

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

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according to
Article 29 of Regula-
tion (EU) No 305/2011
and member of EOTA
(European Organi-
sation for Technical
Assessment)
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★ ★

European Technical Assessment

ETA-11/0384
of 8 April 2022

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Trade name of the construction product

Product family
to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment
contains

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

This version replaces

Deutsches Institut für Bautechnik

BERNER multicompound system MCS Uni Plus
for masonry

Metal Injection anchors for use in masonry

Berner Trading Holding GmbH
Bernerstraße 6
74653 Künzelsau
DEUTSCHLAND

Berner Herstellwerk 6
Berner manufacturing plant 6

139 pages including 3 annexes which form an integral
part of this assessment

EAD 330076-00-0604, Edition 11/2017

ETA-11/0384 issued on 18 November 2015

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Specific Part**1 Technical description of the product**

The BERNER multicompound system MCS Uni Plus for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with BERNER injection mortar MCS Uni Plus, MCS Uni Plus WE or MCS Uni Plus S, a perforated sleeve and an anchor rod with hexagon nut and washer or an internal threaded anchor 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 anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment**3.1 Mechanical resistance and stability (BWR 1)**

Essential characteristic	Performance
Characteristic values for resistance	See Annexes B 20, C 1 to C 110
Displacements	See Annex C 110
Durability	See annex B 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.3 Hygiene, health and the environment (BWR 3)

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

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

In accordance with the European Assessment Document EAD 330076-00-0604 the applicable European legal act is: [97/177/EC].

The system to be applied is: 1

European Technical Assessment

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English translation prepared by DIBt

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5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 8 April 2022 by Deutsches Institut für Bautechnik

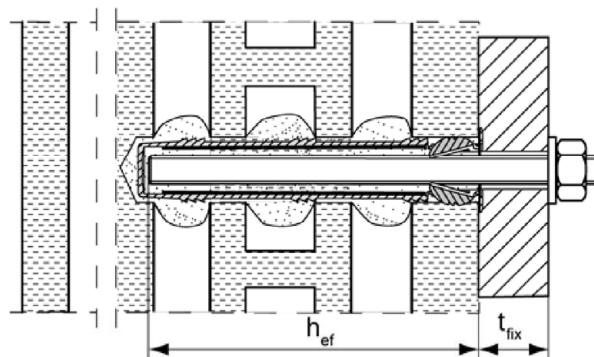
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Baderschneider

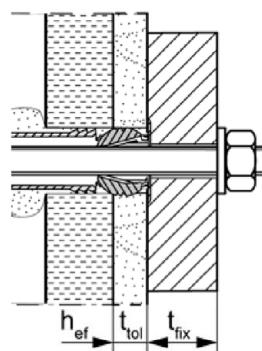
Installation conditions part 1

Anchor rods with perforated sleeve MCS PLUS H; Installation in perforated and solid brick masonry

Pre-positioned anchorage:

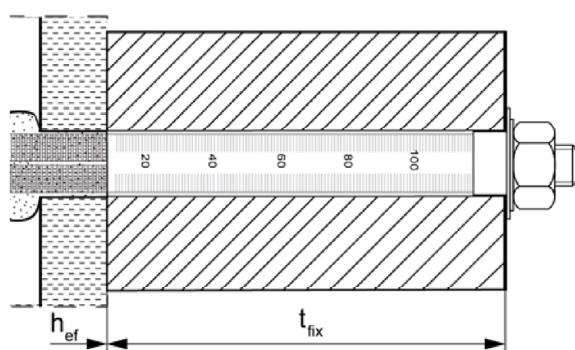


Installation with render bridge

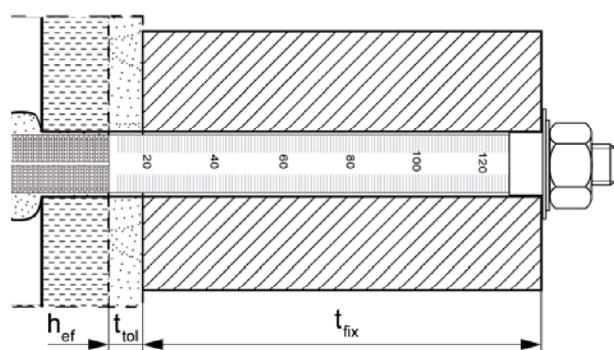


Size of the perforated sleeve: MCS PLUS H 12x50 MCS PLUS H 16x85 MCS PLUS H 20x85 MCS PLUS H 20x200
MCS PLUS H 12x85 MCS PLUS H 16x130 MCS PLUS H 20x130

Push through anchorage:



Installation with render bridge

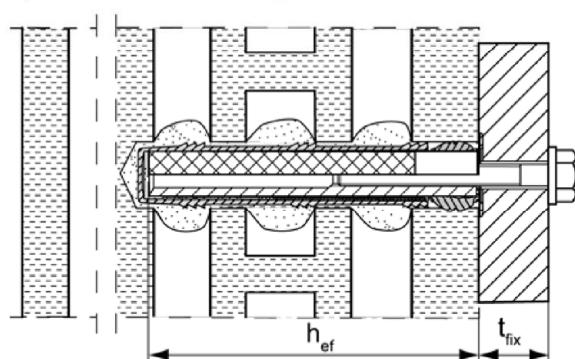


Size of the perforated sleeve: MCS PLUS H 18x130/200

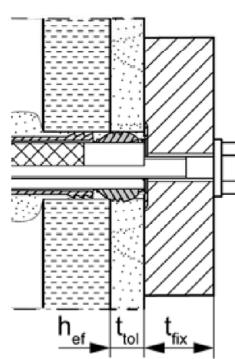
MCS PLUS H 22x130/200

Internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H; Installation in perforated and solid brick masonry

Pre-positioned anchorage:



Installation with render bridge



Pictures not to scale

h_{ef} = effective anchorage depth

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

t_{fix} = thickness of fixture

BERNER multicompound system MCS Uni Plus for masonry

Product description

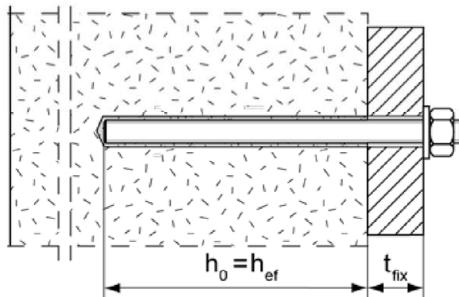
Installation conditions part 1,
Anchor rods and internal threaded anchor with perforated sleeve

Annex A 1

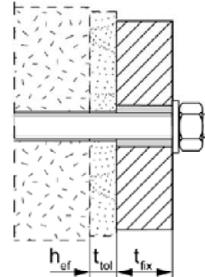
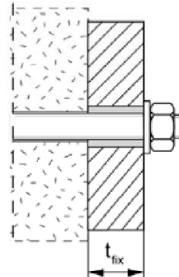
Installation conditions part 2

Anchor rods without perforated sleeve MCS PLUS H;
installation in solid brick masonry and autoclaved aerated concrete

Pre-positioned anchorage:



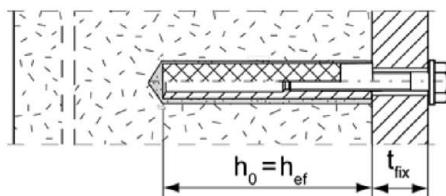
Push through anchorage: Annular gap filled with mortar



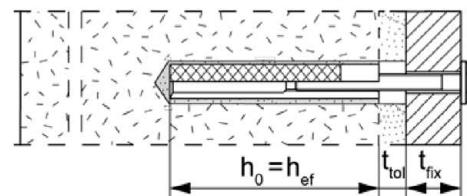
Installation with render bridge

Internal threaded anchors MCS PLUS E without perforated sleeve MCS PLUS H;
installation in solid brick masonry and autoclaved aerated concrete

Pre-positioned anchorage:



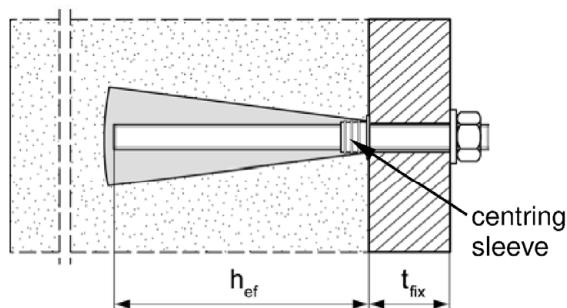
Installation with render bridge



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

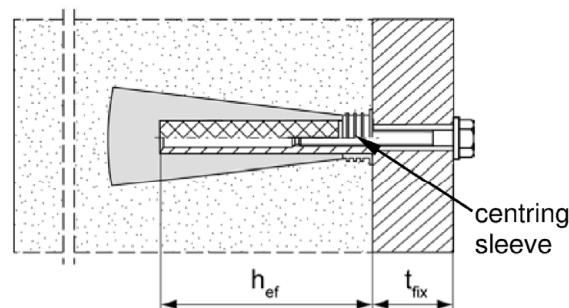
Pre-positioned anchorage:

anchor rods M8, M10, M12



Pre-positioned anchorage:

Internal threaded anchor MCS PLUS E 11x85 M6 / M8



Pictures 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

BERNER multicompound system MCS Uni Plus for masonry

Product description

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

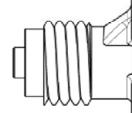
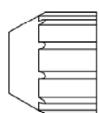
Annex A 2

Overview system components part 1

Mortar cartridge (shuttle cartridge) with sealing cap

1

Sizes: 360 ml, 825 ml



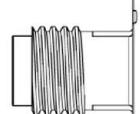
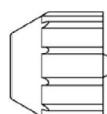
Imprint: MCS Uni Plus or MCS Uni Plus WE or MCS Uni Plus S, processing notes, shelf-life, hazard code, piston travel scale (optional), curing time and processing time (depending on temperature), size, volume



Mortar cartridge (coaxial cartridge) with sealing cap

1

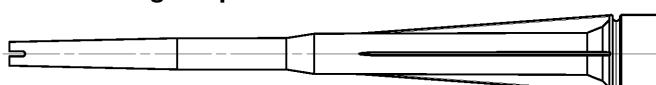
Sizes: 100 ml, 150 ml, 300 ml, 380 ml, 400 ml, 410 ml



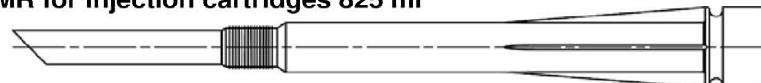
Imprint: MCS Uni Plus or MCS Uni Plus WE or MCS Uni Plus S, processing notes, shelf-life, hazard code, piston travel scale (optional), curing time and processing time (depending on temperature), size, volume



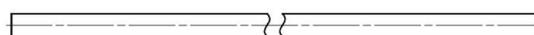
Static mixer MCS Uni Plus for injection cartridges up to 410 ml



Static mixer MCS Plus MJMR for injection cartridges 825 ml



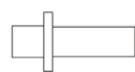
Extension tube Ø 9 for static mixer MCS Uni Plus; Extension tube Ø 9 oder Ø 15 for static mixer MCS Plus M



Centering sleeve for aerated concrete



Injection adapter



Cleaning brush BERNER



BERNER multicomponent system MCS Uni Plus for masonry

Product description

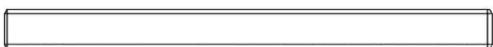
Overview system components part 1: cartridge / static mixer / cleaning tool

Annex A 3

Overview system components part 2

BERNER anchor rod

(2)



Size: M6, M8, M10, M12, M16

Internal threaded anchor MCS PLUS E

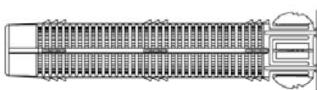
(5)



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

Perforated sleeve MCS PLUS H

(7)



Size: MCS PLUS H 12x50
MCS PLUS H 12x85
MCS PLUS H 16x85
MCS PLUS H 20x85

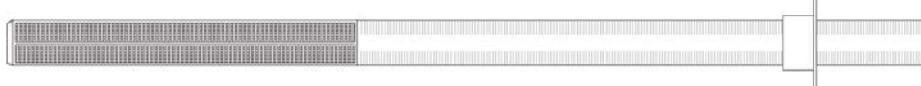
(7)



Size: MCS PLUS H 16x130 K
MCS PLUS H 20x130 K
MCS PLUS H 20x200 K

Perforated sleeve MCS PLUS H (push through anchorage)

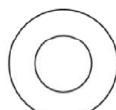
(7)



Size:
MCS PLUS H 18x130/200
MCS PLUS H 22x130/200

Washer

(3)



Hexagon nut

(4)



Blow-out pump



compressed-air cleaning tool



Pictures not to scale

BERNER multicomponent system MCS Uni Plus for masonry

Product description

Overview system components part 2: steel parts / perforated sleeve, cleaning tools

Annex A 4

Table A5.1: Materials

Part	Designation	Material		
1	Mortar cartridge	Mortar, hardener; filler		
		Steel zinc plated	Stainless steel R acc. to EN 10088-1:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015	High corrosion-resistant steel HCR 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 $\geq 5\mu\text{m}$, EN ISO 4042:2018 Zn5/An(A2K) 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 $\geq 5\mu\text{m}$, EN ISO 4042:2018 Zn5/An(A2K) 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 $\geq 5\mu\text{m}$, EN ISO 4042:2018 Zn5/An(A2K) 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 MCS PLUS E	Property class 5.8; EN 10277-1:2018 zinc plated $\geq 5\mu\text{m}$, EN ISO 4042:2018 Zn5/An(A2K)	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 MCS PLUS E	Property class 5.8 or 8.8; EN ISO 898-1:2013 zinc plated $\geq 5\mu\text{m}$, EN ISO 4042:2018 Zn5/An(A2K)	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	PP / PE		
BERNER multicomponent system MCS Uni Plus for masonry				
Product description Materials				Annex A 5

Specifications of intended use part 1

Table B1.1: Overview installation and use

Anchorage subject to		MCS Uni Plus for masonry	
Hole drilling with hammer drill mode 		all bricks; without C28 to C48, C75 to C78	
Hole drilling with rotary drill mode 		all bricks	
Static and quasi static load, in masonry		all bricks	
Use conditions	dry or wet masonry	all bricks	
Installation	Pre-positioned anchorage	Anchor rod or internal threaded anchor (in solid brick masonry and autoclaved aerated concrete)	Perforated sleeve with anchor rod or internal threaded anchor (in perforated and solid brick masonry) Size: MCS PLUS H 12x50 MCS PLUS H 12x85 MCS PLUS H 16x85 MCS PLUS H 16x130 MCS PLUS H 20x85 MCS PLUS H 20x130 MCS PLUS H 20x200
	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: MCS PLUS H 18x130/200 MCS PLUS H 22x130/200
Installation and use conditions	condition d/d	all bricks	
	condition w/d		
	condition w/w		
Installation temperature	$T_{i,min} = 0 \text{ }^\circ\text{C}$ bis $T_{i,max} = +40 \text{ }^\circ\text{C}$		
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)
BERNER multicomponent system MCS Uni Plus for masonry			
Intended Use Specifications part 1			Annex B 1

Specifications of intended use part 2

Anchorage subject to:

- Static and quasi-static loads

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 $h_{\text{eff}}+30\text{mm}$ applies
- 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 according to EOTA Technical Report TR 053:2016-04, Annex B under consideration of the β -factor according to Annex C 110, Table C110.1

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

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

Temperature Range:

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

Use conditions (Environmental conditions):

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

Note: Particularly aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used)

BERNER multicompound system MCS Uni Plus for masonry

Intended Use
Specifications part 2

Annex B 2

Specifications of intended use part 2 continued

Design:

- The anchorages have to be designed in accordance with EOTA Technical Report TR 054:2016-04, Design method A under the responsibility of an engineer experienced in anchorages and masonry work. Applies to all bricks, if no other values are specified:

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

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

For the Calculation of pulling out a brick under tension loading $N_{Rk,pb}$ or pushing out a brick under shear loading $V_{Rk,pb}$ see EOTA Technical Report TR 054:2016-04.

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

Factors for job site tests and displacements see Annex C110

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

Installation:

- Condition d/d: - Installation and use in dry structures
- Condition w/w: - Installation and use in dry and wet structures
- Condition w/d: - Installation in wet structures and use in dry structures
- Hole drilling see Annex C (drilling method)
- In case of aborted hole: The hole shall be filled with mortar
- Bridging of unbearing layer (e.g. plaster) at perforated brick masonry see Annex B 6, Table B6.1
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Fastening screws or anchor rods (including nut and washer) must comply with the appropriate material and property class of the internal threaded anchor MCS PLUS E.
- minimum curing time see Annex B 8, Table B8.2
- Commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:

Material dimensions and mechanical properties of the metal parts according to the specifications are given in Annex A 5, Table 5.1

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

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

BERNER multicompound system MCS Uni Plus for masonry

Intended Use
Specifications part 2 continued

Annex B 3

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 $h_{\text{ef}}^{(1)}$ in AAC cylindrical drill hole	$h_{0,\text{min}}=h_{\text{ef,min}}$ [mm] $h_{0,\text{max}}=h_{\text{ef,max}}$ [mm]			100		
Effective anchorage depth $h_{\text{ef}}^{(1)}$ in AAC conical drill hole	h_0 [mm] $h_{\text{ef},1}$ [mm] $h_{\text{ef},2}$ [mm]	-		$h_{\text{ef}} + 5$ 75 95		-
Effective anchorage depth $h_{\text{ef}}^{(1)}$ in solid brick (depth of drill hole $h_0 = h_{\text{ef}}$)	$h_{\text{ef,min}}$ [mm] $h_{\text{ef,max}}$ [mm]			50		
Diameter of clearance hole in the fixture	pre-position $d_f \leq$ [mm] push through $d_f \leq$ [mm]	7 9	9 11	12 14	14 16	18 20
Diameter of cleaning brush	$d_b \geq$ [mm]				see Table B8.1	
Maximum installation torque	T_{inst} [Nm]				see parameters of brick Annex C	

⁽¹⁾ $h_{\text{ef,min}} \leq h_{\text{ef}} \leq h_{\text{ef,max}}$ is possible.

BERNER anchor rods M6, M8, M10, M12, M16

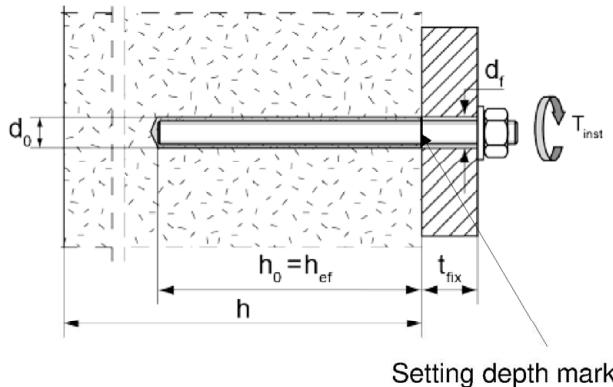


Marking (on random place) BERNER anchor rod:

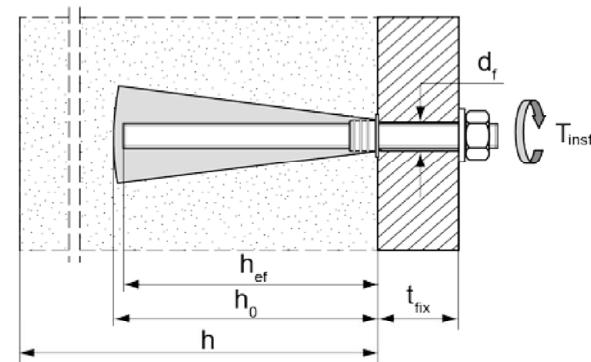
Steel zinc plated PC ⁽¹⁾ 8.8	• or +	Steel hot-dip galvanised PC ⁽¹⁾ 8.8	•
High corrosion resistant steel HCR PC ⁽¹⁾ 50	•	High corrosion resistant steel HCR PC ⁽¹⁾ 70	-
High corrosion resistant steel HCR PC ⁽¹⁾ 80	(Stainless steel R property class 50	~
Stainless steel R property class 80	*		
Alternatively: Colour coding according to DIN 976-1: 2016; property class 4.6 marking according to EN ISO 898-1:2013	⁽¹⁾ PC = property class		

Installation conditions:

Anchor rod in cylindrical drill hole



Anchor rod in conical drill hole



Pictures not to scale

BERNER multicomponent system MCS Uni Plus for masonry

Intended Use

Installation parameters for anchor rods without perforated sleeve

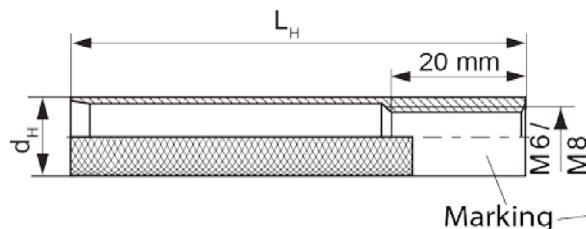
Annex B 4

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

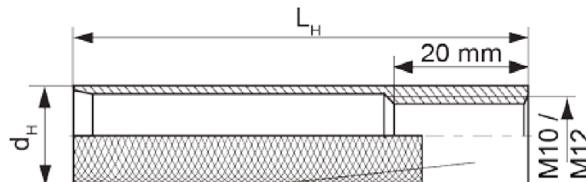
Internal threaded anchor MCS PLUS E	11x85 M6	11x85 M8	15x85 M10	15x85 M12
Diameter of anchor d_H [mm]	11		15	
Nominal drill hole diameter d_0 [mm]		14		18
Length of anchor L_H [mm]			85	
Effective anchorage depth $h_0 = h_{\text{ef}}$ [mm]			85	
Effective anchorage depth h_{ef} [mm] in AAC (conical drill hole)	h_{ef} [mm]	100		-
Diameter of cleaning brush $d_b \geq$ [mm]			see Table B8.1	
Maximum installation torque T_{inst} [Nm]			see parameters of brick Annex C	
Diameter of clearance hole in the fixture d_f [mm]	7	9	12	14
Screw-in depth $l_{E,\text{min}}$ [mm]	6	8	10	12
			60	

Internal threaded anchor MCS PLUS E

MCS PLUS E 11x85 M6, MCS PLUS E 11x85 M8



MCS PLUS E 15x85 M10, MCS PLUS E 15x85 M12

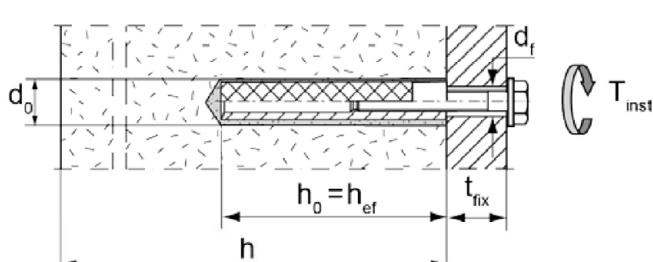


Marking:

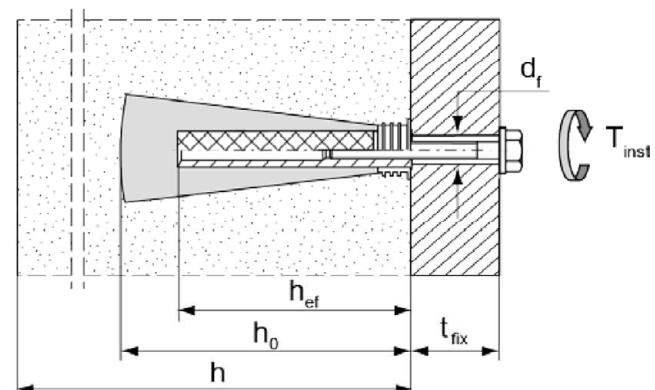
Size, e.g. **M8**, Stainless steel: R, e.g. **M8 R**, High corrosion-resistant steel: HCR, e.g. **M8 HCR**

Installation conditions:

Internal threaded anchor in cylindrical drill hole



Internal threaded anchor in conical drill hole



Pictures not to scale

BERNER multicompound system MCS Uni Plus for masonry

Intended Use

Installation parameters for internal threaded rods MCS PLUS E without perforated sleeve

Annex B 5

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

perforated sleeve MCS PLUS H	12x50	12x85 ²⁾	16x85	16x130 ²⁾	20x85	20x130 ²⁾	20x200 ²⁾
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
Effective anchorage depth	h _{ef,min} [mm]	50	85	85	110	85	110
	h _{ef,max} [mm]	50	85	85	130	85	130
Size of threaded rod	[-]	M6 und M8		M8 und M10		M12 und M16	
Size of internal threaded anchor MCS PLUS E		-	-	11x85	-	15x85	-
Diameter of cleaning brush ¹⁾	d _b ≥ [mm]				see Table B8.1		
Maximum installation torque	T _{inst} [Nm]				see parameters of brick Annex C		

¹⁾ Only for solid areas in hollow bricks and solid bricks.

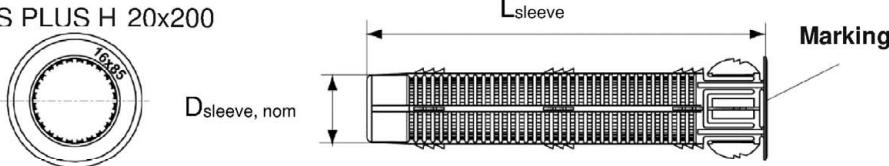
²⁾ Bridging of unbearing layer (e.g. plaster) is possible. When reducing the effective anchorage depth h_{ef,min}, the values of the next shorter perforated sleeve of the same diameter must be used. The smaller value of characteristic resistance must be taken.

Perforated sleeve

MCS PLUS H 12x50; MCS PLUS H 12x85; MCS PLUS H 16x85; MCS PLUS H 16x130;
MCS PLUS H 20x85
MCS PLUS H 20x130; MCS PLUS H 20x200

Marking:

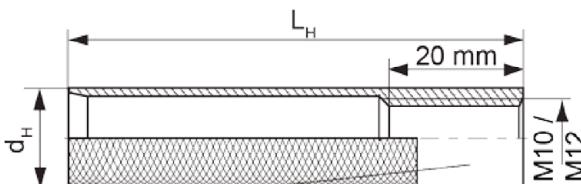
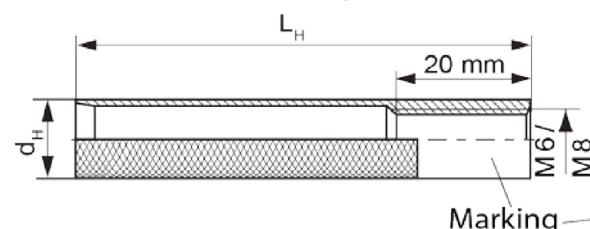
Size D_{sleeve,nom} x L_{sleeve}
(e.g.: 16x85)



Internal threaded anchor MCS PLUS E

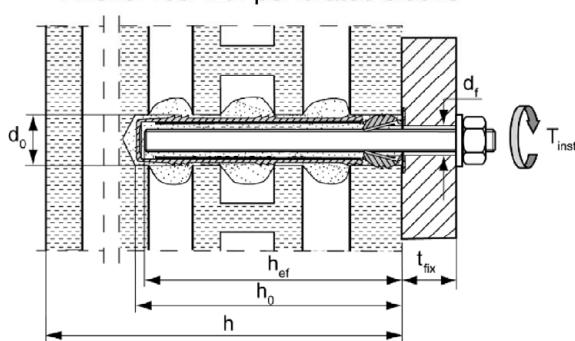
MCS PLUS E 11x85 M6, MCS PLUS E 11x85 M8

MCS PLUS E 15x85 M10, MCS PLUS E 15x85 M12

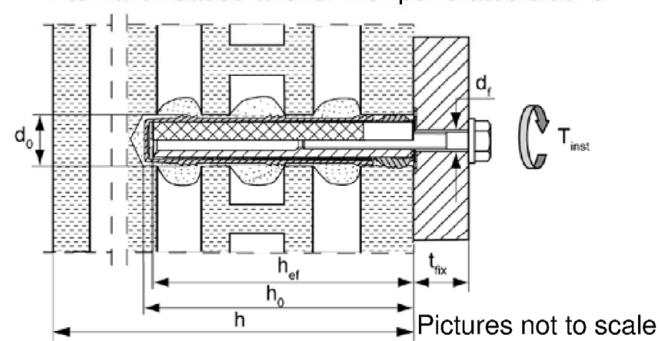


Installation conditions:

Anchor rod with perforated sleeve



Internal threaded anchor with perforated sleeve



BERNER multicomponent system MCS Uni Plus for masonry

Intended Use

Installation parameters for anchor rods and internal threaded anchors MCS PLUS E with perforated sleeve (pre-positioned anchorage)

Annex B 6

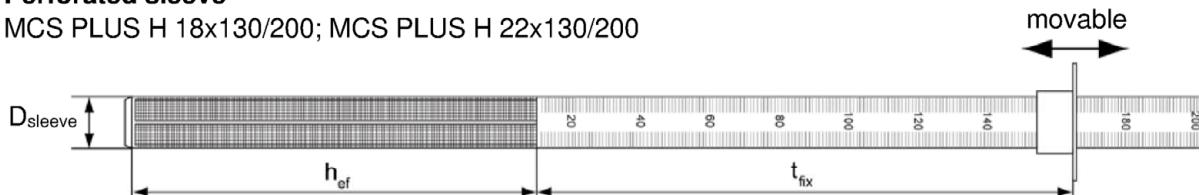
Table B7.1: Installation parameters for anchor rods with perforated sleeves (push through anchorage)

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

¹⁾ Only for solid areas in hollow bricks and solid bricks.

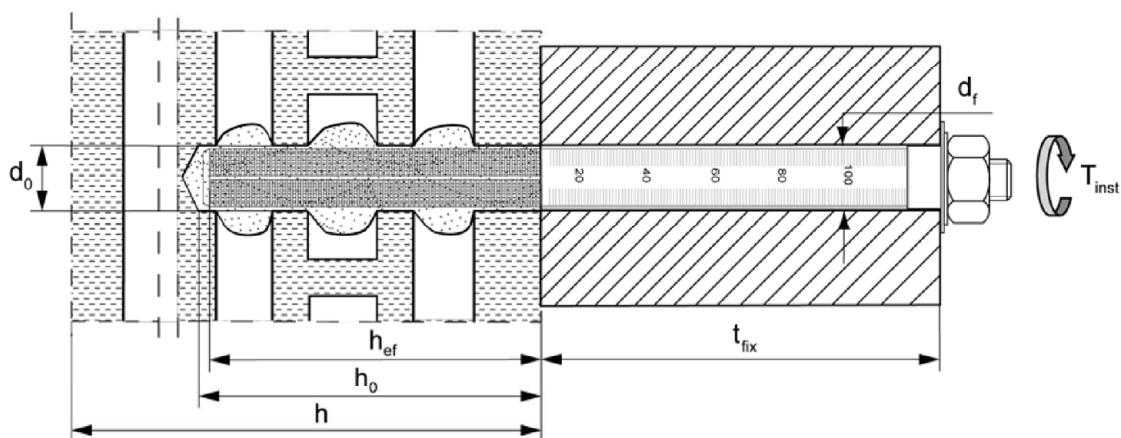
Perforated sleeve

MCS PLUS H 18x130/200; MCS PLUS H 22x130/200



Installation conditions:

Anchor rod with perforated sleeve



Pictures not to scale

BERNER multicompound system MCS Uni Plus for masonry

Intended Use

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

Annex B 7

Tabelle B8.1: Parameters of the cleaning brush BERNER (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 t_{work}			Minimum curing time ¹⁾ t_{cure}		
	MCS Uni Plus WE ³⁾	MCS Uni Plus ²⁾	MCS Uni Plus S ²⁾	MCS Uni Plus WE ³⁾	MCS Uni Plus ²⁾	MCS Uni Plus S ²⁾
> 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

¹⁾ For wet bricks the curing time must be doubled

²⁾ Minimum cartridge temperature +5°C

³⁾ Minimum cartridge temperature ±0°C

Pictures not to scale

BERNER multicomponent system MCS Uni Plus for masonry

Intended use

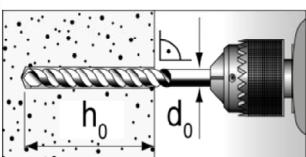
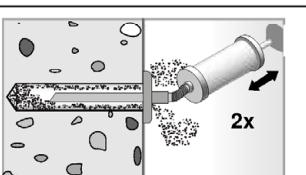
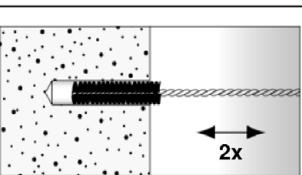
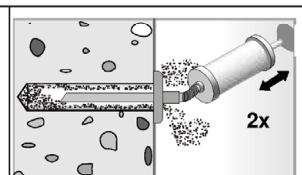
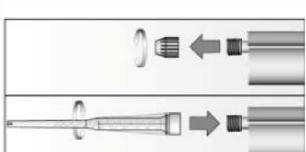
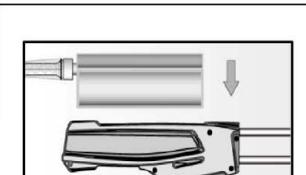
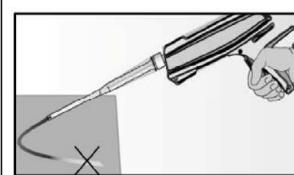
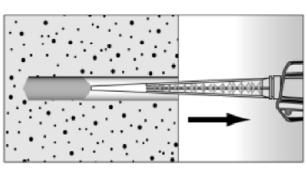
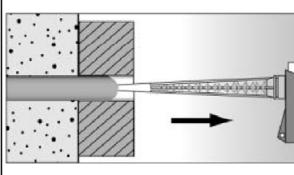
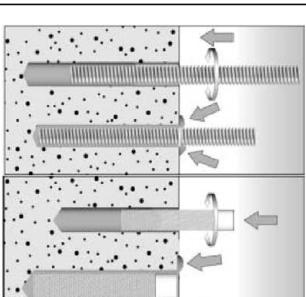
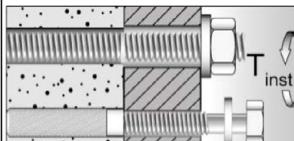
Cleaning brush (steel brush)

Maximum processing times and minimum curing times

Annex B 8

Installation instruction part 1

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

	<p>Drill the hole (drilling method see Annex C of the respective brick) depth of drill hole h_0 and drill hole diameter d_0 see Table B4.1; B5.1</p>		
			<p>Blow out the drill hole twice. Brush twice and blow out twice again.</p>
	<p>Remove the sealing cap. Screw on the static mixer. (the spiral in the static mixer must be clearly visible)</p>		
	<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>
	<p>Fill approximately 2/3 of the drill hole with mortar beginning from the bottom of the hole¹⁾. Avoid bubbles!</p>		<p>For push through anchorage fill the annular clearance with mortar.</p>
	<p>Only use clean and oil-free metal parts. Mark the anchor rod for setting depth. Insert the anchor rod or internal threaded anchor MCS PLUS 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>		
	<p>Do not touch. Minimum curing time see Table B8.2</p>		<p>Mounting the fixture. T_{inst} see parameter of brick.</p>

¹⁾ Exact volume of mortar see manufacturer's specification.

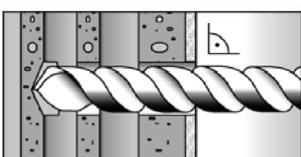
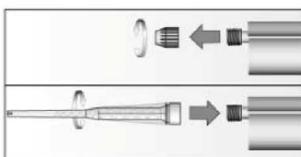
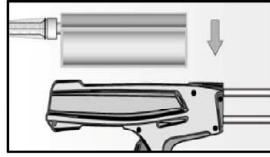
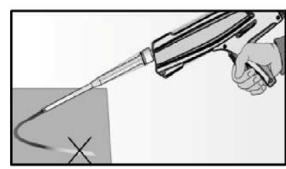
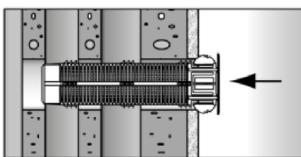
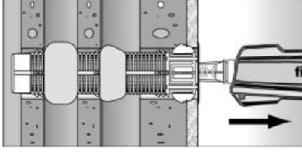
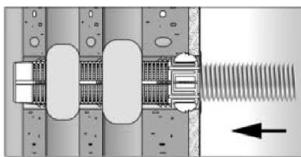
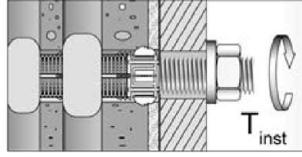
BERNER multicompound system MCS Uni Plus for masonry

Intended use
Installation instruction (without perforated sleeve) part 1

Annex B 9

Installation instruction part 2

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

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

¹⁾ Exact volume of mortar see manufacturer's specification.

BERNER multicomponent system MCS Uni Plus for masonry

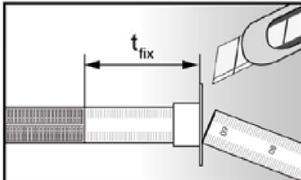
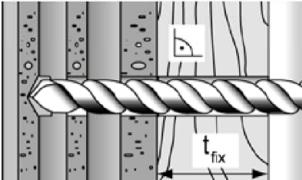
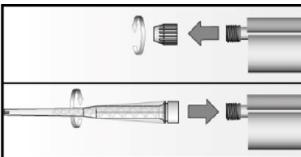
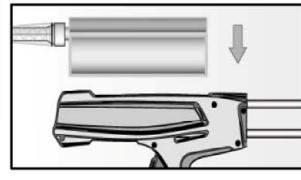
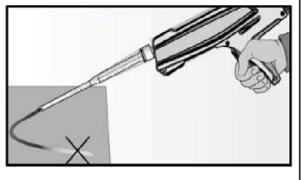
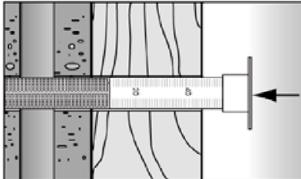
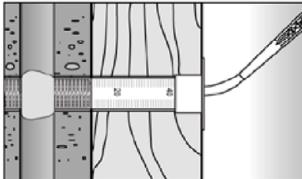
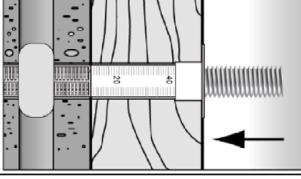
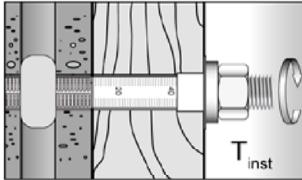
Intended use

Installation instruction (with perforated sleeve) part 2

Annex B 10

Installation instruction part 3

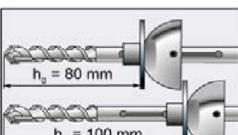
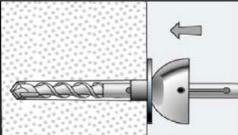
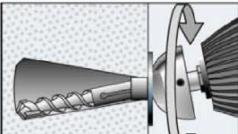
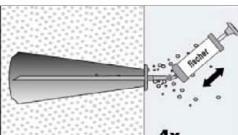
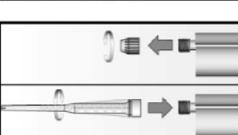
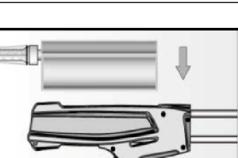
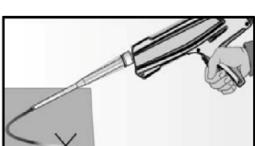
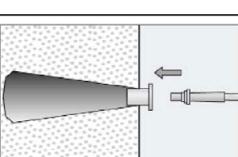
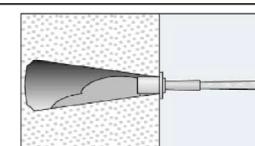
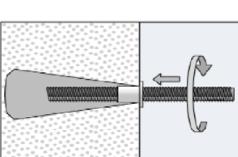
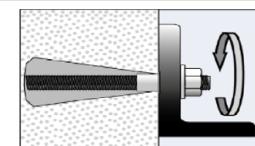
Installation in perforated or solid brick with perforated sleeve (push through anchorage)

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

¹⁾ Exact volume of mortar see manufacturer's specification.

Installation instruction part 4

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

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

BERNER multicomponent system MCS Uni 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

Table B13.1: Overview of controlled bricks part 1

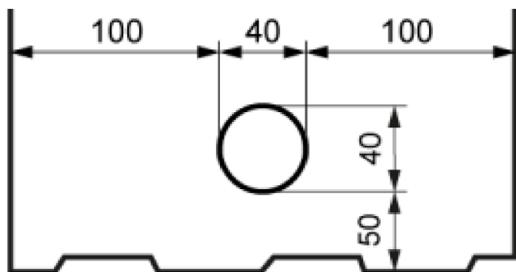
Kind of masonry	Brick format [mm]	Compressive strength f_b [N/mm ²]	Producing country	Density ρ [kg/dm ³]	Annex
Solid brick Mz					
Solid brick Mz	NF ≥240x115x71	12 - 20	Germany	≥1,8	C4 - C7
	2DF ≥240x115x113	10 - 16	Germany	≥1,8	C8/C9
	≥ 245x118x54	10 - 20	Italy	≥1,8	C10/C11
	≥ 230x108x55	10 - 20	Denmark	≥1,8	C12/C13
Solid sand- lime brick KS / perforated Sand- lime brick KSL					
Solid sand - lime brick KS	NF ≥240x115x71	12 - 28	Germany	≥2,0	C14/C15
	8DF ≥ 250x240x240	10 - 28	Germany	≥2,0	C16/C17
	≥ 997x214x538	10 - 36	Netherlands	≥1,8	C18/C19
Perforated sand - lime brick KSL	3DF 240x175x113	8 - 20	Germany	≥1,4	C20 - C23
Vertical perforated brick HLz					
Vertical perforated brick HLz	370x240x237	4 - 12	Germany	≥1,0	C24/C25
	500x175x237	4 - 12	Germany	≥1,0	C24/C25
	2DF 240x115x113	6 - 28	Germany	≥1,4	C26/C27
	248x365x248	4 - 8	Germany	≥0,6	C28 - C31
	248x365x249	8 - 12	Germany	≥0,7	C32 - C35
	248x365x249	4 - 6	Germany	≥0,5	C36 - C39
	248x425x248	4 - 8	Germany	≥0,8	C40 - C43
	248x425x248	4 - 8	Germany	≥0,6	C44 - C47
	500x200x315	4 - 8	France	≥0,6	C48 - C51
	500x200x300	4 - 10	France	≥0,7	C52 - C55
	500x200x315	2 - 8	France	≥0,7	C56 - C59
	560x200x275	4 - 8	France	≥0,7	C60/C61
	255x120x118	2 - 12	Italy	≥1,0	C62 - C64
	275x130x94	6 - 20	Spain	≥0,8	C65/C66
	220x190x290	6 - 10	Portugal	≥0,7	C67 - C70
	253x300x240	2 - 6	Austria	≥0,8	C71 - C74
	250x440x250	6 - 10	Austria	≥0,7	C75 - C78
	230x108x55	2 - 8	Denmark	≥1,4	C79/C80
Horizontal perforated brick LLz					
Horizontal perforated brick LLz	248x78x250	2 - 6	Italy	≥0,7	C81/C82
	128x88x275	2	Spain	≥0,8	C83/C84
Light-weight concrete hollow block Hbl					
Light-weight concrete hollow block Hbl	362x240x240	2 - 4	Germany	≥1,0	C85 - C88
	500x200x200	2 - 6	France	≥1,0	C89/C90
	440x215x215	4 - 10	Ireland	≥1,2	C91 - C94
BERNER multicompound system MCS Uni Plus for masonry					
Intended use Overview of controlled bricks part 1					
Annex B 13					

Table B14.1: Overview of controlled bricks part 2

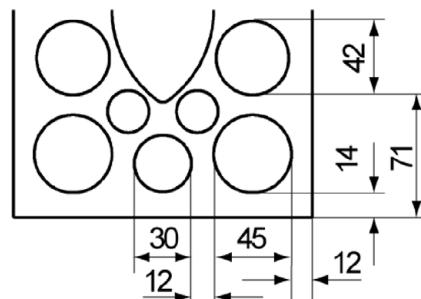
Kind of masonry	Brick format [mm]	Compressive strength f_b [N/mm ²]	Producing country	Density ρ [kg/dm ³]	Annex
Light-weight concrete solid block Vbl					
Light-weight concrete solid block Vbl	≥ 372x300x254	2	Germany	≥0,6	C95/C96
	≥ 250x240x239	4 - 8	Germany	≥1,6	C97 - C100
	≥ 440x100x215	4 - 10	Ireland	≥2,0	C101/C102
	≥ 440x95x215	6 - 12	England	≥2,0	C103/C104
Autoclaved aerated concrete (AAC)					
PP2 / AAC	-	2	Germany	0,35	C105 - C109
PP4 / AAC	-	4	Germany	0,5	C105 - C109
PP6 / AAC	-	6	Germany	0,65	C105 - C109
BERNER multicompound system MCS Uni Plus for masonry					
Intended use Overview of controlled bricks part 2					
Annex B 14					

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

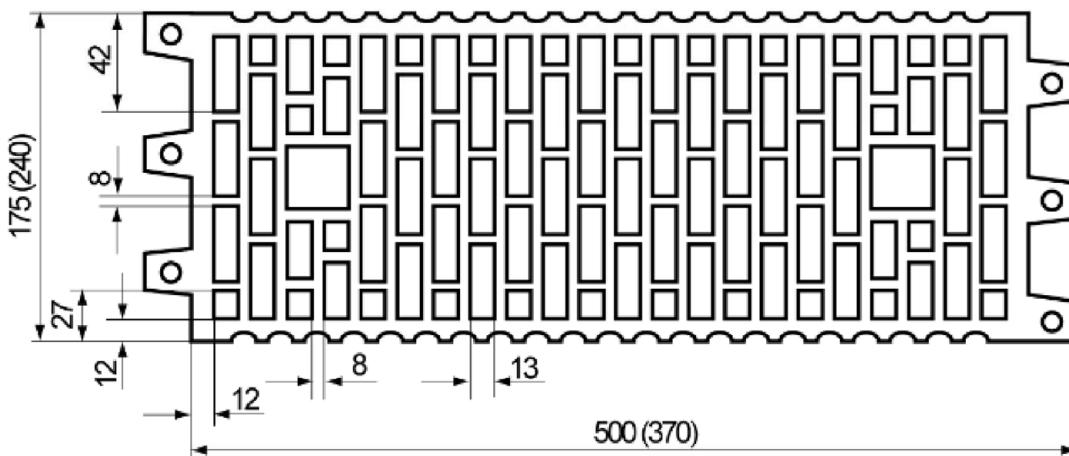
Solid sand-lime brick KS, 8DF,
EN 771-2:2011+A1:2015
according to Annex C 16



Perforated sand-lime brick KSL, 3DF,
EN 771-2:2011+A1:2015; e.g. KS Wemding
according to Annex C 20

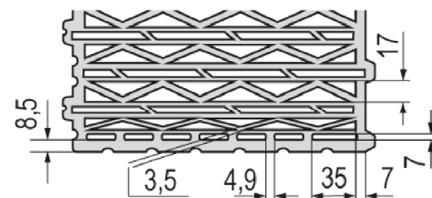
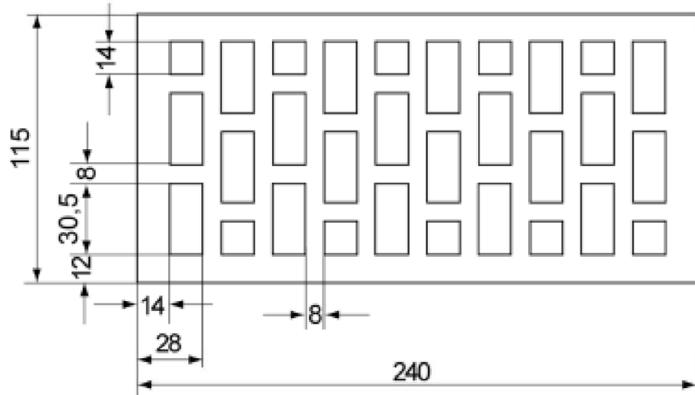


Vertical perforated brick HLz, EN 771-1:2011+A1:2015: e.g. Wienerberger, Poroton according to Annex C 24



Vertical perforated brick HLz, 2DF,
EN 771-1:2011+A1:2015;
e.g. Wienerberger according to Annex C 26

Vertical perforated brick HLz, U8,
EN 771-1:2011+A1:2015; according to Annex C 28



Pictures not to scale

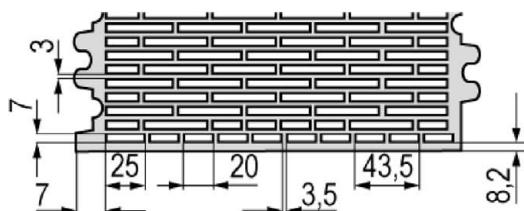
BERNER multicomponent system MCS Uni Plus for masonry

Intended use
Overview dimensions of perforated and hollow bricks part 1

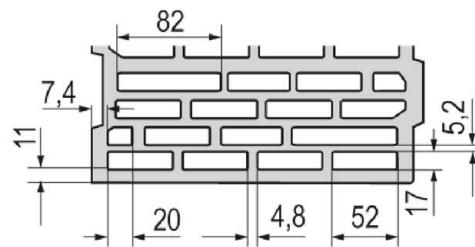
Annex B 15

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

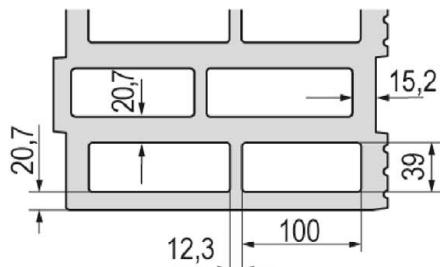
Vertical perforated brick HLz, T10, T11,
EN 771-1:2011+A1:2015; according to Annex C32



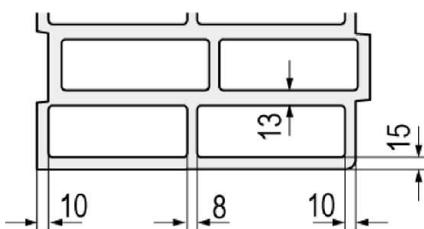
Vertical perforated brick HLz, T7 PF, filled with perlite,
EN 771-1:2011+A1:2015; according to Annex C 36



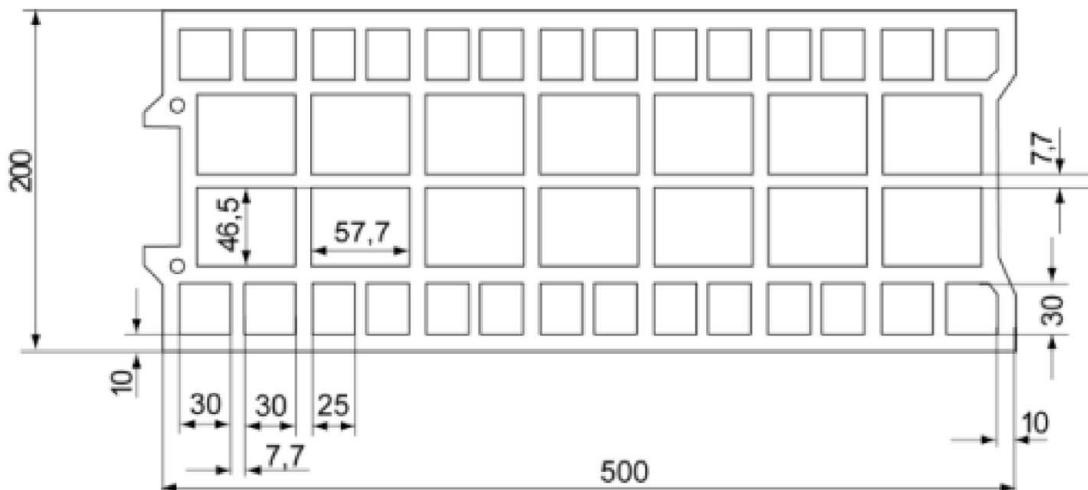
Vertical perforated brick HLz, T9 MW, filled with
mineral wool, EN 771-1:2011+A1:2015; according to
Annex C 40



Vertical perforated brick HLz, FZ 7, filled with mineral
wool, EN 771-1:2011+A1:2015; according to Annex C
44



Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Bouyer Leroux; According to Annex C 48



Pictures not to scale

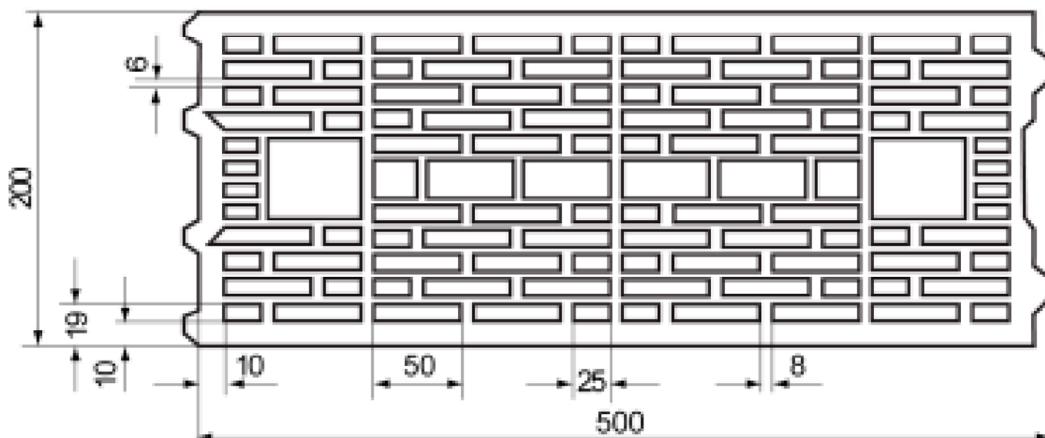
BERNER multicomponent system MCS Uni Plus for masonry

Intended use
Overview dimensions of perforated and hollow bricks part 2

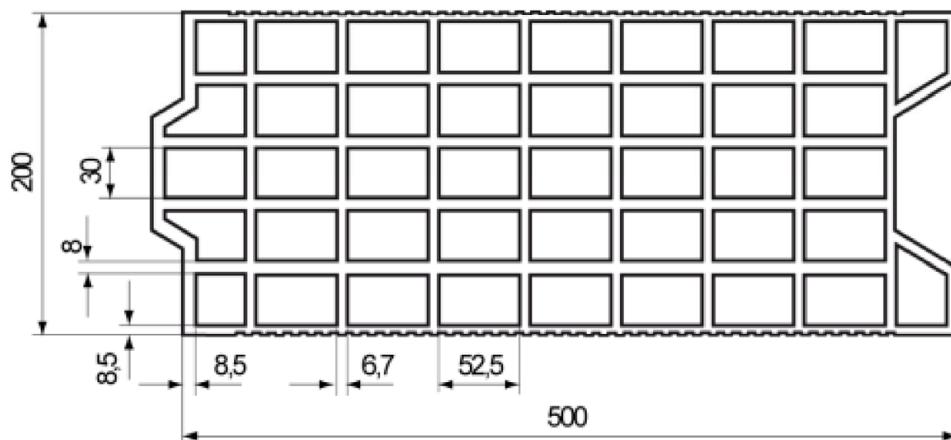
Annex B 16

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

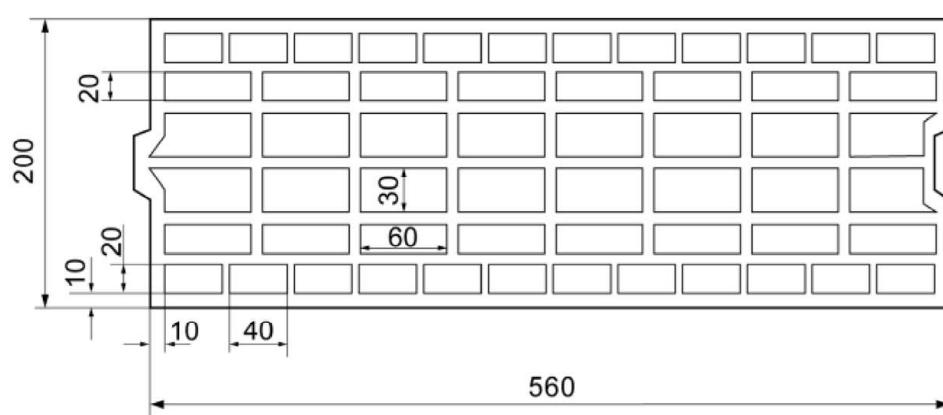
Vertical perforated brick HLz, EN 771-1:2011+A1:2015; e.g. Wienerberger according to Annex C 52



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



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



Pictures not to scale

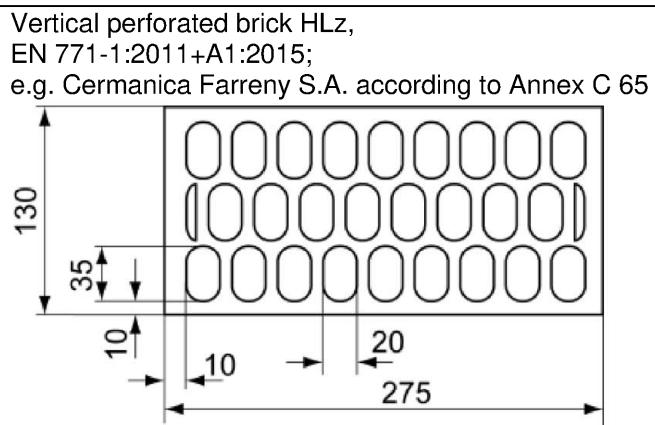
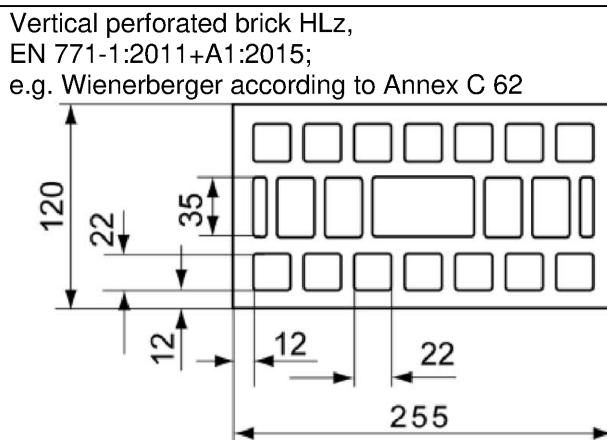
BERNER multicomponent system MCS Uni Plus for masonry

Intended use

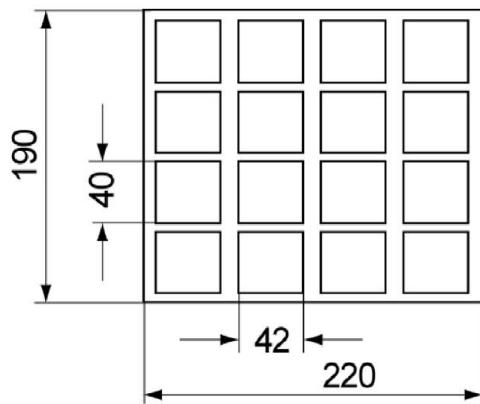
Overview dimensions of perforated and hollow bricks part 3

Annex B 17

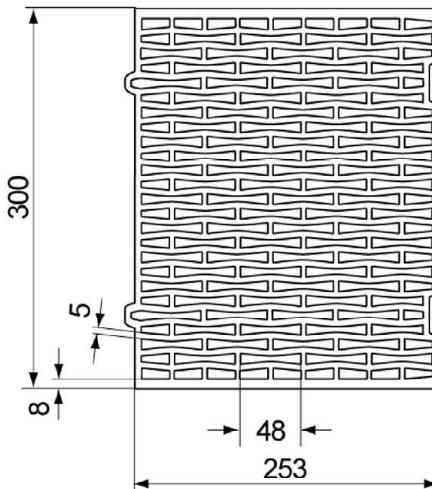
Table B18.1: Overview dimensions of perforated and hollow bricks part 4



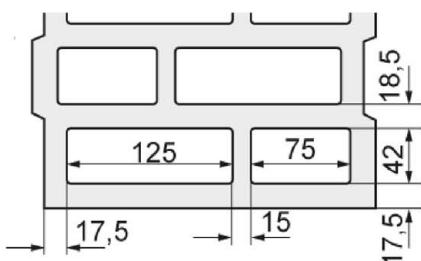
Vertical perforated brick HLz,
EN 771-1:2011+A1:2015;
e.g. Perceram according to Annex C 67



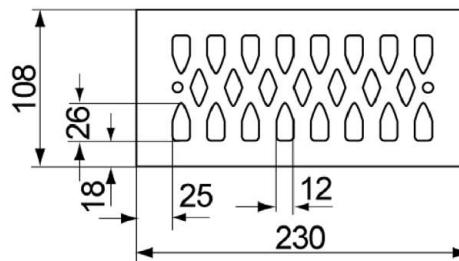
Vertical perforated brick HLz,
EN 771-1:2011+A1:2015;
e.g. Ziegelwerk Brenna according to Annex C 71



Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool, EN 771-1:2011+A1:2015 according to Annex C 75



Vertical perforated brick HLz,
EN 771-1:2011+A1:2015;
e.g. Wienerberger according to Annex C 79



Pictures not to scale

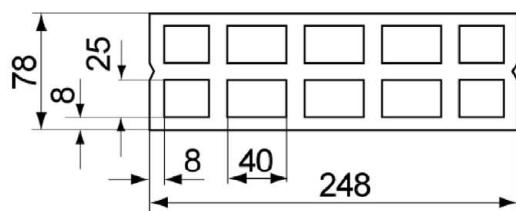
BERNER multicomponent system MCS Uni Plus for masonry

Intended use
Overview dimensions of perforated and hollow bricks part 4

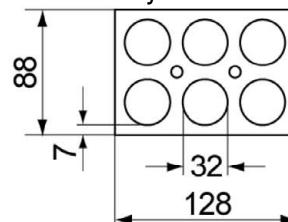
Annex B 18

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

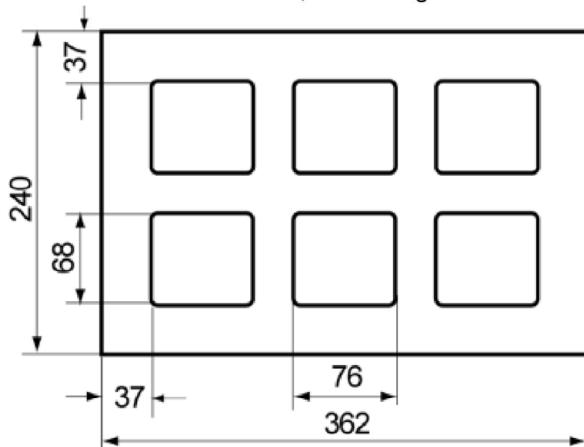
Horizontal perforated brick LLz,
EN 771-1:2011+A1:2015; according to Annex C 81



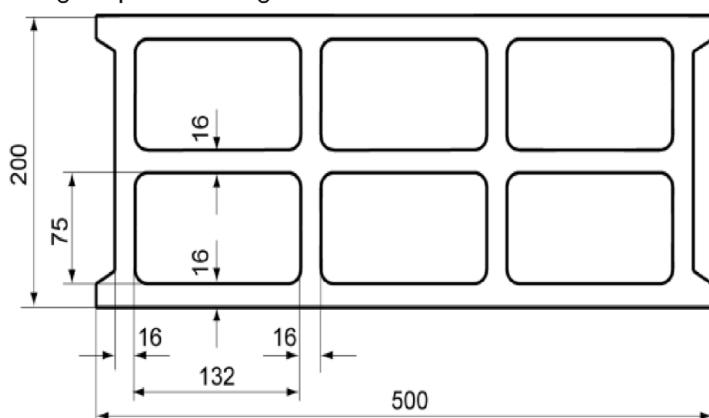
Horizontal perforated brick LLz,
EN 771-1:2011+A1:2015;
e.g. Germanica Farreny S.A according to Annex C 83



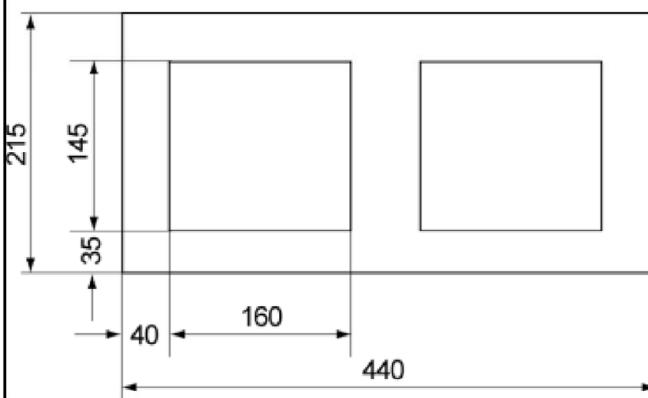
Light-weight concrete hollow block Hbl,
EN 771-3:2011+A1:2015; according to Annex C 85



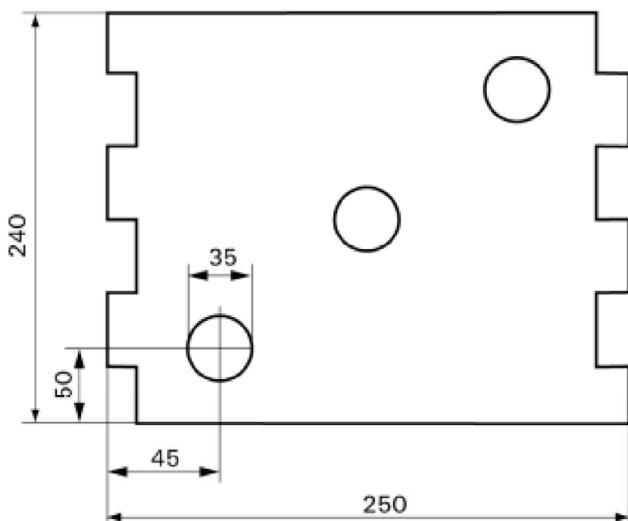
Light-weight concrete hollow block Hbl,
EN 771-3:2011+A1:2015;
e.g. Sepa according to Annex C 89



Light-weight concrete hollow block Hbl,
EN 771-3:2011+A1:2015;
e.g. Roadstone wood according to Annex C 91



Light-weight concrete solid block Vbl,
EN 771-3:2011+A1:2015;
e.g. Sepa according to Annex C 97



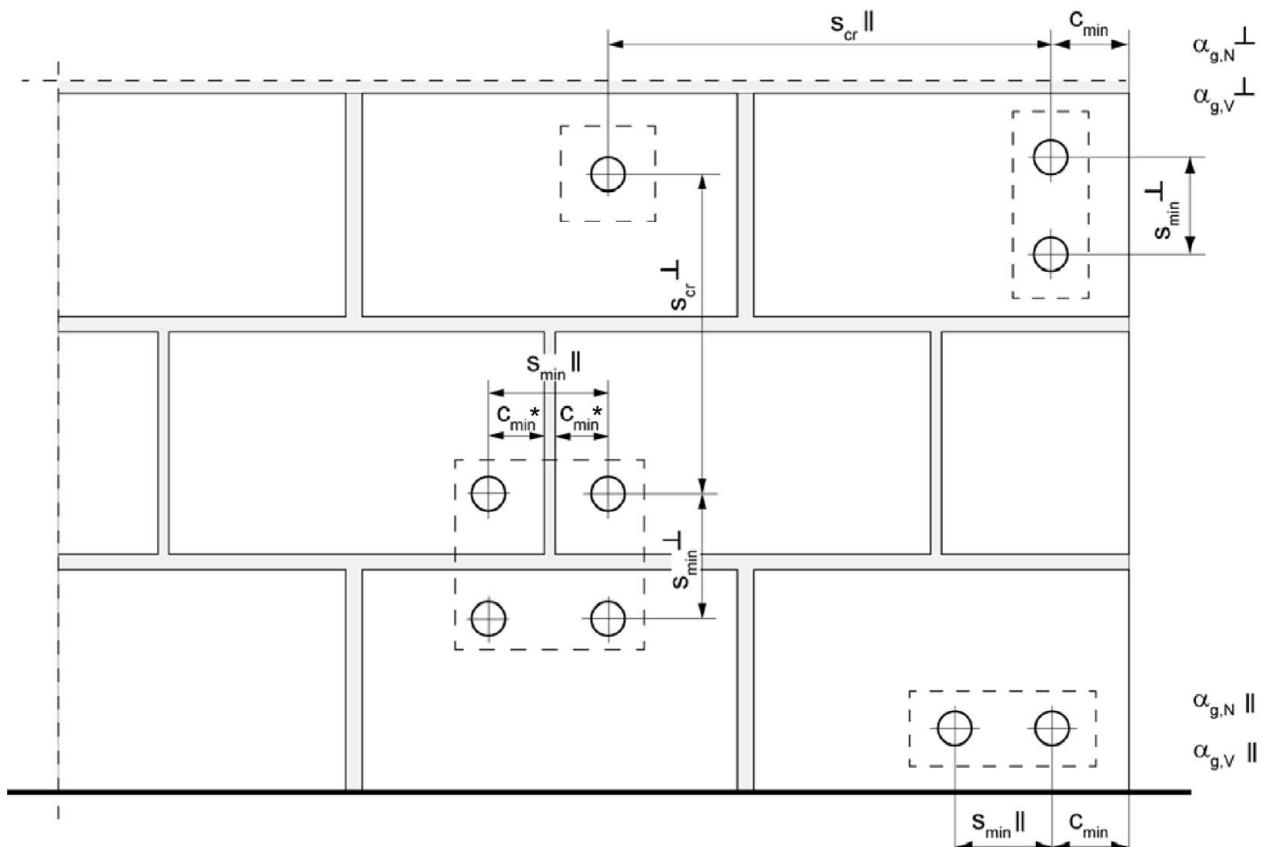
Pictures not to scale

BERNER multicomponent system MCS Uni Plus for masonry

Intended use
Overview dimensions of perforated and hollow bricks part 5

Annex B 19

Spacing and edge distance



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

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

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

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

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

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

BERNER multicomponent system MCS Uni Plus for masonry

Intended use
Spacing and edge distance

Annex B 20

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

Anchor rod / standard threaded rod		M6	M8	M10	M12	M16
Characteristic resistance to steel failure under tension loading ³⁾						
Characteristic resistance $N_{Rk,s}$	Steel zinc plated	4.6	8	15(13)	23(21)	33
		4.8	8	15(13)	23(21)	33
		5.8	10	19(17)	29(27)	43
		8.8	16	29(27)	47(43)	68
	Stainless steel R and High corrosion resistant steel HCR	50	10	19	29	43
		70	14	26	41	59
		80	16	30	47	68
						126

Partial factors¹⁾

Partial factor $\gamma_{Ms,N}$	Steel zinc plated	4.6	[-]	2,00
		4.8		1,50
		5.8		1,50
		8.8		1,50
	Stainless steel R and High corrosion resistant steel HCR	50		2,86
		70		1,50 ²⁾ / 1,87
		80		1,60

¹⁾ In absence of other national regulations

²⁾ Only for BERNER MCS Plus A made of high corrosion-resistant steel HCR

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

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Characteristic steel bearing capacity of BERNER anchor rods under tension loading

Annex C 1

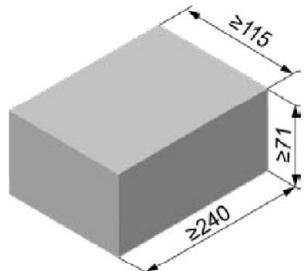
Table C2.1: Characteristic resistance to steel failure of BERNER anchor rods and standard threaded rods under shear loading

Anchor rod / standard threaded rod		M6	M8	M10	M12	M16					
Characteristic resistance under shear loading, steel failure³⁾											
without lever arm											
Characteristic resistance $V_{Rk,s}$	Property class	4.6	4	9(8)	14(13)	20					
		4.8	4	9(8)	14(13)	20					
		5.8	6	11(10)	17(16)	25					
		8.8	8	15(13)	23(21)	34					
		50	5	9	15	21					
		70	7	13	20	30					
		80	8	15	23	34					
						63					
with lever arm											
Characteristic resistance $M_{Rk,s}$	Property class	4.6	6	15(13)	30(27)	52					
		4.8	6	15(13)	30(27)	52					
		5.8	7	19(16)	37(33)	65					
		8.8	12	30(26)	60(53)	105					
		50	7	19	37	65					
		70	10	26	52	92					
		80	12	30	60	105					
						266					
Partial factors¹⁾											
Partial factor $\gamma_{M,y}$	Property class	4.6	[-]	1,67							
		4.8		1,25							
		5.8		1,25							
		8.8		1,25							
		50		2,38							
		70	[-]	1,25 ²⁾ / 1,56							
		80		1,33							
BERNER multicomponent system MCS Uni Plus for masonry											
Performance Characteristic steel bearing capacity of BERNER anchor rods under shear loading											
Annex C 2											

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

Internal threaded anchor MCS PLUS E			M6	M8	M10	M12				
Characteristic resistance to steel failure under tension loading,										
Characteristic resistance with screw $N_{Rk,s}$	Property class	5.8	[kN]	10	18	29				
	Property class R	R		14	26	41				
	Property class 70	HCR		14	26	41				
Partial factors¹⁾										
Partial factor $\gamma_{Ms,N}$	Property class	5.8	[-]	1,50						
	Property class R	R		1,87						
	Property class 70	HCR		1,87						
Characteristic resistance to steel failure under shear loading										
without lever arm										
Characteristic resistance with screw $V_{Rk,s}$	Property class	5.8	[kN]	5	9	15				
	Property class R	R		7	13	20				
	Property class 70	HCR		7	13	20				
with lever arm										
Characteristic resistance $M_{Rk,s}^0$	Property class	5.8	[Nm]	8	19	37				
	Property class R	R		11	26	52				
	Property class 70	HCR		11	26	52				
Partial factors¹⁾										
Partial factor $\gamma_{Ms,V}$	Property class	5.8	[-]	1,25						
	Property class R	R		1,56						
	Property class 70	HCR		1,56						
¹⁾ In absence of other national regulations										
BERNER multicomponent system MCS Uni Plus for masonry										
Performance Characteristic steel bearing capacity of BERNER internal threaded anchor MCS PLUS E						Annex C 3				

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



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	
Density ρ [kg/dm³]	≥ 1,8		
Compressive strength f _b [N/mm²]	12 / 20		
Standard	EN 771-1:2011+A1:2015		

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

Anchor rod	M6	M8	M10	M12	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	M10 M12

Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve

Effective anchorage depth h _{ef}	[mm]	50	50	50	50	85
		80	80	80	80	
		200	200	200	200	
Max. installation torque T _{inst}	[Nm]	4	10			4 10

General installation parameters

Edge distance C _{min}	[mm]	100	100
Edge distance h _{ef} =200 C _{min}		150	⁻¹⁾
S _{min} II,N		60	60
h _{ef} =200 S _{min} II,N		240	⁻¹⁾
S _{min} II,V		240	240
S _{cr} II		240	240
S _{cr} ⊥ = S _{min} ⊥		75	75

Drilling method

Hammer drilling with hard metal hammer drill

¹⁾ No performance assessed

Table C4.2: Group factors

Anchor rods	M6	M8	M10	M12	-	-	
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	M10 M12	
Edge distance C _{min}	[mm]	100					
Group factor	α _{g,N} II	[-]	1,5				
	α _{g,V} II		2,0				
	h _{ef} =200 α _{g,N} II		1,5				
	h _{ef} =200 α _{g,V} II		2,0				
	α _{g,N} ⊥		2,0				
	α _{g,V} ⊥		2,0				
	h _{ef} =200 α _{g,N} ⊥		2,0				
	h _{ef} =200 α _{g,V} ⊥		2,0				

BERNER multicompound system MCS Uni Plus for masonry

Performance

Solid brick Mz, NF, dimensions, installation parameters c=100mm

Annex C 4

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

Table C5.1: Characteristic resistance under tension loading for edge distance c=100mm

Anchor rod	M6	M8	M10		M12		-	-			
Internal threaded anchor MCS PLUS E	-	-	-		-		M6	M8			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)											
compressive strength f_b	use condition	≥ 50	≥ 50	50	80	200	50	80	200	85	
12N/mm^2	w/w	w/d	2,5	2,5	2	3	7,5	2	3,5	5	3,5
	d/d		4	4	3,5	5	12	3	5,5	8	5,5
20N/mm^2	w/w	w/d	3,5	3,5	3	4,5	11	3	5	7	5
	d/d		5,5	5,5	5	7	12	4,5	8	11,5	8

Factor for temperature range 72/120°C: 0,83

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

Anchor rod	M6	M8	M10		M12		-	-	
Internal threaded anchor MCS PLUS E	-	-	-		-		M6	M8	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)									
compressive strength f_b	use condition	≥ 50	≥ 50	≥ 50	200	≥ 50	200	85	
12N/mm^2	w/w	w/d	2,5	2,5	4	8,5	4	11,5	2,5
	d/d								
20N/mm^2	w/w	w/d	4,0	4,0	6	12	5,5	12	4
	d/d								

Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry	Annex C 5
Performance Solid brick Mz, NF, Characteristic resistance under tension and shear loading c=100mm	

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

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

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8		
						11x85	15x85		
Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve									
Effective anchorage depth h_{ef}	[mm]	50	50	50	50	85			
		100	100	100	100	100			
		200	200	200	200	200			
Max. installation torque T_{inst}	[Nm]	4	10			4	10		
General installation parameters									
Edge distance c_{min}						60			
Edge distance c_{min} $h_{ef}=200$						60			
$s_{min \parallel, N}$						80			
$h_{ef}=200 s_{min \parallel, N}$						80			
$s_{min \parallel, V}$						80			
Spacing	$s_{cr \parallel}$					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 MCS PLUS E	-	-	-	-	-	M6	M8
						11x85	15x85
Edge distance c_{min}	[mm]					60	
$\alpha_{g,N} \parallel$						0,6	
$\alpha_{g,V} \parallel$						1,3	
$h_{ef}=200 \alpha_{g,N} \parallel$						1,4	
$h_{ef}=200 \alpha_{g,V} \parallel$						1,5	
$\alpha_{g,N} \perp$						0,3	
$\alpha_{g,V} \perp$						1,3	
$h_{ef}=200 \alpha_{g,N} \perp$						2,0	
$h_{ef}=200 \alpha_{g,V} \perp$						1,1	
BERNER multicomponent system MCS Uni Plus for masonry							
Performance Solid brick Mz, NF, dimensions, installation parameters c=60mm						Annex C 6	

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

Table C7.1: Characteristic resistance under tension loading for edge distance c=60mm

Anchor rod		M6	M8	M10			M12			M16			-	-									
Internal threaded anchor MCS PLUS E		-	-	-			-			-			M6	M8	M10	M12							
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																							
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]												85									
		50	100	50	100	50	100	200	50	100	200	50	100	200									
12N/mm ²	w/w	1,5	2,0	2,0	2,0	2,5	2,0	2,5	2,0	2,5	2,0	5,5	2,0	85									
	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	1)									
20N/mm ²	w/w	2,0	2,5	3,0	2,5	3,5	3,0	3,5	3,0	3,5	3,0	7,5	2,0	85									
	d/d	3,5	4,5	5,5	4,5	5,5	12	4,5	5,5	12	4,5	12	12	1)									
28N/mm ²	w/w	2,5	3,0	4,0	3,0	4,0	3,5	4,0	3,5	4,0	3,5	9,0	2,0	85									
	d/d	4,0	5,5	6,5	5,5	6,5	12	5,5	6,5	12	5,5	12	12	1)									

1) No performance assessed

Factor for temperature range 72/120°C: 0,83

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

Anchor rod		M6	M8	M10			M12			M16			-	-									
Internal threaded anchor MCS PLUS E		-	-	-			-			-			M6	M8	M10	M12							
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)																							
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]												85									
		50	100	50	100	50	100	200	50	100	200	50	100	200									
12N/mm ²	w/w	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	1)								
	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	1)								
20N/mm ²	w/w	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	1)								
	d/d	2,5	5,5	2,5	6,5	4,0	6,5	4,5	4,0	6,5	6,5	1,5	6,5	9,0	1)								

1) No performance assessed

Factor for job site tests and displacements see annex C110

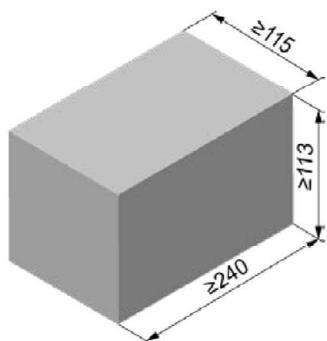
BERNER multicomponent system MCS Uni Plus for masonry

Performance

Solid brick Mz, NF, Characteristic resistance under tension and shear loading c=60mm

Annex C 7

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



Solid brick Mz, 2DF, EN 771-1:2011+A1:2015		
Producer	e.g. Wienerberger	
Nominal dimensions [mm]	length L	width W
	≥ 240	≥ 115
Density ρ [kg/dm³]	≥ 1,8	
Compressive strength f _b [N/mm²]	10 / 16	
Standard	EN 771-1:2011+A1:2015	

Table C8.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M10

M6 M8 M10 M12
11x85 15x85

Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve

Effective anchorage depth h _{ef} [mm]	50	100	50	100	50	100	50	100	85
Max. installation torque T _{inst} [Nm]	4				10			4	10

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H 16x85 K

Effective anchorage depth h _{ef} [mm]	-1)	85	-1)	85	-1)
Max. installation torque T _{inst} [Nm]		10		4	

General installation parameters

Edge distance C _{min}	[mm]	60
S _{min} II		120
S _{cr} II		240
S _{cr} ⊥ = S _{min} ⊥		115

Drilling method

Hammer drilling with hard metal hammer drill

¹⁾ No performance assessed

Table C8.2: Group factors

Anchor rods	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M10
Group factor	$\alpha_{g,N} \parallel$				1,5		
	$\alpha_{g,v} \parallel$				1,4		
	$\alpha_{g,N} \perp$				2		
	$\alpha_{g,v} \perp$						

BERNER multicompound system MCS Uni Plus for masonry

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

Annex C 8

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

Table C9.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M10	M12	M16	-	-	M8	M10	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10	M12	M6 M8 11x85 15x85
						11x85	15x85			
Perforated sleeve MCS PLUS H	-	-	-	-	-	-	-	-	-	16x85
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)										
compressive strength f_b	use condition	50	100	50	100	50	100	50	100	Effective anchorage depth h_{ef} [mm]
10N/mm ²	w/w	1,5	2,5	1,5	2,5	1,5	3	2	3,5	2
	d/d	3	4,0	3,0	4,0	3,0	4,5	3	5,5	3
16N/mm ²	w/w	2,5	4	2,5	4	2,5	4,5	3,5	5,5	3,5
	d/d	4,5	7,0	4,5	7,0	4,5	7,5	5,5	8	5,5
Factor for temperature range 72/120°C: 0,83										

Table C9.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M10	M12	M16	-	-	M8	M10	-	
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10	M12	M6 M8 11x85 15x85	
						11x85	15x85				
Perforated sleeve MCS PLUS H	-	-	-	-	-	-	-	-	-	16x85	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)											
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]					85				
10N/mm ²	w/w	2,5	3,0	3,0	3,5	3,0	2,5	3,0	3,0	3,0	3,5
	d/d										
16N/mm ²	w/w	4,0	5,0	5,5	5,5	5,0	4,0	5,0	5,0	5,0	6,0
	d/d										
Factor for job site tests and displacements see annex C110											

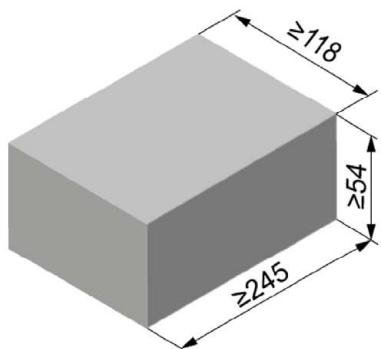
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 9

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



Solid brick Mz, EN 771-1:2011+A1:2015			
Producer	e.g. Nigra		
Nominal dimensions [mm]	length L ≥ 245	width W ≥ 118	height H ≥ 54
Density ρ [kg/dm ³]	≥ 1,8		
Compressive strength f_b [N/mm ²]	10 / 20		
Standard	EN 771-1:2011+A1:2015		

Table C10.1: Installation parameters

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

Table C10.2: Group factors

Anchor rods	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8
						11x85	15x85
Group factor	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[-] 2					
BERNER multicomponent system MCS Uni Plus for masonry							
Performance Solid brick Mz, dimensions, installation parameters							Annex C 10

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

Table C11.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10	M12
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)									
compressive strength f_b	use condition		Effective anchorage depth h_{ef} [mm]						85
	w/w	w/d	0,6	0,9	0,75	0,75	0,75	0,6	0,75
10N/mm²	d/d		1,2	1,5	1,2	1,2	1,2	1,2	1,2
	w/w	w/d	0,9	1,5	1,2	1,2	1,2	0,9	1,2
20N/mm²	d/d		1,5	2,5	2,0	2,0	2,0	1,5	2,0

Factor for temperature range 72/120°C: 0,83

Table C11.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M10	M12	M16	-	-			
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10	M12	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)										
compressive strength f_b	use condition		Effective anchorage depth h_{ef} [mm]						85	
	w/w	w/d	2,0	3,0	4,0	4,5	5,5	2,0	3,0	4,0
10N/mm²	d/d									
	w/w	w/d	2,5	4,0	5,5	6,0	8,0	2,5	4,0	5,5
20N/mm²	d/d									

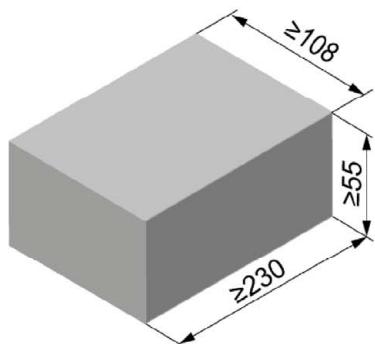
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 11

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



Solid brick Mz, EN 771-1:2011+A1:2015		
Producer	e.g. Wienerberger	
Nominal dimensions [mm]	length L ≥ 230	width W ≥ 108
Density ρ [kg/dm ³]	≥ 1,8	
Compressive strength f_b [N/mm ²]	10 / 20	
Standard	EN 771-1:2011+A1:2015	

Table C12.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16	-	-						
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6 11x85	M8 15x85						
Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve													
Effective anchorage depth h_{ef} [mm]	50	90	50	90	50	90	85						
Max. installation torque T_{inst} [Nm]	4			10		4	10						
General installation parameters													
Edge distance c_{\min}	[mm]	60											
Spacing $s_{\text{cr II}} = s_{\min \parallel}$		230											
$s_{\text{cr } \perp} = s_{\min \perp}$		60											
Drilling method													
Hammer drilling with hard metal hammer drill													

Table C12.2: Group factors

Anchor rods	M6	M8	M10	M12	M16	-	-						
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6 11x85	M8 15x85						
Group factor	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[-] 2											
BERNER multicomponent system MCS Uni Plus for masonry													
Performance	Solid brick Mz, dimensions, installation parameters												
	Annex C 12												

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

Table C13.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10	M12
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)									
compressive strength f_b	use condition			Effective anchorage depth h_{ef} [mm]					
				≥ 50					85
10N/mm ²	w/w	w/d	0,6	0,9	0,75	0,75	0,75		0,75
	d/d		1,2	1,5	1,2	1,2	1,2		1,2
20N/mm ²	w/w	w/d	0,9	1,5	1,2	1,2	1,2		1,2
	d/d		1,5	2,5	2,0	2,0	2,0		2,0

Factor for temperature range 72/120°C: 0,83

Table C13.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M10	M12	M16	-	-		
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10	M12
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)									
compressive strength f_b	use condition			Effective anchorage depth h_{ef} [mm]					
				≥ 50					85
10N/mm ²	w/w	w/d	2,0	3,0	4,0	4,5	5,5	2,0	3,0
	d/d								
20N/mm ²	w/w	w/d	2,5	4,0	5,5	6,0	8,0	2,5	4,0
	d/d								

Factor for job site tests and displacements see annex C110

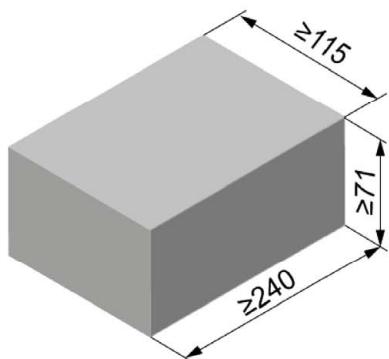
BERNER multicomponent system MCS Uni Plus for masonry

Performance

Solid brick Mz, Characteristic resistance under tension and shear loading

Annex C 13

Solid sand-lime brick KS, NF, EN 771-2:2011+A1:2015



Solid sand-lime brick KS, NF, EN 771-2:2011+A1:2015			
Producer			
Nominal dimensions [mm]	length L ≥ 240	width W ≥ 115	height H ≥ 71
Density ρ [kg/dm ³]	≥ 1,8		
Compressive strength f_b [N/mm ²]	12 / 20 / 28		
Standard	EN 771-2:2011+A1:2015		

Table C14.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16	-	-						
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6 11x85	M10 15x85						
Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve													
Effective anchorage depth h_{ef} [mm]	50	100	50	100	50 200	100 200	50 200						
Max. installation torque T_{inst} [Nm]	3	5	15	15	25	3	5						
General installation parameters													
Edge distance C_{min}	[mm]	60											
$S_{\text{min II}}$		80											
$S_{\text{cr II}}$		3x h_{ef}											
$S_{\text{min I}}$		80											
$S_{\text{cr I}}$		3x h_{ef}											
Drilling method													
Hammer drilling with hard metal hammer drill													

Table C14.2: Group factors

Anchor rod	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6 11x85	M10 15x85
Group factor							
$\alpha_{g,N} \parallel$	[-]	0,7					
$\alpha_{g,v} \parallel$		1,3					
$\alpha_{g,N} \perp$		2,0					
$\alpha_{g,v} \perp$		2,0					

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Solid sand-lime brick KS, NF, dimensions, installation parameters

Annex C 14

Solid sand-lime brick KS, NF, EN 771-2:2011+A1:2015

Table C15.1: Characteristic resistance under tension loading

Anchor rod		M6		M8		M10		M12		M16		-		-	
Internal threaded anchor MCS PLUS E		-	-	-	-	-	-	-	-	-	-	M6	M8	M10	M12
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)															
compressive strength f_b	use condition	50	100	50	100	50	100	50	100	200	50	100	200	50	100
12N/mm ²	w/w	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
	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
20N/mm ²	w/w	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
	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
28N/mm ²	w/w	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
	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

Factor for temperature range 72/120°C: 0,83

Table C15.2: Characteristic resistance under shear loading

Anchor rod		M6		M8		M10		M12		M16		-		-	
Internal threaded anchor MCS PLUS E		-	-	-	-	-	-	-	-	-	-	M6	M8	M10	M12
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)															
compressive strength f_b	use condition	50	100	50	100	50	≥100	50	≥100	50	≥100	85	85	85	85
12N/mm ²	w/w	1,5	3,0	1,5	3,0	1,2	2,0	1,2	2,0	1,2	2,0	1,2	2,0	1,2	1,2
	d/d	2,5	4,0	2,5	4,0	1,5	3,0	1,5	3,0	1,5	3,0	1,5	3,0	1,5	1,5
20N/mm ²	w/w	2,5	4,0	2,5	4,0	1,5	3,0	1,5	3,0	1,5	3,0	1,5	3,0	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	3,5	1,5	1,5

Factor for job site tests and displacements see annex C110

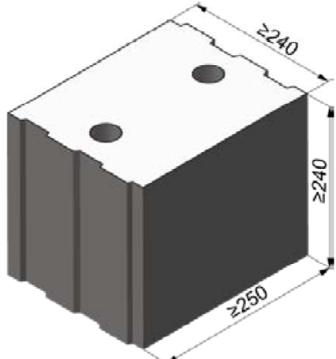
BERNER multicomponent system MCS Uni Plus for masonry

Performance

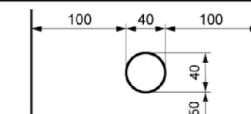
Solid sand-lime brick KS, NF, Characteristic resistance under tension and shear loading

Annex C 15

Solid sand-lime brick KS, 8DF, EN 771-2:2011+A1:2015



Solid sand-lime brick KS, 8DF, EN 771-2:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	length L	width W
≥ 250	≥ 240	≥ 240
Density ρ [kg/dm ³]	≥ 2,0	
Compressive strength f_b [N/mm ²]	10 / 20 / 28	
Standard	EN 771-2:2011+A1:2015	



Dimension see also Annex B 15

Table C16.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8
						11x85	15x85

Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H 16x85 K

Effective anchorage depth h_{ef} [mm]	- ¹⁾	85	- ¹⁾	85	- ¹⁾
Max. installation torque T_{inst} [Nm]		10		4	

General installation parameters

Edge distance C_{min}	[mm]	60
$S_{\text{min II}}$		80
$S_{\text{cr II}}$		3x h_{ef}
$S_{\text{min I}}$		80
$S_{\text{cr I}}$		3x h_{ef}

Drilling method

Hammer drilling with hard metal hammer drill

¹⁾ No performance assessed

Table C16.2: Group factors

Anchor rods	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8
Group factors	$\alpha_{g,N} \parallel$				1,5		
	$\alpha_{g,v} \parallel$				1,2		
	$\alpha_{g,N} \perp$				1,5		
	$\alpha_{g,v} \perp$				1,2		

BERNER multicompound system MCS Uni Plus for masonry

Performance
Solid sand-lime brick KS, 8DF, dimensions, installation parameters

Annex C 16

Solid sand-lime brick KS, 8DF, EN 771-2:2011+A1:2015

Table C17.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M10	M12	M16	-	-	M8	M10	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10 M12	- -	M6 M8
						11x85	15x85			11x85
Perforated sleeve MCS PLUS H	-	-	-	-	-	-	-		16x85	
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)										
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]					85			
10N/mm ²	w/w	w/d	3,0	4,0	4,5	4,5	3,5	3,0	3,5	4,5
	d/d		5,0	7,0	7,0	7,0	5,5	5,0	5,5	8,0
20N/mm ²	w/w	w/d	4,5	6,0	6,0	6,0	5,0	4,5	5,0	6,5
	d/d		7,5	10,0	10,0	10,0	7,5	7,5	7,5	11,0
28N/mm ²	w/w	w/d	5,0	8,0	8,5	8,5	7,0	5,0	7,0	8,5
	d/d		8,5	12,0	12,0	12,0	11,0	8,5	11,0	12,0

Factor for temperature range 72/120°C: 0,83

Table C17.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M10	M12	M16	-	-	M8	M10	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	M10 M12	- -	M6 M8
						11x85	15x85			11x85
Perforated sleeve MCS PLUS H	-	-	-	-	-	-	-		16x85	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)										
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]					85			
10N/mm ²	w/w	w/d	2,5	4,5			2,5	4,5		4,5
	d/d									2,5
20N/mm ²	w/w	w/d	4,0	6,5			4,0	6,5		6,5
	d/d									4,0
28N/mm ²	w/w	w/d	5,0	9,0			5,0	9,0		9,0
	d/d									5,0

Factor for job site tests and displacements see annex C110

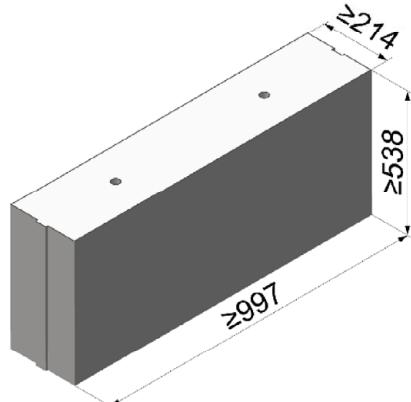
BERNER multicomponent system MCS Uni Plus for masonry

Performance

Solid sand-lime brick KS, 8DF, Characteristic resistance under tension and shear loading

Annex C 17

Solid sand-lime brick KS, EN 771-2:2011+A1:2015



Solid sand-lime brick KS, EN 771-2:2011+A1:2015			
Producer	e.g. Calduran		
Nominal dimensions [mm]	length L	width W	height H
	≥ 997	≥ 214	≥ 538
Density ρ [kg/dm³]	1,8	2,2	
Compressive strength f _b [N/mm²]	10 / 20		36
Standard	EN 771-2:2011+A1:2015		

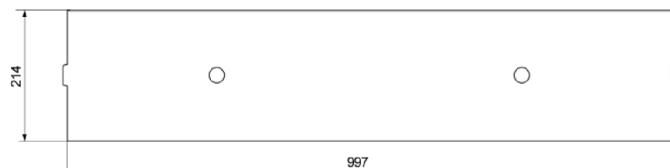


Table C18.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16	-	-							
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8							
Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve														
Effective anchorage depth h _{ef} [mm]	50	100	50	100	50	100	85							
Max. installation torque T _{inst} [Nm]	4			10		4	10							
General installation parameters														
Edge distance c _{min}	s _{cr} II = s _{min} II [mm] s _{cr} ⊥ = s _{min} ⊥	75												
Spacing		3x h _{ef}												
		3x h _{ef}												
Drilling method														
Hammer drilling with hard metal hammer drill														

Table C18.2: Group factors

Anchor rod	M6	M8	M10	M12	M16	-	-	
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8	
						M10	M12	
						11x85	15x85	
Group factors	$\alpha_{g,N} \parallel$ $\alpha_{g,v} \parallel$ $\alpha_{g,N} \perp$ $\alpha_{g,v} \perp$	[-]	2					
BERNER multicomponent system MCS Uni Plus for masonry								
Performance Solid sand-lime brick KS, dimensions, installation parameters						Annex C 18		

Solid sand-lime brick KS, EN 771-2:2011+A1:2015

Table C19.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)							
compressive strength f_b	use condition	50	100	50	100	50	100
10N/mm ²	w/w	4,0	4,0	7,0	5,0	6,0	5,0
	d/d	7,0	7,0	12,0	8,0	9,5	8,0
20N/mm ²	w/w	5,5	6,0	10,0	7,0	8,5	7,0
	d/d	8,5	10,5	12,0	11,5	12,0	11,0
36N/mm ²	w/w	4,5	8,0	12,0	11,5	12,0	12,0
	d/d	8,0	12,0	12,0	12,0	12,0	12,0
Effective anchorage depth h_{ef} [mm]							
							85

Factor for temperature range 72/120°C: 0,83

Table C19.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6	M8
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)							
compressive strength f_b	use condition	50		Effective anchorage depth h_{ef} [mm]			
10N/mm ²	w/w	3,0	5,0	5,5	4,0	4,0	85
	d/d						
20N/mm ²	w/w	4,5	7,0	7,5	6,0	6,0	4,5
	d/d						
36N/mm ²	w/w	4,5	9,0	11,0	12,0	12,0	4,5
	d/d						

Factor for job site tests and displacements see annex C110

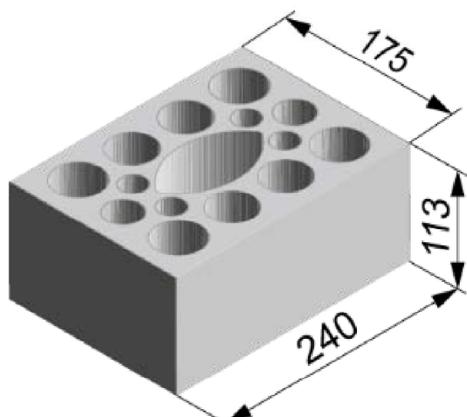
BERNER multicomponent system MCS Uni Plus for masonry

Performance

Solid sand-lime brick KS, Characteristic resistance under tension and shear loading

Annex C 19

Perforated sand-lime brick KSL, 3DF, EN 771-2:2011+A1:2015



Perforated sand-lime brick KSL, 3DF, EN 771-2:2011+A1:2015		
Producer	e.g. KS Wemding	
Nominal dimensions [mm]	length L	width W
	240	175
Density ρ [kg/dm ³]	$\geq 1,4$	
Compressive strength f_b [N/mm ²]	8 / 10 / 12 / 16 / 20	
Standard	EN 771-2:2011+A1:2015	

Dimension see also Annex B 15

Tabelle C20.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

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

General installation parameters

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

Drilling method

Hammer drilling with hard metal hammer drill

Table C20.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	16x85	16x130	20x85	20x130						
Group factors	$\alpha_{g,N \parallel} = \alpha_{g,v \parallel}$ $\alpha_{g,N \perp} = \alpha_{g,v \perp}$	[\cdot]												

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 20

Perforated sand-lime brick KSL, 3DF, EN 771-2:2011+A1:2015

Table C21.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	C_{min}	80	
Spacing	$S_{min \parallel}$	100	
	$S_{cr \parallel}$	240	
	$S_{min \perp}$	115	
	$S_{cr \perp}$	115	
	[mm]		
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C21.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve M CS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[$-$]	1,5 2,0

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 21

Perforated sand-lime brick KSL, 3DF, EN 771-2:2011+A1:2015

Table C22.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-		-		M6	M8				M10	M12		-	
					11x85		-		-	15x85		-		-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
8 N/mm ²	w/w	w/d		1,5		2,0		2,0		2,0		2,0		2,0
	d/d			1,5		2,0		2,5		2,5		2,5		2,5
10 N/mm ²	w/w	w/d		2,0		2,0		2,5		2,5		2,5		2,5
	d/d			2,0		2,5		3,0		3,0		3,0		3,0
12 N/mm ²	w/w	w/d		2,5		2,5		3,0		3,0		3,0		3,0
	d/d			2,5		3,0		3,5		3,5		3,5		3,5
16 N/mm ²	w/w	w/d		3,0		3,5		4,5		4,5		4,5		4,5
	d/d			3,5		4,0		4,5		4,5		4,5		4,5
20 N/mm ²	w/w	w/d		4,0		4,5		5,5		5,5		5,5		5,5
	d/d			4,5		5,0		6,0		6,0		6,0		6,0

Table C22.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)			
compressive strength f_b	use condition		
8 N/mm ²	w/w	w/d	2,0
	d/d		2,5
10 N/mm ²	w/w	w/d	2,5
	d/d		3,0
12 N/mm ²	w/w	w/d	3,0
	d/d		3,5
16 N/mm ²	w/w	w/d	4,5
	d/d		4,5
20 N/mm ²	w/w	w/d	5,5
	d/d		6,0

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicompound system MCS Uni Plus for masonry

Performance

Perforated sand-lime brick KSL, 3DF, Characteristic resistance under tension loading

Annex C 22

Perforated sand-lime brick KSL, 3DF, EN 771-2:2011+A1:2015

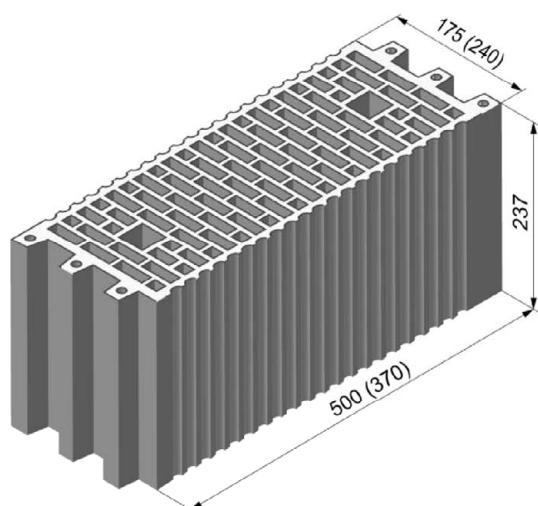
Table C23.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

Anchor rod		M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	
Internal threaded anchor MCS PLUS E		-		-		M6	M8				M10	M12		-		
					11x85						15x85					
Perforated sleeve MCS PLUS H		12x50		12x85		16x85		16x130		20x85		20x130				
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)																
compressive strength f_b	use condition															
8 N/mm ²	w/w	w/d				1,5					3,0			2,5	3,0	2,5
	d/d															
10 N/mm ²	w/w	w/d				2,0					3,5					
	d/d															
12 N/mm ²	w/w	w/d				2,5					4,5			4,0	4,5	4,0
	d/d															
16 N/mm ²	w/w	w/d	3,0	3,5	3,0	3,5	3,0				6,0			5,5	6,0	5,5
	d/d															
20 N/mm ²	w/w	w/d	4,0	4,5	4,0	4,5	4,0				7,5			6,5	7,5	6,5
	d/d															

Table C23.2: Characteristic resistance under shear loading (Push through anchorage)

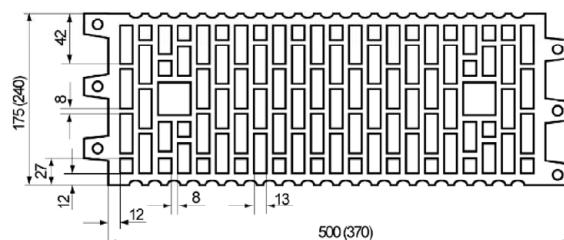
Anchor rod		M10	M12	M16
Perforated sleeve MCS PLUS H		18x130/200		22x130/200
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)				
compressive strength f_b	use condition			
8 N/mm ²	w/w	w/d		
	d/d		3,0	2,5
10 N/mm ²	w/w	w/d		
	d/d		3,5	3,5
12 N/mm ²	w/w	w/d		
	d/d		4,5	4,0
16 N/mm ²	w/w	w/d		
	d/d		6,0	5,5
20 N/mm ²	w/w	w/d		
	d/d		7,5	6,5
Factor for job site tests and displacements see annex C110				
BERNER multicomponent system MCS Uni Plus for masonry				
Performance Perforated sand-lime brick KSL, 3DF, Characteristic resistance under shear loading				
Annex C 23				

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



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
Density ρ [kg/dm ³]	$\geq 1,0$		
Compressive strength f_b [N/mm ²]	4 / 6 / 8 / 10 / 12		
Standard	EN 771-1:2011+A1:2015		



Dimension
see also
Annex B
15

Table C24.1: Installation parameters

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst}	[Nm]	2											
General installation parameters														
Edge distance	C_{min}													
	$S_{min \parallel}$													
Spacing	$S_{cr \parallel}$	[mm]												
	$S_{min \perp}$													
	$S_{cr \perp}$													

Drilling method

Hammer drilling with hard metal hammer drill

Table C24.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	16x130	20x85	20x130							
Group factors	$\alpha_{g,N \parallel} = \alpha_{g,V \parallel}$	[\cdot]								1				
	$\alpha_{g,N \perp} = \alpha_{g,V \perp}$													

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 24

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

Table C25.1: Characteristic resistance under tension loading

Anchor rod		M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E		-	-			M6	M8				M10	M12		-	-
						11x85					15x85				
Perforated sleeve MCS PLUS H		12x50	12x85			16x85		16x130			20x85		20x130		
$N_{Rk} = N_{Rk,p} = N_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C)															
compressive strength f_b	use condition														
4 N/mm ²	w/w	w/d		0,3							0,9				1,2
	d/d			0,4							0,9				1,2
6 N/mm ²	w/w	w/d		0,5							1,5				2,0
	d/d			0,6							1,5				2,0
8 N/mm ²	w/w	w/d		0,75							2,0				2,5
	d/d			0,75							2,0				2,5
10 N/mm ²	w/w	w/d		0,9							2,5				3,0
	d/d			0,9							2,5				3,5
12 N/mm ²	w/w	w/d		0,9							3,0				3,5
	d/d			1,2							3,0				4,0

Factor for temperature range 72/120°C: 0,83

Table C25.2: Characteristic resistance under shear loading

Anchor rod		M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E		-	-			M6	M8				M10	M12		-	-
						11x85					15x85				
Perforated sleeve MCS PLUS H		12x50	12x85			16x85		16x130			20x85		20x130		
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)															
compressive strength f_b	use condition														
4 N/mm ²	w/w	w/d				0,5					0,6		0,5		0,6
	d/d														
6 N/mm ²	w/w	w/d				0,75					0,9		0,75		0,9
	d/d														
8 N/mm ²	w/w	w/d				0,9					1,2		0,9		1,2
	d/d														
10 N/mm ²	w/w	w/d				1,2					1,5		1,2		1,5
	d/d														
12 N/mm ²	w/w	w/d				1,5					2,0		1,5		2,0
	d/d														

Factor for job site tests and displacements see annex C110

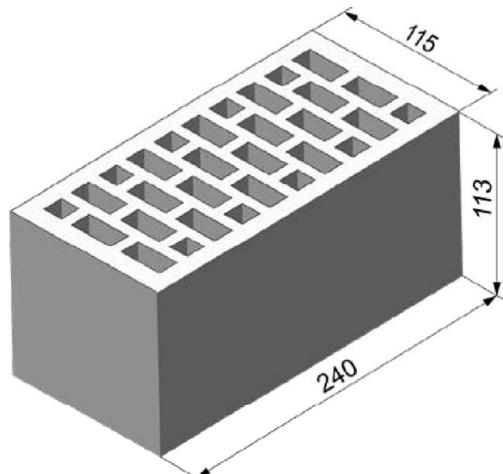
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 25

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



Vertical perforated brick HLz, 2DF, EN 771-1:2011+A1:2015				
Producer	e.g. Wienerberger			
Nominal dimensions [mm]	length L	width W		
	240	115		
Density ρ [kg/dm ³]	$\geq 1,4$			
Compressive strength f_b [N/mm ²]	6 / 10 / 16 / 20 / 28			
Standard	EN 771-1:2011+A1:2015			
Dimension see also Annex B 15				

Table C26.1: Installation parameters

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16						
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	M10 M12	-	-	-						
					11x85			15x85								
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			20x85								
Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H																
Max. installation torque T_{inst} [Nm]						2										
General installation parameters																
Edge distance C_{min}	$s_{cr \parallel} = s_{min \parallel}$ [mm]					80										
Spacing $s_{cr \perp} = s_{min \perp}$						240										
						115										
Drilling method																
Hammer drilling with hard metal hammer drill																

Table C26.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	M10 M12	-	-	-
					11x85			15x85		
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			20x85		
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,v \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,v \perp}$	[-]				2				

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 26

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

Table C27.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	M10	M12	-
Perforated sleeve MCS PLUS H	12x50	12x85	12x85	16x85	16x85	16x85	16x85	15x85	15x85	20x85
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)										
compressive strength f_b	use condition									
6 N/mm ²	w/w	w/d	0,75	0,9	0,75	0,75	0,75	0,9	0,9	0,9
	d/d		0,75	1,2	0,75	0,75	0,75	0,9	0,9	0,9
10 N/mm ²	w/w	w/d	1,2	1,5	1,2	1,2	1,2	1,5	1,5	1,5
	d/d		1,2	2,0	1,2	1,2	1,2	1,5	1,5	1,5
16 N/mm ²	w/w	w/d	2,0	2,5	2,0	2,0	2,0	2,0	2,0	2,0
	d/d		2,0	3,0	2,0	2,0	2,0	2,5	2,5	2,5
20 N/mm ²	w/w	w/d	2,5	3,5	2,5	2,5	2,5	3,0	3,0	3,0
	d/d		2,5	4,0	2,5	2,5	2,5	3,0	3,0	3,0
28 N/mm ²	w/w	w/d	3,0	5,0	3,5	3,5	3,5	4,0	4,0	4,0
	d/d		3,5	5,5	3,5	3,5	3,5	4,5	4,5	4,5

Factor for temperature range 72/120°C: 0,83

Table C27.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	M10	M12	-
Perforated sleeve MCS PLUS H	12x50	12x85	12x85	16x85	16x85	16x85	16x85	15x85	15x85	20x85
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)										
compressive strength f_b	use condition									
6 N/mm ²	w/w	w/d	1,2	1,5	1,2	2,0	1,2	1,5	1,5	2,5
	d/d									
10 N/mm ²	w/w	w/d	2,0	2,5	2,0	4,0	2,0	2,5	2,5	4,5
	d/d									
16 N/mm ²	w/w	w/d	3,0	3,5	3,0	6,0	3,0	3,5	3,5	7,0
	d/d									
20 N/mm ²	w/w	w/d	4,0	4,5	4,0	7,5	4,0	4,5	4,5	8,5
	d/d									
28 N/mm ²	w/w	w/d	5,0	6,5	5,0	9,5	5,0	6,5	6,5	12,0
	d/d									

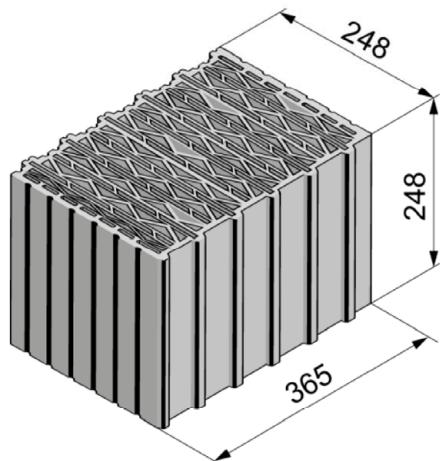
Factor for job site tests and displacements see annex C110

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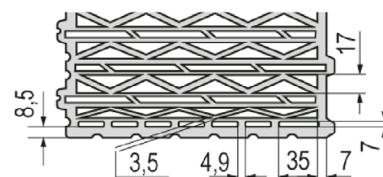
Performance
Vertical perforated brick HLz, 2DF,
Characteristic resistance under tension and shear loading

Annex C 27

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



Vertical perforated brick HLz, U8, EN 771-1:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	length L	width W
	248	365
height H		248
Density ρ [kg/dm ³]	0,6	
Compressive strength f_b [N/mm ²]	4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 15

Table C28.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	3	5	3	5	3	5	5	5	5	5	5	5	5	5	5
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General installation parameters

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

Drilling method

Rotary drilling with carbide drill

Table C28.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									
Group factors	$\alpha_{g,N \parallel}$	[-]	1,3													
	$\alpha_{g,v \parallel}$		1,2													
	$\alpha_{g,N \perp}$		1,3													
	$\alpha_{g,v \perp}$		1,0													

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Performance

Vertical perforated brick HLz, U8, dimensions, installation parameters

Annex C 28

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

Table C29.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
Anchor rod with perforated sleeve MCS PLUS H				
Max. installation torque	T_{inst} [Nm]		5	
General installation parameters				
Edge distance	C_{min}	[mm]	60	
	$S_{min} \parallel$		80	
Spacing	$S_{cr} \parallel$		250	
	$S_{min} \perp$		80	
	$S_{cr} \perp$		250	
Drilling method				
Rotary drilling with carbide drill				

Table C29.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N} \parallel$	[-]	1,3
	$\alpha_{g,V} \parallel$		1,2
	$\alpha_{g,N} \perp$		1,3
	$\alpha_{g,V} \perp$		1,0

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

Annex C 29

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

Table C30.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8	-	-			M10 M12	-	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)

compressive strength f_b	use condition													
4 N/mm²	w/w	w/d	1,2											
	d/d		1,2											
6 N/mm²	w/w	w/d	1,5											
	d/d		1,5											
8 N/mm²	w/w	w/d	1,5											
	d/d		2,0											

Table C30.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve MCS PLUS H			18x130/200		22x130/200	
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)						
compressive strength f_b	use condition					
4 N/mm²	w/w	w/d			1,2	
	d/d				1,5	
6 N/mm²	w/w	w/d			1,5	
	d/d				1,5	
8 N/mm²	w/w	w/d			2,0	
	d/d				2,0	

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

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Performance

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

Annex C 30

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

Table C31.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12						
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition													
4 N/mm ²	w/w	w/d	1,2											
	d/d													
6 N/mm ²	w/w	w/d	1,5											
	d/d													
8 N/mm ²	w/w	w/d	1,5											
	d/d													

Table C31.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition					
4 N/mm ²	w/w	w/d	1,2			
	d/d					
6 N/mm ²	w/w	w/d	1,5			
	d/d					
8 N/mm ²	w/w	w/d	1,5			
	d/d					

Factor for job site tests and displacements see annex C108

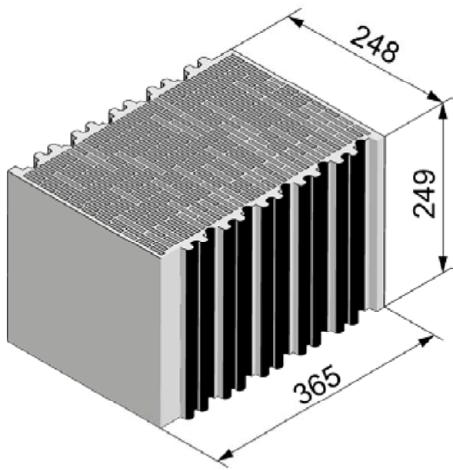
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Performance

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

Annex C 31

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



Vertical perforated brick HLz, T10, T11, EN 771-1:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	length L	width W
	248	365
height H	249	
Density ρ [kg/dm ³]	0,7	
Compressive strength f_b [N/mm ²]	8 / 10 / 12	
Standard	EN 771-1:2011+A1:2015	

Table C32.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	3	5	3	5
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General installation parameters

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

Drilling method

Rotary drilling with carbide drill

Table C32.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									
	$\alpha_{g,N \parallel}$	[-]	1,7													
Group factors	$\alpha_{g,v \parallel}$		0,5													
	$\alpha_{g,N \perp}$		1,3													
	$\alpha_{g,v \perp}$		0,5													

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Performance

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

Annex C 32

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

Table C33.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
Anchor rod with perforated sleeve MCS PLUS H				
Max. installation torque	T_{inst} [Nm]		5	
General installation parameters				
Edge distance	c_{min}	[mm]	60	
	$s_{min \parallel}$		80	
Spacing	$s_{cr \parallel}$		250	
	$s_{min \perp}$		80	
	$s_{cr \perp}$		250	
Drilling method				
Rotary drilling with carbide drill				

Table C33.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N} \parallel$	[-]	1,7
	$\alpha_{g,v} \parallel$		0,5
	$\alpha_{g,N} \perp$		1,3
	$\alpha_{g,v} \perp$		0,5

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Performance

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

Annex C 33

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

Table C34.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8	-	-			M10 M12	-	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)

compressive strength f_b	use condition														
8 N/mm²	w/w	w/d	1,5												1,5
	d/d		1,5												2,0
10 N/mm²	w/w	w/d	1,5												2,0
	d/d		2,0												2,0
12 N/mm²	w/w	w/d	2,0												2,0
	d/d		2,0												2,5

Table C34.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod			M10	M12	M16
Perforated sleeve MCS PLUS H				18x130/200	22x130/200
	$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)				

compressive strength f_b	use condition				
8 N/mm²	w/w	w/d	1,5		1,5
	d/d		2,0		2,0
10 N/mm²	w/w	w/d	2,0		2,0
	d/d		2,0		2,0
12 N/mm²	w/w	w/d	2,0		2,0
	d/d		2,5		2,5

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

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Performance

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

Annex C 34

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

Table C35.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12						
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition													
8 N/mm ²	w/w	w/d	0,9						1,5					
	d/d													
10 N/mm ²	w/w	w/d	0,9						1,5					
	d/d													
12 N/mm ²	w/w	w/d	1,2						2,0					
	d/d													

Table C35.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve MCS PLUS H	18x130/200			22x130/200		

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition						
8 N/mm ²	w/w	w/d	1,5			2,0	
	d/d						
10 N/mm ²	w/w	w/d	1,5			2,0	
	d/d						
12 N/mm ²	w/w	w/d	2,0			2,0	
	d/d						

Factor for job site tests and displacements see annex C110

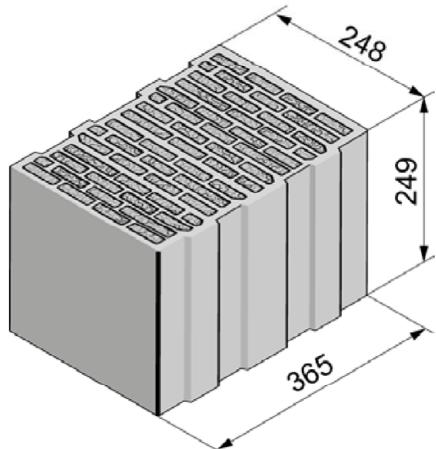
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Performance

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

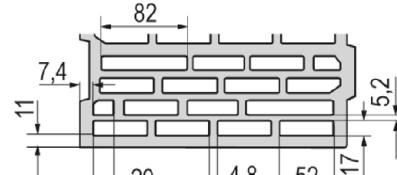
Annex C 35

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



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

Producer	-		
Nominal dimensions [mm]	length L	width W	height H
248	365	249	
Density ρ [kg/dm ³]		0,5	
Compressive strength f_b [N/mm ²]		4 / 6	
Standard	EN 771-1:2011+A1:2015		



Dimension see also
Annex B 16

Table C36.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	-
Perforated sleeve MCSPLUS H	12x50	12x85			11x85		16x85		16x130		20x85		20x130		20x200	

Ankerstangen und Innengewindeanker MCS PLUS E mit Injektionsanker-Hülse MCS PLUS H

Max. installation torque	T_{inst} [Nm]	2	5	2	5
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General installation parameters

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

Drilling method

Rotary drilling with carbide drill

Table C36.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	-
Perforated sleeve MCSPLUS H	12x50	12x85			11x85		16x85		16x130		20x85		20x130		20x200	
Group factors	$\alpha_{g,N \parallel}$	[-]	1,1													
	$\alpha_{g,v \parallel}$		1,2													
	$\alpha_{g,N \perp}$		1,1													
	$\alpha_{g,v \perp}$		1,2													

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

Annex C 36

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

Table C37.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
Anchor rod with perforated sleeve MCS PLUS H				
Max. installation torque	T_{inst} [Nm]		5	
General installation parameters				
Edge distance	c_{min}	[mm]	60	
	$s_{min \parallel}$		80	
Spacing	$s_{cr \parallel}$		250	
	$s_{min \perp}$		80	
	$s_{cr \perp}$		250	
Drilling method				
Rotary drilling with carbide drill				

Table C37.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N} \parallel$	[-]	1,1
	$\alpha_{g,v} \parallel$		1,2
	$\alpha_{g,N} \perp$		1,1
	$\alpha_{g,v} \perp$		1,2

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

Annex C 37

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

Table C38.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8	-	-			M10 M12	-	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																
compressive strength f_b	use condition															
4 N/mm ²	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		
6 N/mm ²	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		

Table C38.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)						
compressive strength f_b	use condition					
4 N/mm ²	w/w	w/d		1,2		1,2
	d/d			1,5		1,5
6 N/mm ²	w/w	w/d		1,5		1,5
	d/d			2,0		2,0

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 38

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

Table C39.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12						
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition											
4 N/mm²	w/w	w/d	0,9 1,5									
	d/d										1,2	
6 N/mm²	w/w	w/d	1,2 2,0									
	d/d										1,5	

Table C39.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod			M10	M12	M16
Perforated sleeve MCS PLUS H				18x130/200	
V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)					
compressive strength f _b	use condition				
4 N/mm²	w/w	w/d		1,5	1,2
	d/d				
6 N/mm²	w/w	w/d		2,0	1,5
	d/d				

Factor for job site tests and displacements see annex C110

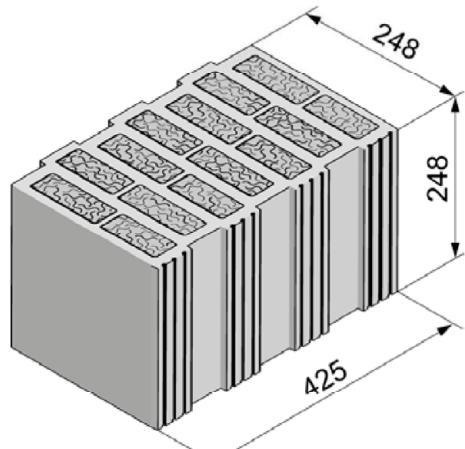
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 39

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



Vertical perforated brick HLz, T9 MW, filled with mineral wool, EN 771-1:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	length L	width W
	248	425
height H	248	
Density ρ [kg/dm ³]	0,8	
Compressive strength f_b [N/mm ²]	4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	

Dimension see also Annex B 16

Table C40.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	
Perforated sleeve MCSPLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	3	5	3	5
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General installation parameters

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

Drilling method

Rotary drilling with carbide drill

Table C40.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	
Perforated sleeve MCSPLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									

Group factors

$\alpha_{g,N \parallel}$	[-]	1,3
$\alpha_{g,v \parallel}$		1,2
$\alpha_{g,N \perp}$		0,6
$\alpha_{g,v \perp}$		1,2

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 40

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

Table C41.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
Anchor rod with perforated sleeve MCS PLUS H				
Max. installation torque	T_{inst} [Nm]		5	
General installation parameters				
Edge distance	C_{min}	[mm]	60	
	$S_{min} \parallel$		80	
Spacing	$S_{cr} \parallel$		250	
	$S_{min} \perp$		80	
	$S_{cr} \perp$		250	
Drilling method				
Rotary drilling with carbide drill				

Table C41.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N} \parallel$	[-]	1,3
	$\alpha_{g,v} \parallel$		1,2
	$\alpha_{g,N} \perp$		0,6
	$\alpha_{g,v} \perp$		1,2

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 41

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

Table C42.1: Characteristic resistance 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 MCS PLUS E	-	-			M6	M8				M10	M12			-	-	-
					11x85					15x85						
Perforated sleeve MCS PLUS H	12x50		12x85		16x85		16x130		20x85		20x130		20x200			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																
compressive strength f_b	use condition															
4 N/mm ²	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				
6 N/mm ²	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				
8 N/mm ²	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				

Table C42.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16													
Perforated sleeve MCS PLUS H	18x130/200		22x130/200													
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																
compressive strength f_b	use condition															
4 N/mm ²	w/w	w/d		3,0								4,0				
	d/d			3,0								4,5				
6 N/mm ²	w/w	w/d		3,5								5,0				
	d/d			4,0								5,5				
8 N/mm ²	w/w	w/d		4,0								6,0				
	d/d			4,5								6,5				

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 42

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

Table C43.1: Characteristic resistance 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 MCS PLUS E	-	-			M6	M8				M10	M12			-	-	-
Perforated sleeve MCS PLUS H	12x50		12x85		16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition														
4 N/mm²	w/w	w/d	2,0			2,0			2,5			2,0			1,5
	d/d														
6 N/mm²	w/w	w/d	2,5			2,5			3,0			2,5			2,0
	d/d														
8 N/mm²	w/w	w/d	2,5			3,0			4,0			3,0			2,5
	d/d														

Table C43.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10		M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)				
compressive strength f _b	use condition			
4 N/mm²	w/w	w/d	2,5	
	d/d			
6 N/mm²	w/w	w/d	3,0	
	d/d			
8 N/mm²	w/w	w/d	4,0	
	d/d			

Factor for job site tests and displacements see annex C110

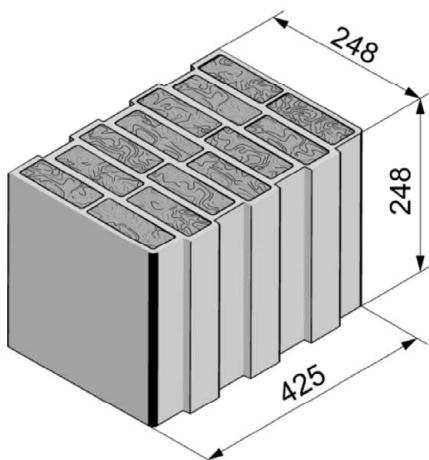
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 43

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



Vertical perforated brick HLz, FZ 7, filled with mineral wool, EN 771-1:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	length L	width W
	248	425
height H	248	
Density ρ [kg/dm ³]	0,6	
Compressive strength f_b [N/mm ²]	4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	

Dimension see also Annex B 16

Table C44.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12					
					11x85					15x85						

Perforated sleeve MCSPLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200
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Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	2	5	2	5
General installation parameters					
Edge distance	c_{min}		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

Table C44.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12					
					11x85					15x85						
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130						20x85		20x130	20x200			
Group factors	$\alpha_{g,N \parallel}$															
	$\alpha_{g,v \parallel}$															
	$\alpha_{g,N \perp}$															
	$\alpha_{g,v \perp}$															

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 44

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

Table C45.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
Anchor rod with perforated sleeve MCS PLUS H				
Max. installation torque	T_{inst} [Nm]		5	
General installation parameters				
Edge distance	c_{min}	[mm]	60	
	$s_{min \parallel}$		80	
Spacing	$s_{cr \parallel}$		250	
	$s_{min \perp}$		80	
	$s_{cr \perp}$		250	
Drilling method				
Rotary drilling with carbide drill				

Table C45.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N} \parallel$	[-]	1,9
	$\alpha_{g,v} \parallel$		0,9
	$\alpha_{g,N} \perp$		1,0
	$\alpha_{g,v} \perp$		0,7

BERNER multicompound system MCS Uni Plus for masonry

Performance

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

Annex C 45

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

Table C46.1: Characteristic resistance 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 MCS PLUS E		-	-			M6	M8				M10	M12			-	-	-
Perforated sleeve MCS PLUS H		12x50		12x85		16x85		16x130		20x85		20x130		20x200			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																	
compressive strength f_b	use condition																
4 N/mm ²	w/w	w/d	0,6	0,75	1,5		2,0		1,2		2,0		2,0		2,0		2,0
	d/d		0,6	0,9	1,5		2,0		1,5		2,0		2,5				
6 N/mm ²	w/w	w/d	0,75	0,9	1,5		2,0		1,5		2,5		2,5		2,5		2,5
	d/d		0,9	0,9	2,0		2,5		2,0		2,5		3,0				
8 N/mm ²	w/w	w/d	0,9	1,2	2,0		2,5		2,0		3,0		2,5		3,0		3,5
	d/d		0,9	1,2	2,0		3,0		2,0		3,0						

Table C46.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod		M10	M12	M16
Perforated sleeve MCS PLUS H		18x130/200		22x130/200
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)				
compressive strength f_b	use condition			
4 N/mm ²	w/w	w/d	2,0	2,0
	d/d		2,0	2,0
6 N/mm ²	w/w	w/d	2,0	2,5
	d/d		2,5	2,5
8 N/mm ²	w/w	w/d	2,5	2,5
	d/d		3,0	3,0

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 46

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

Table C47.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12						
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition										
4 N/mm ²	w/w w/d	1,2									1,5
	d/d										1,5
6 N/mm ²	w/w w/d	1,5									2,0
	d/d										1,5
8 N/mm ²	w/w w/d	1,5									2,5
	d/d										2,0

Table C47.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200

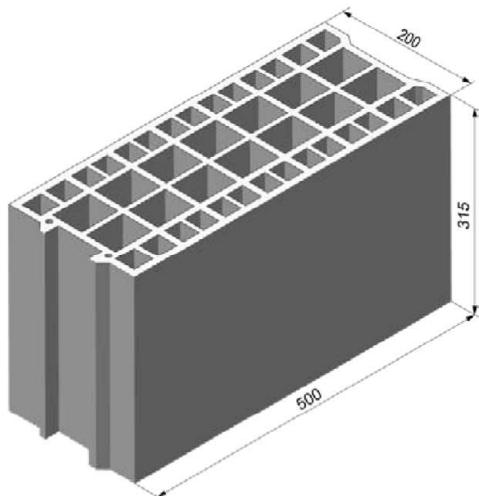
V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition			
4 N/mm ²	w/w w/d	1,5		
	d/d			
6 N/mm ²	w/w w/d	2,0		
	d/d			
8 N/mm ²	w/w w/d	2,5		
	d/d			

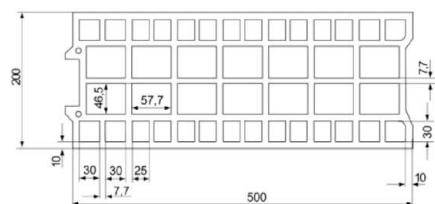
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry	Annex C 47
Performance Vertical perforated brick HLz, FZ 7, filled with mineral wool; Characteristic resistance under shear loading	

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Bouyer Leroux	
Nominal dimensions [mm]	length L	width W
	500	200
Density ρ [kg/dm ³]	$\geq 0,6$	
Compressive strength f_b [N/mm ²]	4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 16

Table C48.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst}	[Nm]	2
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General installation parameters

Edge distance	C_{min}	[mm]	120
	$S_{min \parallel}$		120
Spacing	$S_{cr \parallel}$		500
	$S_{min \perp} = S_{cr \perp}$		315

Drilling method

Hammer drilling with hard metal hammer drill

Table C48.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCSPLUS H	12x50	12x85	16x85	16x130	20x85	20x130								
Group factors	$\alpha_{g,N \parallel}$	[-]	1,3											
	$\alpha_{g,V \parallel}$		1,7											
	$\alpha_{g,N \perp} = \alpha_{g,V \perp}$		2											

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 48

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

Table C49.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	c_{min}	120	
Spacing	$s_{min \parallel}$ $s_{cr \parallel}$	120	
	$[mm]$	500	
	$s_{min \perp} = s_{cr \perp}$	315	
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C49.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,v \parallel}$	[$-$]	1,3 1,7 2
	$\alpha_{g,N \perp} = \alpha_{g,v \perp}$		

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 49

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

Table C50.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-		-		M6	M8				M10	M12		-	-
					11x85					15x85				
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	0,5		1,5		0,75		1,5		1,5		1,5	
	d/d		0,6		1,5		0,9		1,5		2,0			
6 N/mm ²	w/w	w/d	0,75		2,0		1,2		2,0		2,5			
	d/d		0,9		2,5		1,2		2,5		2,5			
8 N/mm ²	w/w	w/d	0,9		3,0		1,5		3,0		3,5			
	d/d		1,2		3,0		2,0		3,0		3,5			

Table C50.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16											
Perforated sleeve MCS PLUS H	18x130/200		22x130/200											
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	0,75		1,5									
	d/d		0,9		2,0									
6 N/mm ²	w/w	w/d	1,2		2,5		1,2		2,5					
	d/d		1,2		2,5		1,2		2,5					
8 N/mm ²	w/w	w/d	1,5		3,0		1,5		3,0		3,5			
	d/d		2,0		3,0		2,0		3,0		3,5			

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

Annex C 50

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

Table C51.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12			
					11x85		-	-		15x85		-		-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d			1,5				0,9		1,5		2,5	0,9
	d/d													
6 N/mm ²	w/w	w/d			2,5				1,5		2,5		3,5	1,5
	d/d													
8 N/mm ²	w/w	w/d			3,5				2,0		3,5		4,5	2,0
	d/d													

Table C51.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10	M12	M16											
Perforated sleeve MCS PLUS H	18x130/200		22x130/200											
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d			0,9									
	d/d													
6 N/mm ²	w/w	w/d			1,5									
	d/d													
8 N/mm ²	w/w	w/d			2,0									
	d/d													

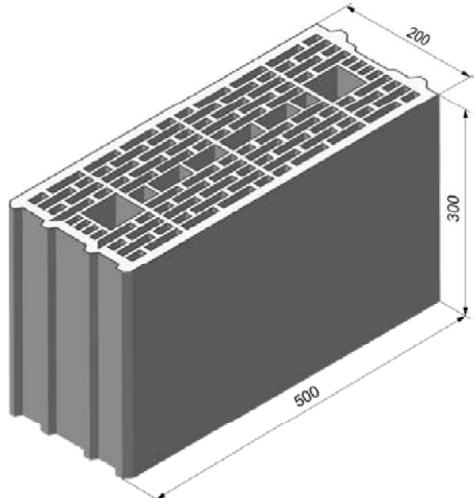
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, Characteristic resistance under shear loading

Annex C 51

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Wienerberger	
Nominal dimensions [mm]	length L	width W
	500	200
Density ρ [kg/dm ³]	$\geq 0,7$	
Compressive strength f_b [N/mm ²]	4 / 6 / 8 / 10	
Standard	EN 771-1:2011+A1:2015	

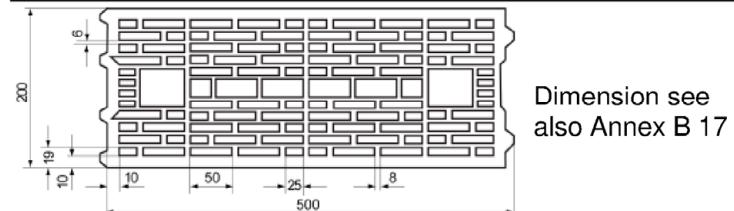


Table C52.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

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

General installation parameters

Edge distance	C_{min}	[mm]	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

Table C52.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	12x85	12x85	16x85	16x85	16x130	16x130	16x130	20x85	20x85	20x130	20x130	20x130
Group factors	$\alpha_{g,N \parallel}$	$\alpha_{g,v \parallel}$	$\alpha_{g,N \perp}$	$\alpha_{g,v \perp}$	[-]									
					1,4									
					2									

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, dimensions, installation parameters

Annex C 52

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

Table C53.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	c_{min}	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			
Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$	1,4	
	$\alpha_{g,v \parallel}$		2
	$\alpha_{g,N \perp} = \alpha_{g,v \perp}$		
BERNER multicompound system MCS Uni Plus for masonry			
Performance Vertical perforated brick HLz, dimensions, installation parameters			Annex C 53

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

Table C54.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-		-		M6	M8				M10	M12		-	-
					11x85					15x85				
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	0,5			0,6			1,2	0,75			1,5	
	d/d		0,6			0,75			1,2	0,9			1,5	
6 N/mm ²	w/w	w/d	0,75			0,9			1,5	1,2			2,0	
	d/d		0,9			1,2			2,0	1,2			2,5	
8 N/mm ²	w/w	w/d	0,9			1,2			2,0	1,5			2,5	
	d/d		1,2			1,5			2,5	1,5			3,0	
10 N/mm ²	w/w	w/d	1,2			1,5			2,5	2,0			3,5	
	d/d		1,5			2,0			3,0	2,0			4,0	

Table C54.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16		
Perforated sleeve MCS PLUS H	18x130/200		22x130/200		
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)					
compressive strength f_b	use condition				
4 N/mm ²	w/w	w/d	1,2	1,5	
	d/d		1,2	1,5	
6 N/mm ²	w/w	w/d	1,5	2,0	
	d/d		2,0	2,5	
8 N/mm ²	w/w	w/d	2,0	2,5	
	d/d		2,5	3,0	
10 N/mm ²	w/w	w/d	2,5	3,5	
	d/d		3,0	4,0	

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

Annex C 54

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

Table C55.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-		-		M6	M8				M10	M12		-	-
					11x85					15x85			-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	0,9	1,2		0,9	1,2		0,6	2,0		0,6		
	d/d													
6 N/mm ²	w/w	w/d	1,2	1,5		1,2	1,5		0,9	3,0		0,9		
	d/d													
8 N/mm ²	w/w	w/d	1,5	2,0		1,5	2,0		1,2	4,0		1,2		
	d/d													
10 N/mm ²	w/w	w/d	2,0	3,0		2,0	3,0		1,5	5,0		1,5		
	d/d													

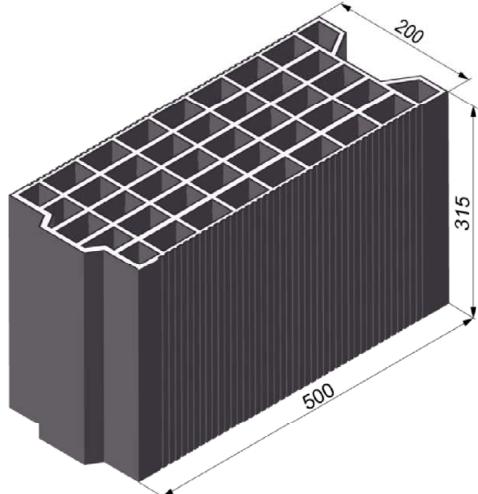
Table C55.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10	M12	M16		
Perforated sleeve MCS PLUS H	18x130/200		22x130/200		
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)					
compressive strength f_b	use condition				
4 N/mm ²	w/w	w/d	0,6		
	d/d				
6 N/mm ²	w/w	w/d	0,9		
	d/d				
8 N/mm ²	w/w	w/d	1,2		
	d/d				
10 N/mm ²	w/w	w/d	1,5		
	d/d				

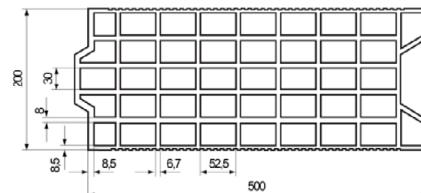
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry	Annex C 55
Performance Vertical perforated brick HLz, Characteristic resistance under shear loading	

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Terreal	
Nominal dimensions [mm]	length L	width W
	500	200
Density ρ [kg/dm ³]	$\geq 0,7$	
Compressive strength f_b [N/mm ²]	2 / 4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 17

Table C56.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130								
Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H														
Max. installation torque	T_{inst}	[Nm]												2
General installation parameters														
Edge distance	c_{min}					50				80			50	80
Spacing	$s_{min \parallel}$									100				
	$s_{cr \parallel}$	[mm]								500				
	$s_{min \perp}$									100				
	$s_{cr \perp}$									315				
Drilling method														
Hammer drilling with hard metal hammer drill														

Table C56.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130								
Group factors	$\alpha_{g,N \parallel}$									1,1				
	$\alpha_{g,v \parallel}$									1,2				
	$\alpha_{g,N \perp}$									1,1				
	$\alpha_{g,v \perp}$									1,2				

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, dimensions, installation parameters

Annex C 56

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

Table C57.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	c_{min}	80	
Spacing	$s_{min \parallel}$	100	
	$s_{cr \parallel}$	500	
	$s_{min \perp}$	100	
	$s_{cr \perp}$	315	
	[mm]		
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C57.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$	1,1	
	$\alpha_{g,v \parallel}$	1,2	
	$\alpha_{g,N \perp}$	1,1	
	$\alpha_{g,v \perp}$	1,2	
	[\cdot]		

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 57

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

Table C58.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16								
Internal threaded anchor MCS PLUS E	-	-		M6 M8 11x85		-	-	-	-	M10 M12 15x85	-	-	-									
Perforated sleeve MCS PLUS H	12x50	12x85		16x85		16x130		20x85		20x130												
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																						
compressive strength f_b	use condition																					
2 N/mm ²	w/w	w/d	0,5																			
	d/d		0,5				0,6		0,5		0,6											
4 N/mm ²	w/w	w/d	0,9																			
	d/d		0,9	1,2																		
6 N/mm ²	w/w	w/d	1,5																			
	d/d		1,5																			
8 N/mm ²	w/w	w/d	2,0																			
	d/d		2,0																			

Table C58.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)			
compressive strength f_b	use condition		
2 N/mm ²	w/w	w/d	0,5
	d/d		0,6
4 N/mm ²	w/w	w/d	0,9
	d/d		1,2
6 N/mm ²	w/w	w/d	1,5
	d/d		1,5
8 N/mm ²	w/w	w/d	2,0
	d/d		2,0

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, Characteristic resistance under tension loading

Annex C 58

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

Table C59.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12		-	-
					11x85		-		-	15x85			-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130			20x85		20x130		
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
2 N/mm ²	w/w	w/d	0,3	0,6	0,3	0,6	0,6	0,6	0,9	0,9	0,9	0,9	0,75	0,75
	d/d													
4 N/mm ²	w/w	w/d	0,75	1,2	0,75	1,2	1,2	1,2	2,0	2,0	2,0	2,0	1,5	1,5
	d/d													
6 N/mm ²	w/w	w/d	0,9	2,0	0,9	2,0	1,5	1,5	3,0	3,0	3,0	3,0	2,0	2,0
	d/d													
8 N/mm ²	w/w	w/d	1,5	2,5	1,5	2,5	2,0	2,0	4,0	4,0	4,0	4,0	3,0	3,0
	d/d													

Table C59.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)				
compressive strength f_b	use condition			
2 N/mm ²	w/w	w/d	0,6	0,75
	d/d			
4 N/mm ²	w/w	w/d	1,2	1,5
	d/d			
6 N/mm ²	w/w	w/d	1,5	2,0
	d/d			
8 N/mm ²	w/w	w/d	2,0	3,0
	d/d			

Factor for job site tests and displacements see annex C110

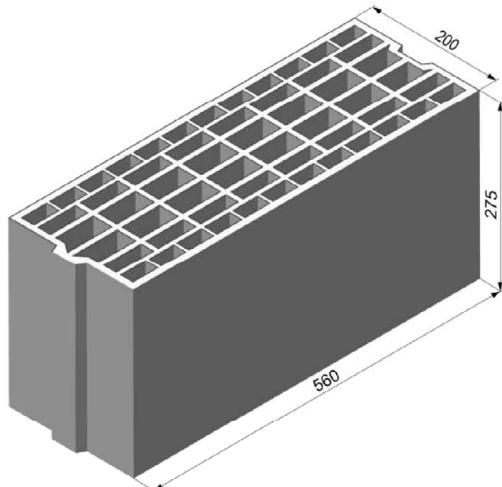
BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, Characteristic resistance under shear loading

Annex C 59

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Imery	
Nominal dimensions [mm]	length L	width W
	560	200
Density ρ [kg/dm ³]	$\geq 0,7$	
Compressive strength f_b [N/mm ²]	4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	

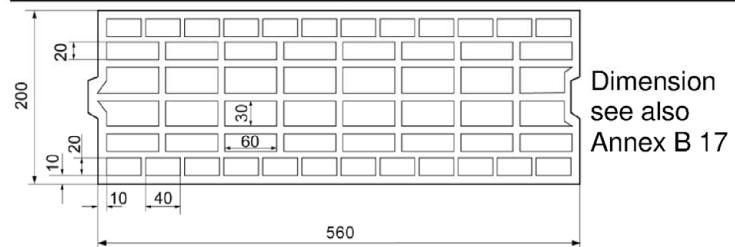


Table C60.1: Installation parameters

Anchor rod	M8	M10	M10	M12	M12	M16	M16
Perforated sleeve MCS PLUS H	16x130		18x130/200		20x130		22x130/200
Anchor rod with perforated sleeve MCS PLUS H							
Max. installation torque	T_{inst} [Nm]					2	
Edge distance	C_{min}					80	
Spacing	$S_{min \parallel} = S_{cr \parallel}$ [mm]					560	
	$S_{min \perp} = S_{cr \perp}$					275	
Drilling method							
Hammer drilling with hard metal hammer drill							

Table C60.2: Group factors

Anchor rod	M8	M10	M10	M12	M12	M16	M16
Perforated sleeve MCS PLUS H	16x130		18x130/200		20x130		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[-]				2	

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, dimensions, installation parameters

Annex C 60

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

Table C61.1: Characteristic resistance under tension loading

Anchor rod		M8	M10	M10	M12	M12	M16
Perforated sleeve MCS PLUS H		16x130		18x130/200		20x130	
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)							
compressive strength f_b	use condition						
4 N/mm²	w/w	w/d	0,9		1,2		
	d/d		1,2		1,5		
6 N/mm²	w/w	w/d	1,5		2,0		
	d/d		1,5		2,0		
8 N/mm²	w/w	w/d	2,0		2,5		
	d/d		2,5		3,0		

Factor for temperature range 72/120°C: 0,83

Table C61.2: Characteristic resistance under shear loading

Anchor rod		M8	M10	M10	M12	M12	M16
Perforated sleeve MCS PLUS H		16x130		18x130/200		20x130	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)							
compressive strength f_b	use condition						
4 N/mm²	w/w	w/d	0,9				
	d/d						
6 N/mm²	w/w	w/d	1,5				
	d/d						
8 N/mm²	w/w	w/d	2,0				
	d/d						

Factor for job site tests and displacements see annex C110

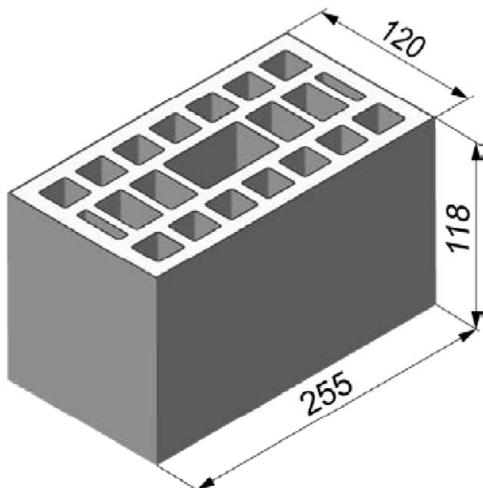
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

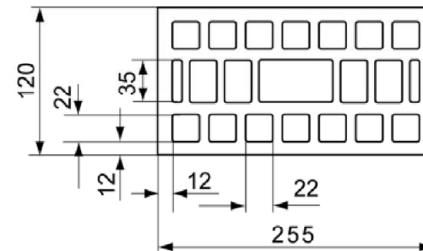
Annex C 61

Vertical perforated brick HLz, EN 771-1:2015



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
Density ρ [kg/dm ³]	$\geq 1,0$		
Compressive strength f_b [N/mm ²]	2 / 4 / 6 / 8 / 10 / 12		
Standard	EN 771-1:2011+A1:2015		



Dimension see also
Annex B 18

Table C62.1: Installation parameters

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	M10 M12	-	-	-
					11x85	-	15x85	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			20x85		
Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H										
Max. installation torque T_{inst} [Nm]						2				
General installation parameters										
Edge distance c_{min}						60				
Spacing $s_{cr \parallel} = s_{min \parallel}$ [mm]						255				
						120				
Drilling method										
Hammer drilling with hard metal hammer drill										

Table C62.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	M10 M12	-	-	-
					11x85	-	15x85	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			20x85		
Group factors	$\alpha_{g,N} \parallel$ $\alpha_{g,V} \parallel$ $\alpha_{g,N} \perp$ $\alpha_{g,V} \perp$	[\cdot]				2				
BERNER multicomponent system MCS Uni Plus for masonry										
Performance	Vertical perforated brick HLz, dimensions, installation parameters								Annex C 62	

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

Table C63.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16									
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	M10	M12									
					11x85	15x85			15x85	-									
Perforated sleeve MCS PLUS H	12x50		12x85		16x85			20x85											
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																			
compressive strength f_b	use condition																		
2 N/mm ²	w/w	w/d	0,4		0,5			- ¹⁾											
	d/d		0,5		0,5			- ¹⁾											
4 N/mm ²	w/w	w/d	0,9		0,9			0,5											
	d/d		0,9		1,2			0,5											
6 N/mm ²	w/w	w/d	1,2		1,5			0,75											
	d/d		1,5		1,5			0,75											
8 N/mm ²	w/w	w/d	1,5		2,0			0,9											
	d/d		2,0		2,0			0,9											
10 N/mm ²	w/w	w/d	2,0		2,5			1,2											
	d/d		2,5		2,5			1,2											
12 N/mm ²	w/w	w/d	2,5		3,0			1,5											
	d/d		3,0		3,5			1,5											

¹⁾ No performance assesses

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

Annex C 63

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

Table C64.1: Characteristic resistance under shear loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	M10	M12
					11x85	11x85			15x85	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85				20x85	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)										
Compressive strength f_b	use condition									
2 N/mm²	w/w	w/d	0,6	0,75	0,6	0,75				
	d/d						0,9			
4 N/mm²	w/w	w/d	1,2	1,5	1,2	1,5				
	d/d						2,0			
6 N/mm²	w/w	w/d	2,0	2,0	2,0	2,0				
	d/d						2,5			
8 N/mm²	w/w	w/d	2,5	3,0	2,5	3,0				
	d/d						3,5			
10 N/mm²	w/w	w/d	3,0	3,5	3,0	3,5				
	d/d						4,5			
12 N/mm²	w/w	w/d	4,0	4,5	4,0	4,5				
	d/d						5,5			

Factor for job site tests and displacements see annex C110

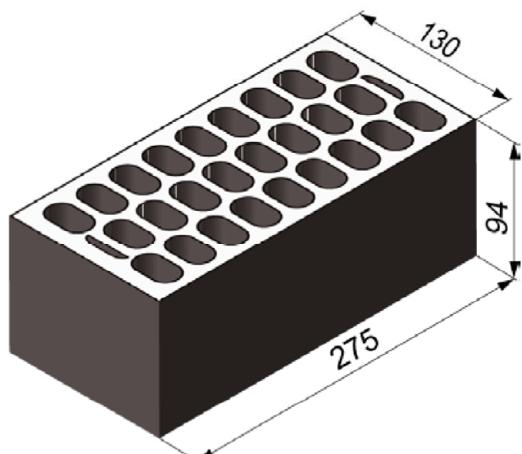
BERNER multicomponent system MCS Uni Plus for masonry

Performance

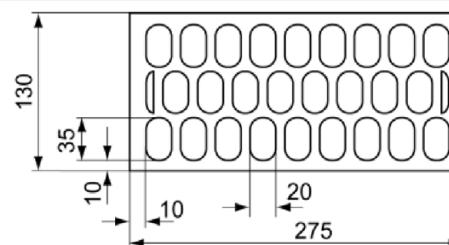
Vertical perforated brick HLz, Characteristic resistance under shear loading

Annex C 64

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer		e.g. Cermanica Farreny S.A.
Nominal dimensions [mm]	length L	width W
	275	130
Density ρ [kg/dm ³]	$\geq 0,8$	
Compressive strength f_b [N/mm ²]	6 / 8 / 12 / 16 / 20	
Standard	EN 771-1:2011+A1:2015	



Dimension see also Annex B 18

Table C65.1: Installation parameters

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	2
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General installation parameters

Edge distance	c_{min}	100	120
Spacing	$s_{cr \parallel} = s_{min \parallel}$ $s_{cr \perp} = s_{min \perp}$	[mm]	275
			95

Drilling method

Hammer drilling with hard metal hammer drill

Table C65.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	M10 M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	12x85	12x85	16x85	16x85	16x85	16x85	20x85	20x85
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[\cdot]				2				

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, dimensions, installation parameters

Annex C 65

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

Table C66.1: Characteristic resistance under tension loading

Anchor rod		M6	M8	M6	M8	-	M8	M10	-	M12	M16				
Internal threaded anchor MCS PLUS E		-	-	-	-	M6	M8	-	M10	M12	-				
						11x85									
								15x85							
Perforated sleeve MCS PLUS H		12x50		12x85		16x85			20x85						
$N_{Rk} = N_{Rk,p} = N_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C)															
compressive strength f_b	use condition														
6 N/mm ²	w/w	w/d	0,4		0,9										
	d/d		0,4		0,9										
8 N/mm ²	w/w	w/d	0,5		1,2										
	d/d		0,6		1,2										
12 N/mm ²	w/w	w/d	0,75		1,5										
	d/d		0,9		2,0										
16 N/mm ²	w/w	w/d	0,9		2,0										
	d/d		1,2		2,5										
20 N/mm ²	w/w	w/d	1,2		3,0										
	d/d		1,5		3,0										

Factor for temperature range 72/120°C: 0,83

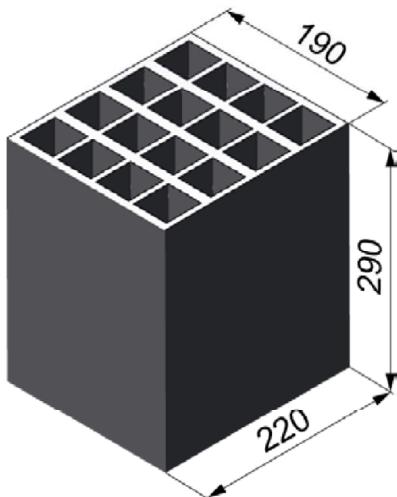
Table C66.2: Characteristic resistance under shear loading

Anchor rod		M6	M8	M6	M8	-	M8	M10	-	M12	M16				
Internal threaded anchor MCS PLUS E		-	-	-	-	M6	M8	-	M10	M12	-				
						11x85									
								15x85							
Perforated sleeve MCS PLUS H		12x50		12x85		16x85			20x85						
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)															
compressive strength f_b	use condition														
6 N/mm ²	w/w	w/d	1,2								1,2				
	d/d														
8 N/mm ²	w/w	w/d	1,5								1,5				
	d/d														
12 N/mm ²	w/w	w/d	2,0								2,5				
	d/d														
16 N/mm ²	w/w	w/d	3,0								3,0				
	d/d														
20 N/mm ²	w/w	w/d	4,0								4,0				
	d/d														

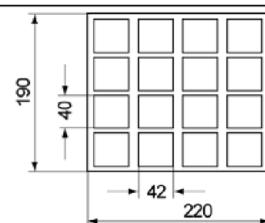
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry	Annex C 66
Performance Vertical perforated brick HLz, Characteristic resistance under tension and shear loading	

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Perceram	
Nominal dimensions [mm]	length L	width W
	220	190
Density ρ [kg/dm ³]	$\geq 0,7$	
Compressive strength f_b [N/mm ²]	6 / 8 / 10	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 18

Table C67.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	2
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General installation parameters

Edge distance	C_{min}	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

Table C67.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130								
Group factors	$\alpha_{g,N \parallel}$	$\alpha_{g,v \parallel}$	$\alpha_{g,N \perp}$	$\alpha_{g,v \perp}$	[-]	2								

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 67

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

Table C68.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200

Anchor rod with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst}	[Nm]	2
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General installation parameters

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

Drilling method

Hammer drilling with hard metal hammer drill

Table C68.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[-]	2

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 68

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

Table C69.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-		M6 M8 11x85		-	-	-	-	M10 M12 15x85	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85		16x85		16x130		20x85		20x130				
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
6 N/mm ²	w/w	w/d	0,3	1,2		1,2		1,5		1,2		1,5		
	d/d		0,4	1,5		1,5		1,5		1,5		1,5		
8 N/mm ²	w/w	w/d	0,5	1,5		1,5		2,0		1,5		2,0		
	d/d		0,5	2,0		2,0		2,5		2,0		2,5		
10 N/mm ²	w/w	w/d	0,6	2,0		2,0		2,5		2,0		2,5		
	d/d		0,6	2,5		2,5		3,0		2,5		3,0		

Table C69.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)			
compressive strength f_b	use condition		
6 N/mm ²	w/w	w/d	1,5
	d/d		1,5
8 N/mm ²	w/w	w/d	2,0
	d/d		2,5
10 N/mm ²	w/w	w/d	2,5
	d/d		3,0

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

Annex C 69

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

Table C70.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12			
					11x85		-	-		15x85		-		-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130			20x85		20x130		
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
6 N/mm ²	w/w	w/d	1,5	1,5	1,5	2,5	1,5	2,0						
	d/d													
8 N/mm ²	w/w	w/d	2,0	2,0	2,0	3,5	2,0	3,0						
	d/d													
10 N/mm ²	w/w	w/d	2,5	3,0	3,0	4,5	3,0	3,5						
	d/d													

Table C70.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)				
compressive strength f_b	use condition			
6 N/mm ²	w/w	w/d	2,0	
	d/d			
8 N/mm ²	w/w	w/d	3,0	
	d/d			
10 N/mm ²	w/w	w/d	3,5	
	d/d			

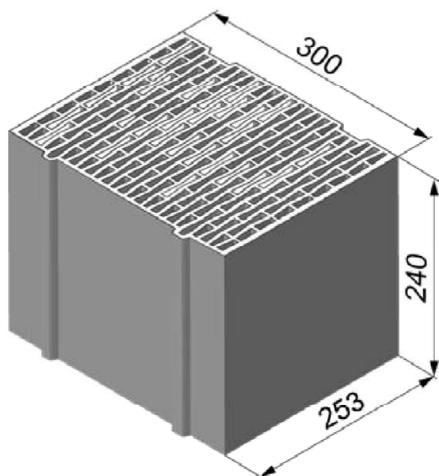
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Vertical perforated brick HLz, Characteristic resistance under shear loading

Annex C 70

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Ziegelwerk Brenna	
Nominal dimensions [mm]	length L	width W
	253	300
Density ρ [kg/dm ³]	$\geq 0,8$	
Compressive strength f_b [N/mm ²]	2 / 4 / 6	
Standard	EN 771-1:2011+A1:2015	

Dimension see also Annex B 18

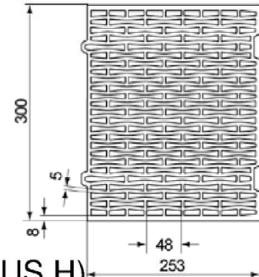


Table C71.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	2
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General installation parameters

Edge distance	C_{min}	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

Table C71.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130								
Group factors	$\alpha_{g,N \parallel}$	$\alpha_{g,V \parallel}$	$\alpha_{g,N \perp}$	$\alpha_{g,V \perp}$	-	-	-	-	-	-	-	-	-	-

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 71

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

Table C72.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	c_{min}	60	
Spacing	$s_{min \parallel} = s_{cr \parallel}$ $s_{min \perp} = s_{cr \perp}$	[mm]	255 240
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C72.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[$-$]	2

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

Table C73.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-		-		M6	M8				M10	M12		-	-
					11x85					15x85				
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
2 N/mm ²	w/w	w/d	- ¹⁾	0,5		0,5		0,4		0,5		0,4		
	d/d		0,3	0,5		0,5		0,5		0,5		0,5		
4 N/mm ²	w/w	w/d	0,5	0,9		0,9		0,9		0,9		0,9		
	d/d		0,6	0,9		0,9		0,9		0,9		0,9		
6 N/mm ²	w/w	w/d	0,75	1,5		1,5		1,2		1,5		1,2		
	d/d		0,9	1,5		1,5		1,5		1,5		1,5		

¹⁾ No performance assessed

Table C73.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16											
Perforated sleeve MCS PLUS H	18x130/200		22x130/200											
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
2 N/mm ²	w/w	w/d						0,4						
	d/d							0,5						
4 N/mm ²	w/w	w/d						0,9						
	d/d							0,9						
6 N/mm ²	w/w	w/d						1,2						
	d/d							1,5						

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, Characteristic resistance under tension loading

Annex C 73

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

Table C74.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

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

$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f_b	use condition													
2 N/mm ²	w/w	w/d	0,5								0,6			
	d/d													
4 N/mm ²	w/w	w/d	0,9								1,2			
	d/d													
6 N/mm ²	w/w	w/d	1,5								1,5			
	d/d													

Table C74.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10		M12		M16					
Perforated sleeve MCS PLUS H	18x130/200				22x130/200					
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)										
compressive strength f_b	use condition									
2 N/mm ²	w/w	w/d	0,5							
	d/d									
4 N/mm ²	w/w	w/d	0,9							
	d/d									
6 N/mm ²	w/w	w/d	1,5							
	d/d									

Factor for job site tests and displacements see annex C110

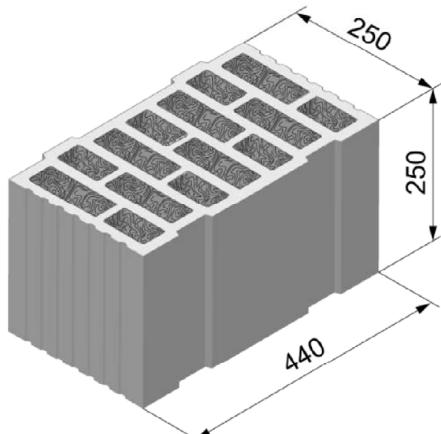
BERNER multicomponent system MCS Uni Plus for masonry

Performance

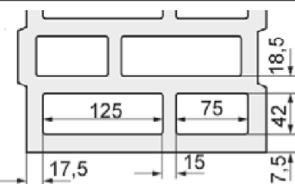
Vertical perforated brick HLz, Characteristic resistance under shear loading

Annex C 74

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



Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool, EN 771-1:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	length L	width W
	250	440
height H		250
Density ρ [kg/dm ³]	0,7	
Compressive strength f_b [N/mm ²]	6 / 8 / 10	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 18

Table C75.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12					
					11x85					15x85						

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	2	5	2	5	6
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General installation parameters

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

Drilling method

Rotary drilling with carbide drill

Table C75.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16	
Internal threaded anchor MCS PLUS E	-	-			M6	M8				M10	M12						
					11x85					15x85							
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130			20x85		20x130		20x200			
Group factors	$\alpha_{a,N \parallel}$	[-]	1,3														
	$\alpha_{a,V \parallel}$		1,3														
	$\alpha_{a,N \perp}$		0,8														
	$\alpha_{g,V \perp}$		1,3														

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 75

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

Table C76.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T _{inst} [Nm]	5	6
General installation parameters			
Edge distance	C _{min}	60	
	S _{min} II	80	
Spacing	S _{cr} II [mm]	250	
	S _{min} ⊥	80	
	S _{cr} ⊥	250	
Drilling method			
Rotary drilling with carbide drill			

Table C76.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	α _{g,N} II	1,3	
	α _{g,v} II	1,3	
	α _{g,N} ⊥	0,8	
	α _{g,v} ⊥	1,3	

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 76

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

Table C77.1: Characteristic resistance 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 MCS PLUS E		-	-			M6	M8				M10	M12		-	-	-	-
Perforated sleeve MCS PLUS H		12x50	12x85			11x85			16x85	16x130		20x85		20x130		20x200	
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																	
compressive strength f_b	use condition																
6 N/mm ²	w/w	w/d	0,75	1,5		1,2						1,5					2,5
	d/d		0,9	1,5		1,2						1,5					2,5
8 N/mm ²	w/w	w/d	0,9	1,5		1,2						1,5					2,5
	d/d		0,9	2,0		1,5						2,0					3,0
10 N/mm ²	w/w	w/d	0,9	2,0		1,5						2,0					3,0
	d/d		1,2	2,0		1,5						2,0					3,5

Table C77.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod		M10	M12	M16		
Perforated sleeve MCS PLUS H		18x130/200		22x130/200		
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)						
compressive strength f_b	use condition					
6 N/mm ²	w/w	w/d		1,5		
	d/d			1,5		
8 N/mm ²	w/w	w/d		1,5		
	d/d			2,0		
10 N/mm ²	w/w	w/d		2,0		
	d/d			2,0		

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry	Annex C 77
Performance Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool, Characteristic resistance under tension loading	

English translation prepared by DIBt

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

Table C78.1: Characteristic resistance 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 MCS PLUS E		-	-		M6	M8					M10	M12		-	-	-	-
Perforated sleeve MCS PLUS H		12x50	12x85		16x85		16x130		20x85		20x130		20x200				
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)																	
compressive strength f_b	use condition																
6 N/mm ²	w/w	w/d				0,9					1,2		0,9		1,2		1,2
	d/d																
8 N/mm ²	w/w	w/d				0,9					1,5		0,9		1,5		1,2
	d/d																
10 N/mm ²	w/w	w/d				1,2					1,5		1,2		1,5		1,5
	d/d																

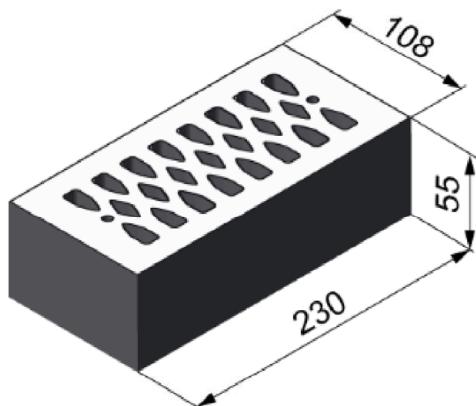
Table C78.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod		M10	M12	M16
Perforated sleeve MCS PLUS H		18x130/200		22x130/200
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)				
compressive strength f_b	use condition			
6 N/mm ²	w/w	w/d		1,2
	d/d			
8 N/mm ²	w/w	w/d		1,5
	d/d			
10 N/mm ²	w/w	w/d		1,5
	d/d			

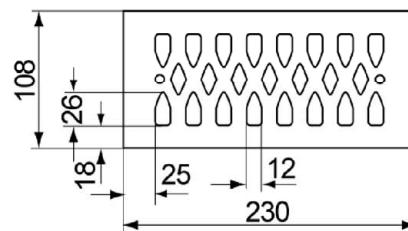
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry	Annex C 78
Performance Vertical perforated brick HLz, Porotherm W 44, filled with mineral wool; Characteristic resistance under shear loading	

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



Vertical perforated brick HLz, EN 771-1:2011+A1:2015		
Producer	e.g. Wienerberger.	
Nominal dimensions [mm]	length L	width W
	230	108
Density ρ [kg/dm ³]	$\geq 1,4$	
Compressive strength f_b [N/mm ²]	2 / 4 / 6 / 8	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 18

Table C79.1: Installation parameters

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	-	M10 M12	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	20x85				15x85		

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst}	[Nm]	2
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General installation parameters

Edge distance	c_{min}	[mm]	60
Spacing	$s_{min \parallel}$		80
	$s_{cr \parallel}$		230
	$s_{min \perp}$		60
	$s_{cr \perp}$		60

Drilling method

Hammer drilling with hard metal hammer drill

Table C79.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6 M8	-	-	M10 M12	-	-
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	20x85				15x85		
Group factors	$\alpha_{a,N} \parallel$	$\alpha_{a,v} \parallel$	$\alpha_{a,N} \perp$	$\alpha_{a,v} \perp$	[-]	2				

BERNER multicomponent system MCS Uni Plus for masonry

Performance

Vertical perforated brick HLz, dimensions, installation parameters

Annex C 79

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

Table C80.1: Characteristic resistance under tension loading ¹⁾

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16			
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	M10	M12			
					11x85	15x85			15x85	-			
Perforated sleeve MCS PLUS H	12x50		12x85		16x85			20x85					
$N_{Rk} = N_{Rk,p} = N_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C)													
compressive strength f_b	use condition												
2 N/mm ²	w/w	w/d	0,3	0,9	0,75				0,5				
	d/d		0,3	0,9	0,9				0,6				
4 N/mm ²	w/w	w/d	0,6	1,5	1,5				0,9				
	d/d		0,75	2,0	1,5				1,2				
6 N/mm ²	w/w	w/d	0,9	2,5	2,5				1,5				
	d/d		0,9	3,0	2,5				1,5				
8 N/mm ²	w/w	w/d	1,2	3,5	3,0				2,0				
	d/d		1,5	4,0	3,5				2,5				

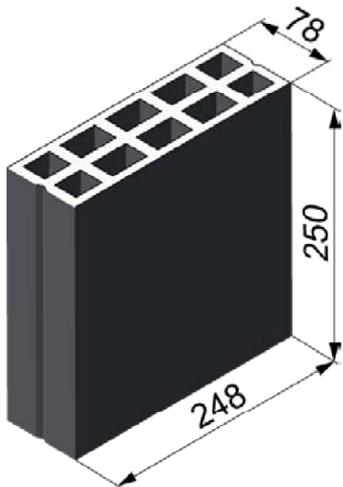
¹⁾ If the fixing is in a solid area, for w/w, the characteristic value shall be reduced with the factor 0,64.

Factor for temperature range 72/120°C: 0,83

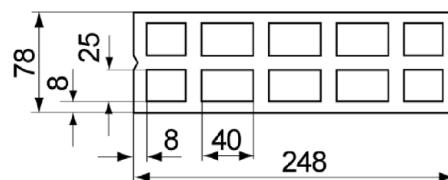
Table C80.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	-	M12	M16							
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	M10	M12							
					11x85	15x85			15x85	-							
Perforated sleeve MCS PLUS H	12x50		12x85		16x85			20x85									
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)																	
compressive strength f_b	use condition																
2 N/mm ²	w/w	w/d	0,6					0,4									
	d/d																
4 N/mm ²	w/w	w/d	1,2					0,9									
	d/d																
6 N/mm ²	w/w	w/d	1,5					1,2									
	d/d																
8 N/mm ²	w/w	w/d	2,5					1,5									
	d/d																
Factor for job site tests and displacements see annex C110																	
BERNER multicomponent system MCS Uni Plus for masonry								Annex C 80									
Performance Vertical perforated brick HLz, Characteristic resistance under tension and shear loading																	

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



Horizontal perforated brick LLz, EN 771-1:2011+A1:2015			
Producer	-		
Nominal dimensions [mm]	length L	width W	height H
	250	78	248
Density ρ [kg/dm ³]	$\geq 0,7$		
Compressive strength f_b [N/mm ²]	2 / 4 / 6		
Standard	EN 771-1:2011+A1:2015		



Dimension see also Annex B 19

Table C81.1: Installation parameters

Anchor rod	M6	M8
Perforated sleeve MCS PLUS H	12x50	
Anchor rod with perforated sleeve MCS PLUS H		
Max. installation torque	T_{inst} [Nm]	2
General installation parameters		
Edge distance	C_{min}	100
Spacing	$S_{min \parallel}$	75
	$S_{cr \parallel}$	250
	$S_{min \perp} = S_{cr \perp}$	250
Drilling method		
Hammer drilling with hard metal hammer drill		

Table C81.2: Group factors

Anchor rod	M6	M8
Perforated sleeve MCS PLUS H	12x50	
Group factors	$\alpha_{g,N \parallel}$	1,6
	$\alpha_{g,V \parallel}$	1,1
	$\alpha_{g,N \perp}$	
	$\alpha_{g,V \perp}$	2,0

BERNER multicomponent system MCS Uni Plus for masonry

Performance
Horizontal perforated brick LLz, dimensions, installation parameters

Annex C 81

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

Table C82.1: Characteristic resistance under tension loading

Anchor rod		M6	M8
Perforated sleeve MCS PLUS H		12x50	
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)			
compressive strength f_b	use condition		
2 N/mm²	w/w	0,5	
	d/d	0,6	
4 N/mm²	w/w	0,9	
	d/d	1,2	
6 N/mm²	w/w	1,5	
	d/d	1,5	

Factor for temperature range 72/120°C: 0,83

Table C82.2: Characteristic resistance under shear loading

Anchor rod		M6	M8
Perforated sleeve MCS PLUS H		12x50	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)			
compressive strength f_b	use condition		
2 N/mm²	w/w	0,5	
	d/d		
4 N/mm²	w/w	0,9	
	d/d		
6 N/mm²	w/w	1,5	
	d/d		

Factor for job site tests and displacements see annex C110

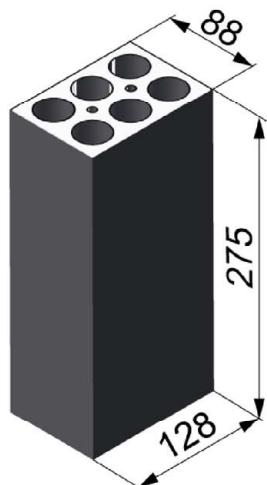
BERNER multicomponent system MCS Uni Plus for masonry

Performance

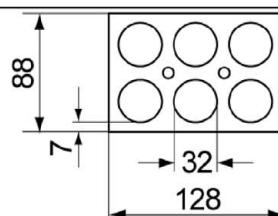
Horizontal perforated brick LLz, Characteristic resistance under tension and shear loading

Annex C 82

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



Horizontal perforated brick LLz, EN 771-1:2011+A1:2015		
Producer	e.g. Cermanica Farreny S.A.	
Nominal dimensions [mm]	length L	width W
	275	88
Density ρ [kg/dm ³]	$\geq 0,8$	
Compressive strength f_b [N/mm ²]	2	
Standard	EN 771-1:2011+A1:2015	



Dimension see also
Annex B 19

Table C83.1: Installation parameters

Anchor rod	M6	M8
Perforated sleeve MCS PLUS H	12x50	
Anchor rod with perforated sleeve MCS PLUS H		
Max. installation torque	T_{inst} [Nm]	2
General installation parameters		
Edge distance	C_{min}	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		

Table C83.2: Group factors

Anchor rod	M6	M8
Perforated sleeve MCS PLUS H	12x50	
Group factors		
$\alpha_{g,N \parallel}$		1,3
$\alpha_{g,v \parallel}$		1,5
$\alpha_{g,N \perp}$		1,3
$\alpha_{g,v \perp}$		1,5
BERNER multicomponent system MCS Uni Plus for masonry		
Performance	Horizontal perforated brick LLz, dimensions, installation parameters	
		Annex C 83

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

Table C84.1: Characteristic resistance under tension loading

Anchor rod	M6	M8
Perforated sleeve MCS PLUS H		12x50
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)		
compressive strength f_b	use condition	
2 N/mm ²	w/w w/d d/d	1,5

Factor for temperature range 72/120°C: 0,83

Table C84.2: Characteristic resistance under shear loading

Anchor rod	M6	M8
Perforated sleeve MCS PLUS H		12x50
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)		
compressive strength f_b	use condition	
2 N/mm ²	w/w w/d d/d	1,2

Factor for job site tests and displacements see annex C110

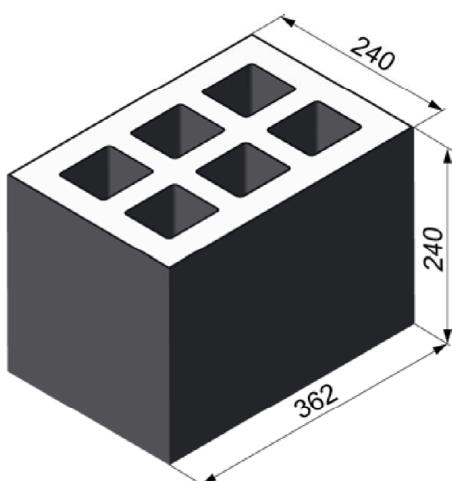
BERNER multicomponent system MCS Uni Plus for masonry

Performance

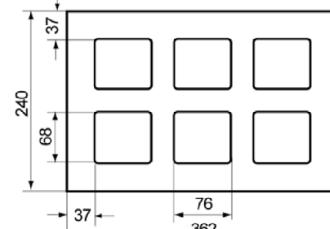
Horizontal perforated brick LLz, Characteristic resistance under tension and shear loading

Annex C 84

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



Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015		
Producer	-	
Nominal dimensions [mm]	Länge L	Breite B
	362	240
Höhe H	240	
Density ρ [kg/dm ³]	$\geq 1,0$	
Compressive strength f_b [N/mm ²]	2 / 4	
Standard	EN 771-3:2011+A1:2015	



Dimension see also
Annex B 19

Table C85.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque T_{inst} [Nm]	2
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General installation parameters

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

Drilling method

Hammer drilling with hard metal hammer drill

Table C85.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85	16x85	16x130	20x85	20x130	20x200									
Group factors	$\alpha_{n \parallel}$	[-]	1.2													
	$\alpha_{a \parallel}$		1.1													
	$\alpha_{q,N \perp}$		2.0													
	$\alpha_{g,V \perp}$															

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 85

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

Table C86.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	c_{min}	60	
Spacing	$s_{min \parallel}$ $s_{cr \parallel}$ $s_{min \perp} = s_{cr \perp}$	[mm]	100 362 240
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C86.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,v \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,v \perp}$	[$-$]	1,2 1,1 2,0

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 86

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

Table C87.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12					-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)																
compressive strength f_b	use condition															
2 N/mm ²	w/w	w/d	1,2							1,5						2,5
	d/d		1,2							1,5						2,5
4 N/mm ²	w/w	w/d	2,0							3,0						5,0
	d/d		2,5							3,0						5,5

Table C87.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10		M12		M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200			
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)						
compressive strength f_b	use condition					
2 N/mm ²	w/w	w/d			1,5	
	d/d				1,5	
4 N/mm ²	w/w	w/d			3,0	
	d/d				3,0	

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 87

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

Table C88.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12						
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition													
2 N/mm ²	w/w	w/d	0,9											
	d/d													
4 N/mm ²	w/w	w/d	2,0											
	d/d													

Table C88.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10		M12		M16						
Perforated sleeve MCS PLUS H	18x130/200			22x130/200							
V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)											
compressive strength f _b	use condition										
2 N/mm ²	w/w	w/d	0,9								
	d/d										
4 N/mm ²	w/w	w/d	2,0								
	d/d										

Factor for job site tests and displacements see annex C110

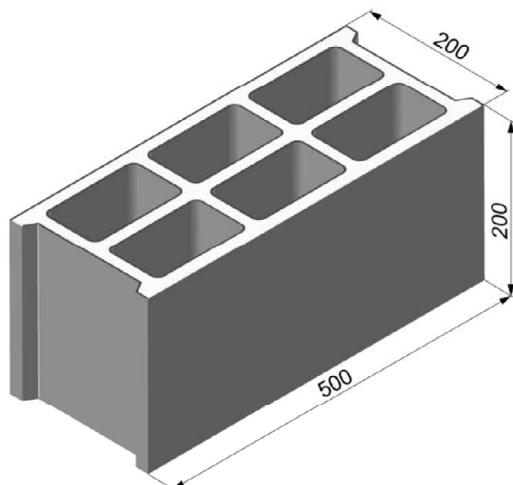
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 88

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



Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015		
Producer	e.g. Sepa	
Nominal dimensions [mm]	length L	width W
	500	200
height H		200
Density ρ [kg/dm ³]	$\geq 1,0$	
Compressive strength f_b [N/mm ²]	2 / 4 / 6	
Standard	EN 771-1:2011+A1:2015	

Dimension see also Annex B 19

Table C89.1: Installation parameters

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8		-				M10	M12	
					11x85							15x85		

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst} [Nm]	1	2
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General installation parameters

Edge distance	c_{min}	100
Spacing	$s_{min \parallel} = s_{cr \parallel}$ [mm]	500
	$s_{min \perp} = s_{cr \perp}$	200

Drilling method

Hammer drilling with hard metal hammer drill

Table C89.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-		M6	M8		-				M10	M12	
					11x85							15x85		
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			16x130	18x130/200			20x85		
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[\cdot]								2				

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 89

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

Table C90.1: Characteristic resistance under tension loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8						M10	M12	
					11x85							15x85		
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			16x130	18x130/200			20x85		
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
2 N/mm ²	w/w	w/d										0,4		
	d/d											0,5		
4 N/mm ²	w/w	w/d										0,9		
	d/d											0,9		
6 N/mm ²	w/w	w/d										1,2		
	d/d											1,5		

Factor for temperature range 72/120°C: 0,83

Table C90.2: Characteristic resistance under shear loading

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	M10	M12	-	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8						M10	M12	
					11x85							15x85		
Perforated sleeve MCS PLUS H	12x50	12x85			16x85			16x130	18x130/200			20x85		
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
2 N/mm ²	w/w	w/d										0,9		
	d/d													
4 N/mm ²	w/w	w/d										1,5		
	d/d													
6 N/mm ²	w/w	w/d										2,5		
	d/d													

Factor for job site tests and displacements see annex C110

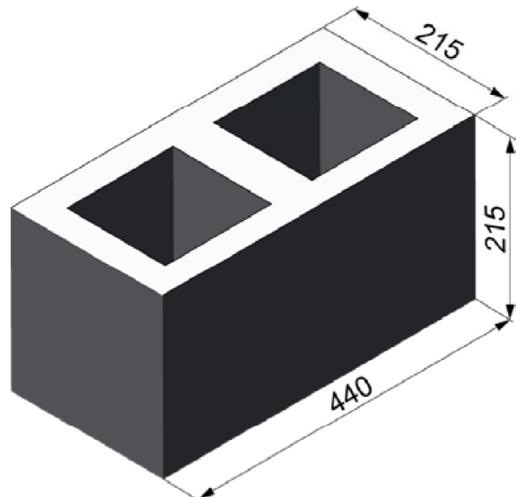
BERNER multicompound system MCS Uni Plus for masonry

Performance

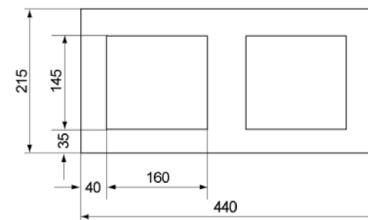
Light-weight concrete hollow block Hbl,
Characteristic resistance under tension and shear loading

Annex C 90

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



Light-weight concrete hollow block Hbl, EN 771-3:2011+A1:2015		
Producer	e.g. Roadstone wood	
Nominal dimensions [mm]	length L	width W
	440	215
height H	215	
Density ρ [kg/dm ³]	$\geq 1,2$	
Compressive strength f_b [N/mm ²]	4 / 6 / 8 / 10	
Standard	EN 771-3:2011+A1:2015	



Dimension see also
Annex B 19

Table C91.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

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

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque	T_{inst}	[Nm]	2
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General installation parameters

Edge distance	c_{min}	[mm]	110
Spacing	$s_{min \parallel}$		100
	$s_{cr \parallel}$		440
	$s_{min \perp}$		100
	$s_{cr \perp}$		215

Drilling method

Hammer drilling with hard metal hammer drill

Table C91.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-			M6	M8					M10	M12		
					11x85						15x85			
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130			
Group factors	$\alpha_{a,N \parallel}$	[-]									1,4			
	$\alpha_{a,V \parallel}$										2,0			
	$\alpha_{a,N \perp}$										1,4			
	$\alpha_{a,V \perp}$										1,2			

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 91

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

Table C92.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16	
Perforated sleeve MCS PLUS H	18x130/200		22x130/200	
Anchor rod with perforated sleeve MCS PLUS H				
Max. installation torque	T_{inst} [Nm]		2	
General installation parameters				
Edge distance	c_{min}	[mm]	110	
	$s_{min \parallel}$		100	
Spacing	$s_{cr \parallel}$		440	
	$s_{min \perp}$		100	
	$s_{cr \perp}$		215	
Drilling method				
Hammer drilling with hard metal hammer drill				

Table C92.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N} \parallel$	[-]	1,4
	$\alpha_{g,v} \parallel$		2,0
	$\alpha_{g,N} \perp$		1,4
	$\alpha_{g,v} \perp$		1,2

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 92

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

Table C93.1: Characteristic resistance under tension loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-		M6 M8 11x85		-	-	-	-	M10 M12 15x85	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85		16x85		16x130		20x85		20x130				
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	0,9			1,2			2,0					
	d/d		1,2			1,5			2,0					
6 N/mm ²	w/w	w/d	1,5			2,0			3,0					
	d/d		1,5			2,0			3,0					
8 N/mm ²	w/w	w/d	2,0			2,5			3,5					
	d/d		2,0			3,0			4,0					
10 N/mm ²	w/w	w/d	2,5			3,0			4,5					
	d/d		3,0			3,5			5,0					

Table C93.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod	M10	M12	M16											
Perforated sleeve MCS PLUS H	18x130/200		22x130/200											
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	1,2			2,0			2,0					
	d/d		1,5			2,0			2,0					
6 N/mm ²	w/w	w/d	2,0			3,0			3,0					
	d/d		2,0			3,0			3,0					
8 N/mm ²	w/w	w/d	2,5			3,5			3,5					
	d/d		3,0			4,0			4,0					
10 N/mm ²	w/w	w/d	3,0			4,5			4,5					
	d/d		3,5			5,0			5,0					

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 93

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

Table C94.1: Characteristic resistance under shear loading (Pre-positioned anchorage)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-		M6 M8 11x85		-	-	-	-	M10 M12 15x85	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85		16x85		16x130		20x85		20x130				
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f_b	use condition													
4 N/mm ²	w/w	w/d	0,75	1,2	0,75	1,2	0,75							
	d/d							1,2						
6 N/mm ²	w/w	w/d	1,2	2,0	1,2	2,0	1,2							
	d/d							2,0						
8 N/mm ²	w/w	w/d	1,5	2,5	1,5	2,5	1,5							
	d/d							2,5						
10 N/mm ²	w/w	w/d	2,0	3,0	2,0	3,0	2,0							
	d/d							3,0						

Table C94.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10	M12	M16		
Perforated sleeve MCS PLUS H	18x130/200		22x130/200		
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)					
compressive strength f_b	use condition				
	w/w	w/d			
4 N/mm ²	d/d			1,2	
6 N/mm ²	w/w	w/d			2,0
8 N/mm ²	w/w	w/d			2,5
10 N/mm ²	w/w	w/d			3,0

Factor for job site tests and displacements see annex C110

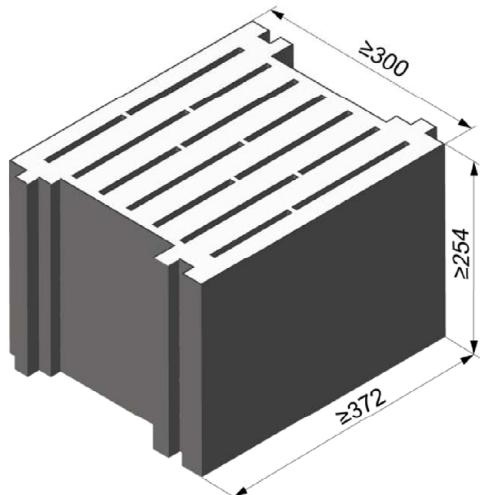
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Performance

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

Annex C 94

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



Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015		
Producer	e.g. Sepa	
Nominal dimensions [mm]	length L	width W
	≥ 372	≥ 300
Density ρ [kg/dm³]	≥ 0,6	
Compressive strength f _b [N/mm²]	2	
Standard	EN 771-3:2011+A1:2015	

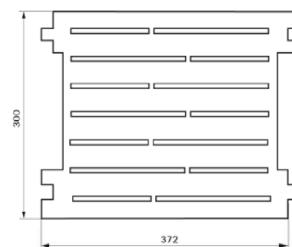


Table C95.1: Installation parameters

Anchor rod	M8	M10	M10	M12	M12	M16	M16	M12	M16
Perforated sleeve MCS PLUS H	16x130		18x130/200		20x130		22x130/200		20x200
Anchor rod with perforated sleeve MCS PLUS H									
Max. installation torque	T _{inst}	[Nm]					4		
Edge distance	C _{min}						130		
Spacing	S _{min} II = S _{cr} II	[mm]					370		
	S _{min} ⊥ = S _{cr} ⊥						250		
Drilling method									
Hammer drilling with hard metal hammer drill									

Table C95.2: Group factors

Anchor rod	M8	M10	M10	M12	M12	M16	M16	M12	M16
Perforated sleeve MCS PLUS H	16x130		18x130/200		20x130		22x130/200		20x200
Group factors	$\alpha_{g,N} \parallel$	$\alpha_{g,v} \parallel$	$\alpha_{g,N} \perp$	$\alpha_{g,v} \perp$				2	
BERNER multicomponent system MCS Uni Plus for masonry									
Performance Light-weight concrete solid block Vbl, dimensions, installation parameters								Annex C 95	

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

Table C96.1: Characteristic resistance under tension loading

Anchor rod	M8	M10	M10	M12	M12	M16	M16	M12	M16
Perforated sleeve MCS PLUS H	16x130		18x130/200		20x130		22x130/200		20x200
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)									
compressive strength f_b	use condition								
2 N/mm ²	w/w	w/d	2,0			2,5		3,0	
	d/d		2,0			3,0		4,0	

Factor for temperature range 72/120°C: 0,83

Table C96.2: Characteristic resistance under shear loading

Anchor rod	M8	M10	M10	M12	M12	M16	M16	M12	M16
Perforated sleeve MCS PLUS H	16x130		18x130/200		20x130		22x130/200		20x200
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)									
compressive strength f_b	use condition								
2 N/mm ²	w/w	w/d	4,5			6,5			
	d/d								

Factor for job site tests and displacements see annex C110

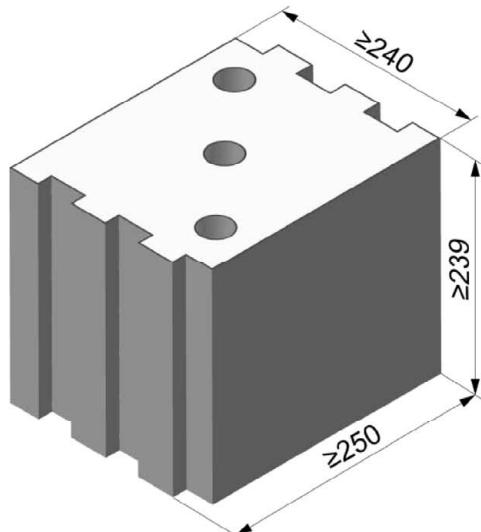
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Performance

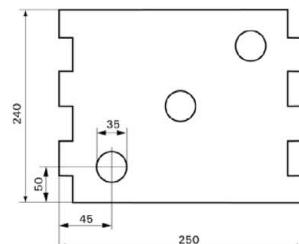
Light-weight concrete solid block Vbl,
Characteristic resistance under tension and shear loading

Annex C 96

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



Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015			
Producer	KLB		
Nominal dimensions [mm]	length L ≥ 250	width W ≥ 240	height H ≥ 239
Density ρ [kg/dm ³]	≥ 1,6		
Compressive strength f_b [N/mm ²]	4 / 6 / 8		
Standard	EN 771-3:2011+A1:2015		



Dimension see also
Annex B 19

Table C97.1: Installation parameters
(Pre-positioned anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85			11x85		16x85	16x130		20x85		20x130		20x200		

Anchor rod and internal threaded anchor MCS PLUS E with perforated sleeve MCS PLUS H

Max. installation torque T_{inst} [Nm]	4
General installation parameters	
Edge distance c_{min} [mm]	130
Spacing $s_{min \parallel} = s_{cr \parallel}$ [mm]	250
$s_{min \perp} = s_{cr \perp}$	250

Drilling method

Hammer drilling with hard metal hammer drill

Table C97.2: Group factors

Anchor rod	M6	M8	M6	M8	-	M8	M10	M8	M10	-	M12	M16	M12	M16	M12	M16
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8	-	-	-	M10	M12	-	-	-	-	
Perforated sleeve MCS PLUS H	12x50	12x85			11x85		16x85	16x130		20x85		20x130		20x200		
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[-]								2,0						

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 97

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

Table C98.1: Installation parameters
(Push through anchorage with perforated sleeve MCS PLUS H)

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Anchor rod with perforated sleeve MCS PLUS H			
Max. installation torque	T_{inst} [Nm]		2
General installation parameters			
Edge distance	c_{min}	130	
Spacing	$s_{min \parallel} = s_{cr \parallel}$ $s_{min \perp} = s_{cr \perp}$	[mm]	250
			250
Drilling method			
Hammer drilling with hard metal hammer drill			

Table C98.2: Group factors

Anchor rod	M10	M12	M16
Perforated sleeve MCS PLUS H	18x130/200		22x130/200
Group factors	$\alpha_{g,N \parallel}$ $\alpha_{g,V \parallel}$ $\alpha_{g,N \perp}$ $\alpha_{g,V \perp}$	[$-$]	2,0

BERNER multicompound system MCS Uni Plus for masonry

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

Annex C 98

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

Table C99.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8	-	-			M10 M12	-	-	-	-	-	-
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

N_{Rk} = N_{Rk,p} = N_{Rk}, [kN] depending on the compressive strength f_b (temperature range 50/80°C)

compressive strength f _b	use condition													
4 N/mm²	w/w	w/d	1,2				2,0				2,5		3,0	
	d/d		2,0				3,5				4,0		5,0	
6 N/mm²	w/w	w/d	1,5				3,0				4,0		5,0	
	d/d		3,0				5,0				6,5		7,5	
8 N/mm²	w/w	w/d	2,0				4,0				5,0		6,5	
	d/d		4,0				7,0				8,5		9,0	

Table C99.2: Characteristic resistance under tension loading (Push through anchorage)

Anchor rod			M10	M12	M16
Perforated sleeve MCS PLUS H				18x130/200	22x130/200
N_{Rk} = N_{Rk,p} = N_{Rk}, [kN] depending on the compressive strength f_b (temperature range 50/80°C)					
compressive strength f _b	use condition				
4 N/mm²	w/w	w/d	2,5		3,0
	d/d		4,0		5,0
6 N/mm²	w/w	w/d	4,0		5,0
	d/d		6,5		7,5
8 N/mm²	w/w	w/d	5,0		6,5
	d/d		8,5		9,0

Factor for job site tests and displacements see annex C110

Factor for temperature range 72/120°C: 0,83

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 99

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

Table C100.1: Characteristic resistance 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 MCS PLUS E	-	-			M6 M8					M10 M12						
Perforated sleeve MCS PLUS H	12x50	12x85			16x85		16x130		20x85		20x130		20x200			

V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)

compressive strength f _b	use condition											
4 N/mm²	w/w	w/d	2,0 3,0 2,0 3,0 2,0 3,5									
	d/d											
6 N/mm²	w/w	w/d	3,0 4,5 3,0 4,5 3,0 5,5									
	d/d											
8 N/mm²	w/w	w/d	4,0 6,0 4,0 6,0 4,0 7,0									
	d/d											

Table C100.2: Characteristic resistance under shear loading (Push through anchorage)

Anchor rod	M10		M12		M16									
Perforated sleeve MCS PLUS H	18x130/200			22x130/200										
V_{Rk} = V_{Rk,b} = V_{Rk,c} [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)														
compressive strength f _b	use condition													
4 N/mm²	w/w	w/d	3,5			4,5								
	d/d													
6 N/mm²	w/w	w/d	5,5			6,5								
	d/d													
8 N/mm²	w/w	w/d	7,0			8,5								
	d/d													

Factor for job site tests and displacements see annex C110

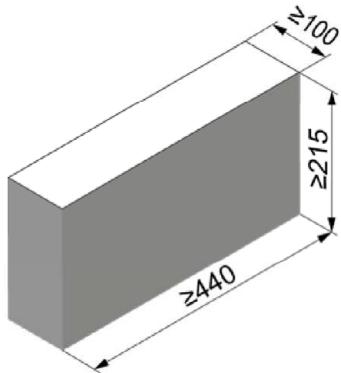
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 100

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



Light-weight concrete solid block Vbl, EN 771-3:2011+A1:2015		
Producer	Roadstone wood	
Nominal dimensions [mm]	length L ≥ 440	width W ≥ 100
Density ρ [kg/dm³]	≥ 2,0	
Compressive strength f _b [N/mm²]	4 / 6 / 8 / 10	
Standard	EN 771-3:2011+A1:2015	

Table C101.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16
Anchor rod without perforated sleeve					
Effective anchorage depth h _{ef} [mm]	50	70	50	70	50
Max. installation torque T _{inst} [Nm]	4			10	
General installation parameters					
Edge distance C _{min}			100		
Spacing S _{min} II			75		
	[mm]	S _{cr} II	3x h _{ef}		
Spacing S _{min} ⊥			75		
	S _{cr} ⊥		3x h _{ef}		
Drilling method					
Hammer drilling with hard metal hammer drill					

Table C101.2: Group factors

Anchor rod	M6	M8	M10	M12	M16
Group factors			1,6		
			1,3		
			1,4		
			1,3		

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 101

Light-weight concrete solid block Vbl, EN 771-3:2015

Table C102.1: Characteristic resistance under tension loading

Anchor rod		M6	M8	M10	M12	M16
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)						
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm] ≥ 50				
4 N/mm ²	w/w	1,2			1,2	
	d/d	2,0			2,0	
6 N/mm ²	w/w	1,5			2,0	
	d/d	3,0			3,5	
8 N/mm ²	w/w	2,0			2,5	
	d/d	4,0			4,5	
10N/mm ²	w/w	3,0			3,5	
	d/d	5,0			5,5	

Factor for temperature range 72/120°C: 0,83

Table C102.2: Characteristic resistance under shear loading

Anchor rod		M6	M8	M10	M12	M16
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)						
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm] ≥ 50				
4 N/mm ²	w/w	1,2	1,5	1,5	1,5	1,5
	d/d					
6 N/mm ²	w/w	2,0	2,0	2,5	2,5	2,5
	d/d					
8 N/mm ²	w/w	2,5	2,5	3,0	3,0	3,5
	d/d					
10N/mm ²	w/w	3,0	3,5	4,0	4,0	4,5
	d/d					

Factor for job site tests and displacements see annex C110

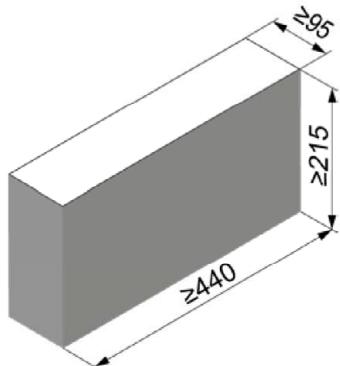
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 102

Light-weight concrete solid block Vbl, EN 771-3:2015



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
Density ρ [kg/dm³]	≥ 2,0		
Compressive strength f _b [N/mm²]	6 / 8 / 10 / 12		
Standard	EN 771-3:2011+A1:2015		

Table C103.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16
Anchor rod without perforated sleeve					
Effective anchorage depth h _{ef} [mm]	50	70	50	70	50
Max. installation torque T _{inst} [Nm]	4			10	
General installation parameters					
Edge distance c _{min}			60		
Spacing s _{min} II			75		
Spacing	s _{cr} II [mm]		3x h _{ef}		
			75		
			3x h _{ef}		
Drilling method					
Hammer drilling with hard metal hammer drill					

Table C103.2: Group factors

Anchor rod	M6	M8	M10	M12	M16
Group factors	α _{g,N} II		1,9		
	α _{g,v} II		1,4		
	α _{g,N} ⊥		1,9		
	α _{g,v} ⊥		1,4		

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 103

Light-weight concrete solid block Vbl, EN 771-3:2015

Table C104.1: Characteristic resistance under tension loading

Anchor rod		M6		M8		M10		M12		M16	
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)											
compressive strength f_b	use condition										
6 N/mm ²	w/w	w/d	50	70	50	70	50	70	50	70	50
	d/d		2,5	3,5	2,5	3,5	2,5	3,5	2,5	3,5	2,5
8 N/mm ²	w/w	w/d	2,0	2,5	2,0	2,5	2,0	3,0	2,0	3,0	2,0
	d/d		3,5	4,5	3,5	4,5	3,5	5,0	3,5	5,0	3,5
10 N/mm ²	w/w	w/d	2,5	3,5	2,5	3,5	2,5	3,5	2,5	3,5	2,5
	d/d		4,5	6,0	4,5	6,0	4,5	6,0	4,5	6,0	4,5
12 N/mm ²	w/w	w/d	3,0	4,0	3,0	4,0	3,0	4,5	3,0	4,5	3,0
	d/d		5,0	7,0	5,0	7,0	5,0	7,5	5,0	7,5	5,0

Factor for temperature range 72/120°C: 0,83

Table C104.2: Characteristic resistance under shear loading

Anchor rod		M6		M8		M10		M12		M16	
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)											
compressive strength f_b	use condition										
6 N/mm ²	w/w	w/d									
	d/d		2,0		2,0		2,0		1,5		1,5
8 N/mm ²	w/w	w/d									
	d/d		2,5		2,5		3,0		2,5		2,5
10 N/mm ²	w/w	w/d									
	d/d		3,5		3,5		4,0		3,0		3,0
12 N/mm ²	w/w	w/d									
	d/d		4,0		4,0		4,5		3,5		3,5

Factor for job site tests and displacements see annex C110

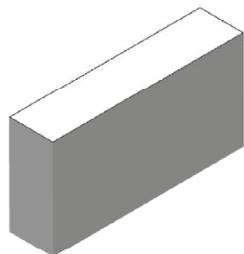
BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 104

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



Autoclaved aerated concrete, EN 771-4:2011+A1:2015			
Producer			e.g. Ytong
Density ρ	[kg/dm ³]	0,35	0,5
Compressive strength f_b	[N/mm ²]	2	4
Standard			EN 771-4:2011+A1:2015

Table C105.1: Installation parameters

Anchor rod	M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E	-	-	-	-	-	M6 11x85	M8 15x85

Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve

Effective anchorage depth h_{ef} [mm]	100	200	100	200	100	200	100	200	100	200	85
Max. installation torque T_{inst} [Nm]	1	4	1	8	2	12	2	16	2	20	1

General installation parameters

Edge distance C_{min}	[mm]	100
$S_{cr \parallel} = S_{min \parallel}$		250
$h_{ef}=200\text{mm}$		80
$S_{min \parallel}$		3x h_{ef}
$h_{ef}=200\text{mm}$		250
$S_{cr \perp} = S_{min \perp}$		80
$h_{ef}=200\text{mm}$		3x h_{ef}

Drilling method

Hammer drilling with hard metal hammer drill

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 105

Table C106.1: 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 MCS PLUS E	-	-	-	-	-	M6	M8
						11x85	15x85
Group factors	$h_{ef}=200 \alpha_{g,N} \parallel$	[-]	1,6				$\text{-}^1)$
	$h_{ef}=200 \alpha_{g,v} \parallel$		1,1				$\text{-}^1)$
	$\alpha_{g,N} \parallel, \alpha_{g,v} \parallel$		2				
	$h_{ef}=200 \alpha_{g,N} \perp$		1,6				$\text{-}^1)$
	$h_{ef}=200 \alpha_{g,v} \perp$		0,8				$\text{-}^1)$
	$\alpha_{g,N} \perp, \alpha_{g,v} \perp$		2				

$\text{-}^1)$ No performance assessed

Table C106.2: 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 MCS PLUS E	-	-	-	-	-	M6	M8
						11x85	15x85
Group factors	$h_{ef}=200 \alpha_{g,N} \parallel$	[-]	0,7				$\text{-}^1)$
	$h_{ef}=200 \alpha_{g,v} \parallel$		2,0				$\text{-}^1)$
	$\alpha_{g,N} \parallel, \alpha_{g,v} \parallel$		2				
	$h_{ef}=200 \alpha_{g,N} \perp$		0,7				$\text{-}^1)$
	$h_{ef}=200 \alpha_{g,v} \perp$		1,2				$\text{-}^1)$
	$\alpha_{g,N} \perp, \alpha_{g,v} \perp$		2				

$\text{-}^1)$ No performance assessed

Table C106.3: 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 MCS PLUS E	-	-	-	-	-	M6	M8
						11x85	15x85
Group factors	$h_{ef}=200 \alpha_{g,N} \parallel$	[-]	0,7				$\text{-}^1)$
	$h_{ef}=200 \alpha_{g,v} \parallel$		2,0				$\text{-}^1)$
	$\alpha_{g,N} \parallel, \alpha_{g,v} \parallel$		2				
	$h_{ef}=200 \alpha_{g,N} \perp$		0,7				$\text{-}^1)$
	$h_{ef}=200 \alpha_{g,v} \perp$		1,2				$\text{-}^1)$
	$\alpha_{g,N} \perp, \alpha_{g,v} \perp$		2				

$\text{-}^1)$ No performance assessed

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 106

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

Table C107.1: Characteristic resistance under tension loading

Anchor rod		M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E		-	-	-	-	-	M6	M8
		M10 M12 11x85 15x85						
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)								
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]						
		100	200	100	200	100	200	100
2 N/mm ²	w/w	1,2	1,2	1,5	2,0	1,5	3,0	1,5
	d/d	1,5	3,0	1,5	3,0	1,5	3,5	2,0
4 N/mm ²	w/w	1,2	- ¹⁾	2,0	1,5	2,5	3,5	2,0
	d/d	1,5	- ¹⁾	2,0	3,0	3,0	5,0	2,5
6 N/mm ²	w/w	1,5	- ¹⁾	3,0	2,5	4,5	5,0	4,5
	d/d	1,5	- ¹⁾	3,5	4,0	5,0	7,0	5,0
		100	200	100	200	100	200	85

¹⁾ No performance assessed

Factor for temperature range 72/120°C: 0,83

Table C107.2: Characteristic resistance under shear loading

Anchor rod		M6	M8	M10	M12	M16	-	-
Internal threaded anchor MCS PLUS E		-	-	-	-	-	M6	M8
		M10 M12 11x85 15x85						
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)								
compressive strength f_b	use condition	Effective anchorage depth h_{ef} [mm]						
		100	200	100	200	100	200	100
2 N/mm ²	w/w	1,2	1,2	1,2	1,2	1,2	1,5	1,2
	d/d							1,2
4 N/mm ²	w/w	2,0	- ¹⁾	2,5	2,0	2,0	2,5	2,0
	d/d							2,0
6 N/mm ²	w/w	2,5	- ¹⁾	3,0	2,5	3,0	3,5	4,0
	d/d							4,5
		100	200	100	200	100	200	85

¹⁾ No performance assessed

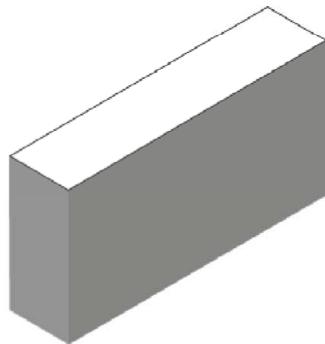
Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry

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

Annex C 107

**Autoclaved aerated concrete (conical drill hole with special drill bit PBB),
EN 771-4:2011+A1:2015**



Autoclaved aerated concrete, EN 771-4:2011+A1:2015				
Producer	e.g. Ytong			
Density ρ [kg/dm ³]	0,35	0,5	0,65	
Compressive strength f_b [N/mm ²]	2	4	6	
Standard	EN 771-4:2011+A1:2015			

Table C108.1: Installation parameters

Anchor rod	M8	M10	M12	-		
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8
Anchor rod and internal threaded anchor MCS PLUS E without perforated sleeve						
Effective anchorage depth h_{ef} [mm]	75	95	75	95	75	85
Max. installation torque T_{inst} [Nm]				2		
General installation parameters						
Edge distance C_{min}	120	150	120	150	120	150
Spacing $s_{cr\parallel} = s_{min\parallel}$ [mm]	240	300	240	300	240	300
$s_{cr\perp} = s_{min\perp}$	240	250	240	250	240	250
Drilling method						
Hammer drilling with hard metal hammer drill						

Table C108.2: Group factors

Anchor rod	M8	M10	M12	-		
Internal threaded anchor MCS PLUS E	-	-	-	-	M6	M8
					11x85	
Group factors	$\alpha_{g,N\parallel}$ $\alpha_{g,v\parallel}$ $\alpha_{g,N\perp}$ $\alpha_{g,v\perp}$	[\cdot]		2		
BERNER multicomponent system MCS Uni Plus for masonry						

Performance

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

Annex C 108

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

EN 771-4:2011+A1:2015

Table C109.1: Characteristic resistance under tension loading

Anchor rod		M8		M10		M12		-
Internal threaded anchor MCS PLUS E		-	-	-	-	-	-	M6 M8 11x85
$N_{Rk} = N_{Rk,p} = N_{Rk}$, [kN] depending on the compressive strength f_b (temperature range 50/80°C)								
compressive strength f_b	use condition	75	95	75	95	75	95	85
2 N/mm ²	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
4 N/mm ²	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
6 N/mm ²	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

Factor for temperature range 72/120°C: 0,83

Table C109.2: Characteristic resistance under shear loading

Anchor rod		M8		M10		M12		-
Internal threaded anchor MCS PLUS E		-	-	-	-	-	-	M6 M8 11x85
$V_{Rk} = V_{Rk,b} = V_{Rk,c}$ [kN] depending on the compressive strength f_b (temperature range 50/80°C and 72/120°C)								
compressive strength f_b	use condition	75	95	75	95	75	95	85
2 N/mm ²	w/w w/d	2,5						
	d/d							
4 N/mm ²	w/w w/d	4,5						
	d/d							
6 N/mm ²	w/w w/d	6,0						
	d/d							

Factor for job site tests and displacements see annex C110

BERNER multicomponent system MCS Uni Plus for masonry

Performance

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

Annex C 109

β-factors for job site tests; displacements

Table C110.1: β-factors for job site tests

use condition		w/w and w/d		d/d	
temperature range		50/80	72/120	50/80	72/120
Material	Size				
solid units	M6	0,55	0,46	0,96	0,80
	M8	0,57	0,51		
	M10	0,59	0,52		
	M12 MCS PLUS E 11x85	0,6	0,54		
	M16 MCS PLUS E 15x85	0,62	0,52		
	MCS PLUS H 16x85 K	0,55	0,46		
hollow units	all sizes	0,86	0,72	0,96	0,8
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 C110.2: Displacements

Material	N [kN]	δN_0 [mm]	δN_∞ [mm]	V [kN]	δV_0 [mm]	δV_∞ [mm]
solid units and autoclaved aerated concrete $h_{ef}=100\text{mm}$	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	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	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,2	0,4	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	0,91	1,37
AAC $h_{ef}=200\text{ mm}$ annex C 105 - C 107	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	1,03	2,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	1,25	1,88
brick Annex C 89 / C 90	$\frac{N_{Rk}}{1,4 * \gamma_{Mm}}$	0,03	0,06	$\frac{V_{Rk}}{1,4 * \gamma_{Mm}}$	6,44	9,66

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

BERNER multicomponent system MCS Uni Plus for masonry

Performance
β-factors for job site tests; displacements

Annex C 110