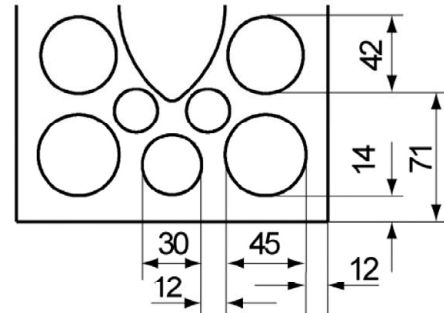
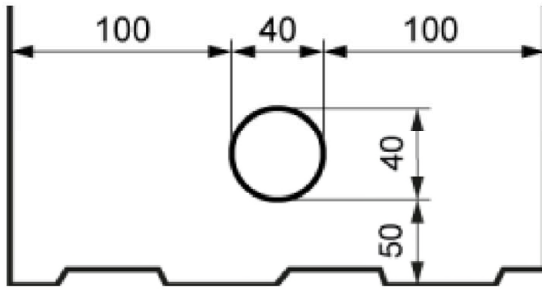
**Annex B 14**

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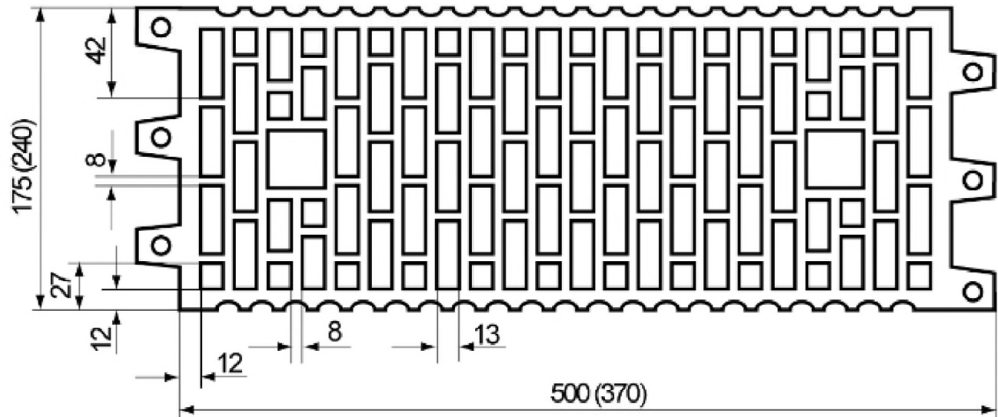
**Table B15.1: Overview dimensions of perforated and hollow bricks part 1**

Solid calcium silicate brick KS, 8DF,  
EN 771-2:2011+A1:2015 according to Annex C 16

Perforated calcium silicate brick KSL, 3DF,  
EN 771-2:2011+A1:2015; e.g. KS Wemding  
according to Annex C 24

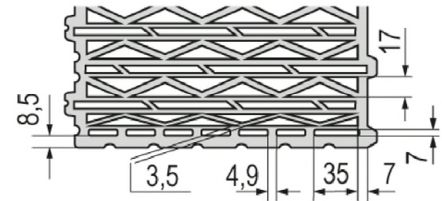
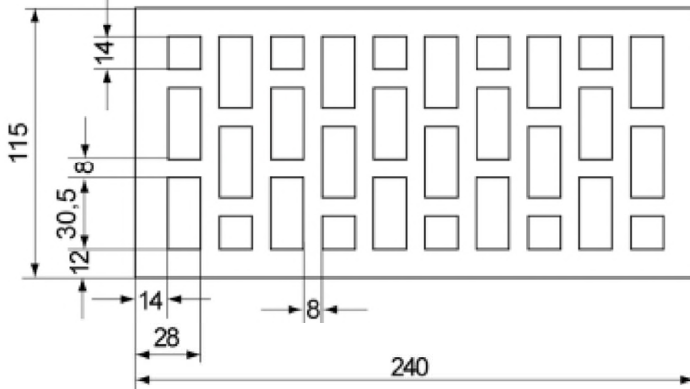


Vertical perforated brick HLz, EN 771-1:2011+A1:2015: e.g. Wienerberger, Poroton according to Annex C 28



Vertical perforated brick HLz, 2DF,  
EN 771-1:2011+A1:2015; e.g. Wienerberger  
according to Annex C 30

Vertical perforated brick HLz, U8,  
EN 771-1:2011+A1:2015; according to Annex C 32



Measures in [mm]

Figures not to scale

fischer injection system FIS V Plus for masonry

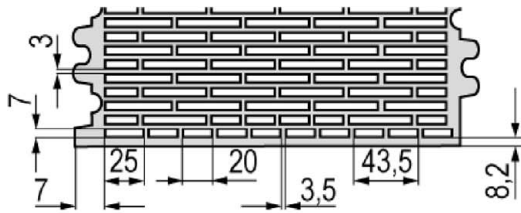
**Intended Use**  
Overview dimensions of perforated and hollow bricks part 1

**Annex B 15**

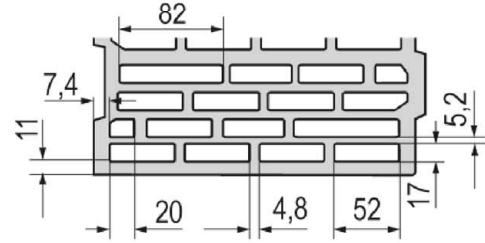
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**Table B16.1: Overview dimensions of perforated and hollow bricks part 2**

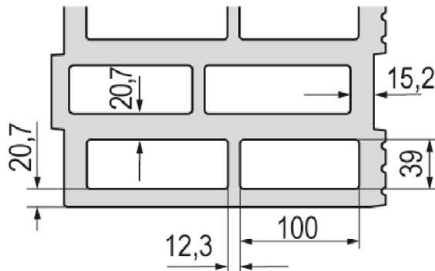
Vertical perforated brick HLz, T10, T11, EN 771-1:2011+A1:2015; according to Annex C36



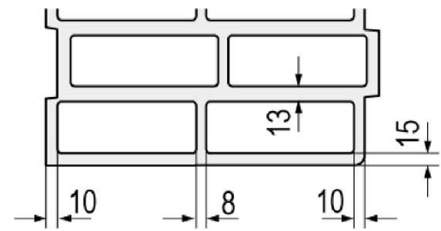
Vertical perforated brick HLz, T7 PF, filled with perlite, EN 771-1:2011+A1:2015; according to Annex C 40



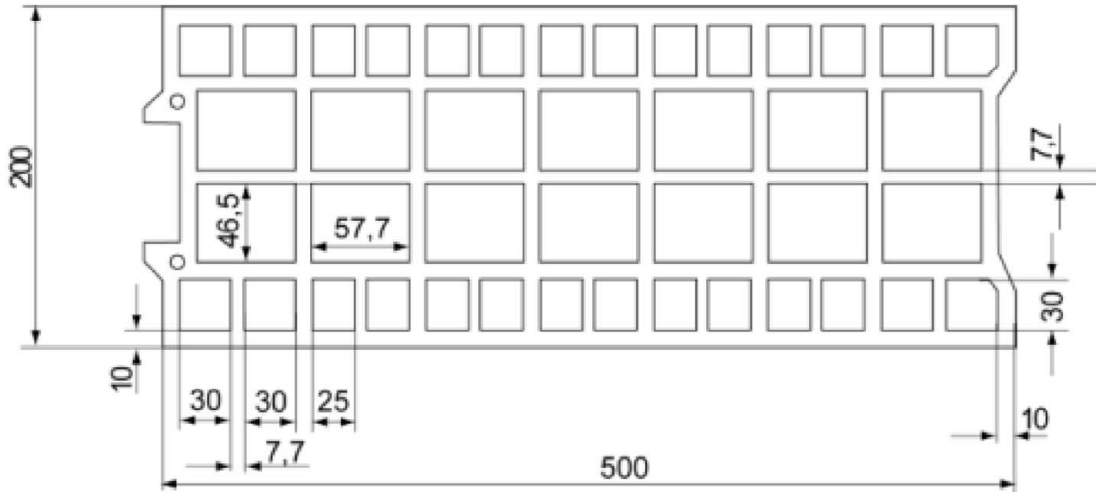
Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1.2011+A1.2015; according to Annex C 44



Vertical perforated brick HLz, FZ 7, filled with mineral wool, EN 771-1.2015, according to Annex C 48



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Bouyer Leroux; According to Annex C 52



Measures in [mm]

Figures not to scale

fischer injection system FIS V Plus for masonry

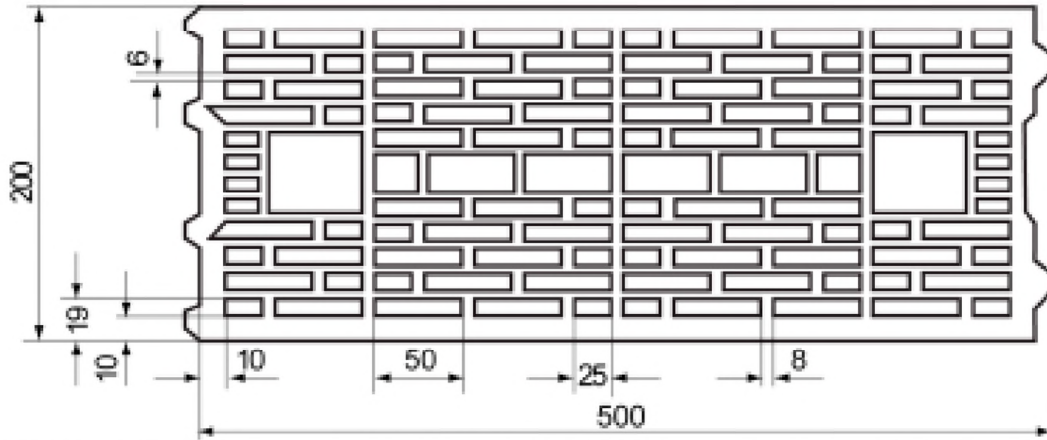
**Intended Use**  
Overview dimensions of perforated and hollow bricks part 2

**Annex B 16**

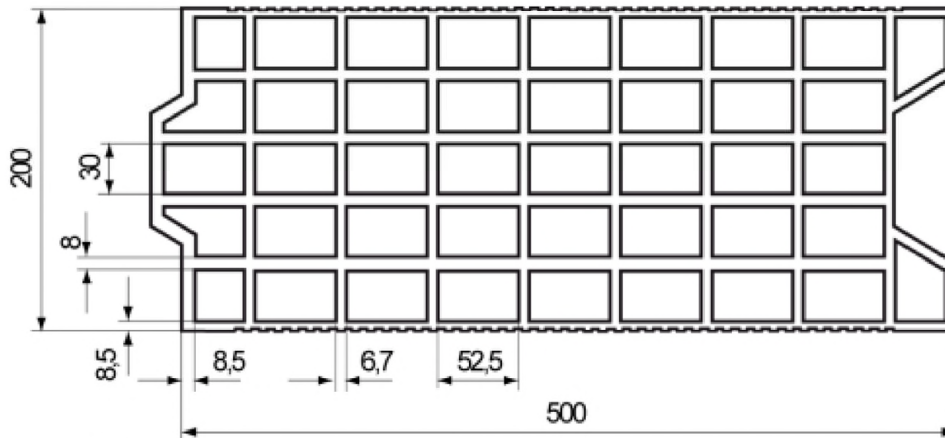
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**Table B17.1: Overview dimensions of perforated and hollow bricks part 3**

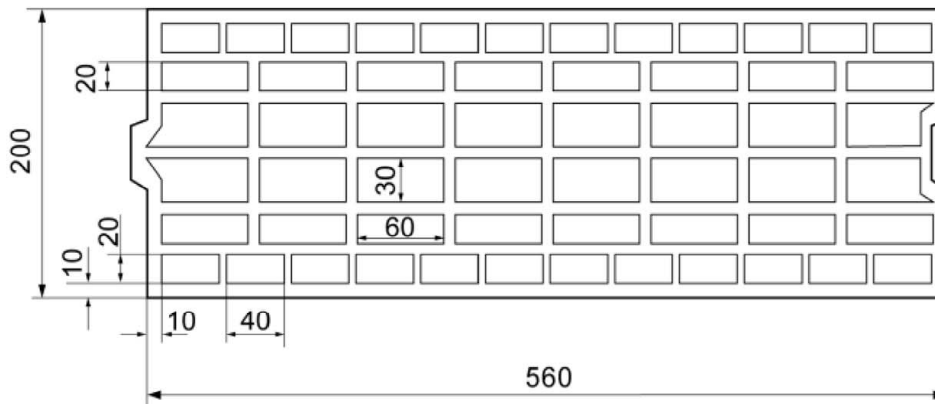
Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Wienerberger according to Annex C 56



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Terreal according to Annex C 60



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Imery according to Annex C 64



Measures in [mm]

Figures not to scale

fischer injection system FIS V Plus for masonry

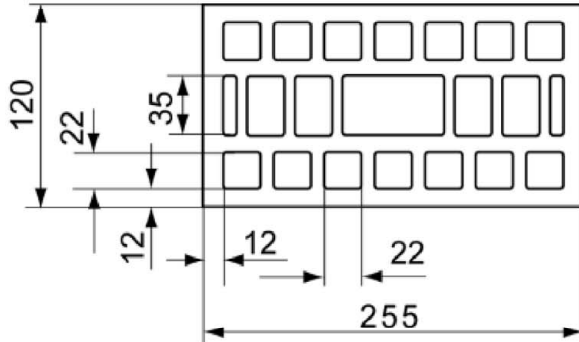
**Intended Use**  
Overview dimensions of perforated and hollow bricks part 3

**Annex B 17**

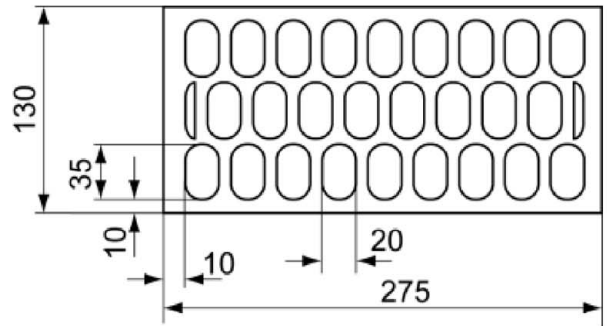
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**Table B18.1: Overview dimensions of perforated and hollow bricks part 4**

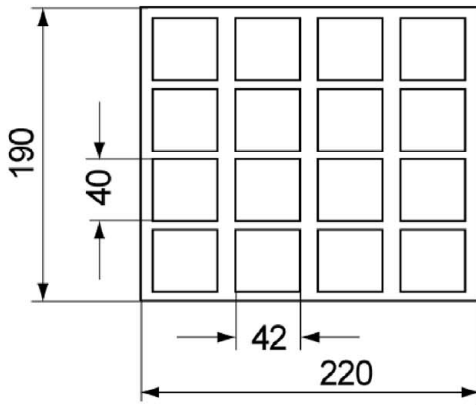
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Wienerberger according to Annex C 66



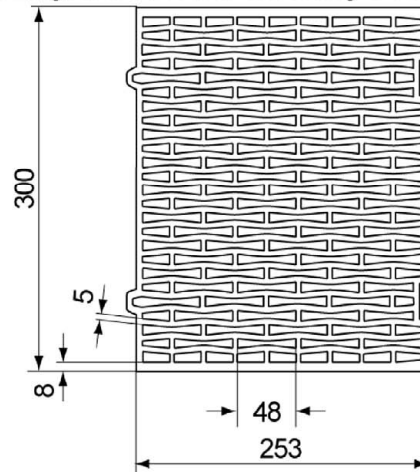
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Ceramica Farreny S.A. according to Annex C 69



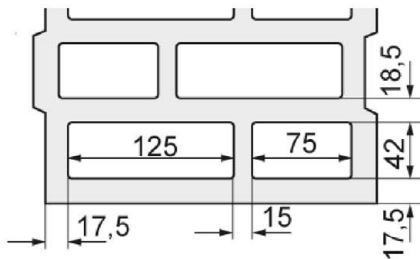
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Perceram according to Annex C 72



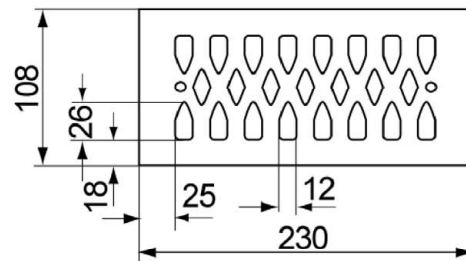
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Ziegelwerk Brenna according to Annex C 76



Vertical perforated brick HLz, Porotherm W 44, filled  
with mineral wool, EN 771-1:2011+A1:2015 according  
to Annex C 80



Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Wienerberger according to Annex C 84



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 4

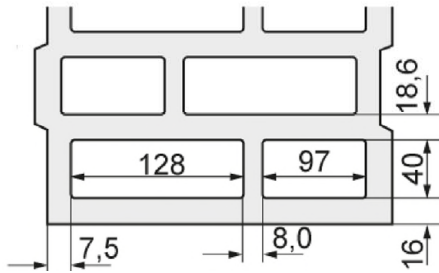
**Annex B 18**

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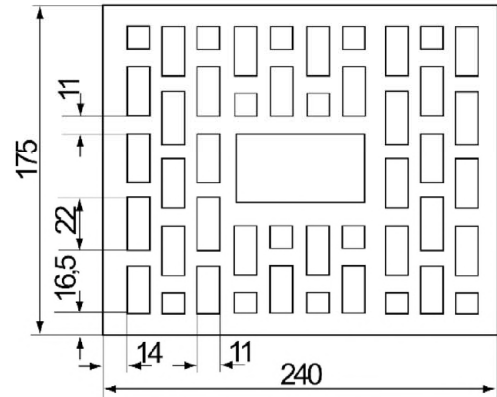


**Table B19.1: Overview dimensions of perforated and hollow bricks part 5**

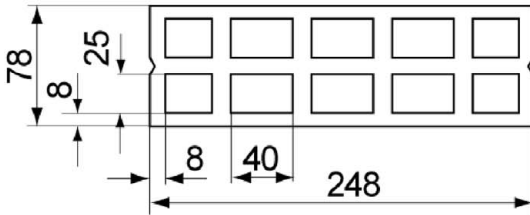
Vertical perforated brick filled with mineral wool,  
EN 771-1:2011+A1:2015; according to Annex C 86



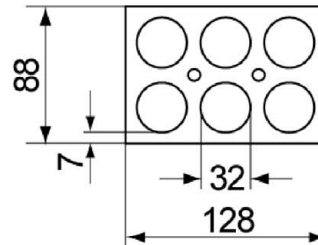
Vertical perforated brick HLz,  
EN 771-1:2011+A1:2015;  
e.g. Wienerberger according to Annex C 90



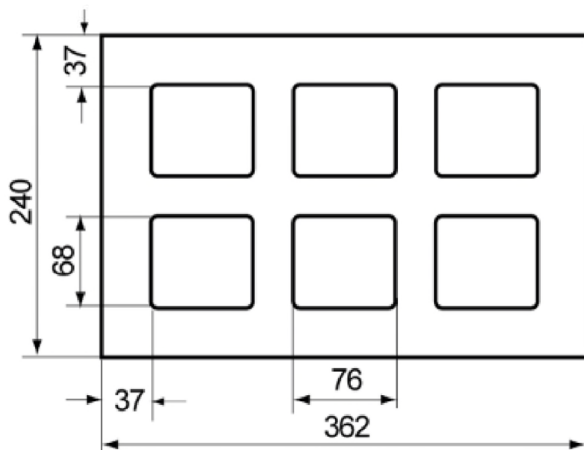
Horizontal perforated brick LLz,  
EN 771-1:2011+A1:2015; according to Annex C 94



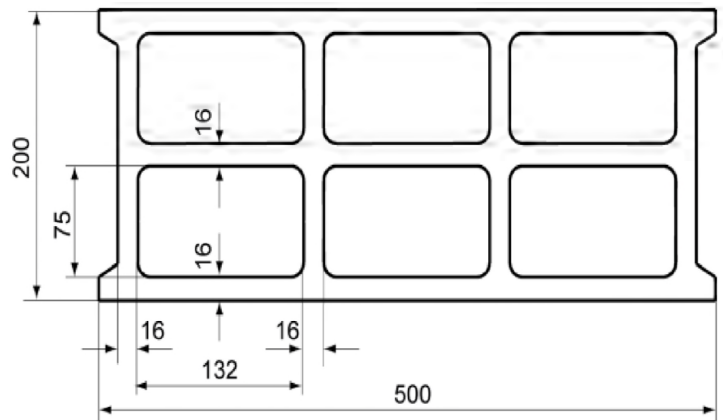
Horizontal perforated brick LLz,  
EN 771-1:2011+A1:2015;  
e.g. Cermanica Farreny S.A according to Annex C 96



Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015; according to Annex C 98



Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015;  
e.g. Sepa according to Annex C 102



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 5

**Annex B 19**

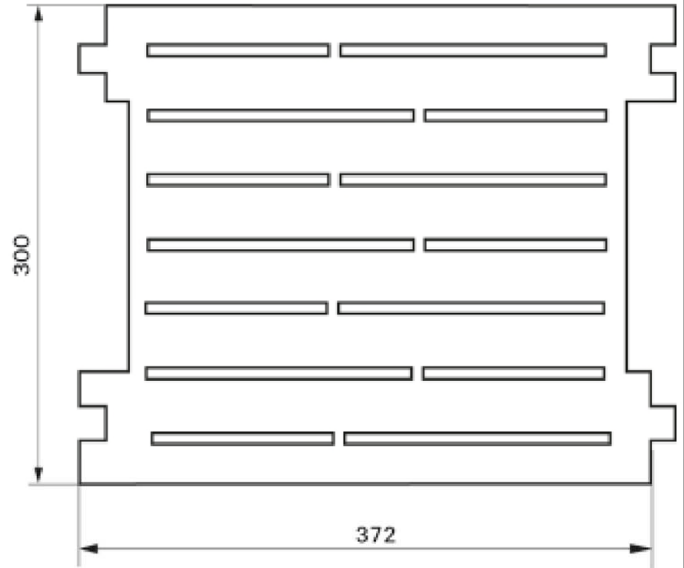
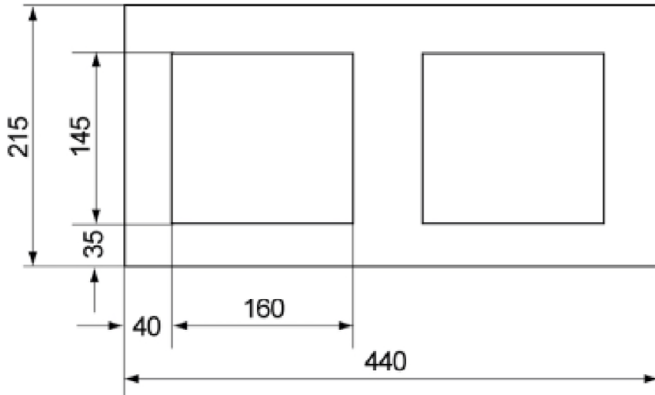
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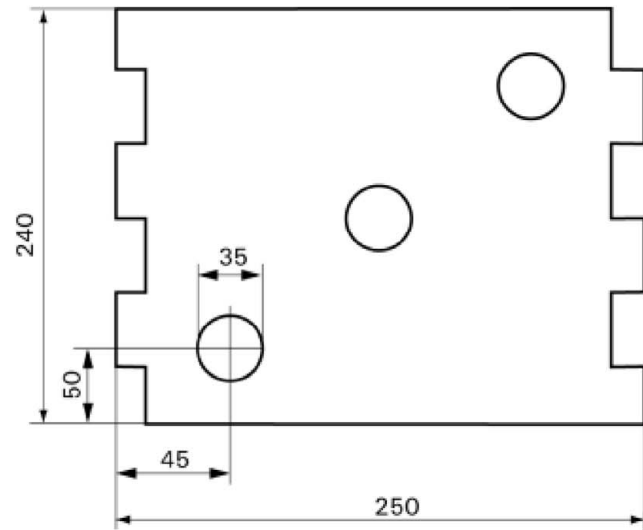
**Table B20.1: Overview dimensions of perforated and hollow bricks part 6**

Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015  
e.g. Roadstone wood according to Annex C 104

Light-weight concrete hollow block Hbl,  
EN 771-3:2011+A1:2015  
e.g. Sepa according to Annex C 108



Light-weight concrete solid block Vbl,  
EN 771-3:2011+A1:2015;  
e.g. Sepa according to Annex C 110



Measures in [mm]  
Figures not to scale

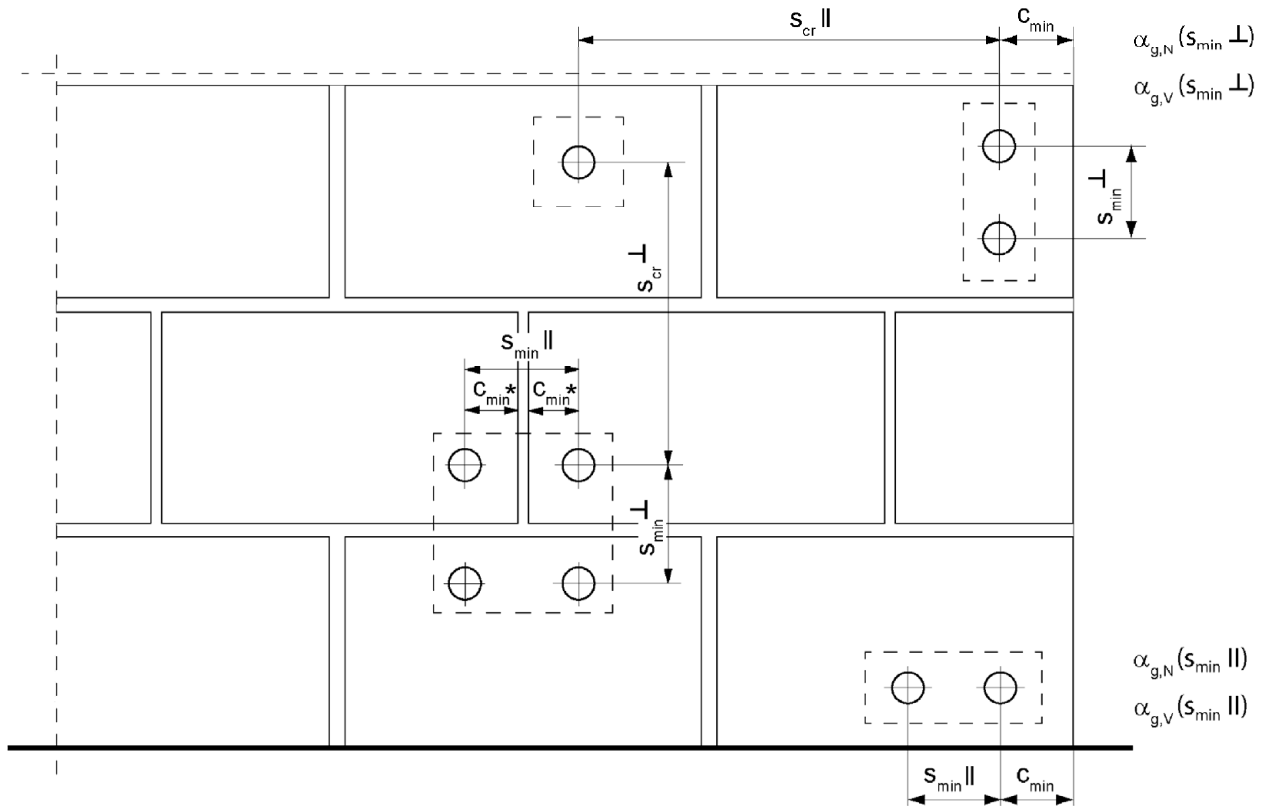
fischer injection system FIS V Plus for masonry

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

**Annex B 20**

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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 B 21**

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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

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

### 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 B 22**

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

Anchor rod / standard threaded rod		M6	M8 <sup>3)</sup>	M10 <sup>3)</sup>	M12	M16		
<b>Characteristic resistance to steel failure under tension loading</b>								
Characteristic resistance $N_{Rk,s}$	Steel zinc plated	4.6	[kN]	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
	Stainless steel R and High corrosion resistant steel HCR	8.8		16,0	29,2(26,5)	46,4(42,8)	67,4	125,6
		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	4.6	[-]	2,00			
		4.8		1,50			
		5.8		1,50			
	Stainless steel R and High corrosion resistant steel HCR	8.8		1,50			
		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 of a single anchor under tension loading of fischer anchor rods and standard threaded rods

**Annex C 1**

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

Anchor rod / standard threaded rod		M6	M8 <sup>3)</sup>	M10 <sup>3)</sup>	M12	M16			
<b>Characteristic resistance to steel failure under shear loading</b>									
<b>without lever arm</b>									
Characteristic resistance $V_{Rk,s}$	Steel zinc plated	Property class	4.6	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	
		Stainless steel R and High corrosion resistant steel HCR	Property class	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	Property class	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	
				8,0	14,6	23,2	33,7	62,8	
<b>with lever arm</b>									
Characteristic resistance $M^0_{Rk,s}$	Steel zinc plated	Property class	4.6	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	
		Stainless steel R and High corrosion resistant steel HCR	Property class	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	Property class	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	
				12,2	29,9	59,8	104,6	265,9	
<b>Partial factors<sup>1)</sup></b>									
Partial factors $\gamma_{Ms,V}$	Steel zinc plated	Property class	4.6	[-]	1,67				
			4.8		1,25				
			5.8		1,25				
	8.8		1,25						
	Stainless steel R and High corrosion resistant steel HCR		50		2,38				
			70		1,25 <sup>2)</sup> / 1,56				
	80		1,33						

<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 (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 of a single anchor under shear loading with and without lever arm of fischer anchor rods and standard threaded rods

**Annex C 2**

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

fischer internal threaded anchor FIS E			M6	M8	M10	M12	
<b>Characteristic resistance to steel failure under tension loading, decisive values of sleeve and screw/threaded rod</b>							
Characteristic resistance with screw	$N_{Rk,s}$	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
<b>Partial factors<sup>1)</sup></b>							
Partial factors	$\gamma_{Ms,N}$	Property class 4.6	[-]	2,00			
		Property class 5.8		1,50			
		Property class R		1,87			
		Property class 70 HCR		1,87			
<b>Characteristic resistance to steel failure under shear loading; decisive values of sleeve and screw/threaded rod</b>							
<b>without lever arm</b>							
Characteristic resistance with screw	$V_{Rk,s}$	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
<b>with lever arm</b>							
Characteristic resistance	$M^0_{Rk,s}$	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
<b>Partial factors<sup>1)</sup></b>							
Partial factors	$\gamma_{Ms,V}$	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							

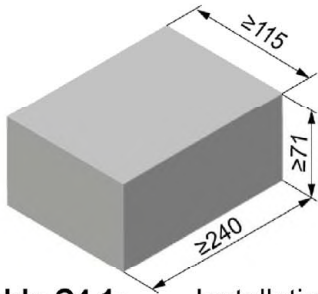
fischer injection system FIS V Plus for masonry

**Performance**

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

**Annex C 3**

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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 $\rho$ [kg/dm <sup>3</sup> ]	≥ 1,8		
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup> [N/mm <sup>2</sup> ]	15 / 12 or 25 / 20 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	-	-			
<b>Internal threaded anchor FIS E</b>	-	-	-	-	M6	M8	M10	M12	
					<b>11x85</b>		<b>15x85</b>		
<b>Anchor rod and internal threaded anchor FIS E without perforated sleeve</b>									
Effective anchorage depth $h_{ef}$ [mm]	50	50	50	50	85				
	80	80	80	80					
	200	200	200	200					
Max. installation torque $\max T_{inst}$ [Nm]	4	10			4	10			
<b>General installation parameters</b>									
Edge distance $c_{min} = c_{cr}$	100				100				
Edge distance $h_{ef}=200$ $c_{min} = c_{cr}$	150				- <sup>2)</sup>				
Spacing	$s_{min II,N}$	60				60			
	$h_{ef}=200$ $s_{min II,N}$	240				- <sup>2)</sup>			
	$s_{min II,V}$	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 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	-	-		
<b>Internal threaded anchor FIS E</b>	-	-	-	-	M6	M8	M10	M12
					<b>11x85</b>		<b>15x85</b>	
Edge distance $c_{min}$ [mm]	<b>100</b>							
Group factor	$\alpha_{a,N} (s_{min II})$	1,5						
	$\alpha_{g,V} (s_{min II})$	2,0						
	$h_{ef}=200$ $\alpha_{g,N} (s_{min II})$	1,5						
	$h_{ef}=200$ $\alpha_{g,V} (s_{min II})$	2,0						
	$\alpha_{a,N} (s_{min \perp})$	2,0						
	$\alpha_{g,V} (s_{min \perp})$	2,0						
	$h_{ef}=200$ $\alpha_{a,N} (s_{min \perp})$	2,0						
	$h_{ef}=200$ $\alpha_{g,V} (s_{min \perp})$	2,0						

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**Performance**

 Solid brick Mz, NF, dimensions, installation parameters  $c=100\text{mm}$ 
**Annex C 4**

**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	
<b>Tension resistance <math>N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (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]											
		≥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			

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) 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	
<b>Shear resistance <math>V_{RK} = V_{RK,b} = V_{RK,c,II} = V_{RK,c,I}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (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]											
		≥50	≥50	≥50	200	≥50	200	85					
15 / 12 N/mm <sup>2</sup>	w/w   w/d	2,5	2,5	4,0	8,5	4,0	11,5	2,5					
	d/d	4,0	4,0	6,0	12,0	5,5	12,0	4,0					

- 1) The 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 C 123.

fischer injection system FIS V Plus for masonry

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

**Annex C 5**



# 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
		11x85		15x85				M10
<b>Anchor rod and internal threaded anchor FIS E without perforated sleeve</b>								
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	
<b>General installation parameters</b>								
Edge distance $c_{min} = C_{cr}$						60		
Edge distance $h_{ef}=200$	$C_{min}$					60		
Spacing	$s_{min II,N}$					80		
	$h_{ef}=200 s_{min II,N}$					80		
	$s_{min II,V}$					80		
	$s_{cr II}$					$3x h_{ef}$		
	$s_{min \perp}$					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 FIS E		-	-	-	-	-	M6	M8
		11x85		15x85				M10
Edge distance $c_{min}$	[mm]					60		
Group factor	$\alpha_{g,N} (s_{min II})$					0,6		
	$\alpha_{g,V} (s_{min II})$					1,3		
	$h_{ef}=200 \alpha_{g,N} (s_{min II})$					1,4		
	$h_{ef}=200 \alpha_{g,V} (s_{min II})$					1,5		
	$\alpha_{g,N} (s_{min \perp})$					0,3		
	$\alpha_{g,V} (s_{min \perp})$					1,3		
	$h_{ef}=200 \alpha_{g,N} (s_{min \perp})$					2,0		
	$h_{ef}=200 \alpha_{g,V} (s_{min \perp})$					1,1		

fischer injection system FIS V Plus for masonry

**Performance**  
Solid brick Mz, NF, dimensions, installation parameters  $c=60\text{mm}$

**Annex C 6**

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## 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 FIS E	-		-		-			-			-			M6	M8	M10	M12
														11x85		15x85	
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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]														
			50	100	50	100	50	100	200	50	100	200	50	100	200	85	
15 / 12 N/mm <sup>2</sup>	w/w	w/d	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	w/d	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	w/d	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>		

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) No performance assessed  
 3) 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 FIS E	-		-		-			-			-			M6	M8	M10	M12
														11x85		15x85	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [mm]														
			50	100	50	100	50	100	200	50	100	200	50	100	200	85	
15 / 12 N/mm <sup>2</sup>	w/w	w/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	- <sup>2)</sup>	
	d/d		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	- <sup>2)</sup>	
25 / 20 N/mm <sup>2</sup>	d/d		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	- <sup>2)</sup>	

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) No performance assessed.  
 Factor for job site tests and displacements see annex C 123.

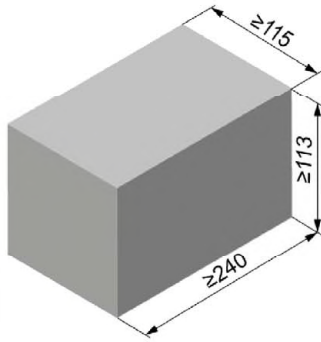
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**Performance**  
 Solid brick Mz, NF, Characteristic resistance under tension and shear loading  $c=60\text{mm}$

**Annex C 7**

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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 $\rho$ [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 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	M8	M10	M12		
	11x85		15x85								
<b>Anchor rod and internal threaded anchor FIS E without perforated sleeve</b>											
Effective anchorage depth $h_{ef}$ [mm]	50	100	50	100	50	100	50	100	85		
Max. installation torque $\max T_{inst}$ [Nm]	4		10				4	10			
<b>Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H 16x85 K</b>											
Effective anchorage depth $h_{ef}$ [mm]	_2)		85		_2)			85		_2)	
Max. installation torque $\max T_{inst}$ [Nm]	_2)		10		_2)			4	10	_2)	
<b>General installation parameters</b>											
Edge distance $c_{min} = c_{cr}$					60						
Spacing	$s_{min \parallel}$					120					
	$s_{cr \parallel}$					240					
	$s_{cr \perp} = s_{min \perp}$					115					

### Drilling method

Hammer drilling with hard metal hammer drill

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) No performance assessed.

**Table C8.2:** Group factors

Anchor rods	M6	M8	M10	M12	M16	-		-		
Internal threaded anchor FIS E	-	-	-	-	-	M6	M8	M10	M12	
	11x85		15x85							
Group factor	$\alpha_{g,N} (s_{min \parallel})$	[-]	1,5							
	$\alpha_{g,V} (s_{min \parallel})$		1,4							
	$\alpha_{g,N} (s_{min \perp})$		2,0							
	$\alpha_{g,V} (s_{min \perp})$									

fischer injection system FIS V Plus for masonry

**Performance**  
 Solid brick Mz, 2DF, dimensions, installation parameters

**Annex C 8**

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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

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

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [mm]												
		50	100	50	100	50	100	50	100	50	100	85		
<b>12,5 / 10 N/mm<sup>2</sup></b>	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
<b>20 / 16 N/mm<sup>2</sup></b>	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

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) 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

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

**Shear resistance  $V_{RK} = V_{RK,b} = V_{RK,c,II} = V_{RK,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [mm]													
		≥ 50						85							
<b>12,5 / 10 N/mm<sup>2</sup></b>	w/w   w/d	2,5	3,0	3,0	3,5	3,0	2,5	3,0	3,0	3,0	3,0	3,0	3,5	2,5	3,0
	d/d														
<b>20 / 16 N/mm<sup>2</sup></b>	w/w   w/d	4,0	5,0	5,5	5,5	5,0	4,0	5,0	5,0	5,0	5,0	5,0	6,0	4,0	5,0
	d/d														

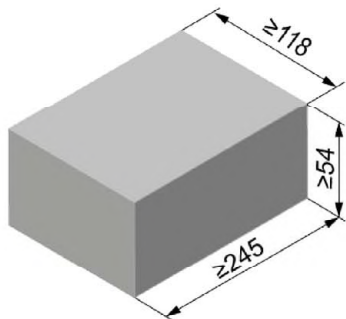
- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength. Factor for job site tests and displacements see annex C 123.

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

**Annex C 9**

## 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 $\rho$	[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 C10.1:** Installation parameters

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

### Drilling method

Hammer drilling with hard metal hammer drill

<sup>1)</sup> The 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	M8	M10	M12		
	11x85		15x85								
Group factor	$\alpha_{g,N} (s_{min \parallel})$	[-]	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 brick Mz, dimensions, installation parameters

**Annex C 10**

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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						
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>										
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [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 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							
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [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 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 C 123.

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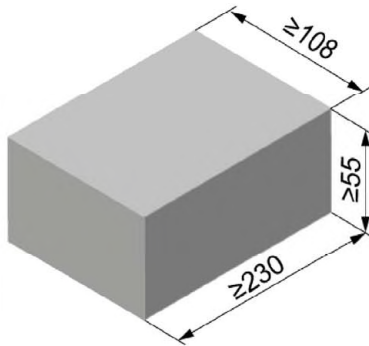
**Performance**  
Solid brick Mz, Characteristic resistance under tension and shear loading

**Annex C 11**

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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 $\rho$ [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	M8	M10	M12
	11x85		15x85						
<b>Anchor rod and internal threaded anchor FIS E without perforated sleeve</b>									
Effective anchorage depth $h_{ef}$ [mm]	50	90	50	90	50	90	50	90	85
Max. installation torque $\max T_{inst}$ [Nm]	4		10				4		10
<b>General installation parameters</b>									
Edge distance $c_{min} = c_{cr}$	60								
Spacing $s_{cr \parallel} = s_{min \parallel}$ [mm]	230								
	$s_{cr \perp} = s_{min \perp}$	60							
<b>Drilling method</b>									
Hammer drilling with hard metal hammer drill									

<sup>1)</sup> The 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	M8	M10	M12		
	11x85		15x85								
Group factor	$\alpha_{g,N} (s_{min \parallel})$	[-]	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 brick Mz, dimensions, installation parameters

**Annex C 12**

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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						
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>										
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [mm]								
		≥ 50						85		
12,5 / 10 N/mm <sup>2</sup>	w/w	0,60	0,90	0,75	0,75	0,75	0,75			
	w/d	1,20	1,50	1,20	1,20	1,20	1,20			
25 / 20 N/mm <sup>2</sup>	w/w	0,90	1,50	1,20	1,20	1,20	1,20			
	w/d	1,50	2,50	2,00	2,00	2,00	2,00			

<sup>1)</sup> The 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 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						
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [mm]								
		≥ 50						85		
12,5 / 10 N/mm <sup>2</sup>	w/w	2,0	3,0	4,0	4,5	5,5	2,0	3,0	4,0	4,5
	w/d									
25 / 20 N/mm <sup>2</sup>	w/w	2,5	4,0	5,5	6,0	8,0	2,5	4,0	5,5	6,0
	w/d									

<sup>1)</sup> The 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 C 123.

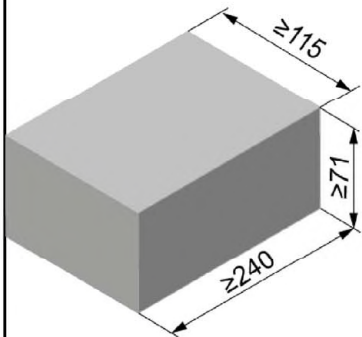
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**Performance**  
Solid brick Mz, Characteristic resistance under tension and shear loading

**Annex C 13**

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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 $\rho$	[kg/dm <sup>3</sup> ]	≥ 1,8		
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	[N/mm <sup>2</sup> ]	15 / 12 or 25 / 20 or 35 / 28		
Standard or annex	EN 771-2:2011+A1:2015			

**Table C14.1:** Installation parameters

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

**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 compressive strength of the single brick must not be less than 80% of the mean compressive strength.

**Table C14.2:** Group factors

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

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**Performance**  
Solid calcium silicate brick KS, NF, dimensions, installation parameters

**Annex C 14**

## 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						

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [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 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 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						

**Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [mm]											
		50	100	50	100	50	≥100	50	≥100	50	≥100	85	85
15 / 12 N/mm <sup>2</sup>	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	1,5	3,0	1,5	3,0	1,2	2,0	1,2	2,0	1,2	2,0	1,2	1,2
25 / 20 N/mm <sup>2</sup>	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	2,5	4,0	2,5	4,0	1,5	3,0	1,5	3,0	1,5	3,0	1,5	1,5
35 / 28 N/mm <sup>2</sup>	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	3,0	4,5	3,0	4,5	1,5	3,5	1,5	3,5	1,5	3,5	1,5	1,5

<sup>1)</sup> The 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 C 123.

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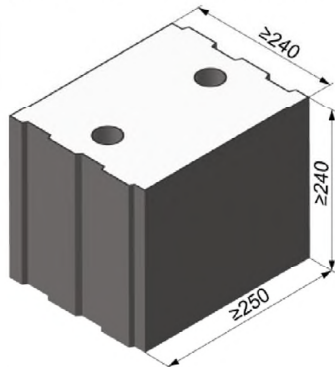
### Performance

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

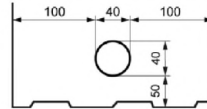
**Annex C 15**

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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 $\rho$	[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 B 15

**Table C16.1: Installation parameters**

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

### 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	

### General installation parameters

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

### Drilling method

Hammer drilling with hard metal hammer drill

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength
- 2) No performance assessed

**Table C16.2: Group factors**

<b>Anchor rods</b>	<b>M6</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	-	-		
<b>Internal threaded anchor FIS E</b>	-	-	-	-	-	<b>M6</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>
						<b>11x85</b>		<b>15x85</b>	
Group factors	$\alpha_{a,N} (s_{min} \parallel)$	[-]	1,5						
	$\alpha_{a,V} (s_{min} \parallel)$		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

**Annex C 16**

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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	-	-	M6	M8
		11x85		15x85								11x85		
Perforated sleeve FIS H K		-	-	-	-	-	-		-		16x85			
Tension resistance $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>														
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [mm]												
		≥ 50					85							
12,5 / 10 N/mm <sup>2</sup>	w/w	3,0	4,0	4,5	4,5	3,5	3,0	3,5		4,5	3,0	4,5		
	w/d	5,0	7,0	7,0	7,0	5,5	5,0	5,5		8,0	5,0	8,0		
25 / 20 N/mm <sup>2</sup>	w/w	4,5	6,0	6,0	6,0	5,0	4,5	5,0		6,5	4,5	6,5		
	w/d	7,5	10,0	10,0	10,0	7,5	7,5	7,5		11,0	7,5	11		
35 / 28 N/mm <sup>2</sup>	w/w	5,0	8,0	8,5	8,5	7,0	5,0	7,0		8,5	5,0	8,5		
	w/d	8,5	12,0	12,0	12,0	11,0	8,5	11,0		12,0	8,5	12		

<sup>1)</sup> The 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 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	-	-	M6	M8
		11x85		15x85								11x85		
Perforated sleeve FIS H K		-	-	-	-	-	-		-		16x85			
Shear resistance $V_{RK} = V_{RK,b} = V_{RK,c,II} = V_{RK,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [mm]												
		≥ 50					85							
12,5 / 10 N/mm <sup>2</sup>	w/w	2,5	4,5			2,5	4,5		4,5	2,5	4,5			
	w/d	4,0	6,5			4,0	6,5		6,5	4,0	6,5			
25 / 20 N/mm <sup>2</sup>	w/w	5,0	9,0			5,0	9,0		9,0	5,0	9,0			
	w/d	8,5	12,0			8,5	12,0		12,0	8,5	12			

<sup>1)</sup> The 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 C 123.

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### Performance

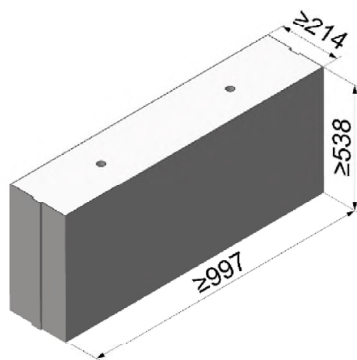
Solid calcium silicate brick KS, 8DF, Characteristic resistance under tension and shear loading

**Annex C 17**

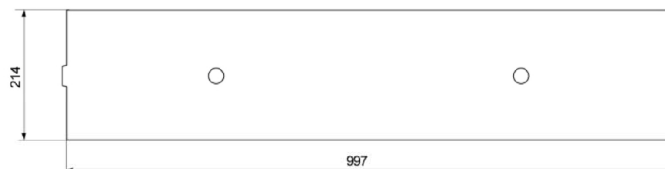
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# Solid calcium silicate brick KS, EN 771-2:2011+A1:2015



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 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 FIS E	-	-	-	-	-	M6	M8	M10	M12
							11x85	15x85	
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**  
Solid calcium silicate brick KS, dimensions, installation parameters

**Annex C 18**

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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 FIS E		-	-	-	-	-	M6	M8	M10	M12	
								11x85		15x85	
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>											
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [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 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 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 FIS E		-	-	-	-	-	M6	M8	M10	M12	
								11x85		15x85	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 $h_{ef}$ [mm]									
		≥ 50									
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	3,0	5,0	5,5	4,0	4,0	3,0	5,0	5,5	4,0	
	d/d										
25 / 20 N/mm <sup>2</sup>	w/w   w/d	4,5	7,0	7,5	6,0	6,0	4,5	7,0	7,5	6,0	
	d/d										
45 / 36 N/mm <sup>2</sup>	w/w   w/d	4,5	9,0	11,0	12,0	12,0	4,5	9,0	11,0	12,0	
	d/d										

<sup>1)</sup> The 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 C 123.

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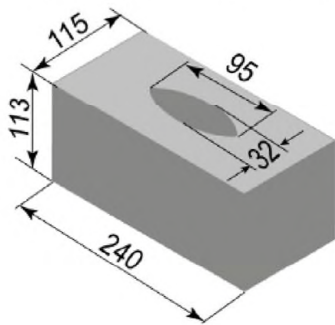
### Performance

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

**Annex C 19**

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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 $\rho$	[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 anchorage 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									
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### General installation parameters

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

### Drilling method

Hammer drilling with hard metal hammer drill

<sup>1)</sup> The 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	$\alpha_{g,N}(s_{min \parallel}) =$ $\alpha_{g,V}(s_{min \parallel}) =$ $\alpha_{g,N}(s_{min \perp}) =$ $\alpha_{g,V}(s_{min \perp}) =$	[-]									
		2									

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**Performance**  
Solid calcium silicate brick KS, dimensions, installation parameters

**Annex C 20**

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

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

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	4		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	100		
Spacing	$s_{min \parallel}$	390	
	$s_{cr \parallel}$ [mm]	390	
	$s_{min \perp}$	390	
	$s_{cr \perp}$	390	
<b>Drilling method</b>			
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	$\alpha_{g,N}(s_{min \parallel})$ $\alpha_{g,V}(s_{min \parallel})$ $\alpha_{g,N}(s_{min \perp})$ $\alpha_{g,V}(s_{min \perp})$		2

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**Performance**  
Solid calcium silicate brick KS, dimensions, installation parameters

**Annex C 21**

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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 anchorage)

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	

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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 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 anchorage)

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

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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	
	d/d	3,5	
25 / 20 N/mm <sup>2</sup>	w/w	3,0	
	d/d	5,5	

<sup>1)</sup> The 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 C 123.

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**Performance**  
Solid calcium silicate brick KS, Characteristic resistance under tension loading

**Annex C 22**

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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 anchorage)

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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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	
	d/d		
25 / 20 N/mm <sup>2</sup>	w/w	5,5	
	d/d		

<sup>1)</sup> The 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 C 123.

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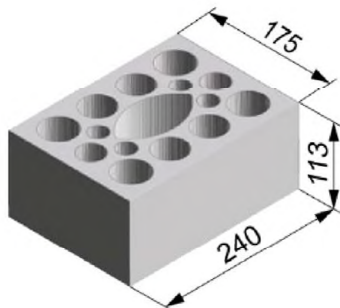
**Performance**  
Solid calcium silicate brick KS, Characteristic resistance under shear loading

**Annex C 23**

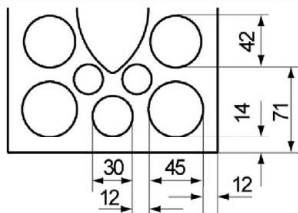
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# Perforated calcium silicate brick KSL, 3DF, EN 771-2:2011+A1:2015



Producer		-		
Nominal dimensions	[mm]	length L	width W	height H
		240	175	113
Mean gross dry density $\rho$	[kg/dm <sup>3</sup> ]	$\geq 1,4$		
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 B 15

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

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

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

Max. installation torque	max T <sub>inst</sub> [Nm]	2													
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### General installation parameters

Edge distance	C <sub>min</sub> = C <sub>cr</sub>	60				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

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

**Table C24.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

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

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### Performance

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

**Annex C 24**

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

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

Anchor rod		M10	M12	M16
Perforated sleeve FIS H K		18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>				
Max. installation torque	$\max T_{inst}$	[Nm]	2	
<b>General installation parameters</b>				
Edge distance	$c_{min} = c_{cr}$		80	
Spacing	$s_{min \parallel}$	[mm]	100	
	$s_{cr \parallel}$		240	
	$s_{min \perp}$		115	
	$s_{cr \perp}$		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	$\alpha_{g,N} (s_{min \parallel})$	[-]	1,5	
	$\alpha_{g,V} (s_{min \parallel})$			
	$\alpha_{g,N} (s_{min \perp})$		2,0	
	$\alpha_{g,V} (s_{min \perp})$			

fischer injection system FIS V Plus for masonry

**Performance**  
Perforated calcium silicate brick KSL, 3DF, dimensions, installation parameters

**Annex C 25**

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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 anchorage)

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	

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions										
	w/w	w/d									
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 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 C26.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through anchorage)

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

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions			
	w/w	w/d		
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 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:  $N_{RK(72/120°C)} = 0,83 \cdot N_{RK(50/80°C)}$ .

Factor for job site tests and displacements see annex C 123.

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**Performance**

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

**Annex C 26**

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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 anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor FIS E	-		-		M6	M8	-		-		M10	M12	-	
Perforated sleeve FIS H K	12x50		12x85		16x85			16x130		20x85			20x130	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	1,5						3,0			2,5	3,0	2,5
	d/d													
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	2,0						3,5					
	d/d													
15 / 12 N/mm <sup>2</sup>	w/w	w/d	2,5						4,5			4,0	4,5	4,0
	d/d													
20 / 16 N/mm <sup>2</sup>	w/w	w/d	3,0	3,5	3,0	3,5	3,0	6,0			5,5	6,0	5,5	
	d/d													
25 / 20 N/mm <sup>2</sup>	w/w	w/d	4,0	4,5	4,0	4,5	4,0	7,5			6,5	7,5	6,5	
	d/d													

<sup>1)</sup> The 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 anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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>	3,5		3,5
15 / 12 N/mm <sup>2</sup>	4,5		4,0
20 / 16 N/mm <sup>2</sup>	6,0		5,5
25 / 20 N/mm <sup>2</sup>	7,5		6,5

<sup>1)</sup> The 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 C 123.

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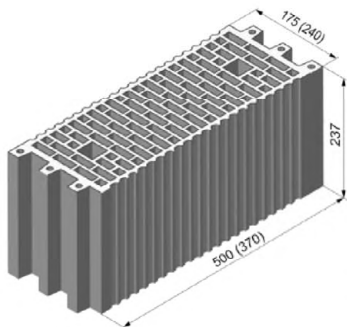
### Performance

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

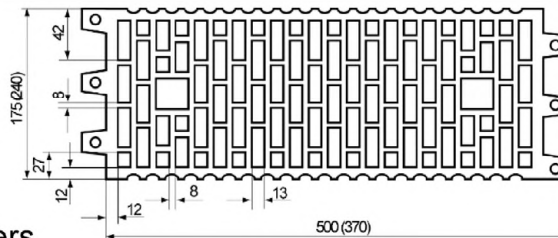
**Annex C 27**

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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> ]	$\geq 1,0$		
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 B 15

**Table C28.1:** Installation parameters

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

## 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>	100
Spacing	S <sub>min II</sub>	100
	S <sub>cr II</sub> [mm]	500 (370)
	S <sub>min ⊥</sub>	100
	S <sub>cr ⊥</sub>	240

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C28.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

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

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

**Annex C 28**

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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		
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,30			0,90			1,20					
	d/d		0,40			0,90			1,20					
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	0,50			1,50			2,00					
	d/d		0,60			1,50			2,00					
10 / 8 N/mm <sup>2</sup>	w/w	w/d	0,75			2,00			2,50					
	d/d		0,75			2,00			2,50					
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	0,90			2,50			3,00					
	d/d		0,90			2,50			3,50					
15 / 12 N/mm <sup>2</sup>	w/w	w/d	0,90			3,00			3,50					
	d/d		1,20			3,00			4,00					

<sup>1)</sup> The 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		
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,50			0,60			0,50			0,60		
			0,75			0,90			0,75			0,90		
			0,90			1,20			0,90			1,20		
			1,20			1,50			1,20			1,50		
			1,50			2,00			1,50			2,00		

<sup>1)</sup> The 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 C 123.

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### Performance

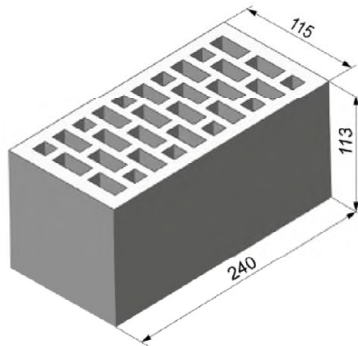
Vertical perforated brick HLz, Characteristic resistance under tension and shear loading

### Annex C 29

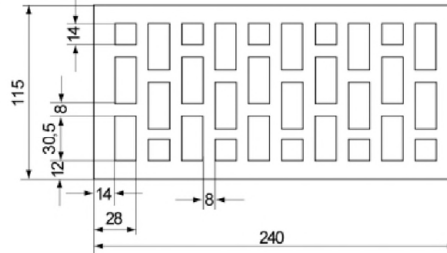
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# Vertical perforated brick HLz, 2DF, EN 771-1:2011+A1:2015



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> ]	$\geq 1,4$		
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 B 15

**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		16x85			20x85		

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

Max. installation torque $\max T_{inst}$ [Nm]	2									
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**General installation parameters**

Edge distance $c_{min} = c_{cr}$	80									
Spacing $s_{cr \parallel} = s_{min \parallel}$	240									
	$s_{cr \perp} = s_{min \perp}$	115								

**Drilling method**

Hammer drilling with hard metal hammer drill

<sup>1)</sup> The 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

**Annex C 30**

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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	M8	-		M10	M12	-
			11x85		15x85						
Perforated sleeve FIS H K	12x50		12x85		16x85			20x85			
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 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	M8	-		M10	M12	-
			11x85		15x85						
Perforated sleeve FIS H K	12x50		12x85		16x85			20x85			
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 w/d 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 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 C 123.

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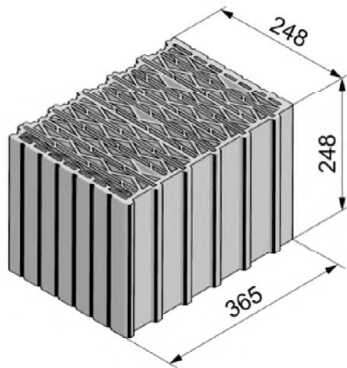
### Performance

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

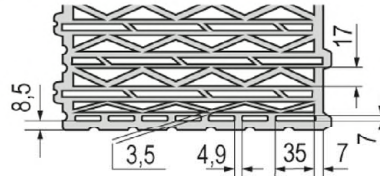
**Annex C 31**

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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 B 15

**Table C32.1:** Installation parameters  
(Pre-positioned anchorage 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									
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### 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 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													

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**Performance**  
Vertical perforated brick HLz, U8, dimensions, installation parameters

**Annex C 32**

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

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

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	5		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	60		
$s_{min \parallel}$	80		
Spacing $s_{cr \parallel}$ [mm]	250		
$s_{min \perp}$	80		
$s_{cr \perp}$	250		
<b>Drilling method</b>			
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 $\alpha_{g,N}(s_{min \parallel})$	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		

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**Performance**  
Vertical perforated brick HLz, U8, dimensions, installation parameters

**Annex C 33**

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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 anchorage)

<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	-		-	
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85		16x130		20x85			20x130		20x200		

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

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

<sup>1)</sup> The 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 anchorage)

<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>

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

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

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

### Performance

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

**Annex C 34**

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## 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 anchorage)

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	-		-		-	
Perforated sleeve FIS H K	12x50		12x85		16x85		16x130		20x85			20x130		20x200		

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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		
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	1,5
	d/d		

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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		
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	1,5
	d/d		

<sup>1)</sup> The 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 C 123.

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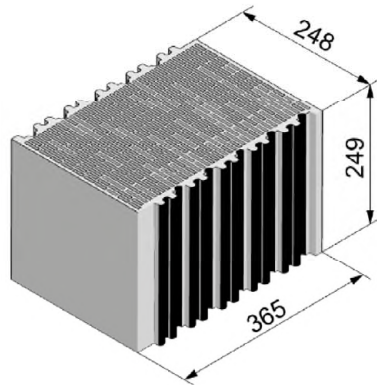
### Performance

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

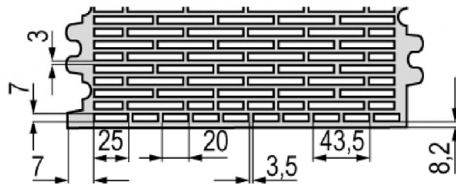
**Annex C 35**

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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 B 16

**Table C36.1:** Installation parameters  
(Pre-positioned anchorage 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 <sub>inst</sub> [Nm]	3				5	3	5			
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**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 compressive strength of the single brick must not be less than 80% of the mean compressive strength.

**Table C36.2:** 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	α <sub>g,N</sub> (S <sub>min</sub>   )	[-]	1,7	
			α <sub>g,V</sub> (S <sub>min</sub>   )	0,5
			α <sub>g,N</sub> (S <sub>min</sub> ⊥)	1,3
			α <sub>g,V</sub> (S <sub>min</sub> ⊥)	0,5

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**Performance**  
Vertical perforated brick HLz, T10, T11, dimensions, installation parameters

**Annex C 36**

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

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

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	5		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	60		
$s_{min \parallel}$	80		
Spacing $s_{cr \parallel}$ [mm]	250		
$s_{min \perp}$	80		
$s_{cr \perp}$	250		
<b>Drilling method</b>			
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		

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**Performance**  
Vertical perforated brick HLz, T10, T11, dimensions, installation parameters

**Annex C 37**

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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 anchorage)

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	-	-	-	-	-	-	-	-
Perforated sleeve FIS H K	12x50	12x85	16x85		16x130		20x85		20x130		20x200					

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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									

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

2) 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 anchorage)

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

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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									

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

2) 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 C 123.

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

**Annex C 38**

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## 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 anchorage)

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	-		-		
Perforated sleeve FIS H K	12x50		12x85		16x85			16x130			20x85			20x130		20x200	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,9	1,5	2,0
	d/d				
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	0,9	1,5	2,0
	d/d				
15 / 12 N/mm <sup>2</sup>	w/w	w/d	1,2	2,0	2,0
	d/d				

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	1,5		2,0
	d/d				
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	1,5		2,0
	d/d				
15 / 12 N/mm <sup>2</sup>	w/w	w/d	2,0		2,0
	d/d				

<sup>1)</sup> The 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 C 123.

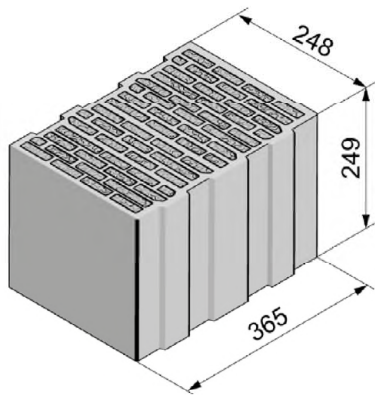
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**Performance**  
Vertical perforated brick HLz, T10, T11, Characteristic resistance under shear loading

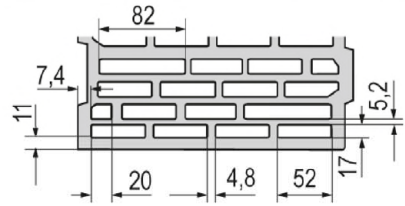
**Annex C 39**

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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 B 16

**Table C40.1:** Installation parameters (Pre-positioned anchorage 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					
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**General installation parameters**

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

**Drilling method**

Rotary drilling with carbide drill

<sup>1)</sup> The 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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**Vertical perforated brick HLz, T7 PF, filled with perlite, EN 771-1:2011+A1:2015**

**Table C41.1:** Installation parameters  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod		M10	M12	M16
Perforated sleeve FIS H K		18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>				
Max. installation torque	$\max T_{inst}$ [Nm]	5		
<b>General installation parameters</b>				
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		
<b>Drilling method</b>				
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

**Annex C 41**

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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 anchorage)

<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	

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions															
<b>5 / 4 N/mm<sup>2</sup></b>	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	
<b>8 / 6 N/mm<sup>2</sup></b>	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 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 C42.2:** Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading (Push through anchorage)

<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>			

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

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

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

Factor for job site tests and displacements see annex C 123.

fischer injection system FIS V Plus for masonry

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

**Annex C 42**

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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 anchorage)

<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	-		-		-	
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85			16x130			20x85			20x130		20x200		

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,9	1,5	1,2																
	d/d																			
8 / 6 N/mm <sup>2</sup>	w/w   w/d	1,2	2,0	1,5																
	d/d																			

<sup>1)</sup> The 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 anchorage)

<b>Anchor rod</b>	M10	M12	M16
<b>Perforated sleeve FIS H K</b>	18x130/200		22x130/200

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	1,5	1,2																
	d/d																		
8 / 6 N/mm <sup>2</sup>	w/w   w/d	2,0	1,5																
	d/d																		

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

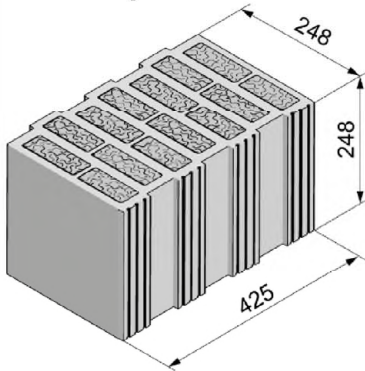
**Performance**  
Vertical perforated brick HLz, T7 PF, filled with perlite,  
Characteristic resistance under shear loading

**Annex C 43**

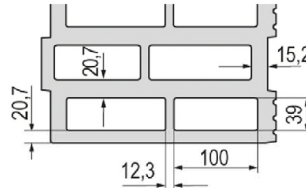
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# Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1:2011+A1:2015



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 B 16

**Table C44.1:** Installation parameters  
(Pre-positioned anchorage 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					
$s_{min \parallel}$	80					
Spacing $s_{cr \parallel}$ [mm]	250					
$s_{min \perp}$	80					
$s_{cr \perp}$	250					

### Drilling method

Rotary drilling with carbide drill

<sup>1)</sup> The 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		16x85			16x130		20x85			20x130		20x200	

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

**Annex C 44**

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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 anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	5		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	60		
$s_{min \parallel}$	80		
Spacing $s_{cr \parallel}$ [mm]	250		
$s_{min \perp}$	80		
$s_{cr \perp}$	250		
<b>Drilling method</b>			
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

**Annex C 45**

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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 anchorage)

<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	

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions											
	w/w	w/d										
<b>5 / 4 N/mm<sup>2</sup></b>	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	
<b>8 / 6 N/mm<sup>2</sup></b>	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	
<b>10 / 8 N/mm<sup>2</sup></b>	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 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 anchorage)

<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>

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

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

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

**Performance**

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

**Annex C 46**

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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 anchorage)

<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	-		-	
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85			16x130		20x85			20x130		20x200	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 anchorage)

<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>	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

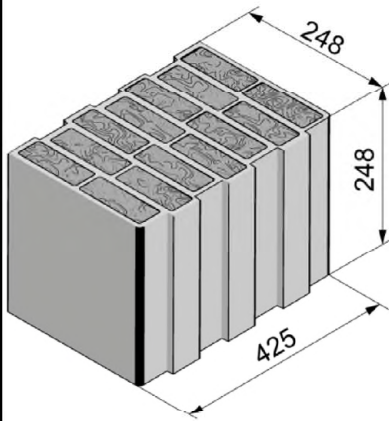
**Performance**

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

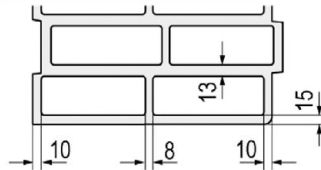
**Annex C 47**

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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 B 16

**Table C48.1:** Installation parameters  
(Pre-positioned anchorage 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]	2				5		2		5					
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## General installation parameters

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

## Drilling method

Rotary drilling with carbide drill

<sup>1)</sup> The 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	-		-		M10	M12	-		-		
					11x85						15x85						
Perforated sleeve FIS H K	12x50		12x85		16x85			16x130			20x85			20x130		20x200	

Group factors	$\alpha_{g,N} (s_{min \parallel})$	[-]	1,9													
	$\alpha_{g,V} (s_{min \parallel})$		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

**Annex C 48**

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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 anchorage with perforated sleeve FIS H K)

Anchor rod		M10	M12	M16
Perforated sleeve FIS H K		18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>				
Max. installation torque	$T_{inst}$	[Nm]	5	
<b>General installation parameters</b>				
Edge distance	$c_{min} = c_{cr}$		60	
Spacing	$s_{min \parallel}$	[mm]	80	
	$s_{cr \parallel}$		250	
	$s_{min \perp}$		80	
	$s_{cr \perp}$		250	
<b>Drilling method</b>				
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

**Annex C 49**

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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 anchorage)**

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	

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	
	d/d		0,60	0,90	1,50			2,00		1,50			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	
	d/d		0,90	0,90	2,00			2,50		2,00			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		3,00	
	d/d		0,90	1,20	2,00			3,00		2,00			3,00		3,50	

<sup>1)</sup> The 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 anchorage)**

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

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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							
	d/d		2,0						2,0							
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	2,0						2,5							
	d/d		2,5						2,5							
10 / 8 N/mm <sup>2</sup>	w/w	w/d	2,5						2,5							
	d/d		3,0						3,0							

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

**Performance**

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

**Annex C 50**

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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 anchorage)

<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	-		-	
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85			16x130		20x85			20x130		20x200	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 anchorage)

<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>			

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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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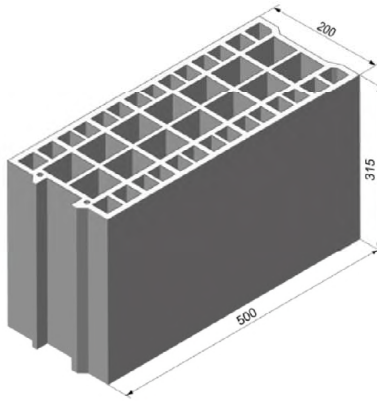
**Performance**

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

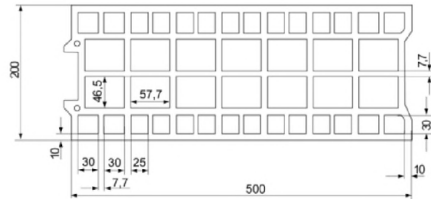
**Annex C 51**

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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> ]	$\geq 0,6$		
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 B 16

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

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

## 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]	120													
Spacing $S_{min II}$		120													
$S_{cr II}$		500													
$S_{min \perp} = S_{cr \perp}$		315													

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C52.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

Group factors	$\alpha_{g,N} (S_{min II})$	[-]	1,3											
	$\alpha_{g,V} (S_{min II})$		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

**Annex C 52**

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

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

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	2		
<b>General installation parameters</b>			
Edge distance $C_{min} = C_{cr}$			120
Spacing	$S_{min II}$	[mm]	120
	$S_{cr II}$		500
	$S_{min \perp} = S_{cr \perp}$		315
<b>Drilling method</b>			
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	$\alpha_{g,N} (S_{min II})$	[-]	1,3
	$\alpha_{g,V} (S_{min II})$		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

**Annex C 53**

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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 anchorage)

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

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	

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

2) 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 anchorage)

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

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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								

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

2) 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 C 123.

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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 54**

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## 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	1,5		0,9		1,5		2,5		0,9	
	d/d											
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	2,5		1,5		2,5		3,5		1,5	
	d/d											
10 / 8 N/mm <sup>2</sup>	w/w	w/d	3,5		2,0		3,5		4,5		2,0	
	d/d											

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,9	
	d/d			
7,5 / 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 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 C 123.

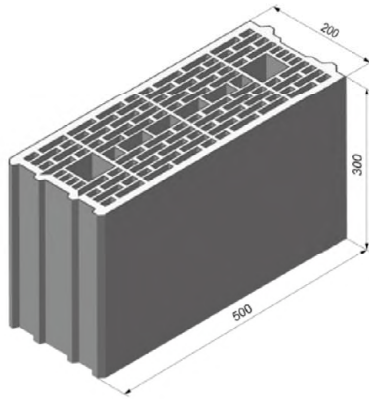
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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under shear loading

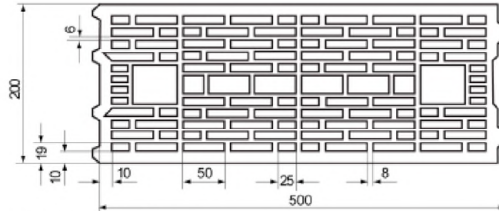
**Annex C 55**

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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> ]	$\geq 0,7$		
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 12,5 / 10		
Standard or annex	EN 771-1:2011+A1:2015			



Dimension see also Annex B 17

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

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

### 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											
	$S_{cr \parallel}$	500											
	$S_{min \perp} = S_{cr \perp}$	300											

### Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C56.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	
Group factors	$\alpha_{g,N} (S_{min \parallel})$	1,4												
	$\alpha_{g,V} (S_{min \parallel})$	2												
	$\alpha_{g,N} (S_{min \perp})$	2												
	$\alpha_{g,V} (S_{min \perp})$	2												

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

**Annex C 56**

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

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

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	2		
<b>General installation parameters</b>			
Edge distance $C_{min} = C_{cr}$	80		
Spacing	$S_{min II}$	100	
	$S_{cr II}$	500	
	$S_{min \perp} = S_{cr \perp}$	300	
<b>Drilling method</b>			
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	$\alpha_{g,N}(S_{min II})$	1,4	
	$\alpha_{g,V}(S_{min II})$	2	
	$\alpha_{g,N}(S_{min \perp})$		
	$\alpha_{g,V}(S_{min \perp})$		

fischer injection system FIS V Plus for masonry

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

**Annex C 57**

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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 anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor FIS E	-		-		M6	M8	-		-		M10	M12	-	
Perforated sleeve FIS H K	12x50		12x85		16x85			16x130		20x85			20x130	
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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			1,50	
	d/d		0,60		0,75			1,20		0,90			1,50	
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	0,75		0,90			1,50		1,20			2,00	
	d/d		0,90		1,20			2,00		1,20			2,50	
10 / 8 N/mm <sup>2</sup>	w/w	w/d	0,90		1,20			2,00		1,50			2,50	
	d/d		1,20		1,50			2,50		1,50			3,00	
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	1,20		1,50			2,50		2,00			3,50	
	d/d		1,50		2,00			3,00		2,00			4,00	

<sup>1)</sup> The 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 anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve FIS H K	18x130/200				22x130/200	
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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		1,5	
	d/d		1,2		1,5	
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	1,5		2,0	
	d/d		2,0		2,5	
10 / 8 N/mm <sup>2</sup>	w/w	w/d	2,0		2,5	
	d/d		2,5		3,0	
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	2,5		3,5	
	d/d		3,0		4,0	

<sup>1)</sup> The 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 C 123.

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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 58**

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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 anchorage)

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	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,9	1,2	0,9	1,2	0,6	2,0	0,6					
	d/d													
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	1,2	1,5	1,2	1,5	0,9	3,0	0,9					
	d/d													
10 / 8 N/mm <sup>2</sup>	w/w	w/d	1,5	2,0	1,5	2,0	1,2	4,0	1,2					
	d/d													
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	2,0	3,0	2,0	3,0	1,5	5,0	1,5					
	d/d													

<sup>1)</sup> The 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 anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve FIS H K	18x130/200				22x130/200	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,6			
	d/d					
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	0,9			
	d/d					
10 / 8 N/mm <sup>2</sup>	w/w	w/d	1,2			
	d/d					
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	1,5			
	d/d					

<sup>1)</sup> The 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 C 123.

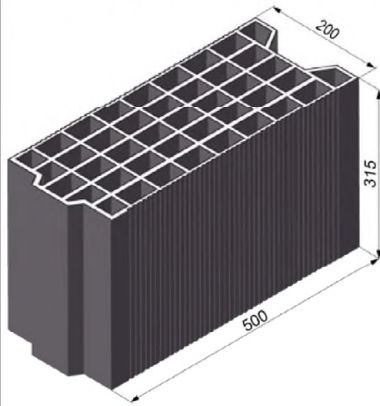
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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under shear loading

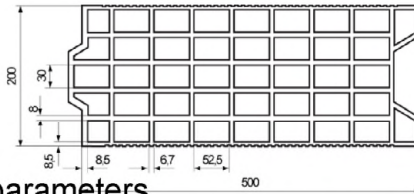
**Annex C 59**

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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 7,5 / 6 or 10 / 8		
Standard or annex	EN 771-1:2011+A1:2015			



Dimension see also Annex B 17

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

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

### 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	$s_{min \parallel}$	$s_{cr \parallel}$ [mm]	100													
			500													
			100													
			315													

### Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C60.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	
Group factors	$\alpha_{g,N}$ ( $s_{min \parallel}$ )	[-]	1,1											
			1,2											
			1,1											
			1,2											

fischer injection system FIS V Plus for masonry

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

**Annex C 60**

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

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

Anchor rod		M10	M12	M16
Perforated sleeve FIS H K		18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>				
Max. installation torque	$\max T_{inst}$ [Nm]	2		
<b>General installation parameters</b>				
Edge distance	$c_{min} = c_{cr}$	80		
Spacing	$s_{min \parallel}$	100		
	$s_{cr \parallel}$ [mm]	500		
	$s_{min \perp}$	100		
	$s_{cr \perp}$	315		
<b>Drilling method</b>				
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		

fischer injection system FIS V Plus for masonry

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

**Annex C 61**

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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 anchorage)

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	
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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						0,6		0,5		0,6	
	d/d		0,5						0,6		0,5		0,6	
5 / 4 N/mm <sup>2</sup>	w/w	w/d	0,9						1,2					
	d/d		0,9		1,2									
7,5 / 6 N/mm <sup>2</sup>	w/w	w/d	1,5						1,5					
	d/d		1,5						2,0					
10 / 8 N/mm <sup>2</sup>	w/w	w/d	2,0						2,0					
	d/d		2,0						2,0					

<sup>1)</sup> The 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 anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 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 C 123.

fischer injection system FIS V Plus for masonry

### Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 62**

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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 anchorage)

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	

**Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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														
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														
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														
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														

<sup>1)</sup> The 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 anchorage)

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

**Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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						
5 / 4 N/mm <sup>2</sup>	w/w   w/d	1,20				1,50	
	d/d						
7,5 / 6 N/mm <sup>2</sup>	w/w   w/d	1,50				2,00	
	d/d						
10 / 8 N/mm <sup>2</sup>	w/w   w/d	2,00				3,00	
	d/d						

<sup>1)</sup> The 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 C 123.

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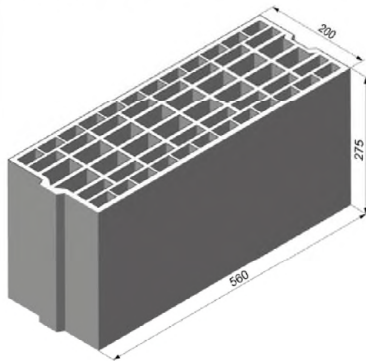
### Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

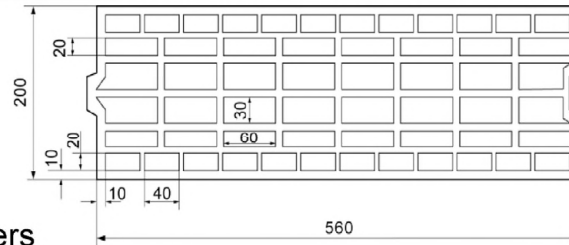
**Annex C 63**

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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 B 17

**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
<b>Anchor rod with perforated sleeve FIS H K</b>							
Max. installation torque	max T <sub>inst</sub> [Nm]	2					
<b>General installation parameters</b>							
Edge distance	C <sub>min</sub> = C <sub>cr</sub>	80					
Spacing	S <sub>min</sub>    = S <sub>cr</sub>    [mm]	560					
	S <sub>min</sub> ⊥ = S <sub>cr</sub> ⊥	275					
<b>Drilling method</b>							
Hammer drilling with hard metal hammer drill							

<sup>1)</sup> The 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				
	$\alpha_{g,V} (S_{min}   )$						
	$\alpha_{g,N} (S_{min} \perp)$						
	$\alpha_{g,V} (S_{min} \perp)$						

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

**Annex C 64**

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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
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>								
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions							
	w/w	w/d						
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 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
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)								
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions							
	w/w	w/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						
10 / 8 N/mm <sup>2</sup>	w/w	w/d				2,0		
		d/d						

<sup>1)</sup> The 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 C 123.

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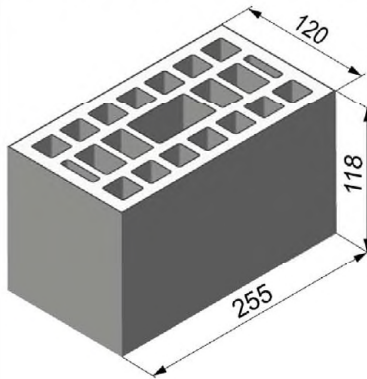
### Performance

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

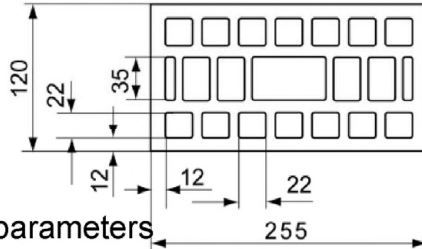
**Annex C 65**

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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> ]	$\geq 1,0$		
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 B 18

**Table C66.1: Installation parameters**

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

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

Max. installation torque $\max T_{inst}$ [Nm]	2									
<b>General installation parameters</b>										
Edge distance $c_{min} = c_{cr}$	60									
Spacing $s_{cr \parallel} = s_{min \parallel}$	255									
	$s_{cr \perp} = s_{min \perp}$	120								

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C66.2: Group factors**

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

**Annex C 66**

## 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			
Tension resistance $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 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 C 123.

fischer injection system FIS V Plus for masonry

### Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 67**

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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			
<b>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}</math> [kN] depending on the mean compressive strength <math>f_b</math>;                      Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)</b>											
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use con- dition										
<b>2,5 / 2 N/mm<sup>2</sup></b>	w/w	w/d	0,60	0,75	0,60	0,75	0,90				
	d/d										
<b>5 / 4 N/mm<sup>2</sup></b>	w/w	w/d	1,20	1,50	1,20	1,50	2,00				
	d/d										
<b>8 / 6 N/mm<sup>2</sup></b>	w/w	w/d	2,00	2,00	2,00	2,00	2,50				
	d/d										
<b>10 / 8 N/mm<sup>2</sup></b>	w/w	w/d	2,50	3,00	2,50	3,00	3,50				
	d/d										
<b>12,5 / 10 N/mm<sup>2</sup></b>	w/w	w/d	3,00	3,50	3,00	3,50	4,50				
	d/d										
<b>15 / 12 N/mm<sup>2</sup></b>	w/w	w/d	4,00	4,50	4,00	4,50	5,50				
	d/d										

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

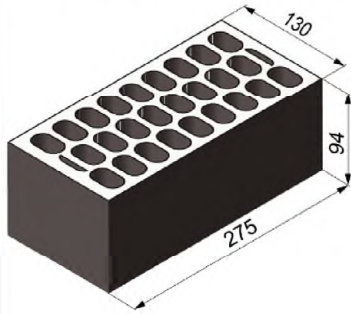
### Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

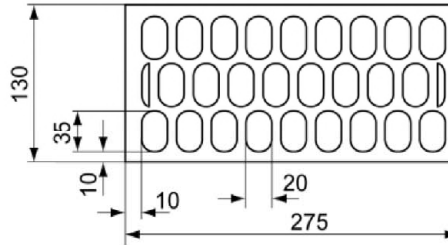
**Annex C 68**

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



Producer	e.g. Ceramica 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 B 18

**Table C69.1:** Installation parameters

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

**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					120				
Spacing $s_{cr \parallel} = s_{min \parallel}$	275									
	$s_{cr \perp} = s_{min \perp}$	95								

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C69.2:** Group factors

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

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

**Annex C 69**

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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			
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,40		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 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 C 70**

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

**Table C71.2:** 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	M8	-		M10	M12	-	
					11x85				15x85			
Perforated sleeve FIS H K	12x50		12x85		16x85				20x85			
<b>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)</b>												
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	1,2		1,2							
	d/d											
10 / 8 N/mm <sup>2</sup>	w/w	w/d	1,5		1,5							
	d/d											
15 / 12 N/mm <sup>2</sup>	w/w	w/d	2,0		2,5							
	d/d											
20 / 16 N/mm <sup>2</sup>	w/w	w/d	3,0		3,0							
	d/d											
25 / 20 N/mm <sup>2</sup>	w/w	w/d	4,0		4,0							
	d/d											

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

### Performance

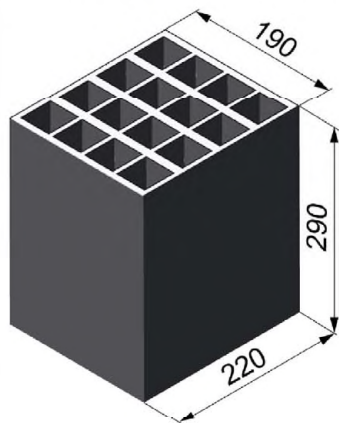
Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 71**

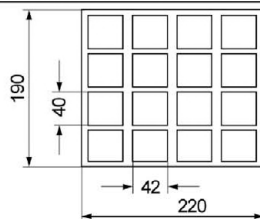
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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



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> ]	$\geq 0,7$		
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 B 18

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

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

## 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 compressive strength of the single brick must not be less than 80% of the mean compressive strength.

**Table C72.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

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

**Annex C 72**  
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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015

**Table C73.1:** Installation parameters  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	2		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	110		
Spacing $s_{min}$ [mm]	$s_{min \parallel} = s_{cr \parallel}$	220	
	$s_{min \perp} = s_{cr \perp}$	290	
<b>Drilling method</b>			
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

**Annex C 73**

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## 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 anchorage)

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	

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup>

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

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

2) 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 anchorage)

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

Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup>

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use conditions							
	w/w	w/d						
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					

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

2) 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 C 123.

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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 74**

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## 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 anchorage)

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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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   w/d	1,5	1,5	1,5	2,5	1,5	2,0		
	d/d								
10 / 8 N/mm <sup>2</sup>	w/w   w/d	2,0	2,0	2,0	3,5	2,0	3,0		
	d/d								
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	2,5	3,0	3,0	4,5	3,0	3,5		
	d/d								

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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   w/d	2,0	
	d/d		
10 / 8 N/mm <sup>2</sup>	w/w   w/d	3,0	
	d/d		
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	3,5	
	d/d		

<sup>1)</sup> The 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.

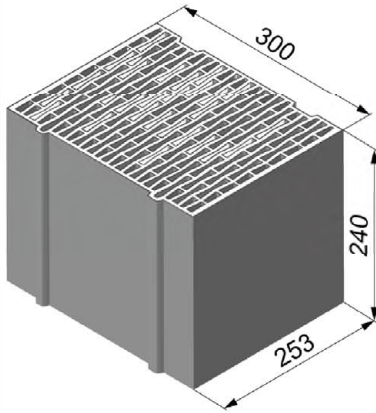
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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under shear loading

**Annex C 75**

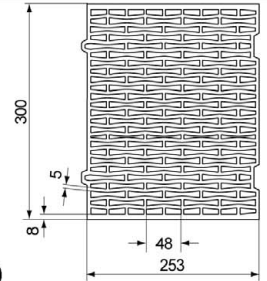
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# Vertical perforated brick HLz, EN 771-1:2011+A1:2015



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> ]	$\geq 0,8$		
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 B 18



**Table C76.1:** Installation parameters  
(Pre-positioned anchorage with perforated sleeve FIS H K)

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

**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	$s_{min \parallel} = s_{cr \parallel}$ [mm]													
	255													
	$s_{min \perp} = s_{cr \perp}$													
	240													

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C76.2:** Group factors

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

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

**Annex C 76**

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

**Table C77.1:** Installation parameters  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod		M10	M12	M16
Perforated sleeve FIS H K		18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>				
Max. installation torque	$T_{inst}$	[Nm]	2	
<b>General installation parameters</b>				
Edge distance	$c_{min} = c_{cr}$		60	
Spacing	$s_{min \parallel} = s_{cr \parallel}$	[mm]	255	
	$s_{min \perp} = s_{cr \perp}$		240	
<b>Drilling method</b>				
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	
	$\alpha_{g,V} (s_{min \parallel})$			
	$\alpha_{g,N} (s_{min \perp})$			
	$\alpha_{g,V} (s_{min \perp})$			

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

**Annex C 77**

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## 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 anchorage)

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	

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

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

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

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

3) 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 anchorage)

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

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>2)</sup>**

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

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

2) 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 C 123.

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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 78**

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## 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 anchorage)

<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>

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 C 123.

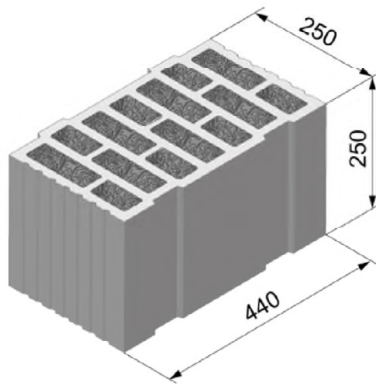
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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under shear loading

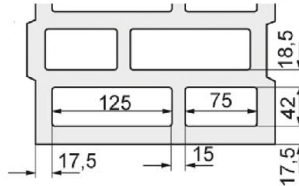
**Annex C 79**

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**Vertical perforated brick HLz, Porotherm 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 B 18

**Table C80.1:** Installation parameters  
(Pre-positioned anchorage 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	11x85	-	-	M10	M12	15x85	-	-	-	-	-	-
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85			16x130		20x85			20x130		20x200	
<b>Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K</b>																
Max. installation torque	max T <sub>inst</sub> [Nm]	2				5	2	5	6							
<b>General installation parameters</b>																
Edge distance	c <sub>min</sub> = c <sub>cr</sub>	60														
Spacing	s <sub>min</sub>	80														
	s <sub>cr</sub>	250														
	s <sub>min</sub> ⊥	80														
	s <sub>cr</sub> ⊥	250														
<b>Drilling method</b>																
Rotary drilling with carbide drill																

**Table C80.2:** 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	11x85	-	-	M10	M12	15x85	-	-	-	-	-	-
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85			16x130		20x85			20x130		20x200	
Group factors	α <sub>g,N</sub> (s <sub>min</sub>   )	1,3														
	α <sub>g,V</sub> (s <sub>min</sub>   )	1,3														
	α <sub>g,N</sub> (s <sub>min</sub> ⊥)	0,8														
	α <sub>g,V</sub> (s <sub>min</sub> ⊥)	1,3														

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**Performance**  
Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool;  
dimensions, installation parameters

**Annex C 80**

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**Vertical perforated brick HLz, PoroTherm W 44, filled with mineral wool,  
EN 771-1:2011+A1:2015**

**Table C81.1:** Installation parameters  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod		M10	M12	M16
Perforated sleeve FIS H K		18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>				
Max. installation torque	max T <sub>inst</sub> [Nm]	5	6	
<b>General installation parameters</b>				
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
<b>Drilling method</b>				
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	α <sub>g,N</sub> (S <sub>min</sub>   )			1,3
	α <sub>g,V</sub> (S <sub>min</sub>   )			1,3
	α <sub>g,N</sub> (S <sub>min</sub> ⊥)			0,8
	α <sub>g,V</sub> (S <sub>min</sub> ⊥)			1,3

fischer injection system FIS V Plus for masonry

**Performance**

Vertical perforated brick HLz, PoroTherm W 44, filled with mineral wool;  
dimensions, installation parameters

**Annex C 81**

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**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 anchorage)

<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	-		-	
<b>Perforated sleeve FIS H K</b>	12x50		12x85		16x85			16x130		20x85			20x130		20x200	

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use con- ditions									
	<b>8 / 6 N/mm<sup>2</sup></b>	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		
<b>10 / 8 N/mm<sup>2</sup></b>	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	
<b>12,5 / 10 N/mm<sup>2</sup></b>	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	

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

2) 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 anchorage)

<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>

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup>**

Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	Use con- ditions			
	<b>8 / 6 N/mm<sup>2</sup></b>	w/w	w/d	1,5
d/d		1,5		
<b>10 / 8 N/mm<sup>2</sup></b>	w/w	w/d	1,5	
	d/d		2,0	
<b>12,5 / 10 N/mm<sup>2</sup></b>	w/w	w/d	2,0	
	d/d		2,0	

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

2) 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 C 123.

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**Performance**

Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool,  
Characteristic resistance under tension loading

**Annex C 82**

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**Vertical perforated brick HLz, Porotherm 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 anchorage)

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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ;  
Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ;  
Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)

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

<sup>1)</sup> The 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 C 123.

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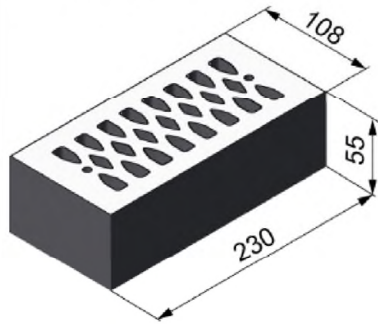
**Performance**

Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool;  
Characteristic resistance under shear loading

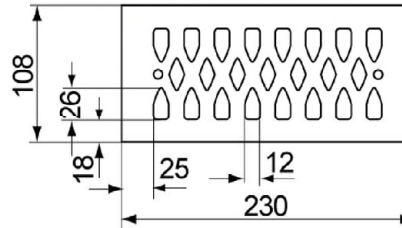
**Annex C 83**

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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
	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 B 18

**Table C84.1: Installation parameters**

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	-	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			20x85		

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

Max. installation torque $\max T_{inst}$ [Nm]	2									
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**General installation parameters**

Edge distance	$c_{min} = c_{cr}$	60								
	$s_{min II}$	80								
	$s_{scr II}$ [mm]	230								
	$s_{min \perp}$	60								
	$s_{scr \perp}$	60								

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C84.2: Group factors**

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	-	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			20x85		

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

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

**Annex C 84**

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## 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	M8	-		M10	M12	-
					11x85				15x85		
Perforated sleeve FIS H K	12x50		12x85		16x85			20x85			
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C) <sup>3)</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	0,30		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 w/w, the characteristic value shall be reduced with the factor 0,64.

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

**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	M8	-		M10	M12	-
					11x85				15x85		
Perforated sleeve FIS H K	12x50		12x85		16x85			20x85			
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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							0,4		
	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							1,2		
	d/d						1,5				
10 / 8 N/mm <sup>2</sup>	w/w	w/d							1,5		
	d/d						2,5				

<sup>1)</sup> The 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

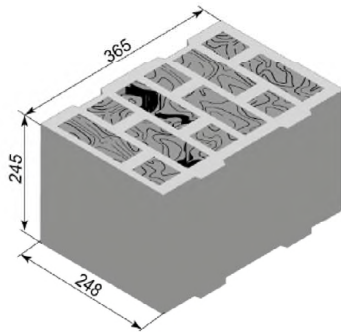
Vertical perforated brick HLz, Characteristic resistance under tension and shear loading

**Annex C 85**

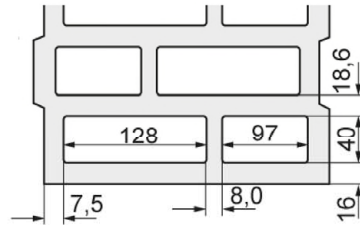
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# Vertical perforated brick filled with mineral wool, EN 771-1:2011+A1:2015



Producer	e.g. Wienerberger			
Nominal dimensions	[mm]	length L	width W	height H
		≥ 365	≥ 248	≥ 245
Mean gross dry density $\rho$	[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 B 19

**Table C86.1:** Installation parameters  
(Pre-positioned anchorage with perforated sleeve FIS H K)

<b>Anchor rod</b>	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
<b>Internal threaded anchor FIS E</b>	-		M6	M8	-		-		M10	M12	-	
			11x85						15x85			
<b>Perforated sleeve FIS H K</b>	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
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**General installation parameters**

Edge distance	$c_{min} = c_{cr}$	100
Spacing	$s_{min \parallel}$	250
	$s_{cr \parallel}$ [mm]	
	$s_{min \perp}$	245
	$s_{cr \perp}$	

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C86.2:** Group factors

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

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

**Annex C 86**  
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## Vertical perforated brick filled with mineral wool, EN 771-1:2011+A1:2015

**Table C87.1:** Installation parameters  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque	max $T_{inst}$ [Nm]	4	
<b>General installation parameters</b>			
Edge distance	$c_{min} = c_{cr}$	100	
Spacing	$s_{min \parallel}$	250	
	$s_{cr \parallel}$ [mm]		
	$s_{min \perp}$	245	
	$s_{cr \perp}$		
<b>Drilling method</b>			
Hammer drilling with hard metal hammer drill			

**Table C87.2:** 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**

Vertical perforated brick filled with mineral wool, dimensions, installation parameters

**Annex C 87**

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## Vertical perforated brick 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 anchorage)

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			

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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	3,0
	d/d	2	2,0	3,0		2,0		2,0	3,0

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) 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 anchorage)

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

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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	

- 1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.  
 2) For temperature range 72/120°C no performance assessed.

Factor for job site tests and displacements see annex C 123.

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### Performance

Vertical perforated brick filled with mineral wool, Characteristic resistance under tension loading

**Annex C 88**

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## Vertical perforated brick 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 anchorage)

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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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
d/d	2,5		3,0	3,0		3,0		1,5		1,5	1,5	1,5	1,5

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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
d/d	3,0		

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

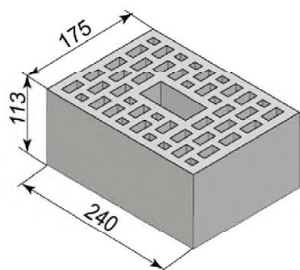
### Performance

Vertical perforated brick filled with mineral wool, Characteristic resistance under shear loading

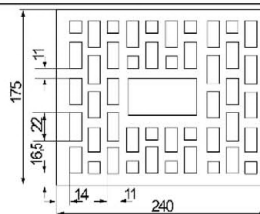
**Annex C 89**

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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
		≥ 240	≥ 175	≥ 113
Mean gross dry density $\rho$	[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 B 19

**Table C90.1:** Installation parameters  
(Pre-positioned anchorage with perforated sleeve FIS H K)

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

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

Max. installation torque	$\max T_{inst}$ [Nm]	2	4
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### General installation parameters

Edge distance	$C_{min} = C_{cr}$	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 compressive strength of the single brick must not be less than 80% of the mean compressive strength.

**Table C90.2:** Group factors

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

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

**Annex C 90**

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

**Table C91.1:** Installation parameters  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	4		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	100		
Spacing	$s_{min \parallel}$	240	
	$s_{cr \parallel}$ [mm]		
	$s_{min \perp}$	115	
	$s_{cr \perp}$		
<b>Drilling method</b>			
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	$\alpha_{g,N} (s_{min \parallel})$	$\alpha_{g,V} (s_{min \parallel})$	2
	$\alpha_{g,N} (s_{min \perp})$	$\alpha_{g,V} (s_{min \perp})$	

fischer injection system FIS V Plus for masonry

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

**Annex C 91**

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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 anchorage)

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	

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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	4,0		4,5		4,5			4,0	
	d/d	4	4,5		5,0		5,0			4,0	

<sup>1)</sup> The 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 anchorage)

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

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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	4,5	
	d/d	5,0	
		4,0	
		4,0	

<sup>1)</sup> The 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 C 123.

fischer injection system FIS V Plus for masonry

**Performance**  
Vertical perforated brick HLz, Characteristic resistance under tension loading

**Annex C 92**

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## 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 anchorage)

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		

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, d/d; (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 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 C 123

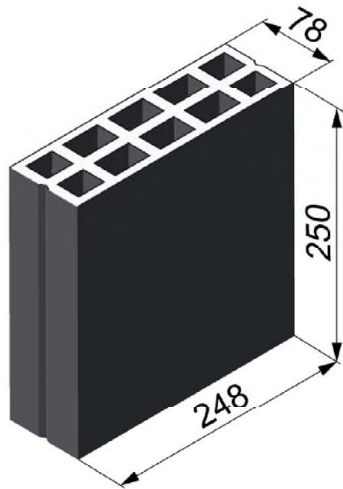
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**Performance**  
Vertical perforated brick HLz, Characteristic resistance under shear loading

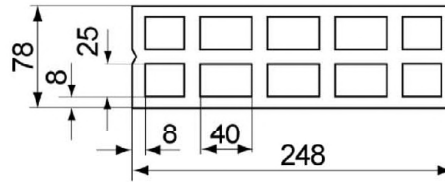
**Annex C 93**

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# 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 B 19

**Table C94.1: Installation parameters**

<b>Anchor rod</b>	<b>M6</b>		<b>M8</b>
<b>Perforated sleeve FIS H K</b>	<b>12x50</b>		
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque	max T <sub>inst</sub> [Nm]	2	
<b>General installation parameters</b>			
Edge distance	c <sub>min</sub> = c <sub>cr</sub>	100	
Spacing	s <sub>min II</sub>	75	
	s <sub>cr II</sub>	250	
	s <sub>min ⊥</sub> = s <sub>cr ⊥</sub>	250	
<b>Drilling method</b>			
Hammer drilling with hard metal hammer drill			

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

**Table C94.2: Group factors**

<b>Anchor rod</b>	<b>M6</b>		<b>M8</b>
<b>Perforated sleeve FIS H K</b>	<b>12x50</b>		
Group factors	α <sub>g,N</sub> (s <sub>min II</sub> )	[-]	1,6
	α <sub>g,V</sub> (s <sub>min II</sub> )		1,1
	α <sub>g,N</sub> (s <sub>min ⊥</sub> )		2,0
	α <sub>g,V</sub> (s <sub>min ⊥</sub> )		

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

**Annex C 94**

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## 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	
<b>Tension resistance <math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>2)</sup></b>			
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	
8 / 6 N/mm <sup>2</sup>	w/w   w/d	1,5	
	d/d	1,5	

<sup>1)</sup> The 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	
<b>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)</b>			
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		
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 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 C 123.

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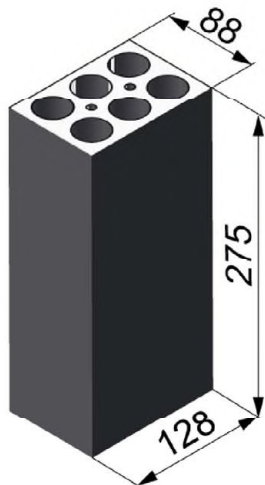
### Performance

Horizontal perforated brick LLz, Characteristic resistance under tension and shear loading

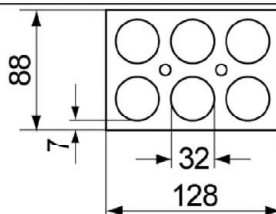
**Annex C 95**

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# Horizontal perforated brick LLz, EN 771-1:2011+A1:2015



Producer	e.g. Ceramica 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> ]	$\geq 0,8$		
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 B 19

**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	$T_{inst}$ [Nm]	2	
General installation parameters			
Edge distance	$c_{min} = c_{cr}$	60	
Spacing	$s_{min \parallel}$	75	
	$s_{cr \parallel}$ [mm]	275	
	$s_{min \perp}$	75	
	$s_{cr \perp}$	130	
Drilling method			
Hammer drilling with hard metal hammer drill			

<sup>1)</sup> The 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

**Annex C 96**  
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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	
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	1,5	
	d/d		

<sup>1)</sup> The 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	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	1,2	
	d/d		

<sup>1)</sup> The 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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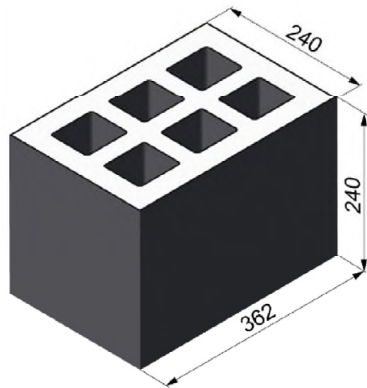
### Performance

Horizontal perforated brick LLz, Characteristic resistance under tension and shear loading

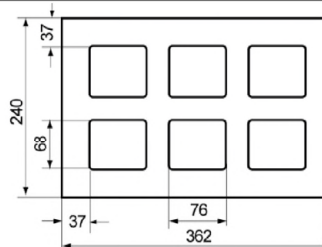
**Annex C 97**

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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> ]	$\geq 1,0$		
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 B 19

**Table C98.1:** Installation parameters (Pre-positioned anchorage 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															
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**General installation parameters**

Edge distance $c_{min} = c_{cr}$	60															
Spacing [mm]	$s_{min \parallel}$															
	100															
	$s_{cr \parallel}$															
362																
$s_{min \perp} = s_{cr \perp}$																
240																

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C98.2:** 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 [-]	$\alpha_{g,N} (s_{min \parallel})$	1,2														
	$\alpha_{g,V} (s_{min \parallel})$	1,1														
	$\alpha_{g,N} (s_{min \perp})$	2,0														
	$\alpha_{g,V} (s_{min \perp})$															

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

**Annex C 98**

**Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015**

**Table C99.1: Installation parameters**  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	2		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	60		
Spacing	$s_{min II}$	100	
	$s_{cr II}$	362	
	$s_{min \perp} = s_{cr \perp}$	240	
<b>Drilling method</b>			
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	$\alpha_{g,N} (s_{min II})$	1,2	
	$\alpha_{g,V} (s_{min II})$	1,1	
	$\alpha_{g,N} (s_{min \perp})$	2,0	
	$\alpha_{g,V} (s_{min \perp})$		

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

**Annex C 99**

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## 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 anchorage)

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			
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	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 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 anchorage)

Anchor rod	M10		M12		M16		
Perforated sleeve FIS H K	18x130/200				22x130/200		
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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					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 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 C 100

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## 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 anchorage)

<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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	2,0
	d/d		

<sup>1)</sup> The 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 anchorage)

<b>Anchor rod</b>	M10	M12	M16
<b>Perforated sleeve FIS H K</b>	18x130/200		22x130/200

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	2,0
	d/d		

<sup>1)</sup> The 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 C 123.

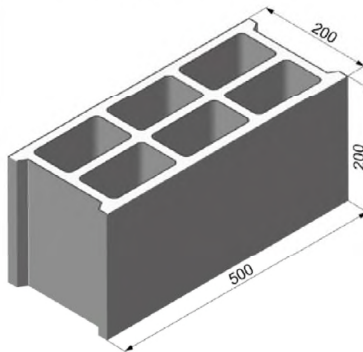
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**Performance**  
Light-weight concrete hollow block Hbl, Characteristic resistance under shear loading

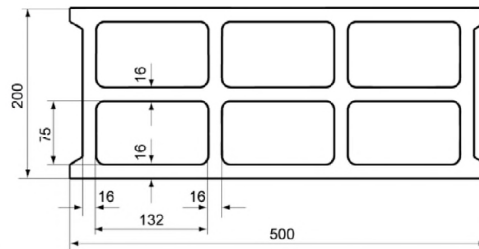
**Annex C 101**

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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> ]	$\geq 1,0$		
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 B 19

**Table C102.1: Installation parameters**

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
<b>Internal threaded anchor FIS E</b>	-	-	M6	M8	M6	M8	-	-	-	-	M10	M12	-	-
			11x85									15x85		
<b>Perforated sleeve FIS H K</b>	12x50	12x85	16x85			16x130	18x130/200		20x85					
<b>Anchor rod and internal threaded anchor FIS E with perforated sleeve FIS H K</b>														
Max. installation torque $\max T_{inst}$ [Nm]	1				2									
<b>General installation parameters</b>														
Edge distance $c_{min} = c_{cr}$					100									
Spacing $s_{min \parallel} = s_{cr \parallel}$					500									
					200									

**Drilling method**

Hammer drilling with hard metal hammer drill

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

**Table C102.2: Group factors**

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
<b>Internal threaded anchor FIS E</b>	-	-	M6	M8	M6	M8	-	-	-	-	M10	M12	-	-
			11x85									15x85		
<b>Perforated sleeve FIS H K</b>	12x50	12x85	16x85			16x130	18x130/200		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**  
Light-weight concrete hollow block Hbl, dimensions, installation parameters

**Annex C 102**

# 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			

**Tension resistance  $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 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 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			

**Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 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 C 123.

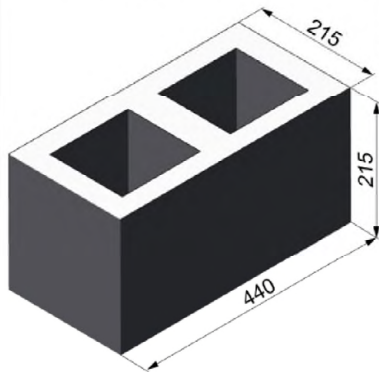
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**Performance**  
Light-weight concrete hollow block Hbl,  
Characteristic resistance under tension and shear loading

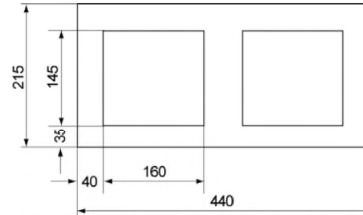
**Annex C 103**

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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> ]	$\geq 1,2$		
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 B 20

**Table C104.1: Installation parameters**  
(Pre-positioned anchorage with perforated sleeve FIS H K)

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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	

## 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	$s_{min II}$	100													
	$s_{cr II}$ [mm]	440													
	$s_{min \perp}$	100													
	$s_{cr \perp}$	215													

## Drilling method

Hammer drilling with hard metal hammer drill

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

**Table C104.2: Group factors**

<b>Anchor rod</b>	M6	M8	M6	M8	-	M8	M10	M8	M10	-	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		
Group factors	$\alpha_{g,N} (s_{min II})$	1,4													
	$\alpha_{g,V} (s_{min II})$	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

**Annex C 104**

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# Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015

## Table C105.1: Installation parameters

(Push through anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	2		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	110		
$s_{min \parallel}$	100		
Spacing $s_{cr \parallel}$ [mm]	440		
$s_{min \perp}$	100		
$s_{cr \perp}$	215		
<b>Drilling method</b>			
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		

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### Performance

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

**Annex C 105**

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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 anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
Internal threaded anchor FIS E	-	-	M6	M8	11x85	-	-	-	-	-	-	M10	M12	-
Perforated sleeve FIS H K	12x50	12x85	16x85			16x130	18x130/200		20x85					
Tension resistance $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	0,9			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 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 anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
Tension resistance $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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
8 / 6 N/mm <sup>2</sup>	w/w	w/d	2,0
	d/d		2,0
10 / 8 N/mm <sup>2</sup>	w/w	w/d	2,5
	d/d		3,0
12,5 / 10 N/mm <sup>2</sup>	w/w	w/d	3,0
	d/d		3,5

<sup>1)</sup> The 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 C 123.

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### Performance

Light-weight concrete hollow block Hbl, Characteristic resistance under tension loading

### Annex C 106

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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 anchorage)

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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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										1,20
	d/d															
8 / 6 N/mm <sup>2</sup>	w/w   w/d	1,20	2,00	1,20	2,00	1,20										2,00
	d/d															
10 / 8 N/mm <sup>2</sup>	w/w   w/d	1,50	2,50	1,50	2,50	1,50										2,50
	d/d															
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	2,00	3,00	2,00	3,00	2,00										3,00
	d/d															

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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													
8 / 6 N/mm <sup>2</sup>	w/w   w/d													2,0
	d/d													
10 / 8 N/mm <sup>2</sup>	w/w   w/d													2,5
	d/d													
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d													3,0
	d/d													

<sup>1)</sup> The 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 C 123.

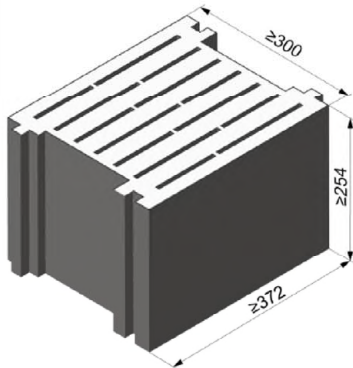
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**Performance**  
Light-weight concrete hollow block Hbl, Characteristic resistance under shear loading

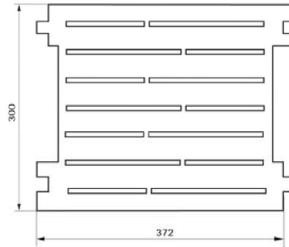
**Annex C 107**

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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 $\rho$	[kg/dm <sup>3</sup> ]	≥ 0,6		
Mean compressive strength / Min. compressive strength single brick <sup>1)</sup>	[N/mm <sup>2</sup> ]	2,5 / 2		
Standard or annex	EN 771-3:2011+A1:2015			



Dimension see also Annex B 20

**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
<b>Anchor rod with perforated sleeve FIS H K</b>									
Max. installation torque	max T <sub>inst</sub> [Nm]		4						
<b>General installation parameters</b>									
Edge distance	c <sub>min</sub> = c <sub>cr</sub>		130						
Spacing	s <sub>min</sub>    = s <sub>cr</sub>    [mm]		370						
	s <sub>min</sub> ⊥ = s <sub>cr</sub> ⊥		250						

## Drilling method

Hammer drilling with hard metal hammer drill

<sup>1)</sup> The 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	$\alpha_{g,N} (s_{min}   )$		[-]						
	$\alpha_{g,V} (s_{min}   )$								
	$\alpha_{g,N} (s_{min} \perp)$								
	$\alpha_{g,V} (s_{min} \perp)$								
2									

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**Performance**  
Light-weight concrete solid block Vbl, dimensions, installation parameters

**Annex C 108**

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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
Tension resistance $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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 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 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	
Shear resistance $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}$ [kN] depending on the mean compressive strength $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	4,5				6,5			
	d/d									

<sup>1)</sup> The 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 C 123.

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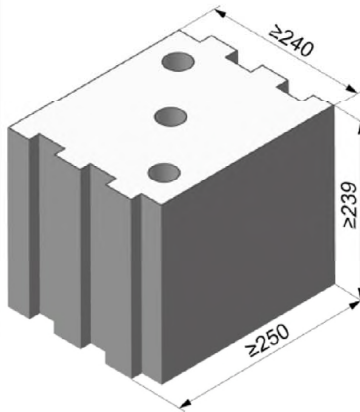
### Performance

Light-weight concrete solid block Vbl,  
Characteristic resistance under tension and shear loading

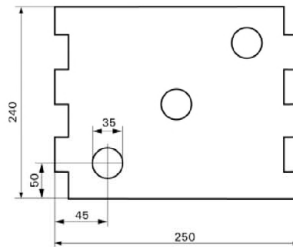
**Annex C 109**

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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 $\rho$	[kg/dm <sup>3</sup> ]	≥ 1,6		
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 771-3:2011+A1:2015		



Dimension see also Annex B 20

**Table C110.1: Installation parameters**  
(Pre-positioned anchorage 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]	4															
<b>General installation parameters</b>																
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 compressive strength of the single brick must not be less than 80% of the mean compressive strength.

**Table C110.2: 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	$\alpha_{g,N} (S_{min \parallel})$	[-]														
	$\alpha_{g,V} (S_{min \parallel})$															
	$\alpha_{g,N} (S_{min \perp})$															
	$\alpha_{g,V} (S_{min \perp})$															
2,0																

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**Performance**  
Light-weight concrete solid block Vbl, dimensions, installation parameters

**Annex C 110**

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# Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015

**Table C111.1: Installation parameters**  
(Push through anchorage with perforated sleeve FIS H K)

Anchor rod	M10	M12	M16
Perforated sleeve FIS H K	18x130/200		22x130/200
<b>Anchor rod with perforated sleeve FIS H K</b>			
Max. installation torque $\max T_{inst}$ [Nm]	2,0		
<b>General installation parameters</b>			
Edge distance $c_{min} = c_{cr}$	130		
Spacing $s_{min}$ [mm]	$s_{min \parallel} = s_{cr \parallel}$		
	$s_{min \perp} = s_{cr \perp}$		
<b>Drilling method</b>			
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	[-]		2,0
	$\alpha_{g,N} (s_{min \parallel})$		
	$\alpha_{g,V} (s_{min \parallel})$		
	$\alpha_{g,N} (s_{min \perp})$		
	$\alpha_{g,V} (s_{min \perp})$		

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**Performance**  
Light-weight concrete solid block Vbl, dimensions, installation parameters

**Annex C 111**

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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 anchorage)

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		

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	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 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 anchorage)

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

**Tension resistance  $N_{RK} = N_{RK,p} = N_{RK,b} = N_{RK,p,c} = N_{RK,b,c}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	2,5		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 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 C 123.

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### Performance

Light-weight concrete solid block Vbl, Characteristic resistance under tension loading

**Annex C 112**

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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 anchorage)

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	

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	2,0	3,0	2,0	3,0	2,0	3,5				4,5			
	d/d													
8 / 6 N/mm <sup>2</sup>	w/w   w/d	3,0	4,5	3,0	4,5	3,0	5,5				6,5			
	d/d													
10 / 8 N/mm <sup>2</sup>	w/w   w/d	4,0	6,0	4,0	6,0	4,0	7,0				8,5			
	d/d													

<sup>1)</sup> The 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 anchorage)

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

Shear resistance  $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$  [kN] depending on the mean compressive strength  $f_b$ ; Installation and use condition w/w, w/d, d/d; (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	3,5				4,5			
	d/d								
8 / 6 N/mm <sup>2</sup>	w/w   w/d	5,5				6,5			
	d/d								
10 / 8 N/mm <sup>2</sup>	w/w   w/d	7,0				8,5			
	d/d								

<sup>1)</sup> The 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 C 123.

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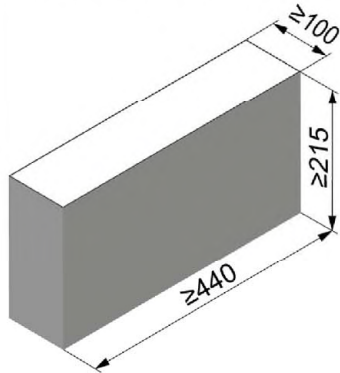
**Performance**  
Light-weight concrete solid block Vbl, Characteristic resistance under shear loading

**Annex C 113**

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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 $\rho$	[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		
<b>Anchor rod without perforated sleeve</b>											
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							
<b>General installation parameters</b>											
Edge distance $c_{min} = c_{cr}$		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 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

**Annex C 114**

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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>Tension resistance <math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (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]				
		≥ 50				
5 / 4 N/mm <sup>2</sup>	w/w   w/d	1,2			1,2	
	d/d	2,0			2,0	
8 / 6 N/mm <sup>2</sup>	w/w   w/d	1,5			2,0	
	d/d	3,0			3,5	
10 / 8 N/mm <sup>2</sup>	w/w   w/d	2,0			2,5	
	d/d	4,0			4,5	
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	3,0			3,5	
	d/d	5,0			5,5	

<sup>1)</sup> The 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>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,I}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (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]				
		≥ 50				
5 / 4 N/mm <sup>2</sup>	w/w   w/d	1,2	1,5	1,5	1,5	1,5
	d/d					
8 / 6 N/mm <sup>2</sup>	w/w   w/d	2,0	2,0	2,5	2,5	2,5
	d/d					
10 / 8 N/mm <sup>2</sup>	w/w   w/d	2,5	2,5	3,0	3,0	3,5
	d/d					
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	3,0	3,5	4,0	4,0	4,5
	d/d					

<sup>1)</sup> The 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 C 123.

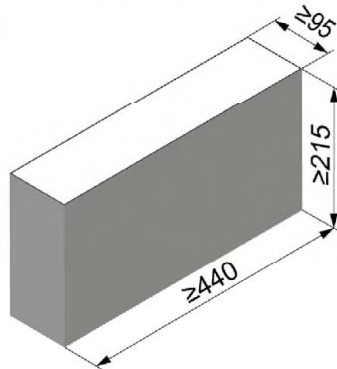
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**Performance**  
Light-weight concrete solid block Vbl,  
Characteristic resistance under tension and shear loading

**Annex C 115**

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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 $\rho$	[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		
<b>Anchor rod without perforated sleeve</b>											
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							
<b>General installation parameters</b>											
Edge distance $c_{min} = c_{cr}$		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 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

# 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					
<b>Tension resistance <math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (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]									
		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

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

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

**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
<b>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}</math> [kN] depending on the mean compressive strength <math>f_b</math>; Installation and use condition w/w, w/d, d/d; (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]				
		≥ 50				
7,5 / 6 N/mm <sup>2</sup>	w/w   w/d	2,0	2,0	2,0	1,5	1,5
	d/d					
10 / 8 N/mm <sup>2</sup>	w/w   w/d	2,5	2,5	3,0	2,5	2,5
	d/d					
12,5 / 10 N/mm <sup>2</sup>	w/w   w/d	3,5	3,5	4,0	3,0	3,0
	d/d					
15 / 12 N/mm <sup>2</sup>	w/w   w/d	4,0	4,0	4,5	3,5	3,5
	d/d					

1) The 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 C 123.

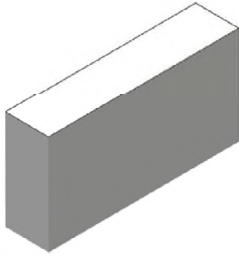
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**Performance**  
Light-weight concrete solid block Vbl,  
Characteristic resistance under tension and shear loading

**Annex C 117**

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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	M8	M10	M12
	11x85		15x85						

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

Effective anchorage depth $h_{ef}$	[mm]	100	200	100	200	100	200	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
$h_{ef}=200mm$ $s_{min \parallel}$ [mm]		80
$h_{ef}=200mm$ $s_{cr \parallel}$		3x $h_{ef}$
Spacing $s_{cr \perp} = s_{min \perp}$		250
$h_{ef}=200mm$ $s_{min \perp}$		80
$h_{ef}=200mm$ $s_{cr \perp}$		3x $h_{ef}$

**Drilling method**

Hammer drilling with hard metal hammer drill

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

fischer injection system FIS V Plus for masonry

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

**Annex C 118**

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**Table C119.1: Group factors for autoclaved aerated concrete**  
(Compressive strength  $f_b = 2 \text{ N/mm}^2$ )

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor FIS E	-	-	-	-	-	M6	M8	M10	M12
						11x85		15x85	
Group factors	[-]	$h_{ef}=200 \alpha_{g,N} (S_{min II})$	1,6			-1)	-1)		
		$h_{ef}=200 \alpha_{g,V} (S_{min II})$	1,1			-1)	-1)		
		$\alpha_{g,N II}, \alpha_{g,V} (S_{min II})$	2						
		$h_{ef}=200 \alpha_{g,N} (S_{min \perp})$	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						

1) No performance assessed.

**Table C119.2: Group factors for autoclaved aerated concrete**  
(Compressive strength  $f_b = 4 \text{ N/mm}^2$ )

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor FIS E	-	-	-	-	-	M6	M8	M10	M12
						11x85		15x85	
Group factors	[-]	$h_{ef}=200 \alpha_{g,N} (S_{min II})$	0,7			-1)	-1)		
		$h_{ef}=200 \alpha_{g,V} (S_{min II})$	2,0			-1)	-1)		
		$\alpha_{g,N II}, \alpha_{g,V} (S_{min II})$	2						
		$h_{ef}=200 \alpha_{g,N} (S_{min \perp})$	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						

1) No performance assessed.

**Table C119.3: Group factors for autoclaved aerated concrete**  
(Compressive strength  $f_b = 6 \text{ N/mm}^2$ )

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor FIS E	-	-	-	-	-	M6	M8	M10	M12
						11x85		15x85	
Group factors	[-]	$h_{ef}=200 \alpha_{g,N} (S_{min II})$	0,7			-1)	-1)		
		$h_{ef}=200 \alpha_{g,V} (S_{min II})$	2,0			-1)	-1)		
		$\alpha_{g,N II}, \alpha_{g,V} (S_{min II})$	2						
		$h_{ef}=200 \alpha_{g,N} (S_{min \perp})$	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						

1) No performance assessed.

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**Performance**  
Autoclaved aerated concrete (cylindrical drill hole), Group factors

**Annex C 119**

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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	M8	M10	M12	
											11x85		15x85		
<b>Tension resistance <math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN] depending on the mean compressive strength <math>f_{c,m}</math>; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C)<sup>3)</sup></b>															
Mean compressive strength / Min. compressive strength single brick <sup>2)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [mm]												85	
		100	200	100	200	100	200	100	200	100	200	100	200		
2,5 / 2 N/mm <sup>2</sup>	w/w	w/d	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	
5 / 4 N/mm <sup>2</sup>	w/w	w/d	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	
8 / 6 N/mm <sup>2</sup>	w/w	w/d	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	

1) No performance assessed.

2) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

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

**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	M8	M10	M12	
											11x85		15x85		
<b>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}</math> [kN] depending on the mean compressive strength <math>f_{c,m}</math>; Installation and use condition w/w, w/d, d/d; (temperature range 50/80°C and 72/120°C)</b>															
Mean compressive strength / Min. compressive strength single brick <sup>2)</sup>	Use conditions	Effective anchorage depth $h_{ef}$ [mm]												85	
		100	200	100	200	100	200	100	200	100	200	100	200		
2,5 / 2 N/mm <sup>2</sup>	w/w	w/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	
	d/d														
5 / 4 N/mm <sup>2</sup>	w/w	w/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	
	d/d														
8 / 6 N/mm <sup>2</sup>	w/w	w/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	
	d/d														

1) No performance assessed.

2) The 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 C 123.

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### Performance

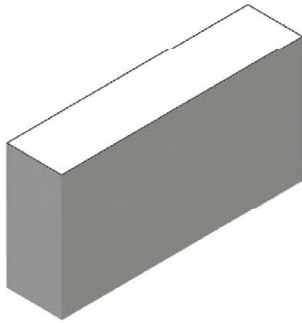
Autoclaved aerated concrete (cylindrical drill hole),  
Characteristic resistance under tension and shear loading

**Annex C 120**

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

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**Performance**

Autoclaved aerated concrete (conical drill hole with special drill bit PBB),  
dimensions, installation parameters

**Annex C 121**

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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
<b>Tension resistance <math>N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}</math> [kN] depending on the mean compressive strength <math>f_{c,m}</math>; Installation and use condition w/w, w/d, d/d; (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]						
		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

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

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

**Table C122.2:** Characteristic resistance under shear loading

Anchor rod		M8		M10		M12		-
Internal threaded anchor FIS E		-	-	-	-	-	-	M6   M8 11x85
<b>Shear resistance <math>V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}</math> [kN] depending on the mean compressive strength <math>f_{c,m}</math>; Installation and use condition w/w, w/d, d/d; (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]						
		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							

1) The 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 C 123.

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**Performance**

Autoclaved aerated concrete (conical drill hole with special drill bit PBB),  
Characteristic resistance under tension and shear loading

**Annex C 122**

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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				
solid units	M6	0,55	0,46	0,96	0,80
	M8	0,57	0,51		
	M10	0,59	0,52		
	M12 FIS E 11x85	0,60	0,54		
	M16 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 cylindrical drill hole	all sizes	0,73	0,73	0,81	0,81
Autoclaved aerated concrete conical drill hole	all sizes	0,66	0,59	0,73	0,66

**Table C123.2: Displacements**

Material	N [kN]	δN <sub>0</sub> [mm]	δN <sub>∞</sub> [mm]	V [kN]	δV <sub>0</sub> [mm]	δV <sub>∞</sub> [mm]
solid units and autoclaved aerated concrete h <sub>ef</sub> =100mm	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,03	0,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	0,82	0,88
hollow units	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,48	0,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	1,71	2,56
solid brick Mz NF annex C 4 - C 7	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,74	1,48	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	1,23	1,85
solid brick KS NF annex C 14 / C 15	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,20	0,40	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	0,91	1,37
AAC h <sub>ef</sub> =200 mm annex C 118 - C 120	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	1,03	2,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	1,25	1,88
brick Annex C 101 / C 102	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,03	0,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	6,44	9,66

For anchorage in autoclaved aerated concrete, 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 C 123**

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# Fire resistance under tension and shear loading

**Table C124.1: Fire resistance under tension and shear loading**

Brick	Solid brick Mz,NF, acc. to Annex C 4			Solid calcium silicate brick KS, NF,acc. to Annex C 14			Perforated calcium silicate brick KSL, acc to Annex C 24			Vertical perforated brick HLz, acc to Annex C 30			Vertical perforated brick HLz, acc to Annex C 28		
	Mean compressive strength / Min. compressive strength single brick <sup>3)</sup>	≥ 15 / ≥ 12			≥ 15 / ≥ 12			≥ 10 / ≥ 8			≥ 7,5 / ≥ 6			≥ 5 / ≥ 4	
Size	M8	M10	M12	M8	M10	M12	M8	M10	M12	M8	M10	M12	M8	M10	M12
Perforated Sleeve	-			-			16x130		20x130	16x85		20x85	16x130		20x130
Perforated Sleeve for bridging of unbearing layer	-			-			-		20x200	16x130		20x130	-		20x200
h <sub>ef</sub>	[mm] ≥ 80			≥ 50			≥ 130		≥ 130	≥ 85		≥ 85	≥ 130		≥ 130

## Characteristic resistance to failure under tension loading

N <sub>Rk,s,fi</sub> = N <sub>Rk,p,fi</sub> = N <sub>Rk,b,fi</sub> <sup>2)</sup>	R30	[kN]	0,82	0,32	1,07	1,09	1,10	0,28	0,30	0,35	0,31	
	R60		0,73	0,31	0,66	0,61	0,56	0,19	0,22	0,22	0,22	0,22
	R90		0,64	0,29	0,25	0,13	- <sup>1)</sup>	0,10	0,10	0,10	0,10	0,13
	R120		0,59	0,28	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>

## Characteristic resistance to failure under shear loading <sup>2)</sup>

### without lever arm

V <sub>Rk,s,fi</sub>	R30	[kN]	0,82	0,32	1,07	1,09	1,10	0,28	0,30	0,35	0,31
	R60		0,73	0,31	0,66	0,61	0,56	0,19	0,22	0,22	0,22
	R90		0,64	0,29	0,25	0,13	- <sup>1)</sup>	0,10	0,10	0,10	0,13
	R120		0,59	0,28	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>

### with lever arm

M <sup>0</sup> <sub>Rk,s,fi</sub>	R30	[Nm]	0,83	1,05	1,27	0,33	0,42	0,50	1,09	1,40	1,71	0,29	0,39	0,54	0,32	0,40	0,48
	R60		0,74	0,93	1,13	0,31	0,39	0,47	0,67	0,78	0,86	0,19	0,28	0,34	0,22	0,28	0,34
	R90		0,65	0,82	0,99	0,29	0,37	0,44	0,26	0,17	- <sup>1)</sup>	0,10	0,12	0,15	0,13	0,16	0,20
	R120		0,60	0,76	0,92	0,28	0,35	0,43	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>

## General installation Parameters

Edge distance and spacing	C <sub>cr,fi</sub>	[mm]	100	60	80	80	100
	S <sub>cr,fi</sub>		320	200	520	340	520

1) No performance assessed.

2) V<sub>Rk,b,fi</sub> = N<sub>Rk,b,fi</sub>.

3) The 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 γ<sub>M,fi</sub> = 1,0.

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### Performance

Fire resistance to failure under tension and shear loading; Fire resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

**Annex C 124**

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