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European Technical Assessment Body for construction products



European Technical Assessment

ETA-13/0909 of 10 December 2024

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

Injection system VMU plus for masonry

Injection system for use in masonry

MKT

Metall-Kunststoff-Technik GmbH & Co. KG

Auf dem Immel 2 67685 Weilerbach DEUTSCHLAND

Werk 1, D

Werk 2, D

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

EAD 330076-01-0604, Edition 10/2022

ETA-13/0909 issued on 8 December 2016

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Specific Part

1 Technical description of the product

The "Injection System VMU plus for masonry" is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar VMU plus or VMU plus Polar, a perforated sleeve and an anchor rod with hexagon nut and washer or an Internal threaded rod. The steel elements are made of zinc coated steel, stainless steel or high corrosion resistant steel.

The anchor rod is placed into a drilled hole filled with injection mortar and is anchored via the bond between steel element, injection mortar and masonry and mechanical interlock.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the fastener is used in compliance with the specifications and conditions given in Annex B.

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for static and quasi-static loading	See Annexes B6, B7 C1 to C60
Characteristic resistance and displacements for seismic loading	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire under tension and shear loading with and without lever arm. Minimum edge distances and spacing	See Annexes C4, C9, C10, C15, C16, C19, C21, C22, C23, C40, C42, C47, C48, C49, C50, C55 and C56

3.3 Hygiene, health and the environment (BWR 3)

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

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

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

The system to be applied is: 1

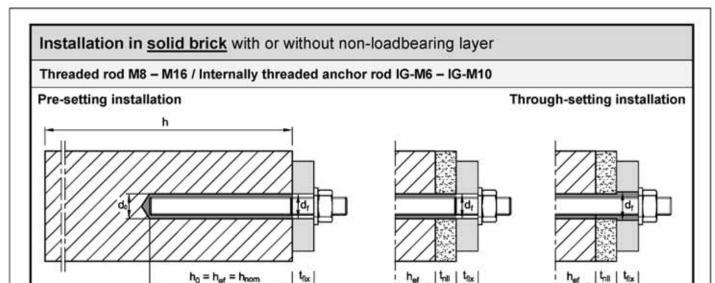
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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 10 December 2024 by Deutsches Institut für Bautechnik

Beatrix Wittstock Head of Section beglaubigt: Baderschneider

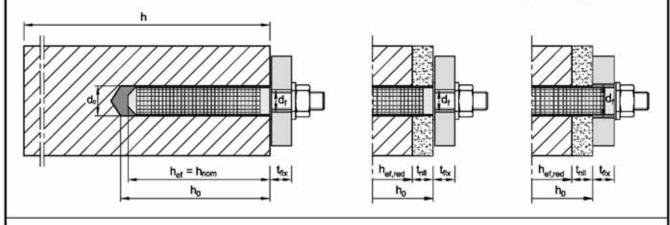




Threaded rod M8 - M16 / Internally threaded anchor rod IG-M6 - IG-M10 with sleeve

Pre-setting installation

Through-setting installation



For through-setting installation, the annular gap between the anchor rod and the fixture must be filled with mortar.

Legend (Annex A1 and Annex A2):

hef = effective anchorage depth

h_{nom} = overall anchor embedment depth

h₀ = depth of drill hole

h = thickness of masonry member d₀ = nominal drill hole diameter

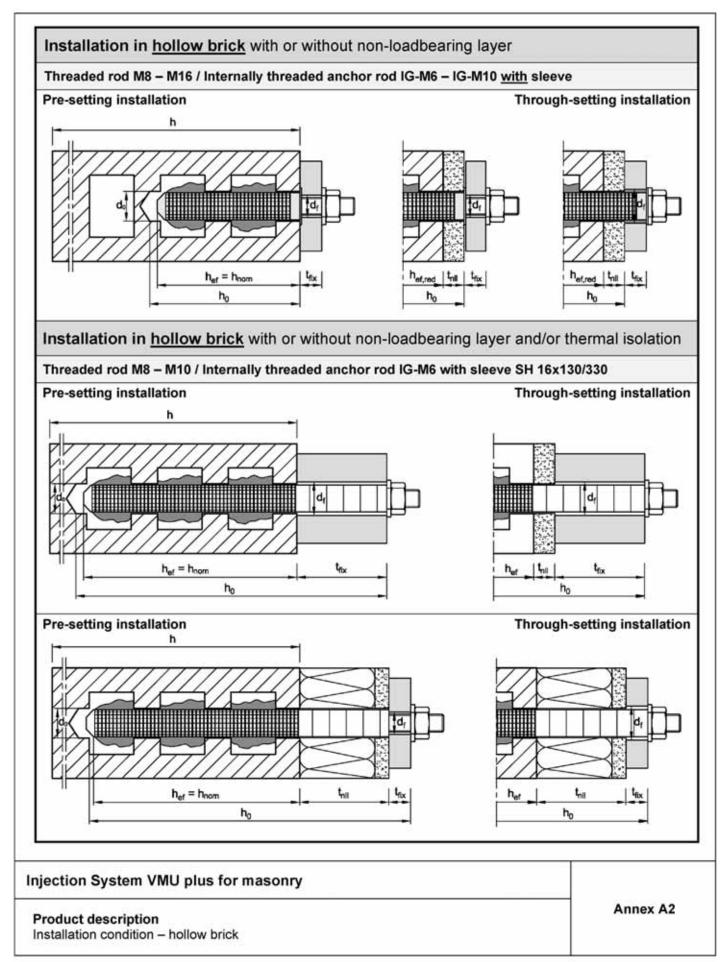
d_f = diameter of clearance hole in the fixture

t_{fix} = thickness of fixture

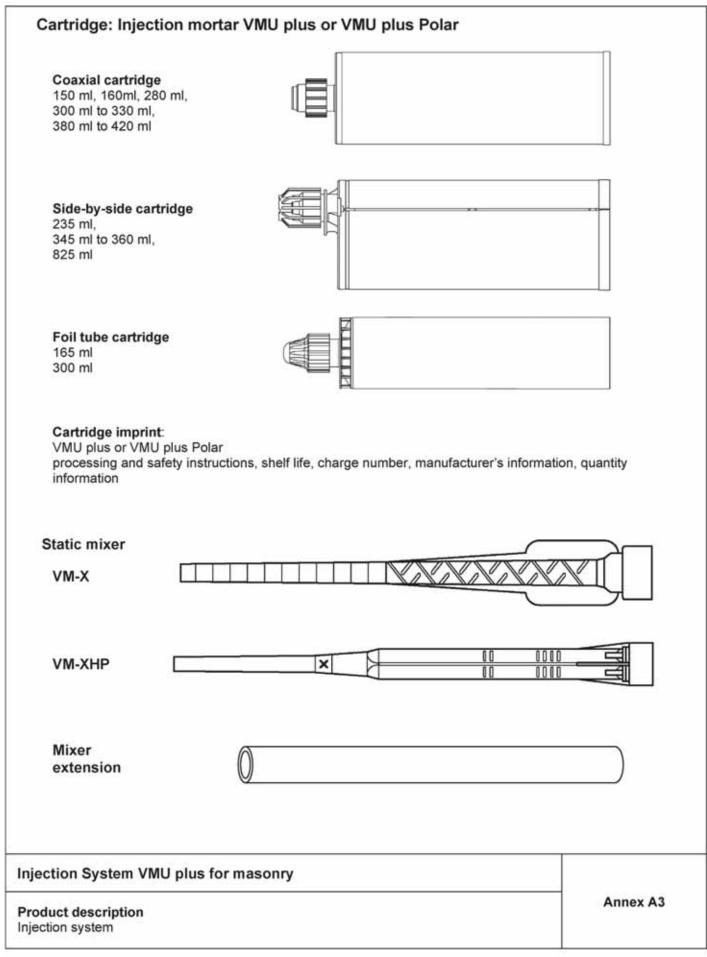
t_{nll} = thickness of non-loadbearing layer

Injection System VMU plus for masonry	
Product description	Annex A1
Installation condition – solid brick	







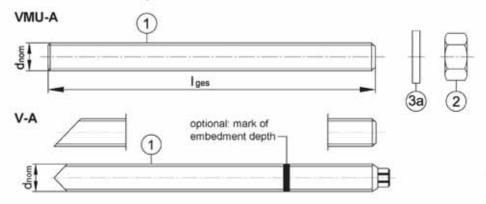




Threaded rod

Threaded rod VMU-A and V-A

M8, M10, M12, M16 (zinc plated, A4, HCR) with washer and hexagon nut



Marking e.g.:
M10

identifying mark of manufacturing plant

M10 size of thread

additional marking:

-8 strength class 8.8
 A4 stainless steel

HC high corrosion resistant steel

Threaded rod VM-A (material sold by the metre, to be cut at the required length)

M8, M10, M12, M16 (zinc plated, A2, A4, HCR)

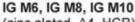
- Materials, dimensions and mechanical properties see Table A1

Commercial standard threaded rod with:

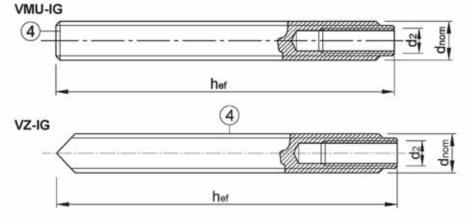
M8, M10, M12, M16 (zinc plated, A2, A4, HCR)

- Materials, dimensions and mechanical properties see Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004 (documents must be retained)

Internally threaded anchor rod VMU-IG and VZ-IG



(zinc plated, A4, HCR)



Marking e.g.: M8

 identifying mark of manufacturing plant

I internal thread (optional)

M8 size of internal thread

additional marking:

-8 strength class 8.8

A4 stainless steel

HCR high corrosion resistant steel

Injection System VMU plus for masonry

Product description

Threaded rods and internally threaded anchor rods

Annex A4



-			
Ian	le A1:	IV/I つt	Oriol
Iau	IC A I.	IVIGI	CIIGI

	Designation	M	aterial and	d mech	anical pro	perties		
electr not-d	ip galvanized ≥	5 µm acc. to E 50 µm in avera 45 µm acc. to E	ge acc. to l	EN ISO	1461:202	2, EN IS	O 10684:200	04+AC:2009 or
	Property class		characte	characteristic characteristic ultimate strength yield strength		fracture elongation	EN ISO 683-4:2018.	
		4.6		400 240 400 320		240	A ₅ > 8 %	EN 10263:2017
1	Threaded rod	4.8				320	A ₅ > 8 %	Commercial standard
		5.6	f _{uk} [N/mm²]	500	— [N/mm²] ⊦	300	A ₅ > 8 %	threaded rod:
		5.8	[iv/mm-]	500		400	A ₅ > 8 %	EN ISO 898-1:2013
		8.8		800	1	640	A ₅ > 8 %	
		4	for class 4	1.6 or 4.	8 rods			
2	Hexagon nut	5	for class 4	1.6, 4.8,	5.6 or 5.8	rods		EN ISO 898-2:2022
	3.6	for class 4				İs		
3	Washer			e.g.: EN ISO 7089:2000, EN ISO 7093:2000, E EN ISO 887:2006				ISO 7094:2000,
331	Internally threaded	5.8	A ₅ > 8%					
		0.0			V 95		A5 > 0%	
	anchor rod ³⁾	8.8 C		301 / 1.4	4307 / 1.4	311 / 1.4	A ₅ > 8%	EN ISO 683-4:2018
Stain	anchor rod3)	8.8 C C Steel HCR C Property class	discontinues	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength	4307 / 1.4 4404 / 1.4	311 / 1.4 571 / 1.4 eristic	A ₅ > 8% 4567 / 1.454 4578) fracture elongation)
Stain	anchor rod ³⁾ iless steel A2 ¹⁾ iless steel A4	8.8 C C Steel HCR C Property class 50	RC II (1.44 RC III (1.44 RC V (1.45 characte ultimate s	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength	4307 / 1.4 4404 / 1.4 4565) charact yield str	311 / 1.4 571 / 1.4 eristic	A ₅ > 8% 4567 / 1.4544 4578) fracture elongation A ₅ > 8%	EN 10088-1:2014
Stain Stain High	anchor rod ³⁾ lless steel A2 ¹⁾ lless steel A4 corrosion resistant	8.8 C C Steel HCR C Property class 50 70	RC II (1.4 RC III (1.4 RC V (1.45	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength 500 700	4307 / 1.4 4404 / 1.4 4565)	311 / 1.4 571 / 1.4 eristic rength 210 450 (560) 2)	A ₅ > 8% 4567 / 1.454 4578) fracture elongation A ₅ > 8% A ₅ > 8 %	EN 10088-1:2014
Stain Stain High	anchor rod ³⁾ lless steel A2 ¹⁾ lless steel A4 corrosion resistant	8.8 C C Steel HCR C Property class 50	RC II (1.44 RC III (1.44 RC V (1.45 characte ultimate s	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength	4307 / 1.4 4404 / 1.4 4565) charact yield str	311 / 1.4 571 / 1.4 eristic rength 210 450	A ₅ > 8% 1567 / 1.454 1578) fracture elongation A ₅ > 8% A ₅ > 8 %	EN 10088-1:2014
Stain Stain High	anchor rod ³⁾ lless steel A2 ¹⁾ lless steel A4 corrosion resistant	8.8 C C Steel HCR C Property class 50 70	RC II (1.44 RC III (1.44 RC V (1.45 characte ultimate s	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength 500 700 800	4307 / 1.4 4404 / 1.4 4565) charact yield str	311 / 1.4 571 / 1.4 eristic rength 210 450 (560) ²⁾	A ₅ > 8% 1567 / 1.454 1578) fracture elongation A ₅ > 8% A ₅ > 8 %	EN 10088-1:2014 EN ISO 3506-1:2020
Stain Stain High	anchor rod ³⁾ lless steel A2 ¹⁾ lless steel A4 corrosion resistant	8.8 C C C Steel HCR C Property class 50 70 80	RC II (1.44 RC III (1.44 RC V (1.45 characte ultimate s	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength 500 700 800	4307 / 1.4 4404 / 1.4 4565) charact yield str	311 / 1.4 571 / 1.4 eristic rength 210 450 (560) ²⁾	A ₅ > 8% 1567 / 1.454 1578) fracture elongation A ₅ > 8% A ₅ > 8 %	EN 10088-1:2014 EN ISO 3506-1:2020
Stain Stain High	anchor rod³) lless steel A2 ¹) lless steel A4 corrosion resistant Threaded rod	8.8 C C C C C C C C C C C C C C C C C C C	RC II (1.44 RC III (1.44 RC V (1.45 characte ultimate s	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength 500 700 800 60 rods 50 or 70	4307 / 1.4 4404 / 1.4 4565) charact yield str f _{yk} [N/mm²]	311 / 1.4 571 / 1.4 eristic rength 210 450 (560) ²⁾	A ₅ > 8% 1567 / 1.454 1578) fracture elongation A ₅ > 8% A ₅ > 8 %	EN 10088-1:2014 EN ISO 3506-1:2020
Stain Stain High	anchor rod³) lless steel A2 ¹) lless steel A4 corrosion resistant Threaded rod	8.8 C C C C C C C C C C C C C C C C C C C	RC II (1.44 RC V (1.45 characte ultimate s fuk [N/mm²] for class 5 for class 5 e.g.: EN IS	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength 500 700 800 60 rods 50 or 70 50, 70 o	4307 / 1.4: 4404 / 1.4: 4565) charact yield str fyk [N/mm²]	311 / 1.4 571 / 1.4 eristic rength 210 450 (560) ²⁾ 600 (640) ²⁾	A ₅ > 8% 4567 / 1.454 4578) fracture elongation A ₅ > 8% A ₅ > 8 % A ₅ > 8 %	EN 10088-1:2014 EN ISO 3506-1:2020
Stain Stain High	anchor rod³) Iless steel A2 ¹) Iless steel A4 corrosion resistant Threaded rod Hexagon nut	8.8 C C C C C C C C C C C C C C C C C C C	RC II (1.44 RC V (1.45 characte ultimate s fuk [N/mm²] for class 5 for class 5 e.g.: EN IS	301 / 1.4 401 / 1.4 529 / 1.4 eristic trength 500 700 800 60 rods 50 or 70 50, 70 o SO 708 094:200 steel A4	4307 / 1.4 4404 / 1.4 4565) charact yield str fyk [N/mm²] rods r 80 rods 9:2000, El 90; EN ISC	311 / 1.4 571 / 1.4 eristic rength 210 450 (560) ²⁾ 600 (640) ²⁾	A ₅ > 8% 4567 / 1.454 4578) fracture elongation A ₅ > 8% A ₅ > 8 % A ₅ > 8 %	EN 10088-1:2014 EN ISO 3506-1:2020 EN 10088-1:2014 EN ISO 3506-2:2020

¹⁾ Property class 50 and 70

³⁾ Using VMU-IG or VZ-IG, screws or threaded rods (incl. nut and washer) must at least correspond to the material and strength class of the internally threaded anchor rod used.

Injection System VMU plus for masonry	
Product description Materials	Annex A5

²⁾ Value in brackets for anchor rods VMU-A and V-A



Table A2: Dimensions of threaded rods and internally threaded anchor rods

Threaded rod			M8 M10	M10	M12	M16
Diameter	d = d _{nom}	[mm]	8	10	12	16
Total length	I _{ges}	[mm]	h _{ef} + t _{fix} + 9,5	h _{ef} + t _{fix} + 11,5	h _{ef} + t _{fix} + 17,5	h _{ef} + t _{fix} + 20,0
Internally threaded ar	nchor rod		-	IG M6	IG M8	IG M10
Internal diameter	d ₂	[mm]	-	6	8	10
Outer diameter	d = d _{nom}	[mm]	-	10	12	16
min. screw-in depth	L _I G,min	[mm]	=	8	10	10
Total length	lges	[mm]	A	1,000,000	th sleeve: hef - 5r out sleeve: hef	nm

Table A3: Dimensions of sleeves VM-SH

Туре	Size	d _s [mm]	L _s [mm]	h _{ef} = h _{nom} [mm]
L _s = h _{ef} = h _{norn}	VM-SH 12x80	12	80	80
d _s	VM-SH 16x85	16	85	85
	VM-SH 20x85	20	85	85
L _s = h _{ef} = h _{nom}	VM-SH 16x130	16	130	130
d _s t	VM-SH 20x130	20	130	130
Q	VM-SH 20x200	20	200	200
t _s h _{ef} = h _{nom} d _s for installation through insulation up to a thickness of 20 cm or through-setting installation	VM-SH 16x130/330 ¹⁾	16	330	130

¹⁾ In Annex C this sleeve is covered with the VM-SH 16x130

Injection System VMU plus for masonry	
Product description Dimensions of threaded rods and sleeves	Annex A6



Specifications of intended use

Anchorages	Static and quasi-sta	tic loads	M8 - M16	
subject to	Fire exposure	IG M6 - IG M10		
	Tension and shear I	(with and without sleeve)		
Base Material	Masonry group b:	Solid brick masonry	Annex B 3	
	Masonry group c:	Hollow brick masonry	Annex B 3 to B 5	
	Masonry group d:	Autoclaved Aerated Concrete	Annex B 3	
	For other bricks in s the characteristic re according to EOTA according to Annex	s of the masonry M2,5 at minimum a olid masonry, hollow masonry or in a sistance of the anchor may be deter TR 053, Edition July 2022 under con C1, Table C1	autoclaved aerated concrete, mined by job site tests	
Temperature range	T _b : - 40°C to +80°C (max. short term T _c : - 40°C to +120°C	temperature +40°C and max. long to temperature +80°C and max. long to temperature +120°C and max. long	erm temperature +50°C)	
Hole drilling	See Annex C			
Use conditions (Environmental conditions):	For all other condition	o dry internal conditions (all materials ons acc. to EN 1993-1-4:2006+ A2:2 Annex A (stainless steel and high con	020 corresponding to corrosion	
Use category	Condition d/d Installation and use in dry masonry Condition w/w Installation and use in dry or wet masonry (incl. w/d, installation in wet masonry and use in dry masonry)			

Note: The characteristic resistance for solid bricks and autoclaved aerated concrete are also valid for larger brick sizes and larger compressive strength of the masonry unit.

Injection System VMU plus for masonry	
Intended Use	Annex B1
Specifications	



Specifications of intended use (continued)

Design:

- Verifiable calculation notes and drawings are 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.
- The anchorages are designed in accordance with the EOTA TR 054, Edition July 2022, under the responsibility of an engineer experienced in anchorages and masonry work.
- · Applies to all bricks if no other values are specified:
 - NRK = NRKb = NRKb = NRKbc = NRKbc
 - V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,⊥}
- For the calculation of pulling out a brick under tension loading NRk,pb or pushing out a brick under shear loading VRk,pb see EOTA Technical Report TR 054, Edition July 2022.
- NRk,s, VRk,s and M⁰Rk,s see annexes C2 C4
- For application with sleeve with drill bit size ≤ 15mm installed in joints not filled with mortar.
 - NRk,p,j = 0,18 * NRk,p and NRk,b,j = 0,18 * NRk,b (NRk,p = NRk,b see Annex C)
 - VRKcj = 0,15 * VRKc and VRKbj = 0,15 * VRKb (VRKb see Annex C; and VRKc see Annex C5)
- Applications without sleeve installed in unfilled joints are not permitted.

Installation:

- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Using internally threaded anchor rod (VMU-IG or VZ-IG) screws and threaded rods (incl. nut and washer) must at least correspond to the material and strength class of the internally threaded anchor rod used.

Injection System VMU plus for masonry	
Intended use Specifications	Annex B2

7201515 24 8 06 04-325/19



Designation Density [kg/dm³] Dimension LxBxH [mm]	Picture	Perfo Sleeve VM-SH	Fire exposure	Annex	Designation Density [kg/dm³] Dimension LxBxH [mm]	Picture	Perfo Sleeve VM-SH	Fire exposure	Annex
	t weight concre I 771-4:2011+A		c. to			ht weight concre EN 771-3:2011+A		cc. to	
AAC ρ = 0,35-0,60 ≥ 499x240x249	1	12x80 16x85 16x130 20x85 20x130 20x200	_	C6 - C8	VBL ρ≥0,6 ≥240x300x113		12x80 16x85 16x130 20x85 20x130 20x200	1	C59
	Hollow ligh	t weight co	oncre	te bric	k acc. to EN 771-	3: 2011+A1:2015			
HBL 16DF ρ≥ 1,0 500x250x240		16x85 16x130 20x85 20x130 20x200	~	C55 - C56	Bloc creux B40 p ≥ 0,8 495x195x190	EFF	16x130 20x130	-	C51
ATT.	Cald	ium silica	brick	s acc.	to EN 771-2:2011	+A1:2015			·
KS-NF ρ ≥ 2,0 ≥ 240x115x71		12x80 16x85 16x130 20x85 20x130 20x200	~	C9 - C10	KSL-3DF ρ≥1,4 240x175x113	9.556	16x85 16x130 20x85 20x130	- 3	C1
KSL-8DF ρ ≥ 1,4 248x240x238		16x130 20x130 20x200	-	C13 - C14	KSL-12DF p ≥ 1,4 498x175x238	3333	16x130 20x130	*	C1 C1
	S	olid clay b	ricks	acc. to	EN 771-1:2011+	A1:2015			
MZ-1DF ρ≥ 2,0 ≥ 240x115x55		12x80 16x85 16x130 20x85 20x130 20x200	-	C17 C18	MZ – 2 DF ρ ≥ 2,0 ≥ 240x115x113		12x80 16x85 16x130 20x85 20x130 20x200	~	C1:

Injection System VMU plus for masonry	
Intended use Brick types and properties	Annex B3



Designation Density [kg/dm³] Dimension LxBxH [mm]	Picture	Perfo Sleeve VM-SH	Fire exposure	Annex	Designation Density [kg/dm³] Dimension LxBxH [mm]	Picture	Perfo Sleeve VM-SH	Fire exposure	Annex
	н	ollow clay I	bricks	acc. to	EN 771-1:2011+	A1:2015			
HIz-10DF p ≥ 1,25 300x240x249		12x80 16x85 16x130 20x85 20x130 20x200	~	C22 C23	Porotherm Homebric p ≥ 0,7 500x200x299	The state of the s	12x80 16x85 16x130 20x85 20x130	1	C2 C2
BGV Thermo p ≥ 0,6 500x200x314		12x80 16x85 16x130 20x85 20x130		C26 C27	Brique creuse C40 ρ≥ 0,7 500x200x200		12x80 16x85 16x130 20x85 20x130	-1	C3
Calibric R+ ρ ≥ 0,6 500x200x314		12x80 16x85 16x130 20x85 20x130	_	C28 C29	Blocchi Leggeri ρ≥0,6 250x120x250		12x80 16x85 16x130 20x85 20x130	1	C3
Urbanbric ρ ≥ 0,7 560x200x274		12x80 16x85 16x130 20x85 20x130	-	C30 C31	Doppio Uni ρ ≥ 0,9 250x120x120	· Hilliam	12x80 16x85 16x130 20x85 20x130	1	CS
10	Hollow clay	bricks with	thern	nal ins	ulation acc. to EN	771-1:2011+A1:	2015	. v	
Coriso WS07 p ≥ 0,55 248x365x249 Mineral wool		12x80 16x85 16x130 20x85 20x130 20x200	=	C38 - C39	T8 P ρ ≥ 0,56 248x365x249 Perlite		12x80 16x85 16x130 20x85 20x130 20x200	343	C4
T7 MW ρ ≥ 0,59 248x365x249 Mineral wool		12x80 16x85 16x130 20x85 20x130 20x200	V	C40 - C42	MZ90-G ρ ≥ 0,68 248x365x249 Mineral wool		12x80 16x85 16x130 20x85 20x130 20x200	-	C4

Injection System VMU plus for masonry	300 A A A A A A A A A A A A A A A A A A
Intended use	Annex B4
Brick types and properties	



Continuation Table B1: Overview brick types and properties

Designation Density [kg/dm³] Dimension LxBxH [mm]	Picture	Perfo Sleeve VM-SH	Fire exposure	Annex	Designation Density [kg/dm³] Dimension LxBxH [mm]	Picture	Perfo Sleeve VM-SH	Fire exposure	Annex
	Hollow clay b	ricks with t	herm	al insu	lation acc. to EN	771-1:2011+A1:2	015		
Poroton FZ7,5 ρ ≥ 0,90 248x365x249 Mineral wool		12x80 16x85 16x130 20x85 20x130 20x200	~	C47 - C48	Poroton FZ9 p≥ 0,90 248x365x249 Mineral wool		12x80 16x85 16x130 20x85 20x130 20x200	~	C49 C50
Poroton S9 p ≥ 0,85 248x365x249 Perlite		12x80 16x85 16x130 20x85 20x130 20x200		C51 C52	Thermopor TV8+ ρ≥ 0,7 248x365x249 Mineral wool		12x80 16x85 16x130 20x85 20x130 20x200	-	C53

Injection System VMU plus for masonry	
Intended Use	Annex B5
Brick types and properties	



Table B2: Installation parameters for autoclaved aerated concrete AAC and solid masonry (without sleeve) for pre- or through-setting installation

Threaded ro	d		M8	M10 IG-M6	M12 IG-M8	M16 IG-M10		
Nominal drill hole diameter do [mm]			10	12	14	18		
Depth of drill hole h ₀ [mm]				h _{ef} + t _{fix} 1)				
Effective anchorage depth hef [mm]			80	≥ 90	≥ 100	≥ 100		
Diameter of clearance	pre-setting dr sinstallation	[mm]	9	7 (IG-M6) 12 (M10)	9 (IG-M8) 14 (M12)	12 (IG-M10) 18 (M16)		
hole in the fixture	through- setting dr s installation	[mm]	12	14	16	20		
Brush		[-]	RB 10	RB 12	RB 14	RB 18		
Minimum bru	sh diameter d	[mm]	10,5	12,5	14,5	18,5		
Maximum ins	Maximum installation torque Tinst [Nn			see An	nex C			
Minimum me	mber thickness hmi	[mm]	h _{ef} + 30					
Minimum spa	cing s _{mi}	[mm]		see An	nex C			
Minimum edg	e distance cmi	[mm]		see An	nex C			

¹⁾ Consider tfix in case of through-setting installation

Table B3: Installation parameters in solid and hollow masonry (with sleeve) for presetting Installation

Threaded rod		M8		M8 / M10 IG-M6			M12 / M16 -M8 / IG-N	Townson or the second
Sleeve VM-SH		12x80	16x85	16x130	16x130 /330	20x85	20x130	20x200
Nominal drill hole diameter do	[mm]	12		16			20	
Depth of drill hole ho	[mm]	85	90	135	330	90	135	205
Effective anchorage depth he	[mm]	80	85	130	130	85	130	200
Diameter of clearance hole in the fixture d _f ≤	[mm]	9		7 (IG-I 9 (M8) 12 (M10			9 (IG- 12 (IG- 14 (M1: 18 (M1	M10) 2)
Brush	[-]	RB 12	RB 16			RB 20		
Minimum brush diameter da	[mm]	12,5		16,5		20,5		
Maximum installation torque Tinst	[Nm]			s	ee Annex	c	1.17	
Minimum member thickness hmin	[mm]	115	115	195	195	115	195	240
Minimum spacing s _{min}	[mm]		•	s	ee Annex	С		
Minimum edge distance c _{min}	[mm]			s	ee Annex	С		

Annex B6



Table B4: Installation parameters in solid and hollow masonry (<u>with</u> sleeve) for presetting installation through non-load-bearing layers and/or through-setting installation

Threaded rod			1110000	M10 -M6	40.000	/ M16 / IG-M10
Sleeve VM-S	н		16x130	16x130/330	20x130	20x200
Nominal drill hole diameter d ₀ [mm]				16		20
Depth of drill hole ho [mm]			her + 5mm + t _{nll} + t _{fix} 1)			
Effective	pre-setting installation her	[mm]	130	130	130	200
anchorage depth	through-setting installation her	[mm]	85	130	85	85
Maximum thic non-loadbeari	may tal	[mm]	45	200	45	115
Diameter of clearance hole in the	pre-setting d _f ≤	[mm]	7 9 12	(IG-M6) (M8) (M10)	9 12 14 18	(IG-M8) (IG-M10) (M12) (M16)
fixture	through-setting d _f ≤	[mm]	1	18	3	22
Brush		[-]	RB 16		RB 20	
Minimum brus	sh diameter d _b	[mm]	16,5		20,5	
Maximum inst	tallation torque Tinst	[Nm]	see Annex C			
Minimum mer	mber thickness h _{min}	[mm]	195 (115)	195	195 (115)	240 (115)
Minimum spa	cing s _{min}	[mm]		see An	nex C	*
Minimum edg	e distance c _{min}	[mm]		see An	nex C	

¹⁾ Consider t_{nll} and/or t_{fix} in case of non-loadbearing layers and/or through-setting installation.

Cleaning and installation tools

Compressed air tool (min. 6 bar)



Brush RB



Blow out pump (Volume ≥ 750 ml)



Brush extension

	-
	100

Injection System VMU plus for masonry

Intended use

Installation parameters and cleaning and installation tools

Annex B7



Table B5: Working and curing time - VMU plus

Temperature in the base material [°C]		the base	Maximum working	Minimum curing time in				
		al	time	in dry base material	in wet base material			
- 10°C	to	- 6°C	90 min	24 h	48 h			
- 5°C	to	- 1°C	90 min	14 h	28 h			
0°C	to	+ 4°C	45 min	7 h	14 h			
+ 5°C	to	+ 9°C	25 min	2 h	4 h			
+ 10°C	to	+ 19°C	15 min	80 min	160 min			
+ 20°C	to	+ 29°C	6 min	45 min	90 min			
+ 30°C	to	+ 34°C	4 min	25 min	50 min			
+ 35°C	to	+ 39°C	2 min	20 min	40 min			
*	+ 40°(0	1,5 min	15 min	30 min			
Cartridge temperature 1)				+5°C to +40°C				

¹⁾ At temperatures in the base material of -10°C to -6°C, the cartridge temperature must be at least +15°C.

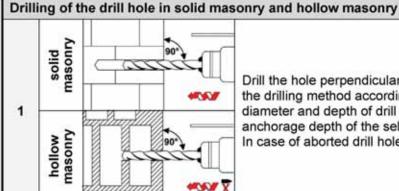
Table B6: Working and curing time - VMU plus Polar

Temperature in the base material [°C]			Maximum working	Minimum curing time			
					time	in dry base material	in dry base material
- 20°C	to	- 16°C	75 min	24 h	48 h		
- 15°C	to	- 11°C	55 min	16 h	32 h		
- 10°C	to	- 6°C	35 min	10 h	20 h		
- 5°C	to	- 1°C	20 min	5 h	10 h		
0°C	to	+4°C	10 min	2,5 h	5 h		
+5°C to +9°C		6 min	80 min	160 min			
1	+ 10°(0	6 min	60 min	2 h		
Cartridge temperature				-20°C to +10°C			

Injection System VMU plus for masonry	
Intended use Working and curing times	Annex B8



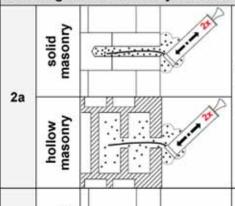
Installation instructions



Drill the hole perpendicular to the surface of the base material using the drilling method according to Annex C, with the specified drill hole diameter and depth of drill hole corresponding to the anchor size and anchorage depth of the selected anchor.

In case of aborted drill hole, the drill hole shall be filled with mortar.

Cleaning in solid masonry and hollow masonry



Blow out from the bottom of the bore hole with the blow out pump (Annex B7) a minimum of **two** times.

For applications in solid masonry with a bore hole depth $h_0 > 100$ mm cleaning with compressed air is required.

2b Arnosem wasonida w

Brush the hole with an appropriately sized wire brush $\geq d_{b,min}$ (Table B2, B3 and B4, check minimum brush diameter $d_{b,min}$) a minimum of **two** times using a drilling machine or battery screwdriver.

If the drill hole ground is not reached, an appropriate brush extension must be used.

Aunosem vanosem vanose

Finally starting from the bottom or back of the drill hole blow out the hole with the blow out pump again a minimum of **two** times. For applications in solid masonry with a bore hole depth $h_0 > 100$ mm cleaning with compressed air is required.

Injection System VMU plus for masonry

Intended use

Installation instruction: drilling of drill hole / cleaning in solid and hollow masonry

Annex B9



Installation instructions - continuation

Prep	paration injection	
3	In Ithe State of the Ither of t	Remove the cap and attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. In case of a foil tube cartridge, cut off the clip before use. For every working interruption longer than the recommended working time (Table B5 and B6) as well as for new cartridges, a new static-mixer shall be used.
4	h _{ef} +(t _{nll})+(t _{fix})	Mark position of embedment depth on the threaded rod. Consider the and/or thix in case of installation through non-loadbearing layers and/or through setting installation. The threaded rod shall be free of dirt, grease, oil or other foreign material.
5	min.3x	Prior to dispensing into the drill hole, squeeze out separately (a minimum of three full strokes, for foil tube cartridges at least 6 full strokes) and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey color.
Insta	Illation without sleeve	
6		Starting at the bottom of the drill hole and fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid air pockets. Use mixer extension if necessary. Observe temperature dependent working time (Table B5 or B6).
7		Insert fastener while turning slightly up to the embedment mark.
8		Annular gap between threaded rod and base material must be completely filled with mortar. For through setting installation the annular gap between threaded rod and fixture must also be filled with mortar. Otherwise, the installation must be repeated starting from step 6 before the maximum working time has expired.
9	X	Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (Table B5 or B6). After full curing time remove excess mortar.
10	Tinst,max	Install the fixture using a torque wrench, observing the maximum installation torque T _{inst} according to Annex C.

Injection System VMU plus for masonry	
Intended use Installation instruction: Preparation injection / Installation without sleeve	Annex B10



Installation instructions - continuation

Inst	allation with sleeve	
6		Insert the perforated sleeve flush with the surface of the masonry. Only use sleeves that have the right length. Never cut the sleeve in the anchoring area. For through-setting installation with perforated sleeve VM SH 16x130/330 through a non-load-bearing layer and/or add-on part, the clamping area may be shortened to the thickness of the non-load-bearing layer and/or attachment.
7		Fill the perforated sleeve with mortar from the bottom or back. Use mixer extension if necessary. Refer to the cartridge label or the installation instructions for the exact quantity of mortar. For through setting installation, the perforated sleeve must be completely filled with mortar up to the fixture. Observe the working and curing times given in Table B5 and B6.
8		To optimize the distribution of the mortar, insert the fastener with slight rotation to the defined embedment depth.
9	X I C	Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (Table B5 and B6).
10	T _{inst,max}	Install the fixture using a torque wrench, observing the maximum installation torque T _{inst} according to Annex C.

Injection System VMU plus for masonry	
Intended use Installation instruction: Installation with sleeve	Annex B11



Table C1: β - factor for job-site testing under tension loading

		700 de 90		* 14.7	β-factor					
Brick type	Anchor	Perfo sleeve VM-SH	anchorage depth h _{ef}	T _a : 24°C / 40°C		Т _ь : 50°С / 80°С		T₀: 72°C/120°C		
	size			d/d	w/d w/w	d/d	w/d w/w	d/d	w/d w/w	
Autoclaved aerated concrete	all sizes	with or without VM-SH	all	0,95	0,86	0,81	0,73	0,81	0,73	
	d₀ ≤ 14 mm	VM-SH		0,93	0,80	0,87	0,74	0,65	0,56	
	d ₀ ≥ 16 mm	VIVI-SIT	all	0,93	0,93	0,87	0,87	0,65	0,65	
Calcium silica bricks	d ₀ ≤ 14 mm	=	≤ 100mm	0,93	0,80	0,87	0,74	0,65	0,56	
	d ₀ ≥ 16 mm			0,93	0,93	0,87	0,87	0,65	0,65	
	all sizes		> 100mm	0,93	0,56	0,87	0,52	0,65	0,40	
		VM-SH	all	0,86	0,86	0,86	0,86	0,73	0,73	
Clay bricks	all sizes	_	≤ 100mm	0,86	0,86	0,86	0,86	0,73	0,73	
			> 100mm	0,86	0,43	0,86	0,43	0,73	0,37	
Concrete	d ₀ ≤ 12 mm	with or		0,93	0,80	0,87	0,74	0,65	0,56	
bricks	d₀ ≥ 16 mm	without VM-SH	all	0,93	0,93	0,87	0,87	0,65	0,65	

Annex C1



Table C2: Characteristic steel resistance under tension and shear load for threaded rods

Threaded r	od	M 8	M 10	M 12	M 16			
Steel failur	e							
Cross section	onal area	As	[mm²]	36,6	58,0	84,3	157	
Characteris	stic resistance under tension load	1)						
7242217	Property class 4.6 and 4.8	N _{Rk,s}	[kN]	15 (13)1)	23 (21)1)	34	63	
0.7111000007	Property class 5.6 and 5.8	N _{Rk,s}	[kN]	18 (17) ¹⁾	29 (27)1)	42	79	
zinc piated	Property class 8.8	NRKs	[kN]	29 (27)1)	46 (43)1)	67	126	
	Property class 50 (A2/A4/HCR)	N _{Rk,s}	[kN]	18	29	42	79	
	Property class 70 (A2/A4/HCR)	N _{Rk,s}	[kN]	26	41	59	110	
Steel	Property class 80 (A4/HCR)	NRks	[kN]	29	46	67	126	
Partial fact	ors ²⁾							
steel,	Property class 4.6 and 5.6	YMs,N	[-]		2,0	0		
[16] [15] TAN	Property class 4.8, 5.8 and 8.8	YMs,N	[-]		1,3	-		
	Property class 50 (A2/A4/HCR)	YMs,N	[-]	2,86				
stainless	Property class 70 (A2/A4/HCR)	YMs,N	[-]	1,87 (1,5)3)				
steel	Property class 80 (A4/HCR)	YMs,N	[-]	1,6 (1,5)3)				
Characteris	stic resistance under shear load 1)							
	e without lever arm							
	Property class 4.6 and 4.8	V ⁰ Rk,s	[kN]	7 (6) ¹⁾	12 (10)1)	17	31	
	Property class 5.6 and 5.8	V ⁰ Rk,s	[kN]	9 (8)1)	15 (13)1)	21	39	
steel failur steel, tinc plated stainless	Property class 8.8	V ⁰ Rk,s	[kN]	15 (13)1)	23 (21)1)	34	63	
	Property class 50 (A2/A4/HCR)	V ⁰ Rk,s	[kN]	9	15	21	39	
	Property class 70 (A2/A4/HCR)	V ⁰ Rk,s	[kN]	13	20	30	55	
steer	Property class 80 (A4/HCR)	V ⁰ Rk,s	[kN]	15	23	34	63	
Steel failur	e with lever arm - characteristic b	ending m	oment					
r. Valedi	Property class 4.6 and 4.8	M ⁰ Rk,s	[Nm]	15 (13) ¹⁾	30 (27)1)	52	133	
100	Property class 5.6 and 5.8	M ⁰ Rks	[Nm]	19 (16)1)	37 (33)1)	65	166	
Steel failur Cross section Characteris steel, zinc plated stainless steel Partial fact steel, zinc plated Stainless steel Characteris Steel failur steel, zinc plated stainless steel Steel failur steel, zinc plated stainless steel Partial fact steel, zinc plated	Property class 8.8	M ⁰ Rk,s	[Nm]	30 (26)1)	60 (53)1)	105	266	
(e)(e)(a)(a)(e)(e)	Property class 50 (A2/A4/HCR)	M ⁰ Rk,s	[Nm]	19	37	65	166	
	Property class 70 (A2/A4/HCR)	M ⁰ Rk,s	[Nm]	26	52	92	233	
Sidei	Property class 80 (A4/HCR)	M ⁰ Rk,s	[Nm]	30	60	105	266	
Partial fact	ors ²⁾							
	Property class 4.6 and 5.6	[-]	1,67					
zinc plated	Property class 4.8, 5.8 and 8.8	γMs,V γMs,V	[-]	1,25				
	Property class 50 (A2/A4/HCR)	YMs,V	[-]		2,3			
	Property class 70 (A2/A4/HCR)	γMs,V	[-]		1,56 (1			
	Property class 80 (A4/HCR)	į ma, v	[-]	1,33 (1,25)3)				

¹⁾ The characteristic resistances apply for all anchor rods with the cross-sectional area A_s specified here: VMU-A, V-A, VM-A. For commercial standard threaded rods with a smaller cross-sectional area (e.g. hot-dip galvanized threaded rods M8, M10 according to EN ISO 10684:2004 + AC:2009), the value in bracket is valid.

³⁾ Value in bracket only valid for anchor rod VMU-A or V-A

Injection System VMU plus for masonry	
Performances Characteristic steel resistance under tension and shear load for threaded rods	Annex C2

²⁾ In absence of national regulation



Table C3: Characteristic steel resistance under tension and shear load for internally threaded anchor rod

Internally threa	aded anchor rod	IG-M6	IG-M8	IG-M10				
Steel failure 1)								
Characteristic	resistance under tension load							
steel,	Property class 5.8	N _{Rk,s}	[kN]	10	17	29		
zinc plated	Property class 8.8	NRKs	[kN]	16	27	46		
stainless steel	Property class 70 (A4/HCR)	N _{RK,s}	[kN]	14	26	41		
Partial factors	2)							
steel,	Property class 5.8 y _{Ms,N} [-]				1,5			
zinc plated	Property class 8.8	γMs,N	[-]	1,5				
stainless steel	Property class 70 (A4/HCR)	γMs,N	[-]	1,87				
Characteristic	resistance under shear load							
Steel failure w	ithout lever arm					_		
steel,	Property class 5.8	$V^0_{Rk,s}$	[kN]	5	9	15		
zinc plated	Property class 8.8	V ⁰ Rk,s	[kN]	8	14	23		
stainless steel	Property class 70 (A4/HCR)	V ⁰ Rk,s	[kN]	7	13	20		
Steel failure <u>w</u>	ith lever arm – characteristic ben	ding momen	t					
steel,	Property class 5.8	M ⁰ Rks	[Nm]	8	19	37		
zinc plated	Property class 8.8	M ⁰ Rk,s	[Nm]	12	30	60		
stainless steel	Property class 70 (A4/HCR)	M ⁰ Rk,s	[Nm]	11	26	52		
Partial factors	2)							
steel,	Property class 5.8	γMs,V	[-]		1,25			
zinc plated	Property class 8.8	γMs,∨	[-]		1,25			
stainless steel	Property class 70 (A4/HCR)	γms,∨	[-]		1,56			

¹⁾ Fastening screws or threaded rods (incl. nut and washer) must comply with the appropriate material and property class of the internally threaded anchor rod. The characteristic tension resistance for steel failure of the given strength class are valid for the internally threaded anchor rod and the fastening element.

Injection System VMU plus for masonry	
Performances	Annex C3
Characteristic steel resistance under tension and shear load for internally threaded anchor rod	Part of Selection Cast Labor

²⁾ In absence of national regulation



Table C4: Characteristic steel resistance under fire exposure - Threaded rod

Threaded rod			M 8	M 10	M 12	M 16	
Characteristic resistance under ter	nsion load						
	R30	N _{Rk,s,fi}	[kN]	1,1	1,7	3,0	5,7
Steel, property class 5.8 and 8.8;	R60	N _{Rk,s,fi}	[kN]	0,9	1,4	2,3	4,2
Stainless steel (A2/ A4/ HCR) property class ≥ 50	R90	N _{Rk,s,fi}	[kN]	0,7	1,0	1,6	3,0
property dass 2 00	R120	N _{Rk,s,fi}	[kN]	0,5	0,8	1,2	2,2
Characteristic resistance under sh	ear load 1)				***		
Steel failure without lever arm							
	R30	V ⁰ Rk,s,fi	[kN]	1,1	1,7	3,0	5,7
Steel, property class 5.8 and 8.8;	R60	V ⁰ Rk,s,fi	[kN]	0,9	1,4	2,3	4,2
Stainless steel (A2/ A4/ HCR) property class ≥ 50	R90	V ⁰ Rk,s,fi	[kN]	0,7	1,0	1,6	3,0
property dass 2 00	R120	V ⁰ Rk,s,fi	[kN]	0,5	0,8	1,2	2,2
Steel failure with lever arm - chara	cteristic be	nding m	ment				
	R30	M ⁰ Rk,s,fi	[Nm]	1,1	2,2	4,7	12,0
Steel, property class 5.8 and 8.8;	R60	M ⁰ Rk,s,fi	[Nm]	0,9	1,8	3,5	9,0
Stainless steel (A2/ A4/ HCR) property class ≥ 50	R90	M ⁰ Rk,s,fi	[Nm]	0,7	1,3	2,5	6,3
property diase 2 ou	R120	M ⁰ Rk,s,fi	[Nm]	0,5	1,0	1,8	4,7
Partial factor	all	γMs,fi	[-]		1	,0	

Table C5: Characteristic steel resistance under fire exposure - Internally threaded anchor rod

Internally threaded anchor rod		IG-M6	IG-M8	IG-M10		
Characteristic resistance under ter	nsion load					
	R30	NRk,s,fi	[kN]	0,3	1,1	1,7
Steel, property class 5.8 and 8.8;	R60	NRk,s,fi	[kN]	0,2	0,9	1,4
Stainless steel (A4 / HCR) property class 70	R90	N _{Rk,s,fi}	[kN]	0,2	0,7	1,0
property dass 70	R120	N _{Rk,s,fi}	[kN]	0,1	0,5	0,8
Characteristic resistance under sh	ear load					
Steel failure without lever arm						
	R30	V ⁰ Rk,s,fi	[kN]	0,3	1,1	1,7
Steel, property class 5.8 and 8.8;	R60	V ⁰ Rk,s,fi	[kN]	0,2	0,9	1,4
Stainless steel (A4 / HCR) property class 70	R90	V ⁰ Rk,s,fi	[kN]	0,2	0,7	1,0
property diasa ro	R120	V ⁰ Rk,s,fi	[kN]	0,1	0,5	0,8
Steel failure with lever arm - chara	cteristic ber	nding mo	ment			
	R30	M ⁰ Rk,s,fi	[Nm]	0,2	1,1	2,2
Steel, property class 5.8 and 8.8;	R60	M ⁰ Rk,s,fi	[Nm]	0,2	0,9	1,8
Stainless steel (A4 / HCR) property class 70	R90	M ⁰ Rk,s,fi	[Nm]	0,1	0,7	1,3
property states to	R120	M ⁰ Rk,s,fi	[Nm]	0,1	0,5	1,0
Partial factor	all	γMs,fi	[-]		1,0	

Injection System VMU plus for masonry	
Performance	Annex C4
Characteristic steel resistance under fire exposure	



Edge distance and spacing

= Characteristic edge distance Ccr

= Minimum edge distance Cmin

Characteristic edge distance under Ccr.fi

fire exposure

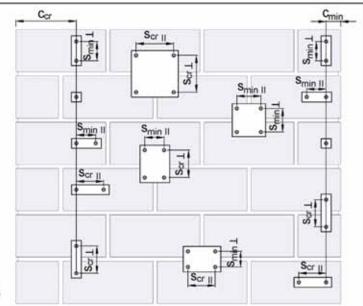
= Characteristic (minimum) spacing Scr II for anchor placed parallel to (Smin,II)

horizontal joint

 Characteristic (minimum) spacing Scr 1 for anchor placed perpendicular to (S_{min}⊥) horizontal joint

 Characteristic spacing for anchor Scr.fi.ll placed perpendicular to horizontal (Scr,fi⊥)

(perpendicular) joint



Definition of reduction- and group factors

Load direction Anchor position	Tension load	Shear load parallel to free edge V II	Shear load perpendicular to free edge V ⊥	
Anchors parallel to horizontal joint scr,ll (smin,ll)	α _g II,N	α _{g II,} ν _{II}	∨ ••• α _{g II} ,ν⊥	
Anchors vertical to horizontal joint $s_{cr,\perp}(s_{min,\perp})$	αg⊥N	ν α _g <u>L</u> , ν _{II}	ν • α ₉ ,ν ₁	

Reduction factor for tension loads at the free edge (single anchor) $(for c_{min} \le c < c_{cr})$ Cledge,N Reduction factor for shear loads perpendicular to the free edge (single anchor) (for $c_{min} \le c < c_{cr}$) Cledge,VI

= Reduction factor for shear loads parallel to the free edge (single anchor) Cledge,VII

(for $c_{min} \le c < c_{cr}$)

Group factor for anchors parallel to horizontal joint under tension load (Lg II, N

= Group factor for anchors perpendicular to horizontal joint under tension load αg⊥N

= Group factor for anchors parallel to horizontal joint under shear load parallel to the free edge ag II, VII

= Group factor for anchors perpendicular to horizontal joint under shear load parallel to the free edge αg⊥VII = Group factor for anchors parallel to horizontal joint under shear load perpendicular to the free edge αg II.V⊥

Single anchor	N _{Rk,b,c}	= $\alpha_{\text{edge,N}} * N_{\text{Rk,b}}$	resp.	N _{Rk,p,c}	= $\alpha_{\text{edge},N} * N_{Rk,p}$	
at the edge:	VRk,c II	= α _{edge,V II} * V _{Rk,b}				
at the eage.	V _{Rk,c} ⊥	= \alpha_edge, V \propto * VRk,b				
E 2660	N^{g}_{Rk}	= α _{g,N} * N _{Rk,b}				
Group of 2	V ^g Rk II	= α _{g, V II} * V _{Rk,b}	resp.	V ^g RkL	$= \alpha_{g,V_{\perp}} * V_{Rk,b}$	(for $c \ge c_{cr}$)
anchors:	V ^g Rk,c II	= αg. VII * VRK,b	resp.	V ^g Rk,c⊥	$= \alpha_{g,V_{\perp}} * V_{Rk,b}$	(for c ≥ c _{min})
E 2500	Ng _{Rk}	= $\alpha_{g \parallel, N} * \alpha_{g \perp, N} * N_{Rk,b}$	7.	1917125-11		29 1.2
Group of 4	V ^g RkII	$= \alpha_{g \parallel, V \parallel} * \alpha_{g \perp, V \parallel} * V_{Rk,b}$	resp.	V ^g Rk1	$= \alpha_{g \parallel, V_{\perp}} * \alpha_{g_{\perp}, V_{\perp}} * V_{Rk,b}$	(for $c \ge c_{cr}$)
anchors:	V ^g Rk,c II	$= \alpha_{g \parallel, V \parallel} * \alpha_{g \perp, V \parallel} * V_{Rk,b}$	resp.	Vg _{Rk,c⊥}	$= \alpha_{g \parallel, V_{\perp}} * \alpha_{g \perp, V_{\perp}} * V_{Rk,b}$	(for c ≥ c _{min})

Equations depend on anchor position and load direction (see table above). Reduction factor, group factor and resistances see Annex C. Reduction for installation in joints see Annex B1.

Injection System VMU plus for masonry

Performance

Definition of spacing and edge distance and reduction- and group factors a

Annex C5

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Brick type: Autoclaved aerated concrete AAC

Table C6: Description

Brick type	Autoclaved aerated concrete AAC		
Density	ρ	[kg/dm ³]	0,35 - 0,6
Normalised mean compressive strength	f _b ≥	[N/mm ²]	2, 4 or 6
Norm		[-]	EN 771-4:2011+A1:2015
Producer (country code)		[-]	e.g. Porit (DE)
Brick dimensions		[mm]	≥ 499 x 240 x 249
Drilling method		[-]	Rotary drilling



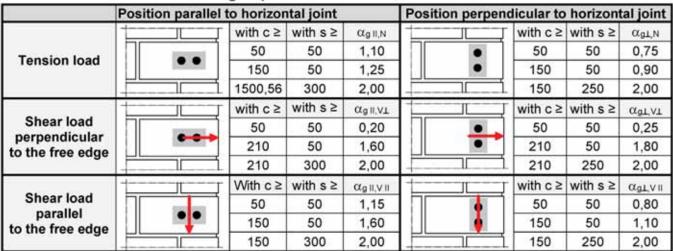
Table C7: Installation parameter

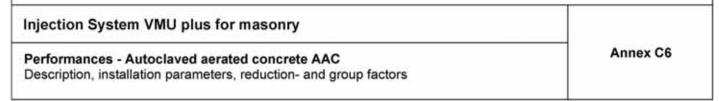
Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 10
Edge distance	Ccr	[mm]	150 (1	for shear I	oads perp	endicula	to the free	edge: ca	= 210)
Minimum edge distance	Cmin	[mm]			0: 0:	50		:00	
Cassina	Scr, II	[mm]				300			
Spacing	Scr. 1	[mm]				250			
Minimum appoins	S _{min,II} [mm]								
Minimum spacing	Smin_1	[mm]	50						

Table C8: Reduction factors for single anchors at the edge

	Toncio	n load		Shear load					
ts.	rensio	iii ioau		perpendicular	perpendicular to the free edge parallel to the free edg				lge
-		with c≥	Cledge,N		with c≥	αedge,V±		with c ≥	Ctedge,VII
	_		0,85	-	50	0,12		50	0,70
	~ .	50	0,85		125	0,50		125	0,85
4		150	1,00		210	1,00		150	1,00

Table C9: Factors for anchor groups







Brick type: Autoclaved aerated concrete AAC - continuation

Table C10: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	c _{cr} and s	≥ Scr
Anchor size	Perfora- Effective								
	ted Sleeve	anchorage depth		d/d		w/d w/w			d/d w/d w/w
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges
		hef			N _{Rk,b} =	N _{Rk,p} 1)			V _{Rk,b} 1)
	l I	[mm]			[k1	١]		-	[kN]
Normalised me	an compres	sive strengt	h f _b ≥ 2 N	l/mm²		Densi	ty ρ≥ 0,3	5 kg/dm	3
M8	-	80	1,2	0,9	0,9	0,9	0,9	0,9	1,5
M10 / IG-M6		90	1,2	0,9	0,9	0,9	0,9	0,9	2,5
M12 / M16 IG-M8 / IG-M10		100	2,0	1,5	1,5	1,5	1,5	1,5	2,5
M8	VM-SH 12	80	1,2	0,9	0,9	0,9	0,9	0,9	1,5
M8 / M10 IG-M6	VM-SH 16	≥ 85	1,2	0,9	0,9	0,9	0,9	0,9	2,5
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 85	2,0	1,5	1,5	1,5	1,5	1,5	2,5
Normalised me	an compres	sive strengt	h f _b ≥ 4 N	l/mm²		Densi	ty ρ≥ 0,5	0 kg/dm	3
M8	3	80	3,0	2,5	2,0	2,5	2,0	2,0	4,5
M10 / IG-M6	1.7.0	90	3,0	2,5	2,0	2,5	2,0	2,0	7,5
M12 / M16 IG-M8 / IG-M10	-	100	5,0	4,5	4,0	4,5	4,0	4,0	7,5
M8	VM-SH 12	80	3,0	2,5	2,0	2,5	2,0	2,0	4,5
M8 / M10 IG-M6	VM-SH 16	≥ 85	3,0	2,5	2,0	2,5	2,0	2,0	7,5
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 85	5,0	4,5	4,0	4,5	4,0	4,0	7,5

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Injection System VMU plus for masonry	
Performances - Autoclaved aerated concrete AAC Characteristic resistance	Annex C7



Brick type: Autoclaved aerated concrete AAC - continuation

Characteristic resistance - continuation:

				Charact	eristic re	sistance	with c≥	ccr and s	≥ S _{cr}		
Anchor size	Sleeve	Effective	Use condition								
		anchorage depth		d/d		w/d w/w			d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef		$N_{Rk,b} = N_{Rk,p}^{-1}$							
		[mm]		[kN]							
Normalised mea	n compress	sive strength	f _b ≥ 6 N	l/mm²		Densit	yρ≥0,60	kg/dm³			
M8	2.5	80	4,0	3,5	3,0	3,5	3,0	3,0	6,0		
M10 / IG-M6		90	4,0	3,5	3,0	3,5	3,0	3,0	10,0		
M12 / M16 IG-M8 / IG-M10	30	100	7,0	6,0	5,5	6,5	5,5	5,5	10,0		
M8	VM-SH 12	80	4,0	3,5	3,0	3,5	3,0	3,0	6,0		
M8 / M10 IG-M6	VM-SH 16	≥ 85	4,0	3,5	3,0	3,5	3,0	3,0	10,0		
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 85	7,0	6,0	5,5	6,5	5,5	5,5	10,0		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\) according to Annex C5

Table C11: Displacements

Anchor size	hef	δ _N / N	δινο	δn∞	δv/V	δνο	δν=
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – IG-M10	all	0,1	0,1*N _{Rk} / 2,8	2*δΝο	0,3	0,3*V _{Rk} /2,8	1,5*δνο
M16		0,,		2 0110	0,1	0,1*V _{Rk} /2,8	

Injection System VMU plus for masonry

Performances - Autoclaved aerated concrete AAC
Characteristic resistance and displacements

Annex C8



Brick type: Solid calcium silica brick KS-NF

Table C12: Description

Brick type		Solid calcium silica brick KS-N				
Density p	[kg/dm ³]	≥ 2,0				
Normalised mean compressive strength	[N/mm ²]	≥ 28				
Conversion factor for lower compressive strengths		$(f_b / 28)^{0.5} \le 1.0$				
Norm	[-]	EN 771-2: 2011+A1:2015				
Producer (country code)	[-]	e.g. Wemding (DE)				
Brick dimensions	[mm]	≥ 240 x 115 x 71				
Drilling method	[-]	Hammer drilling				

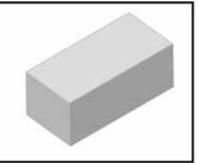


Table C13: Installation parameter

Anchor size	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	Tinst	[Nm]	≤ 10	≤ 10	≤ 15	≤ 15	≤ 10	≤ 10	≤ 10	
Edge distance (under fire exposure)	C _{cr.} (C _{cr.fi})	[mm]	150 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{or} = 240)				240)			
Minimum Edge Distance	Cmin	[mm]	60							
Spacing (under fire	Scr.II; (Scr.fi.II)	[mm]	240 (4 h _{ef})							
exposure)	Scr_it (Scr,fi.i.)	[mm]	150 (4 her)							
Minimum Spacing	Smin,II; Smin,⊥	[mm]	75							

Table C14: Reduction factors for single anchors at the edge

Tension load			perpendicular	to the free	Shear e edge	load parallel to the free edge		
4	with c≥	Cledge,N	+r	with c≥	Cledge,V.L.	1	with c≥	Cledge,VII
	60 ¹⁾	0,50		60	0,30		60	0,60
•	1001)	0,50		100	0,50		100	1,00
	150 ¹⁾	1,00		040	4.00	V	450	4.00
	180	1,00	1-1-1	240	1,00		150	1,00

¹⁾ All applications, except for hef = 200mm and without sleeve

Table C15: Factors for anchor groups

	Position parallel	to horizo	ntal joint		Position perpen	dicular to	horizonta	al joint
	- 2	with c ≥	with s≥	αg II,N		with c≥	with s ≥	αgLN
	u-mana and a second	60 ¹⁾	75	0,70	1	60 ¹⁾	75	1,15
Tension load		150¹)	75	1,40		1501)	75	2,00
		150 ¹⁾	240	2,00		1501)	150	2,00
	1000	1802)	75	1,00		1802)	75	1,15
		1802)	240	1,70		4002)	450	2.00
		2402)	240	2,00		1802)	150	2,00
Charatana		with c≥	with s≥	αg II,V⊥		with c≥	with s≥	αστντ
Shear load		60	75	0,75		60	75	0,90
perpendicular		150	75	2,00		150	75	2,00
to the free edge		150	250	2,00		150	150	2,00
Charterd		with c≥	with s≥	αg II,V II		with c≥	with s≥	αgLVII
Shear load	DESCRIPTION OF THE PERSON	60	75	2,00	•	60	75	2,00
parallel		150	75	2,00		150	75	2,00
to the free edge		150	250	2,00		150	150	2,00

¹⁾ All applications, except for hef = 200mm and without sleeve

²⁾ Only for application with het = 200mm and without sleeve

Annex C9



Brick type: Solid calcium silica brick KS-NF - continuation

Table C16: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	c _{cr} and s	≥ S _{cr}					
Anchor size	Sleeve	Effective			ι	Jse cond	ition		25					
		anchorage depth		d/d			w/d w/w		d/d w/d w/w					
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges					
	1	her			N _{Rk,b} =	N _{Rkp} 1)			V _{Rk,b} 1)					
	,	[mm]			[kN	N]			[kN]					
	No	rmalised mea	n compr	essive st	rength fb	≥ 28 N/m	nm² ²)							
M8	(2)	80	7,0	6,5	5,0	6,0	5,5	4,0						
M10 / IG-M6	**	≥ 90	7,0	6,5	5,0	6,0	5,5	4,0]					
M12 / IG-M8	(4.0	≥ 100	7,0	6,5	5,0	6,0	5,5	4,0						
M16 / IG-M10	*	≥ 100	7,0	6,5	5,0	7,0	6,5	5,0						
M10 - M16 IG-M6 - IG-M10	Ē	200	9,0	8,5	6,5	5,5	5,0	4,0	7,0					
M8	VM-SH 12	80	7,0	6,5	5,0	6,0	5,5	4,0]					
M8 / M10/ IG-M6	VM-SH 16	≥ 85	7,0	6,5	5,0	7,0	6,5	5,0						
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 85	7,0	6,5	5,0	7,0	6,5	5,0						

¹⁾ N_{Rk,b,c} = N_{Rk,p,c} and V_{Rk,c II} = V_{Rk,c ⊥} according to Annex C5

Table C17: Displacements

Ancheroles	hef	δ _N / N	δινο	δn∞	δv / V	δνο	δv∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – IG-M10	all	0,1	0,1*N _{Rk} / 3,5	2*δνο	0,3	0,3*V _{Rk} / 3,5	1,5*δνο
M16					0,1	0,1*V _{Rk} /3,5	

Table C18: Characteristic resistance under fire exposure

Anchor size	Anchor size	Sleeve	Effective anchorage depth			stic resistance N _{Rk,p,fi} = V _{Rk,b,fi}		
		her	R30	R60	R90	R120		
		[mm]			[kN]			
M8		80	0.40	0,41				
M10 / IG-M6	(*)	≥ 90			0,34	0.20		
M12 / IG-M8	141	≥ 100	0,48		0,34	0,30		
M16 / IG-M10	-	≥ 100						
M8	VM-SH 12	80						
M8 / M10 / IG-M6	VM-SH 16	≥ 85	0,47	0,26	No performance	No performance		
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 85	0,47	0,20	assessed	assessed		

Injection System VMU plus for masonry	
Performance Characteristic resistance, displacements, characteristic resistance under fire exposure	Annex C10

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C12. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow calcium silica brick KSL-3DF

Table C19: Description

Brick type	Hollow calcium silica brick KSL-3DF			
Density	ρ [kg/dm³]	≥ 1,4		
Normalised mean compressive strength	f _b [N/mm ²]	≥ 14		
Conversion factor for lower strengths	compressive	$(f_b / 14)^{0.75} \le 1.0$		
Norm	[-]	EN 771-2:2011+A1:2015		
Producer (country code)	[-]	e.g. KS-Wemding (DE)		
Brick dimensions	[mm]	≥ 240 x 175 x 113		
Drilling method	[-]	Rotary drilling		



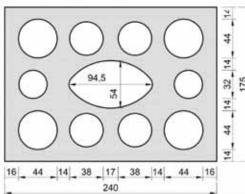
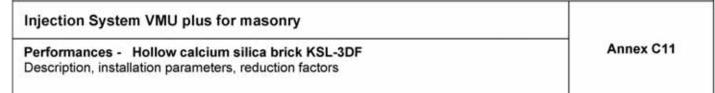


Table C20: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤5	≤ 5	≤8	≤8	≤ 5	≤8	≤ 8
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 240)						= 240)
Minimum edge distance	Cmin	[mm]	60						
2: 161	Scr. II	[mm]	240						
Spacing	Scr, ⊥	[mm]	120						
Minimum spacing	Smin, II; Smin, ±	[mm]	120						

Table C21: Reduction factors for single anchors at the edge

Tensi	on load		Shear load							
Tellan	on load		perpendicular	to the free	e edge	parallel to the free edge				
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c ≥	αedge,VII		
•	60	1,00		60	0,30		60	1,00		
	120	1,00		240	1,00		120	1,00		





Brick type: Hollow calcium silica brick KSL-3DF - continuation

Table C22: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizon	tal joint
		with c ≥	with s ≥	αg II, N		with c≥	with s ≥	$\alpha_{g\perp,N}$
Tanalan land		60	120	1,50	•	60	120	1,00
Tension load	landard .	120	120	2,00		60	120	1,00
		120	240	2,00		120	120	2,00
22222451		with c ≥	with s≥	α _g II,V⊥		with c≥	with s ≥	ασΙ.VΙ
Shear load	SECOND .	60	120	0,30		60	120	0,30
perpendicular to the free edge		120	120	1,00		60	120	0,30
to the nee eage		120	240	2,00		240	120	2,00
2		with c≥	with s≥	αgII,VII		with c≥	with s ≥	αgLVII
Shear load		60	120	1,00		60	100	1.00
parallel to the free edge		120	120	1,60		60	120	1,00
to the nee edge		120	240	2,00		120	120	2,00

Table C23: Characteristic resistance under tension and shear load

				Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}									
Anchor size	Sleeve	Effective anchorage depth		Use condition									
			d/d			w/d w/w			d/d w/d w/w				
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges				
		her			N _{Rk,b} =	N _{Rk,p} 1)			V _{Rk,b} 1)				
		[mm]		[kN]									
	1	Normalised me	ean comp	ressive s	trength f	≥ 14 N/n	nm² ²)						
M8 / M10	V44 011 40	≥ 85	2,5	2,5	1,5	2,5	2,5	1,5	I.				
IG-M6	VM-SH 16	130	2,5	2,5	2,0	2,5	2,5	2,0	1				
M12 / M16 IG-M8 IG-M10	VM-SH 20	≥ 85	6,5	6,0	4,5	6,5	6,0	4,5	6,0				

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c|l} = V_{Rk,c} \perp$ according to Annex C5

Table C24: Displacements

Anchor size	hef	δ _N / N	δινο	δn∞	δ _V / V	δνο	δν∞	
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 – M12 / IG-M6 – IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16		0,13	0,10 NRK7 0,0	2 000	0,31	0,31*V _{Rk} /3,5	1,0 000	

Injection System VMU plus for masonry	
Performance - Hollow calcium silica brick KSL-3DF	Annex C12
Group factors, characteristic resistances and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C19. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow calcium silica brick KSL-8DF

Table C25: Description

Brick type	Hollow calcium silica brick KSL-8DF	
Density ρ [kg/dm ³]	≥ 1,4	
Normalised mean compressive strength $f_b = [N/mm^2]$	≥ 12	100
Conversion factor for lower compressive strengths	$(f_b / 12)^{0.75} \le 1.0$	
Norm [-]	EN 771-2:2011+A1:2015	A AFTERDA OF THE PARTY
Producer (country code) [-]	e.g. KS-Wemding (DE)	
Brick dimensions [mm]	≥ 248 x 240 x 238	
Drilling method [-]	Rotary drilling	
	63 63 64 60 550 54 54 54 54 54 54	=

Table C26: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 5	≤ 5	≤ 8	≤ 8	≤ 5	≤ 8	≤ 8
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 250)						
Minimum edge distance	Cmin	[mm]	50						
Spacing -	Scr. II	[mm]	250						
	S _{cr, ⊥}	[mm]	120						
Minimum spacing	Smin, II	[mm]				50			

Table C27: Reduction factors for single anchors at the edge

Tensio	n load		perpendicular	to the free	Shear e edge	r load perpendicular to the free ed		
	with c≥	Cledge,N		with c≥	Cledge,VL		with c ≥	Cledge,VII
•	50	1,00		50	0,30		50	1,00
	120	1,00		250	1,00		120	1,00

Injection System VMU plus for masonry	
Performances - Hollow calcium silica brick KSL-8DF Description, installation parameters, reduction factors	Annex C13



Brick type: Hollow calcium silica brick KSL-8DF - continuation

Table C28: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpendicular to horizontal joi				
		with c ≥	with s ≥	αg II, N		with c≥	with s ≥	$\alpha_{g\perp,N}$	
Tension load	• •	50	50	1,00		50	50	1,00	
		120	250	2,00		120	120	2,00	
Shear load	1	with c≥	with s≥	α _g II,V⊥	t	with c≥	with s ≥	αστ.ντ	
		50	50	0,45		50	50	0,45	
perpendicular to the free edge		250	50	1,15		250	50	1,20	
to the nee eage		250	250	2,00	ļl	250	250	2,00	
Shear load	1	with c ≥	with s ≥	αgII,VII		with c≥	with s ≥	ασ1,۷ ΙΙ	
parallel		50	50	1,30		50	50	1,00	
to the free edge		120	250	2,00		120	250	2,00	

Table C29: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}									
Anchor size	Sleeve	Effective	Use condition									
		anchorage depth	d/d			w/d w/w			d/d w/d w/w			
				50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges			
		her			N _{Rk,b} =	N _{Rk,p} 1)			V _{Rk,b} 1)			
		[mm]			[kl	٧]			[kN]			
	N	ormalised m	ean com	oressive s	trength f	b ≥ 12 N/r	nm²²)					
M8 / M10 IG-M6	VM-SH 16	130	5,0	4,5	3,5	5,0	4,5	3,5	3,5			
M12 / M16 IG-M8 IG-M10	VM-SH 20	≥ 130	5,0	4,5	3,5	5,0	4,5	3,5	6,0			

 $^{^{1)}\,}N_{Rk,b,c}=N_{Rk,p,c}$ and $V_{Rk,c\,II}=V_{Rk,c\,\perp}$ according to Annex C5

Table C30: Displacements

Ancheroise	hef	δ _N / N	δινο	δN∞	δ _V / V	δνο	δv∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16	all	0,10	0,10 111127 0,0	2 0110	0,31	0,31*V _{Rk} /3,5	1,0 010

Injection System VMU plus for masonry	
Performances - Hollow calcium silica brick KSL-8DF	Annex C14
Group factors, characteristic resistances and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C25. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow calcium silica brick KSL-12DF

Table C31: Description

Brick type	Hollow calcium silica brick KSL-12DF	
Density	ρ [kg/dm³]	≥ 1,4
Normalised mean compressive strength	f _b [N/mm ²]	≥ 12
Conversion factor for lowe strengths	r compressive	$(f_b / 12)^{0.75} \le 1.0$
Norm	[-]	EN 771-2:2011+A1:2015
Producer (country code)	[-]	e.g. KS-Wemding (DE)
Brick dimensions	[mm]	≥ 498 x 175 x 238
Drilling method	[-]	Rotary drilling



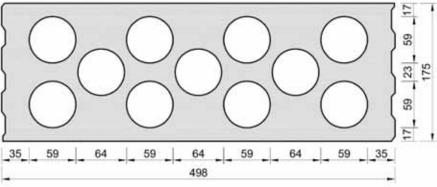


Table C32: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 4	≤ 4	≤ 5	≤ 5	≤ 4	≤ 5	≤ 5
Edge distance (under fire exposure)	Ccr. (Ccr.fi)	[mm]	m] 120 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{cr} = 500)					= 500)	
Minimum edge distance	Cmin	[mm]	50					3197	
Spacing (under fire	Scr,II; (Scr,fi,II)	[mm]	500 (4 h _{ef})						
exposure)	Scr, 1; (Scr, fi, 1)	[mm]	120 (4 h _{ef})						
Minimum spacing	Smin,II;	[mm]	50						

Table C33: Reduction factors for single anchors at the edge

Tension load			Shear load					
			perpendicular	to the free	edge	parallel to the free edge		
	with c≥	αedge,N		with c≥	αedge,V⊥		with c ≥	αedge,VII
•	50	1,00		50	0,45		50	1,00
	120	1,00		500	1,00	*	120	1,00

Injection System VMU plus for masonry	
Performance Hollow calcium silica brick KSL-12DF	Annex C15
Description, installation parameters, reduction factors	



Brick type: Hollow calcium silica brick KSL-12DF - continuation

Table C34: Factors for anchor groups

	Position parallel	to horizon	ntal joint		Position perpen	dicular to	horizon	tal joint
		with c ≥	with s ≥	αg II, N		with c≥	with s ≥	αg⊥,N
Tension load		50	50	1,50		50	50	1,00
		120	500	2,00		120	240	2,00
	t	with c≥	with s ≥	αg II,V⊥	+	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
Shear load		50	50	0,55		50	50	0,50
perpendicular to the free edge		500	50	1,00		500	50	1,00
to the free edge		500	500	2,00		500	250	2,00
Shear load		with c ≥	with s ≥	αg II,V II		with c≥	with s ≥	α _{g⊥,VII}
parallel		50	50	2,00	1 1	50	50	1,30
to the free edge	<u> </u>	120	500	2,00		120	250	2,00

Table C35: Characteristic resistance under tension and shear load

		eeve Effective anchorage depth		Charact	eristic re	sistance	with c≥c	and s ≥	Scr		
*	Classia			Use condition							
Anchor size	VM SH and			d/d		w/d w/w			d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef			V _{Rk,b} 1)						
		[mm]		[kN]							
	Nor	malised mea	an compi	ressive st	trength fb	≥ 12 N/m	m ^{2 2)}				
M8 / M10 IG-M6	VM-SH 16	130	3,5	3,5	2,5	3,5	3,5	2,5	3,5		
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 130	3,5	3,5	2,5	3,5	3,5	2,5	7,0		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\) according to Annex C5

Table C36: Displacements

Anchor size	h _{ef} [mm]	δ _N / N	δ _{N0} [mm]	δ _N ∞	δv / V [mm/kN]	δvo [mm]	δν= [mm]	
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δησ	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16		0,10	0,101111270,0	2 0/10	0,31	0,31*V _{Rk} /3,5	1,0 0,0	

Table C37: Characteristic resistance under fire exposure

W11901.F21	Sleeve	Effective anchorage depth	Characteristic resistance NRk,b,fi = NRk,p,fi = VRk,b,fi						
Anchor size		hef	R30	R60	R90	hef			
		[mm]	[kN]						
M8/M10/IG-M6	VM-SH 16	130				no			
M12/ IG-M8	VM-SH 20	≥ 130	0,37	0,27	0,17	performance assessed			
M16/IG-M10	VM-SH 20	≥ 130				0,12			

Annex C16
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²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C31. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Solid clay brick MZ-1DF

Table C38: Description

Brick type		Solid clay brick MZ-1DF		
Density	ρ [kg/dm³]	≥ 2,0		
Normalised mean compressive strength	f _b [N/mm ²]	≥ 20		
Conversion factor for lowe strengths	$(f_b / 20)^{0.5} \le 1.0$			
Norm	[-]	EN 771-1:2011+A1:2015		
Producer (country code)	[-]	e.g. Wienerberger (DE)		
Brick dimensions	[mm]	≥ 240 x 115 x 55		
Drilling method	[-]	Hammer drilling		

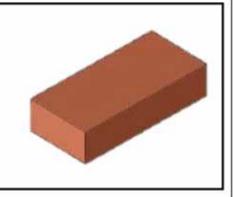


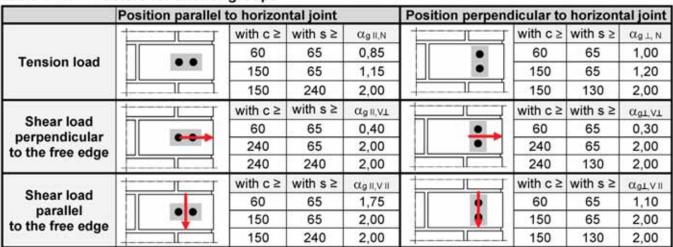
Table C39: Installation parameter

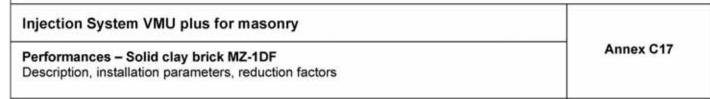
Anchor size	Anchor size			M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	Tinst	[Nm]	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	
Edge distance	Ccr	[mm]	150 (for shear loads perpendicular to the free edge: ccr = 240						r = 240)	
Minimum edge distance	Cmin	[mm]	60							
Casalas	Scr,II	[mm]	240							
Spacing	Scr,1	[mm]	130							
Minimum spacing	65									

Table C40: Reduction factors for single anchors at the edge

Tensio	Tension load			Shear load							
Tentok	on toda		perpendicular to the free edge			parallel to the free edge					
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	Ctedge,VII			
	60	0,75		60	0,10		60	0,30			
	150	1,00		100	0,50		100	0,65			
	180	1,00		240	1,00		150	1,00			

Table C41: Factors for anchor groups







Brick type: Solid clay brick MZ-1DF - continuation

Table C42: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	c _{cr} and s	≥ s _{cr}				
Anchor size	Sleeve	Effective	Use condition										
	00010000	anchorage depth		d/d			d/d w/d w/w						
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges				
		her			N _{Rk,b} =	NRKP 1)		(0.	V _{Rk,b} 1)				
				Ō	[kN]								
	No	ormalised me	an compr	essive st	rength fb	≥ 20 N/m	nm² ²)	P2 —					
M8		80	7,0	6,0	6,0	7,0	6,0	6,0	8,0				
M10 / IG-M6	•	≥ 90	7,0	6,0	6,0	7,0	6,0	6,0	8,0				
M12 / IG-M8	-	≥ 100	7,0	6,0	6,0	7,0	6,0	6,0	8,0				
M16 / IG-M10	541	≥ 100	8,0	6,5	6,5	8,0	6,5	6,5	12,0				
M8	VM-SH 12	80	7,0	6,0	6,0	7,0	6,0	6,0	8,0				
M8 / M10 IG-M6	VM-SH 16	≥ 85	7,0	6,0	6,0	7,0	6,0	6,0	8,0				
M12 IG-M8	VM-SH 20	≥ 85	7,0	6,0	6,0	7,0	6,0	6,0	8,0				
M16 IG-M10	VM-SH 20	≥ 85	8,0	6,5	6,5	8,0	6,5	6,5	12,0				

 $^{^{1)}\,}N_{Rk,b,c}=N_{Rk,p,c}$ and $V_{Rk,c\,II}=V_{Rk,c\,\perp}$ according to Annex C5

Table C43: Displacements

Anchor size	hef	δ _N / N	δινο	δ _{N=}	δv / V	δνο	δv≕	
Alichor Size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 - M12 / IG-M6 - IG-M10	all	0,1	0,1*N _{Rk} / 3,5	2*δηο	0,3	0,3*V _{Rk} /3,5	1,5*δνο	
M16		3.00	-1	2 0.10	0,1	0,1*V _{Rk} /3,5	1 .,0 010	

Injection System VMU plus for masonry

Performances - Solid clay brick MZ-1DF
Characteristic resistance and displacements

Annex C18

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C38. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Solid clay brick MZ-2DF

Table C44: Description

Brick type	: = 355=					
Density	ρ	[kg/dm ³]	≥ 2,0			
Normalised mean compressive strength	fb	[N/mm ²]	≥ 28			
Conversion factor for lowe strengths	$(f_b / 28)^{0.5} \le 1.0$					
Norm		[-]	EN 771-1:2011+A1:2015			
Producer (country code)		[-]	e.g. Wienerberger (DE)			
Brick dimensions		[mm]	≥ 240 x 115 x 113			
Drilling method		[-]	Hammer drilling			

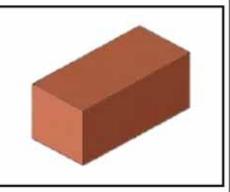


Table C45: Installation parameter

Anchor size					M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 10	≤10 ≤10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Edge distance (under fire exposure)	C _{cr;} (C _{cr,fi})	[mm]	150 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{cr} = 240						= 240)
Minimum edge distance	Cmin	[mm]				50			
Spacing (under fire	Scr,II (Scr,fi,II)	[mm]	240 (4 h _{ef})						
exposure)	Scr,⊥(Scr,fi,⊥)	[mm]	240 (4 hef)						
Minimum spacing	Smin,II; Smin, 1	[mm]	50						

Table C46: Reduction factors for single anchors at the edge

Tonsi	on load		Shear load								
rensi	on load		perpendicular	to the free	parallel to the free edge						
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c≥	Cledge,VII			
	50 ¹⁾	1,00		50	0,20		7.02377	i william			
	150 ¹⁾	1,00		125	0,50	1 1	50	1,00			
	150	1,00		240	1,00		150	1,00			

Table C47: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizon	tal joint
î .		with c ≥	with s ≥	αg II, N		with c≥	with s ≥	α _{g⊥} N
	-	50 ¹⁾	50	1,50	+	501)	50	0,80
Tanalan land		150 ¹⁾	240	2,00		150 ¹⁾	240	2,00
Tension load	• •	1802)	60	1,00		180 ²⁾	60	1,00
		1802)	240	1,55		1802)	120	2,00
		2402)	240	2,00		1802)	120	2,00
	+	with c≥	with s≥	αg II,V⊥	+	with c≥	with s ≥	ασΙ,νι
Shear load		50	50	0,40		50	50	0,20
perpendicular	0-0-	240	50	1,20		240	50	0,60
to the free edge		240	240	2,00		240	125	1,00
*	No. of Contract of	240	240	2,00		240	240	2,00
Charaland		with c ≥	with s ≥	αg II,V II		with c≥	with s ≥	αστ.νιι
Shear load		50	50	1,20	i i	50	50	1,00
parallel to the free edge	1545	150	240	2,00		50	125	1,00
to the nee eage		150	240	2,00		150	240	2,00

¹⁾ All applications, except for hef = 200mm and without sleeve (for Table C46 and C47)

Injection System VMU plus for masonry

Performances - Solid clay brick MZ-2DF

Description, installation parameters, reduction- and group factors

Annex C19

²⁾ Only for application with her = 200mm and without sleeve



Brick type: Solid clay brick MZ-2DF - continuation

Table C48: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	c _{cr} and s	≥ s _{cr}		
Anchereine	Clasus	Sleeve Effective anchorage depth	Use condition								
Anchor size	Sieeve			d/d			w/d w/w				
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef			N _{Rk,b} =	N _{Rkp} 1)			V _{Rk,b} 1)		
		[mm]			[kl	۷]			[kN]		
	No	rmalised mea	n compr	essive st	rength fo	≥ 28 N/m	nm² ²)				
M8	1 = 2	80	9,0	9,0	7,5	9,0	9,0	7,5	9,5		
M10 / IG-M6	3.23	≥ 90	9,0	9,0	7,5	9,0	9,0	7,5	9,5		
M12 / IG-M8		≥ 100	9,0	9,0	7,5	9,0	9,0	7,5	12,0		
M16 / IG-M10	1.95	≥ 100	9,0	9,0	7,5	9,0	9,0	7,5	12,0 ³⁾		
M10 / M12 IG-M6 / IG-M8		200	11,5	11,5	10,0	6,0	6,0	5,0	8,0		
M16 / IG-M10	_ =	200	11,5	11,5	10,0	6,0	6,0	5,0	12,0		
M8	VM-SH 12	80	9,0	9,0	7,5	9,0	9,0	7,5	9,5		
M8 / M10 IG-M6	VM-SH 16	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	9,5		
M12 / IG-M8	VM-SH 20	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	12,0		
M16 / IG-M10	VM-SH 20	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	12,0 3)		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C49: Displacements

Anchor size	h _{ef} [mm]	δ _N / N [mm/kN]	δ _{N0} [mm]	δ _{N∞} [mm]	δv / V [mm/kN]	δνο [mm]	δν- [mm]
M8 - M12 / IG-M6 - IG-M10			2*δνο	0,3	0,3*V _{Rk} /3,5	1,5*δνο	
M16					0,1	0,1*V _{Rk} /3,5	

Injection System VMU plus for masonry

Performance - Solid clay brick MZ-2DF
Characteristic resistance and displacements

Annex C20

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C44. For stones with higher strengths, the shown values are valid without conversion.

³⁾ Valid for all stone strengths with min. 10 N/mm²



Table C50: Characteristic resistance under fire exposure

Anchor size	Sleeve	Effective anchorage depth		Characteristic resistance N _{Rk,b,fi} = N _{Rk,p,fi} = V _{Rk,b,fi}					
711101101 0120		her	R30	R60	R90	R120			
		[mm]		[kN]				
M8	-	80							
M10 / IG-M6	48	≥ 90	0,51 0,44	0.44	0.26	0.22			
M12 / IG-M8		≥ 100		0,36	0,33				
M16 / IG-M10	5.47	≥ 100							
M8	VM-SH 12	80	0,36	0,26	0,15	0,10			
MO / MAO / IC MG	VAA CU 46	≥ 85	0,36	0,26	0,15	0,10			
M8 / M10 / IG-M6	VIVI-SH 16	130	0,92	0,74	0,57	0,49			
M12 / M16	VAA CU 20	≥ 85	0,36	0,26	0,15	0,10			
IG-M8 / IG-M10	VM-SH 20	≥ 130	0,92	0,74	0,57	0,49			

Performance - Solid clay brick MZ-2DF
Characteristic resistance under fire exposure

Annex C21



Brick type: Hollow clay brick HLZ-10 DF

Table C51: Description

Brick type		Hollow clay brick HLZ-10 DF	
Density	ρ [kg/dm³]	≥ 1,25	
Normalised mean compressive strength	f _b [N/mm ²]	≥ 20	
Conversion factor for lowe strengths	r compressive	$(f_b / 20)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Wienerberger (DE)	The state of the s
Brick dimensions	[mm]	300 x 240 x 249	
Drilling method	[-]	Rotary drilling	
	28 - 13	15/15/3 43	

Table C52: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 5	≤ 10	≤ 10	≤ 10	≤5	≤5	≤ 10
Edge distance (under fire exposure)	C _{cr.} (C _{cr.fi})	[mm]	120 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{cr} = 300)						= 300)
Minimum edge distance	Cmin	[mm]				50			***************************************
Characteristic	Scr,II (Scr,fi,II)	[mm]				300 (4 h	ef)		
spacing (under fire exposure)	$\mathbf{S}_{\text{cr},\perp}\;(\mathbf{S}_{\text{cr},\text{fi},\perp})$	[mm]	m] 250 (4 h _{ef})						
Minimum spacing	Smin,it; Smin,i	[mm]	50						

Table C53: Reduction factors for single anchors at the edge

lens	ion load		perpendicular	to the free	e edge	parallel to the free edge			
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c≥	Cledge,VII	
•	50	1,00		50	0,20		50	1,00	
	120	1,00		300	1,00		120	1,00	

Injection System VMU plus for masonry	
Performances – Hollow clay brick HLZ 10DF Description, installation parameters, reduction factors	Annex C22



Brick type: Hollow clay brick HLZ-10 DF – continuation Table C54: Factors for anchor groups

	Position parallel	Position perpendicular to horizontal jo						
		with c≥	with s ≥	CLg II,N		with c≥	with s ≥	αg1,N
Tension load		50	50	1,55		50	50	1,00
		120	300	2,00		120	250	2,00
Observiced.	1	with c≥	with s ≥	α _g II,V⊥	4	with c≥	with s ≥	ασινι
Shear load		50	50	0,30		50	50	0,20
perpendicular		300	50	1,40		300	50	1,00
to the free edge	1	300	300	2,00	4	300	250	2,00
Shear load		with c≥	with s≥	αg II,V II		with c≥	with s ≥	αgL,VII
parallel	[●]	50	50	1,85	1 1	50	50	1,00
to the free edge		120	300	2,00		120	250	2,00

Table C55: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	cr and s	≥ S _{cr}		
A	Classia	Effective anchorage depth		Use condition							
Anchor size	Sleeve		d/d			w/d w/w			d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef			N _{Rk,b} =	N _{Rkp} 1)			V _{Rk,b} 1)		
		[mm]			[k1	V]		0	[kN]		
	No	rmalised mea	n compr	essive st	rength fb	≥ 20 N/m	nm² ²)				
M8	VM-SH 12	80	2,5	2,5	2,0	2,5	2,5	2,0	8,0		
M8 / M10 /IG-M6	VM-SH 16	≥ 85	2,5	2,5	2,0	2,5	2,5	2,0	8,0		
M12 / IG-M8	VM-SH 20	≥ 85	5,0	5,0	4,5	5,0	5,0	4,5	8,0		
M16 / IG-M10	VM-SH 20	≥ 85	5,0	5,0	4,5	5,0	5,0	4,5	11,5		

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c|II} = V_{Rk,c\perp}$ according to Annex C5

Table C56: Displacements

Anchor size	her [mm]	δ _N / N [mm/kN]	δ _{N0} [mm]	δ _{N∞} [mm]	δv / V [mm/kN]	δv ₀ [mm]	δν∞ [mm]
M8 – M12 / IG-M6 – IG-M10 all 0,13 0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο			
M16		0,13 0,13 NRk / 3,5 2	2.0110	0,31	0,31*V _{Rk} /3,5	1,5 000	

Table C57: Characteristic resistance under fire exposure

Anchor size	Sleeve	Effective anchorage depth		Characteristic				
Aliciloi Size		her	R30	R60	R90 R120			
		[mm]		[kN	l]			
M8 / M10 / IG-M6	VM-SH 16	130						
M12 / M16 IG-M8 / IG-M10	VM-SH 20	≥ 130	0,57	0,39	0,21	0,12		

nnex C23
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²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C51. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Porotherm Homebric

Table C58: Description

Brick type		Hollow clay brick Porotherm Homebric	
Density	ρ [kg/dm³]	≥ 0,70	
Normalised mean compressive strength	f _b [N/mm ²]	≥ 10	
Conversion factor for lower co strengths	ompressive	$(f_b / 10)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Wienerberger (FR)	4
Brick dimensions	[mm]	500 x 200 x 299	The state of the s
Drilling method	[-]	Rotary drilling	
		54	31,4,5 200
7,9 25	4,5	494	10.5

Table C59: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	Tinst	[Nm]	≤2	≤ 2	≤ 2	≤2	≤ 2	≤ 2	≤ 2	
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)							
Minimum edge distance	Cmin	[mm]	120							
Sacrian	Scr,II	[mm]	500							
Spacing -	Scr,1	[mm]				300				
Minimum spacing	Smin,II Smin,⊥	[mm]	120							

Table C60: Reduction factors for single anchors at the edge

Tonci	Tension load			Shear load								
rensi	on load		perpendicular	to the free	ree edge parallel to the free edg			lge				
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c≥	Cledge,VII				
	420	4.00		120	0,30		120	1215				
	• 120 1,00	1,00		250	0,60		120	0,60				
	120	1,00		500	1,00		200	1,00				

Injection System VMU plus for masonry	
Performances – Hollow clay brick Porotherm Homebric Description, installation parameters, reduction factors	Annex C24



Brick type: Hollow clay brick Porotherm Homebric - continuation

Table C61: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizont	tal joint
		with c≥	with s ≥	αg II,N		with c≥	with s ≥	αg⊥,N
Tanalan land		120	100	1,00	•	120	100	1,00
Tension load		200	100	2,00	•	200	100	1,20
		120	500	2,00		120	with s ≥ 100 100 300 with s ≥ 100 100 300	2,00
200	†r	with c≥	with s≥	αg II,VI	†r	with c≥	with s ≥	αдт,νт
Shear load		120	100	0,30		120	100	0,30
perpendicular	0-0-	250	100	0,60		250	100	0,60
to the free edge		500 120	100 500	1,00		120	300	2,00
Chandand		with c≥	with s≥	α _g , ν		with c≥	with s ≥	ασμνιι
Shear load parallel		120	100	1,00	1	120	100	1,00
to the free edge		120	500	2,00		120	300	2,00

Table C62: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}							
Anchor size	Sleeve	Effective	ι	Use condition						
		anchorage depth	d/d				w/d w/w		d/d w/d w/w	
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges	
		hef			N _{Rk,b} = I	NRKp 1)			V _{Rk,b} 1)	
		[mm]			[kN	١]	[kN]			
	No	rmalised mea	an compr	essive st	rength fb	≥ 10 N/m	nm²²)			
M8	VM-SH 12	80			1,2	2			3,0	
M8 / M10/		≥ 85			3,0					
IG-M6	VM-SH 16	130			1,5	5			3,5	
M12 / M16/	V44 011 00	≥ 85			1,2	2			4,0	
IG-M8 / IG-M10	VM-SH 20	≥ 130		4,0						

 $^{^{1)}\,}N_{Rk,b,c}$ = $N_{Rk,p,c}$ and $V_{Rk,c\,II}$ = $V_{Rk,c\,\perp}$ according to Annex C5

Table C63: Displacements

Anchor size	hef	δn / N	δινο	δn⊶	δv/V	δνο	δν∞
Anchor Size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm] 0,55*V _{Rk} /3,5	[mm]
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16		0512.5			0,31	0,31*V _{Rk} /3,5	

Injection System VMU plus for masonry	
Performances – Hollow clay brick Porotherm Homebric Group factors, characteristic resistance and displacements	Annex C25

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C58. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick BGV Thermo

Table C64: Description

Table C65: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤2	≤2	≤ 2	
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)							
Minimum edge distance	Cmin	[mm]	120							
Si	Scr,II	[mm]	500							
Spacing -	Scr,1	[mm]				315		ee edge: c _{cr} =		
Minimum spacing	Smin,tl Smin,⊥	[mm]	120							

Table C66: Reduction factors for single anchors at the edge

Tonolo	n lood			load						
rensio	n load		perpendicular	to the free	e edge	perpendicular t	pendicular to the free edge			
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c ≥	Cledge,VII		
	120	1.00		120	0,30		120	0.60		
	120	1,00		250	0,60		120	0,60		
	120	1,00		500	1,00		250	1,00		

Annex C26	
,	



Brick type: Hollow clay brick BGV Thermo - continuation

Table C67: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizon	tal joint
		with c≥	with s ≥	αg II,N		with c≥	with s ≥	αg⊥,N
Tension load		120	100	1,00	•	120	100	1,00
rension load	• •	200	100	1,70		200	100	1,10
		120	500	2,00		120	315	2,00
Shear load		with c≥	with s≥	ας ΙΙ,۷1		with c≥	with s ≥	αστ.ντ
perpendicular	•••	120	100	1,00		120	100	1,00
to the free edge		120	500	2,00		120	315	2,00
Shear load		with c≥	with s≥	α _g II,V II		with c≥	with s ≥	α _g ,ν II
parallel	• •	120	100	1,00	1 1	120	100	1,00
to the free edge		120	500	2,00		120	315	2,00

Table C68: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	cor and s	≥ Scr		
Anchor size	Sleeve	leeve Effective anchorage depth	Use condition								
	73527.52			d/d		w/d w/w			d/d w/d w/w		
				24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges	
		hef	N _{Rk,b} = N			N _{Rk,p} 1)		V _{Rk,b} 1)			
		[mm]	[kN]						[kN]		
	No	rmalised mea	an compr	essive st	rength fb	≥ 10 N/m	nm² ²)				
M8	VM-SH 12	80	1074		0,9	9			3,5		
M8 / M10/	VAA CU 46	≥ 85			3,5						
IG-M6	VM-SH 16	130	2,0	2,0	1,5	2,0	2,0	1,5	4,0		
M12 / M16/	VAA 011 00	≥ 85			0,9	9			4,0		
IG-M8 / IG-M10	VM-SH 20	≥ 130	2,0	2,0	1,5	2,0	2,0	1,5	4,0		

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c|II} = V_{Rk,c\perp}$ according to Annex C5

Table C69: Displacements

Ancheroine	hef	δ _N / N	δινο	δn=	δv/V	δνο	δν∞	
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16	- an	0,10	0,10,111,21,010	2 0110	0,31 0,31*V _{Rk} /3			

Injection System VMU plus for masonry	
Performances - Hollow clay brick BGV Thermo	Annex C27
Group factors, characteristic resistance and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C64. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Calibric R+

Table C70: Description

Brick type		Hollow clay I Calibric R+	brick	
Density	[kg/dm ³]	≥ 0,60	5	
Normalised mean compressive strength	b [N/mm²]	≥ 12		
Conversion factor for lower co strengths	ompressive	$(f_b / 12)^{0.5} \le 1$	0	
Norm	[-]	EN 771-1:201	1+A1:2015	
Producer (country code)	[-]	e.g. Leroux (F	R)	
Brick dimensions	[mm]	500 x 200 x 3	the section 1 and	
Drilling method	[-]	Rotary drilling		
			86	200
				28
4	6	500		-1

Table C71: Installation parameter

Anchor size	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤2	≤ 2	≤2	≤2	≤ 2
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)						
Minimum edge distance	Cmin	[mm]	120						
Cassina	Scr, II	[mm]				500			
Spacing	Scr, ⊥	[mm]				315			
Minimum spacing	Smin, II Smin, ⊥	[mm]	120						

Table C72: Reduction factors for single anchors at the edge

Tonois	on load		Shear load							
rensio	on load		perpendicular	to the free	e edge	perpendicular t	ndicular to the free edge			
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c ≥	Ctedge,VII		
	400	1.00		120	0,15		100	0.20		
	120	1,00		250	0,30		120	0,30		
	120	1,00		500	1,00		250	1,00		

Injection System VMU plus for masonry	
Performances – Hollow clay brick Calibric R+ Description, installation parameters, reduction factors	Annex C28
Description, installation parameters, reduction factors	



Brick type: Hollow clay brick Calibric R+ - continuation

Table C73: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizont	al joint
		with c≥	with s ≥	αg II,N		with c≥	with s ≥	α _{gL,N}
Tanalan land		120	100	1,00	•	120	100	1,00
Tension load	• •	175	100	1,70		175	100	1,10
F		120	500	2,00		120	315	2,00
Shear load		with c≥	with s≥	αو ۱۱,۷⊥		with c≥	with s ≥	αд1,V1
perpendicular	•••	120	100	1,00		120	100	1,00
to the free edge		120	500	2,00		120	315	2,00
Shear load		with c≥	with s≥	α _g II,V II		with c≥	with s ≥	α _{g1,} vii
parallel	• •	120	100	1,00		120	100	1,00
to the free edge		120	500	2,00		120	315	2,00

Table C74: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c ≥ c	cor and s	≥ Scr		
Anchor size	Sleeve	Effective	Use condition								
		anchorage depth	d/d			w/d w/w			d/d w/d w/w		
				50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef			N _{Rk,b} = I	VRK,p 1)			V _{Rk,b} 1)		
		[mm]	[kN]						[kN]		
	No	rmalised mea	ın compr	essive st	rength fb	≥ 12 N/m	nm² ²)				
M8	VM-SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	4,0		
M8 / M10/	VAA CUIAC	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	5,5		
IG-M6 VM-SH16	VIVI-5H16	130	1,5	1,5	1,2	1,5	1,5	1,2	5,5		
M12 / M16	V/M CUIO0	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	8,5		
IG-M8 /IG-M10	VW-SH20	≥ 130	1,5	1,5	1,2	1,5	1,5	1,2	8,5		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C75: Displacements

Anchor size	Anchor size her [mm] [n		δ _{N0} [mm]	δ _{N∞}	δv / V [mm/kN]	δvo [mm]	δν [mm]	
M8 - M12 / IG-M6 - IG-M10	- M12 /		0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16		0,13	0,101111111111	2 0110	0,31	0,31*V _{Rk} /3,5	1,5 000	

Annex C29

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C70. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Urbanbric

Table C76: Description

Brick type	Hollow clay brick Urbanbric	
Density ρ [kg/dm ³]	≥ 0,70	
Normalised mean compressive strength f _b [N/mm ²]	≥ 12	
Conversion factor for lower compressive strengths	$(f_b / 12)^{0.5} \le 1.0$	
Norm [-]	EN 771-1:2011+A1:2015	
Producer (country code) [-]	e.g. Imerys (FR)	The state of the s
Brick dimensions [mm]	560 x 200 x 274	
Drilling method [-]	Rotary drilling	
	Ø40	20 6.5 200
9 40 6	560	\$0 \$1

Table C77: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)						= 500)
Minimum edge distance	Cmin	[mm]	120						
Casaina	Scr, II	[mm]				560			
Spacing	Scr, 1	[mm]	275						
Minimum spacing	Smin, II Smin, ⊥	[mm]	100						

Table C78: Reduction factors for single anchors at the edge

Tension load			perpendicular	Shear load perpendicular to the free edge perpendicular to the f					
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	Cledge,VII	
	400	4.00		120	0,25		400	0.50	
	120	1,00		250	0,50		120	0,50	
	120	1,00		500	1,00		250	1,00	

Annex C30



Brick type: Hollow clay brick Urbanbric - continuation

Table C79: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpendicular to horizontal joi					
		with c≥	with s ≥	αg II,N		with c≥	with s ≥	αg1,N		
Tanalan land		120	100	1,00	•	120	100	1,00		
Tension load	• •	185	100	1,90		185	100	1,10		
		120	560	2,00		120	275	2,00		
Charatand		with c≥	with s≥	ας ΙΙ,۷1		with c≥	with s≥	αστ.ντ		
Shear load perpendicular	•••	120	100	1,00	-	120	100	1,00		
to the free edge		120	560	2,00		120	275	2,00		
Shear load		with c≥	with s≥	α _g II,V II		with c≥	with s≥	αgL,VII		
parallel to the free edge		120	100	1,00	1 1	120	100	1,00		
		120	560	2,00		120	275	2,00		

Table C80: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	cor and s	≥ Scr		
Anchor size	Sleeve	eve Effective anchorage depth	Use condition								
	700000			d/d		w/d w/w			d/d w/d w/w		
				50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		h _{ef}			N _{Rk,b} = I	N _{Rk,p} 1)			V _{Rk,b} 1)		
		[mm]			[kN	1]			[kN]		
	No	malised mea	n compr	essive st	rength fb	≥ 12 N/m	nm² ²)				
M8	VM-SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	4,5		
M8 / M10/	VAA CUL 4C	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	4,5		
IG-M6	M6 VM-SH 16	130	3,0	3,0	2,5	3,0	3,0	2,5	4,5		
M12 / M16		≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	5,0		
IG-M8 / IG-M10	1////->H //1	≥ 130	3,0	3,0	2,5	3,0	3,0	2,5	5,0		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C81: Displacements

Anchoroizo	her	δ _N / N	δινο	δn⇒	δv/V	δνο	δν⇔	
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 - M12 / IG-M6 - IG-M10	18 – M12 /		0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16	7	57445	-1	_ 5110	0,31	0,31*V _{Rk} /3,5	1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

Injection System VMU plus for masonry	
Performances – Hollow clay brick Urbanbric Group factors, characteristic resistance and displacements	Annex C31
Group ractors, characteristic resistance and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C76. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow Clay brick Brique Creuse C40

Table C82: Description

Brick type		Hollow clay brick Brique Creuse C40	
Density	ρ [kg/dm ³]	≥ 0,70	A Committee of the Comm
Normalised mean compressive strength	f _b [N/mm ²]	≥ 12	
Conversion factor for lower strengths	compressive	$(f_b / 12)^{0.5} \le 1.0$	PPD
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Terreal (FR)	
Brick dimensions	[mm]	500 x 200 x 200	
Drilling method	[-]	Rotary drilling	
		8 56 7	
		_40_8	

Table C83: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤2	≤ 2	≤2	≤ 2	≤2	≤ 2
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)						= 500)
Minimum edge distance	Cmin	[mm]	120						
Si	Scr, II	[mm]				500			
Spacing	Scr, 1	[mm]	200						
Minimum spacing	Smin, II Smin, 1	[mm]	200						

Table C84: Reduction factors for single anchors at the edge

Tensio	on load		perpendicular	to the free	Shear edge	load perpendicular t	o the free	e edge
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	
•	120	1,00		120	0,83		120	1,00
	120	1,00		500	1,00	—	250	1,00

Annex C32



Brick type: Hollow Clay brick Brique Creuse C40 - continuation

Table C85: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpen	dicular to	tal joint	
		with c ≥	with s ≥	αg II,N		with c≥	with s ≥	α _{g⊥,N}
Tension load		120	500	2,00		120	200	2,00
Shear load		with c≥	with s ≥	α _g II,V⊥		with c≥	with s ≥	ασι,νι
perpendicular to the free edge		120	500	2,00	-	120	200	2,00
Shear load		with c≥	with s≥	αg II,V II		with c≥	with s ≥	α ₉ ,ν ιι
parallel to the free edge		120	500	2,00		120	200	2,00

Table C86: Characteristic resistance under tension and shear load

			Characteristic resistance with $c \ge c_{cr}$ and $s \ge s_{cr}$								
Anchor size	Sleeve	Effective			ι	Jse cond	ition				
	70000000	anchorage depth		d/d		w/d w/w			d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		h _{ef}			N _{Rk,b} = 1	N _{RKP} 1)			V _{Rk} ,b 1)		
		[mm]			[kN	4]	[kN]				
	No	malised mea	ın compr	essive st	rength fb	≥ 12 N/n	nm² ²)		-		
M8	VM-SH 12	80									
M8 / M10/ IG-M6	VM-SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	1,5		
M12 / M16 / IG-M8 / IG-M10	VM-SH 20	≥ 85			<i>y</i>		illa.		73		

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c|II} = V_{Rk,c\perp}$ according to Annex C5

Table C87: Displacements

Anchoroire	hef	δ _N / N	δινο	δn∞	δv/V	δνο	δν∞	
Anchor size	[mm] [mm/kN		[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δνο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16	7	0,10	0,10 11Ak / 0,0	2 0110	0,31	0,31*V _{Rk} /3,5	1,5 000	

Annex C33

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C82. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Blocchi Leggeri

Table C88: Description

Brick type	Hollow clay brick Blocchi Leggeri	
Density ρ [kg/dm ³]	≥ 0,60	
Normalised mean compressive strength f _b [N/mm ²]	≥ 12	
Conversion factor for lower compressive strengths	$(f_b / 12)^{0.5} \le 1.0$	
Norm [-]	EN 771-1:2011+A1:2015	
Producer (country code) [-]	e.g. Wienerberger (IT)	
Brick dimensions [mm]	250 x 120 x 250	
Drilling method [-]	Rotary drilling	
		120
43 6	250	

Table C89: Installation parameter

Anchor size	Anchor size			M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: ccr = 250)						= 250)
Minimum edge distance	Cmin	[mm]	60						
1000 - 10	Scr, II	[mm]				250			
Spacing	Scr, 1	[mm]				250			
Minimum spacing	S _{min, II} S _{min, ⊥}	[mm]	100						

Table C90: Reduction factors for single anchors at the edge

Tensio	n load		perpendicular	to the free	Shear	load perpendicular t	o the free	e edge
	with c≥	Œedge,N	Perpendicular	with c ≥	αedge,V⊥		with c ≥	
•	60	1,00		60	0,40		60	0,40
	120	1,00		250	1,00		120	1,00

Annex C34



Brick type: Hollow clay brick Blocchi Leggeri - continuation

Table C91: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizonta	al joint
		with c≥	with s ≥	αg II,N		with c≥	with s ≥	αgL,N
Tension load	• •	60	100	1,00		60	100	2,00
		120	250	2,00		120	250	2,00
220000000000000000000000000000000000000		with c≥	with s≥	α _g II,V⊥		with c≥	with s ≥	αστίντ
Shear load		60	100	0,40		60	100	0,40
perpendicular to the free edge		250	100	1,00		250	100	1,00
to the nee eage		250	250	2,00		250	250	2,00
20 1 1		with c ≥	with s ≥	αg II,V II		with c≥	with s ≥	αστ,νιι
Shear load		60	100	0,40	•	60	100	0,40
parallel to the free edge		120	100	1,00		120	100	1,00
to the nee eage		120	250	2,00		120	250	2,00

Table C92: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance with c ≥ c _{cr} and s ≥ s _{cr}					
Anchor size	Sleeve	Effective	Use condition								
		anchorage depth		d/d			w/d w/w		d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		h _{ef}		V _{Rk,b} 1)							
		[mm]		[kN]							
	No	malised mea	n compr	essive st	rength fb	≥ 12 N/m	nm² ²)				
M8	VM-SH 12	80									
M8 / M10/ IG-M6	VM-SH 16	≥ 85	0,6	0,6	0,6	0,6	0,6	0,6	3,5		
M12 / M16 / IG-M8 / IG-M10	VM-SH 20	≥ 85									

¹⁾ N_{Rk,b,c} = N_{Rk,p,c} and V_{Rk,c II} = V_{Rk,c ⊥} according to Annex C5

Table C93: Displacements

Ancheroire	hef	δ _N / N	δινο	δn∞	δ _V / V	δνο	δv∝
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	all	all 0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16	1	,	21.42.3.116.7.212.	_ 0.10	0,31	0,31*V _{Rk} /3,5	

Injection System VMU plus for masonry	
Performances – Hollow clay brick Blocchi Leggeri	Annex C35
Group factors, characteristic resistance and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C88. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow Clay brick Doppio Uni

Table C94: Description

Brick type		Hollow clay brick Doppio Uni	
Density	ρ [kg/dm³]	≥ 0,90	0000
Normalised mean compressive strength	f _b [N/mm ²]	≥ 28	A 39
Conversion factor for lower of strengths	compressive	$(f_b / 28)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Wienerberger (IT)	The state of the s
Brick dimensions	[mm]	250 x 120 x 120	
Drilling method	[-]	Rotary drilling	
			31-120
	11 26 9	250	=

Table C95: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤2	≤ 2
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: ccr = 250)						= 250)
Minimum edge distance	Cmin	[mm]	100						
Scr. II			250						
Spacing	Scr, 1	[mm]	120						
Minimum spacing	Smin, II	[mm]	100						

Table C96: Reduction factors for single anchors at the edge

Tensio	n load		perpendicular	Shear load perpendicular to the free edge perpendicular					
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c≥	αedge,V II	
•	100	1,00		100	0,50		100	1,00	
	120	1,00		250	1,00	*	120	1,00	

Annex C36



Brick type: Hollow Clay brick Doppio Uni - continuation

Table C97: Factors for anchor groups

	Position parallel	Position perpend	licular to	horizonta	al joint			
		with c≥	with s ≥	α _{g II,N}		with c≥	with s ≥	αgL,N
Tension load	• •	100	100	1,00		100	120	2,00
		120	250	2,00		120	120	2,00
Shear load		with c≥	with s≥	αg II,VI		with c≥	with s ≥	αστίντ
perpendicular	0-0-	100	100	1,00	-	100	100	1,00
to the free edge		250	250	2,00		250	120	2,00
Shear load		with c≥	with s≥	α _g II,V II		with c≥	with s≥	αд⊥,∨∥
parallel		100	100	1,00		100	100	1,00
to the free edge		120	250	2,00		120	120	2,00

Table C98: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c ≥ c	cr and s	≥ S _{cr}		
Anchor size	Sleeve	Effective		Use condition							
	anchorage depth	d/d			w/d w/w			d/d w/d w/w			
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef	N _{Rk,b} =			N _{RKp} 1)	V _{Rk,b} 1)				
		[mm]	[kN]						[kN]		
	Nor	malised mea	an compr	essive st	rength f _b	≥ 28 N/m	nm² ²)				
M8	VM-SH 12	80			- ev-c						
M8 / M10/ IG-M6	VM-SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	2,5		
M12 / M16 / IG-M8 / IG-M10	VM-SH 20	≥ 85		***							

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c|l|} = V_{Rk,c\perp}$ according to Annex C5

Table C99: Displacements

Anoboxolas	hef	δ _N / N	δινο	δn=	δv / V	δνο	δv≕
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δησ	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16			34,54,53,544		0,31	0,31*V _{Rk} /3,5	1,0 000

Annex C37

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C94. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Coriso WS07 with insulation

Table C100: Description

Brick type		Hollow clay brick Coriso WS07	
Insulation material		Rock wool	
Density p	[kg/dm ³]	≥ 0,55	All Marie Land
Normalised mean compressive strength	[N/mm ²]	≥ 6	
Conversion factor for lower compostrengths	ressive	$(f_b / 6)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Unipor (DE)	
Brick dimensions	[mm]	248 x 365 x 249	
Drilling method	[-]	Rotary drilling	
14		887 365	

Table C101: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 5	≤5	≤ 10	≤ 10	≤5	≤5	≤5
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 250)						
Minimum edge distance	Cmin	[mm]	50						
Cassina	Scr, II	[mm]	250						
Spacing	Scr, ⊥	[mm]	250						
Minimum spacing	Smin, II	[mm]	50						

Table C102: Reduction factors for single anchors at the edge

Tonei	on load		Shear load								
Tellar	Oli loau		perpendicular	to the free	perpendicular to the free edge						
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	αedge,V II			
•	50	1,00		50	0,30		50	1,00			
	120	1,00		250	1,00	—	120	1,00			

Annex C38



Brick type: Hollow clay brick Coriso WS07 with insulation - continuation

Table C103: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	dicular to	horizonta	al joint
		with c ≥	with s ≥	α _g II,N		with c≥	with s ≥	αgLN
Tension load	• •	50	50	1,50		50	50	1,00
		120	250	2,00		120	250	2,00
5500 E0 E0		with c≥	with s ≥	α _g II,V⊥		with c≥	with s ≥	αστίντ
Shear load		50	50	0,40	•	50	50	0,40
perpendicular to the free edge		250	50	1,00		250	50	1,20
to the nee eage		250	250	2,00		250	250	2,00
Shear load		with c≥	with s≥	α _g II,V II		with c≥	with s≥	ασ⊥,ν ΙΙ
parallel		50	50	1,65	1	50	50	1,00
to the free edge	*	120	250	2,00		120	250	2,00

Table C104: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}								
Anchor size	Sleeve	Effective	Use condition								
	VM-SH	anchorage depth		d/d			w/d w/w		d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 50°C / 72°C / 40°C 80°C 120°C			all temperature ranges		
		her			N _{Rk,b} = I	N _{Rkp} 1)	V _{Rk,b} 1)				
		[mm]	[kN]						[kN]		
	No	rmalised me	an comp	ressive s	trength f	≥ 6 N/m	m² ²)				
M8	VM-SH 12	80			- 10				-		
M8 / M10/ IG-M6	VM-SH 16	≥ 85	1,5	1,5	1,5	1,5	1,5	1,5 1,5	5,0		
M12 / M16 / IG-M8 / IG-M10	VM-SH 20	≥ 85		*	20	1000 A			5.51		

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c | II} = V_{Rk,c \perp}$ according to Annex C5

Table C105: Displacements

Ancheroine	hef	δ _N / N	δινο	δn∽	δv / V	δνο	δv=	
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*VRk/3,5	1,5*δνο	
M16		10596475		. = 310	0,31	0,31*V _{Rk} /3,5	1,0 010	

Annex C39

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C100. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick T7 MW with insulation

Table C106: Description

Brick type		Hollow clay brick	
Insulation material		Rock wool	No. of the last of
Density p	[kg/dm ³]	≥ 0,59	line
Normalised mean f _b	[N/mm ²]	≥ 8	
Conversion factor for lower comp strengths	oressive	$(f_b / 8)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Wienerberger (DE)	THE RESERVE TO SERVE THE PARTY OF THE PARTY
Brick dimensions	[mm]	248 x 365 x 249	
Drilling method	[-]	Rotary drilling	
		117	248
	15 37	- 13	1-1

Table C107: Installation parameter

Anchor size	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	Tinst	[Nm]	≤ 5	≤5	≤ 10	≤ 10	≤5	≤5	≤ 5
Edge distance (under fire exposure)	C _{cr,} (C _{cr,fi})	[mm] 120 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{cr} = 2				250)			
Minimum edge distan	[mm]	50							
Spacing (under fire	Scr. II (Scr.fi, II)	[mm]	250 (4 hef)						
exposure)	Scr, ⊥ (Scr,fi, ⊥)	[mm]	250 (4 h _{ef})						
Minimum spacing	Smin, II; Smin, 1	[mm] 50							

365

Table C108: Reduction factors for single anchors at the edge

Tensio	on load		perpendicular	to the free	Shear e edge	load perpendicular t	o the free	e edge
	with c≥	Ctedge,N		with c≥	αedge,V⊥		with c≥	αedge,VII
•	50	1,00		50	0,35		50	1,00
	120	1,00		250	1,00		120	1,00

Annex C40



Brick type: Hollow clay brick T7 MW with insulation - continuation

Table C109: Factors for anchor groups

	Position parallel t	Position perpendicular to horizontal join			
		with c≥	with s ≥	α _{g II,N}	with c≥ with s≥ α _{g⊥,N}
Tension load	• •	50	50	1,40	50 50 1,15
		120	250	2,00	120 250 2,00
222 27 28	†r	with c≥	with s ≥	αg II,V⊥	+ with c≥ with s≥ αg1,V1
Shear load		50	50	0,60	50 50 0,40
perpendicular to the free edge	●●●	250	50	1,55	250 50 1,00
to the nee eage		250	250	2,00	250 250 2,00
Shear load		with c≥	with s≥	α _g II,V II	with c ≥ with s ≥ α _{g⊥,∨ II}
parallel		50	50	2,00	50 50 1,20
to the free edge		120	250	2,00	120 250 2,00

Table C110: Characteristic resistance under tension and shear load

Anchor size			Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}									
	Sleeve	Effective			ι	Jse cond	ition					
		anchorage depth		d/d			w/d w/w		d/d w/d w/w			
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges			
		her		$N_{Rk,b} = N_{Rk,p}^{-1}$								
		[mm]		[kN]								
	No	rmalised me	an comp	ressive s	trength f	≥ 8 N/m	m² ²)					
M8	VM-SH 12	80			- 10	-			-			
M8 / M10/ IG-M6	VM-SH 16	≥ 85	0.0	0.0	1,5	2,0		4.5	3,0			
M12 / IG-M8	VM-SH 20	≥ 85	2,0	2,0	1,5	2,0	2,0	1,5				
M16 / IG-M10	VM-SH 20	≥ 85							4,5			

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C111: Displacements

Ancheroire	her	δ _N / N	δινο	δn=	δv/V	δνο	δν∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δ _{N0} 0,55	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16		,		2 010	0,31	0,31*V _{Rk} /3,5	1,000

Injection System VMU plus for masonry	
Performance	Annex C41
Performances - Hollow clay brick T7 MW	
Group factors, characteristic resistances and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C106. For stones with higher strengths, the shown values are valid without conversion.



Table C112: Characteristic resistance under fire exposure

Anchor size	Sleeve	Effective anchorage depth		Characteristic				
Allelioi size	Siecve	hef	R30	R60	R90	R120		
		[mm]		[kN	N]			
M8 / M10 /IG-M6	VM-SH 16	130						
M12 / M16 / IG-M8 IG-M10	VM-SH 20	≥ 130	0,64	0,37	0,11	no performance assessed		

Injection System VMU plus for masonry

Performances – Hollow clay brick T7 MW with insulation
Characteristic resistance under fire exposure

Annex C42



Brick type: Hollow clay brick T8 P with insulation

Table C113: Description

Brick type		Hollow clay brick T8 P	
Insulation material		Perlite	THE PERSON
Density	ρ [kg/dm³]	≥ 0,56	
Normalised mean compressive strength	f _b [N/mm ²]	≥ 6	
Conversion factor for lower co strengths	mpressive	$(f_b / 6)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Wienerberger (DE)	THE RESERVE AND ADDRESS OF THE PARTY OF THE
Brick dimensions	[mm]	248 x 365 x 249	The same of the sa
Drilling method	[-]	Rotary drilling	
		113 8 113 6	

Table C114: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 4	≤4	≤ 10	≤ 10	≤4	≤4	≤4
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 250)				= 250)		
Minimum edge distance	Cmin	[mm]	50						
Canadan	Scr, II	[mm]	250						
Spacing	Scr, ⊥	[mm]				250			
Minimum spacing	Smin, II Smin, ⊥	[mm]				50			

Table C115: Reduction factors for single anchors at the edge

Tensio	n load	d Shear I perpendicular to the free edge			load perpendicular t	o the free	e edge	
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c≥	Ctedge,VII
•	50	1,00		50	0,25		50	1,00
	120	1,00		250	1,00		120	1,00

Annex C43



Brick type: Hollow clay brick T8 P- continuation

Table C116: Factors for anchor groups

	Position parallel	Position perpend	dicular to	horizont	al joint			
		with c ≥	with s≥	α _g II,N		with c≥	with s ≥	αgLN
Tension load	• •	50	50	1,30		50	50	1,10
		120	250	2,00		120	250	2,00
		with c≥	with s ≥	αg II,V⊥		with c≥	with s ≥	αστ.ντ
Shear load	1	50	50	0,40		50	50	0,30
perpendicular to the free edge	The state of the s	250	50	1,35		250	50	1,20
to the nee eage		250	250	2,00		250	250	2,00
Shear load		with c≥	with s≥	αgII,VII		with c≥	with s ≥	ασ1,۷11
parallel		50	50	1,70	1	50	50	1,00
to the free edge		120	250	2,00		120	250	2,00

Table C117: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c≥	c _{cr} and s	≥ S _{cr}			
Anchor size Sleeve	Sleeve	Effective	Use condition									
	CONTRACTO	anchorage depth	d/d			w/d w/w			d/d w/d w/w			
		24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges				
		hef			N _{Rk,b} = 1	VRKp 1)			V _{Rk,b} 1)			
		[mm]	[kN]						[kN]			
	No	ormalised me	an comp	ressive s	trength f	b ≥ 6 N/m	m ^{2 2)}					
M8	VM-SH 12	80	Į "									
M8 / M10/ IG-M6	VM-SH 16	≥ 85	1,5	1,5	1,5	1,5	1,5	1,5	4,5			
M12 / IG-M8	VM-SH 20	≥ 85										
M16 / IG-M10	VM-SH 20	≥ 85	2,5	2,5	2,0	2,5	2,5	2,0	7,0			

Table C118: Displacements

Anchor size	hef	δ _N / N	δινο	δn=	δv/V	δνο	δν∞
Alichor Size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16			91.5	2 0110	0,31	0,31*V _{Rk} /3,5	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

Annex C44

¹⁾ $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c|l} = V_{Rk,c\perp}$ according to Annex C5
²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C113. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Thermoplan MZ90-G with insulation

Table C119: Installation parameter

Brick type		Hollow clay brick Thermoplan MZ90-G	
Insulation material		Rock wool	
Density p	[kg/dm ³]	≥ 0,68	The state of the s
Normalised mean compressive strength	[N/mm²]	≥ 12	I May a
Conversion factor for lower constrengths	mpressive	$(f_b / 12)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Mein Ziegelhaus (DE)	
Brick dimensions	[mm]	248 x 365 x 249	
Drilling method	[-]	Rotary drilling	
		138 170	13 13 13
	13	13 17 365	5

Table C120: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 4	≤4	≤ 10	≤ 10	≤4	≤4	≤4
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 250)						
Minimum edge distance	Cmin	[mm]	50						
Canalan	Scr. II	[mm]	250						
Spacing	Scr, 1	[mm]	250						
Minimum spacing	Smin, II	[mm]				50			

Table C121: Reduction factors for single anchors at the edge

Tensio	n load		perpendicular	to the free	load perpendicular t	ndicular to the free edge		
	with c≥	Cledge,N		with c≥	Cledge,V⊥		with c≥	Cledge,VII
•	50	1,00		50	0,25		50	1,00
	120	1,00		250	1,00		120	1,00

Injection System VMU plus for masonry	
Performances – Hollow clay brick Thermoplan MZ90-G Description, installation parameters, reduction factors	Annex C45



Brick type: Lochziegel Thermoplan MZ90-G - continuation

Table C122: Factors for anchor groups

	Position parallel t	to horizor	ntal joint		Position perpend	licular to	horizon	tal joint
		with c≥	with s ≥	α _g II,N		with c≥	with s ≥	αgLN
Tension load	• •	50	50	1,00		50	50	1,00
		120	250	2,00		120	250	2,00
		with c≥	with s≥	αg II,V⊥		with c≥	with s ≥	αστίντ
Shear load	1000000	50	50	0,75		50	50	0,50
perpendicular to the free edge		250	50	2,00		250	50	1,70
to the nee eage		250	250	2,00		250	250	2,00
Shear load		with c≥	with s ≥	αgII,VII		with c≥	with s ≥	αgL,VII
parallel to the free edge		50	50	1,65		50	50	1,15
		120	250	2,00		120	250	2,00

Table C123: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}									
Anchor size	Sleeve	eve Effective		Use condition								
	5,00,0	anchorage depth	d/d			w/d w/w			d/d w/d w/w			
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges			
		h _{ef}		,	N _{Rk,b} =	N _{Rk,p} 1)		111	V _{Rk,b} 1)			
		[mm]	[kN]						[kN]			
	No	rmalised mea	n compr	essive st	rength fb	≥ 12 N/n	nm² ²)					
M8	VM-SH 12	80										
M8 / M10/ IG-M6	VM-SH 16	≥ 85	3,0	3,0	2,5	3,0	3,0	2,5	4,0			
M12 / IG-M8	VM-SH 20	≥ 85			34374							
M16 / IG-M10	VM-SH 20	≥ 85	3,5	3,5	3,0	3,5	3,5	3,0	7,5			

Table C124: Displacements

Anchor size	hef	δ _N / N	δινο	δn=	δv/V	δνο	δν∞	
Alichor Size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 – M12 / IG-M6 – IG-M10 a		0,13	0,13*N _{Rk} / 3,5	2*δνο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16		2.	8		0,31	0,31*V _{Rk} /3,5	155	

Annex C46

¹⁾ N_{Rk,b,c} = N_{Rk,p,c} and V_{Rk,c II} = V_{Rk,c ⊥} according to Annex C5
2) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C119. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Poroton FZ7,5 with insulation

Table C125: Description

	Hollow clay brick Poroton FZ7,5			
	Rock wool			
[kg/dm ³]	≥ 0,70			
[N/mm ²]	≥ 8			
pressive	$(f_b / 8)^{0.5} \le 1.0$			
[-]	EN 771-1:2011+A1:2015			
[-]	e.g. Schlagmann (DE)			
[mm]	248 x 365 x 249			
[-]	Rotary drilling			
	[N/mm²] npressive [-] [-] [mm]			



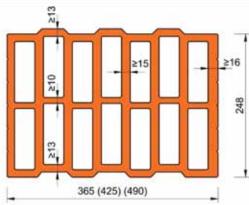


Table C126: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	Tinst	[Nm]	≤ 5	≤5	≤ 10	≤ 10	≤5	≤5	≤ 5			
Edge distance (under fire exposure)	C _{cr,} (C _{cr,fi})	[mm]	(foi	120 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{cr} = 250)								
Minimum edge distan		[mm]	50									
Spacing (under fire	Scr, II (Scr,fi, II)	[mm]	250 (4 her)									
exposure)	Scr, 1 (Scr,fi, 1)	[mm]	250 (4 her)									
Minimum Spacing	Smin, II; Smin, 1	[mm]				50	107					

Table C127: Reduction factors for single anchors at the edge

Tensi	Tension load			Shear load								
101101	on load		perpendicular	to the free	perpendicular to the free edge							
	with c≥	Ctedge,N		with c≥	αedge,V⊥		with c ≥	Cledge,VII				
•	50	1,00		50	0,35		50	1,00				
	120	1,00		250	1,00	*	120	1,00				

Injection System VMU plus for masonry	
Performances – Hollow clay brick FZ7,5 MW Description, installation parameters, reduction factors	Annex C47



Brick type: Hollow clay brick FZ7,5 with insulation - continuation

Table C128: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpen	dicular to	horizon	tal joint
		with c ≥	with s ≥	αg II,N		with c≥	with s ≥	αgLN
Tension load	••	50	50	1,40		50	50	1,15
		120	250	2,00		120	≥ with s ≥ 50 250 ≥ with s ≥ 50 50 250 ≥ with s ≥ 250 ≥ with s ≥	2,00
Shear load	+	with c≥	with s≥	αgII,VL	4	with c≥	with s ≥	α _{g1,V1}
	0-0-	50	50	0,60	-	50	50	0,40
perpendicular to the free edge		250	50	1,55		250	50	1,00
to the free eage	4	250	250	2,00		250	≥ with s ≥ 50 50 250 250 ≥ with s ≥	2,00
Shear load		with c≥	with s ≥	αg II,V II		with c≥	with s ≥	ασΣ۷ΙΙ
parallel		50	50	2,00		50	50	1,20
to the free edge		120	250	2,00		120	250	2,00

Table C129: Characteristic resistance under tension and shear load

		Sleeve Effective anchorage depth	Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}									
A	anch				50							
Anchor size			d/d			w/d w/w			d/d w/d w/w			
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges			
		her		V _{Rk,b} 1)								
		[mm]		[kt			N]					
	No	rmalised me	an comp	ressive s	trength f	≥ 8 N/m	m ^{2 2)}					
M8	VM-SH 12	80										
M8 / M10/ IG-M6	VM-SH 16	≥ 85	2.0	2.0	4.5		2,0	4.5	3,0			
M12 / IG-M8	VM-SH 20	≥ 85	2,0	2,0	1,5	2,0		1,5				
M16 / IG-M10	VM-SH 20	≥ 85				10			4,5			

 $^{^{1)}\,}N_{Rk,b,c}=N_{Rk,p,c}$ and $V_{Rk,c\,II}=V_{Rk,c\,\perp}$ according to Annex C5

Table C130: Displacements

Anchor size	her	δ _N / N	διο	δn	δ _V / V	δνο	δv=	
Afficitor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 – M12 / IG-M6 – IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16					0,31	0,31*V _{Rk} /3,5	.,	

Table C131: Characteristic resistance under fire exposure

Anchor size	Sleeve	Sleeve Effective anchorage depth		Characteristic resistance $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$						
		her	R30	R60	R90	R120				
		[mm]	[kN]							
M8 / M10 /IG-M6	VM-SH 16	130				no norformanco				
M12 / M16 / IG-M8 IG-M10	VM-SH 20	≥ 130	0,64	0,37	0,11	no performance assessed				

Injection System VMU plus for masonry	
Performance – Hollow clay brick FZ7,5 MW	Annex C48
Group factors, characteristic resistance and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C125. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Poroton FZ9 with insulation

Table C132: Description

Brick type		Hollow clay brick Poroton FZ9	
nsulation material		Rock wool	100000000000000000000000000000000000000
Density	ρ [kg/dm³]	≥ 0,90	The man and still
Normalised mean compressive strength	f _b [N/mm ²]	≥ 10	
Conversion factor for lower strengths	compressive	$(f_b / 10)^{0.5} \le 1.0$	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Schlagmann (DE)	
Brick dimensions	[mm]	248 x 365 x 249	1.575.1.5
Drilling method	[-]	Rotary drilling	1
		222.0 214.0	≥19,6 87 87

Table C133: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
nstallation torque T _{inst} [Nr			≤ 5	≤5	≤ 10	≤ 10	≤ 5	≤5	≤ 5		
Edge distance Cor. (under fire exposure) (Ccr.fi) [mm]				120 (2 h_{ef}) (for shear loads perpendicular to the free edge: $c_{cr} = 250$)							
Minimum edge distan	Minimum edge distance cmin [mm]			50							
Spacing (under fire	Scr, II (Scr,fi, II)	[mm]	250 (4 hef)								
exposure)	Scr, 1 (Scr,fi, 1)	[mm]	250 (4 hef)								
Minimum spacing s _{min,II} ; s _{min,⊥} [mm]			50								

Table C134: Reduction factors for single anchors at the edge

Tensi	on load		Shear load								
, , , ,	J.1. 1044		perpendicular	to the free	edge	perpendicular to the free edge					
	with c≥	Ctedge,N		with c≥	Cledge,VL		with c ≥	Ctedge,VII			
•	50	1,00		50	0,35		50	1,00			
	120	1,00		250	1,00	•	120	1,00			

Annex C49



Brick type: Hollow clay brick FZ9 with insulation - continuation

Table C135: Factors for anchor groups

	Position parallel	to horizon	ntal joint		Position perpen	dicular to	horizont	tal joint
		with c≥	with s≥	αg II,N		with c≥	with s ≥	αgLN
Tension load	(●1●1	50	50	1,40		50	50	1,15
		120	250	2,00		120	250	2,00
Observational	4	with c≥	with s≥	αgII,VI	+	with c≥	with s ≥	ασινι
Shear load		50	50	0,60		50	50	0,40
perpendicular to the free edge		250	50	1,55		250	50	1,00
to the free edge	1	250	250	2,00	+	250	250	2,00
Shear load		with c≥	with s ≥	αg II,V II		with c≥	with s ≥	αgLVII
parallel		50	50	2,00	1 1 1	50	50	1,20
to the free edge		120	250	2,00		120	250	2,00

Table C136: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c ≥	cor and s	≥ S _{cr}	
A	Sleeve Effective anchorage depth	anchorage			ι	Jse cond	ition			
Anchor size			d/d			w/d w/w			d/d w/d w/w	
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges	
		her		V _{Rk,b} 1)						
		[mm]		[kt			N]			
,	No	malised mea	n compr	essive st	rength fb	≥ 10 N/m	nm² ²)		-	
M8	VM-SH 12	80								
M8 / M10/ IG-M6	VM-SH 16	≥ 85	0.0	0.0	4.5	2,0	2,0	4.5	3,0	
M12 / IG-M8	VM-SH 20	≥ 85	2,0	2,0	1,5			1,5		
M16 / IG-M10	VM-SH 20	≥ 85							4,5	

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C137: Displacements

Anchor size	her	δ _N / N	δινο	δn=	δ _V / V	δνο	δν	
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 – M12 / IG-M6 – IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16	1	1007000		A-7815AVS	0,31	0,31*V _{Rk} /3,5	AND SAN	

Table C138: Characteristic resistance under fire exposure

Anchor size	Sleeve	Effective anchorage depth		Characteristic resistance $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$					
		h _{ef}	R30	R120					
		[mm]	[kN]						
M8 / M10 /IG-M6	VM-SH 16	130			W-10-				
M12 / M16 / IG-M8 IG-M10	12 / M16 / VM_SH 20	≥ 130	0,64	0,37	0,11	no performance assessed			

Annex C50

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C132. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Poroton S9 with insulation

Table C139: Description

		Hollow clay brick Poroton S9	Printers.
Insulation material		Perlite	
Density	ρ [kg/dm³]	≥ 0,85	
Normalised mean compressive strength	f _b [N/mm ²]	≥ 12	
Conversion factor for lower strengths	compressive	(f _b / 12) ^{0,5} ≤ 1,0	
Norm	[-]	EN 771-1:2011+A1:2015	
Producer (country code)	[-]	e.g. Schlagmann (DE)	
Brick dimensions	[mm]	248 x 365 x 249	
Drilling method	[-]	Rotary drilling	
4	·× (1		≥12,0

Table C140: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: cor = 250)						= 250)
Minimum edge distance	Cmin	[mm]	50						
Casaina	Scr, II	[mm]	250						
Spacing	Scr, 1	[mm]	250						
Minimum spacing	Smin, II Smin, ⊥	[mm]	50						

Table C141: Reduction factors for single anchors at the edge

Tensio	on load		perpendicular	Shear edge	load perpendicular t	o the free	e edge	
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	αedge,∀II
•	50	1,00		50	0,30	•	50	1,00
	120	1,00		250	1,00	V	120	1,00

Injection System VMU plus for masonry	
Performances – Hollow Clay brick Poroton S9 Description, installation parameters, reduction factors	Annex C51



Brick type: Hollow clay brick Poroton S9 with insulation - continuation

Table C142: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpendicular	to horizon	tal joint
		with c ≥	with s ≥	α _g II,N	with c	≥ with s≥	α _g L,N
Tension load	• •	50	50	1,50	50	50	1,00
		120	250	2,00	120	250	2,00
5500 E0 E0	1	with c≥	with s ≥	α _{g II,V⊥}	with c	≥ with s≥	$\alpha_{g\perp,V\perp}$
Shear load		50	50	0,40	50	50	0,40
perpendicular to the free edge		250	50	1,00	250	50	1,20
to the nee eage		250	250	2,00	250	250	2,00
Chantland		with c≥	with s≥	α _g II,V II	with c	≥ with s≥	αg⊥VII
Shear load parallel to the free edge	• •	50	50	1,65	50	50	1,00
		120	250	2,00	120	250	2,00

Table C143: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}							
Anchor size	Sleeve	Effective								
	170000000	anchorage depth		d/d		w/d w/w			d/d w/d w/w	
				50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges	
		her			N _{Rk,b} =	N _{Rk,p} 1)			V _{Rk,b} 1)	
		[mm]			[k1	1]			[kN]	
	No	malised mea	an compr	essive st	rength fb	≥ 12 N/m	nm² ²)			
M8	VM-SH 12	80	143.60		100	ľ			1,90	
M8 / M10/ IG-M6	VM-SH 16	≥ 85	1,5	1,5	1,5	1,5	1,5	1,5	5,0	
M12 / M16 / IG-M8 / IG-M10	VM-SH 20	≥ 85							2.51	

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C144: Displacements

Anchor size	her	δ _N / N	διο	δn=	δ _V /V	δνο	δν=
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δνο	0,55	0,55*V _{Rk} /3,5	1,5*δνο
M16	- 83334	57,713	0,10 11127 0,0	2 0110	0,31	0,31*V _{Rk} /3,5	1

Annex C52

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C139. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow clay brick Thermopor TV8+ with insulation

Table C145: Description

Brick type	Hollow clay brick Thermopor TV8+	
Insulation material	Rock wool	
Density ρ [kg/dm	3] ≥ 0,70	
Normalised mean compressive strength f _b [N/mm	2] ≥ 10	
Conversion factor for lower compressive strengths	(f _b / 10) ^{0,5} ≤ 1,0	
Norm [-]	EN 771-1:2011+A1:2015	
Producer (country code) [-]	e.g. THERMOPOR GmbH (DE)	
Brick dimensions [mm]	247 x 365 x 249	Contract of the Contract of th
Drilling method [-]	Rotary drilling	
10	0E 3 18 18 18 18	247
		1
	365	

Table C146: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 4	≤ 4	≤ 10	≤ 10	≤ 4	≤ 4	≤ 4
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: cer = 250)						
Minimum edge distance	Cmin	[mm]	50						=-0.
Cassina	Scr, II	[mm]	250						
Spacing	S _{cr, ⊥}	[mm]	250						
Minimum spacing	Smin, II	[mm]	50						

Table C147: Reduction factors for single anchors at the edge

Tensio	Tension load perpendicular to the f					load perpendicular t	o the free	e edge
	with c≥	Cledge,N		with c≥	Cledge,V⊥		with c ≥	
	50	1,00		50	0,25		50	1,00
	120	1,00		250	1,00		120	1,00

Injection System VMU plus for masonry

Performances – Hollow Clay brick Thermopor TV8+ Description, installation parameters, reduction factors Annex C53



Brick type: Hollow clay brick Thermopor TV8+ with insulation - continuation

Table C148: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpendicular to horizontal join				
		with c ≥	with s ≥	α _{g II,N}		with c≥	with s ≥	α _{g⊥,N}	
Tension load	• •	50	50	1,00		50	50	1,00	
		120	250	2,00		120	250	2,00	
		with c≥	with s ≥	αg II,V⊥		with c≥	with s≥	$\alpha_{g\perp,V\perp}$	
Shear load		50	50	0,75		50	50	0,50	
perpendicular to the free edge	Barana -	250	50	2,00		250	50	1,70	
to the nee eage		250	250	2,00		250	250	2,00	
Shear load		with c≥	with s ≥	α _g II,V II		with c≥	with s ≥	α _{g ⊥,V II}	
parallel to the free edge	• •	50	50	1,65		50	50	1,15	
		120	250	2,00		120	250	2,00	

Table C149: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s			cor and s	≥ S _{cr}				
Anchor size	Sleeve	Sleeve Effective anchorage depth	Use condition								
			d/d			w/d w/w			d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		hef		3 (8)	N _{Rk,b} =	N _{Rk,p} 1)		No.	V _{Rk,b} 1)		
		[mm]	[kN			١]	[kN]				
	No	rmalised mea	ın compr	essive st	rength fb	≥ 10 N/n	nm² ²)	(1)			
M8	VM-SH 12	80									
M8 / M10/ IG-M6	VM-SH 16	≥ 85	3,0	3,0	2,5	3,0	3,0	2,5	3,5		
M12 / IG-M8	VM-SH 20	≥ 85			1,7% 27.24				100 Table 4*		
M16 / IG-M10	VM-SH 20	≥ 85	3,5	3,5	3,0	3,5	3,5	3,0	7,0		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C150: Displacements

Anchor size	hef	δη / Ν	δινο	δn=	δv/V	δνο	δν∞	
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]	
M8 - M12 / IG-M6 - IG-M10	Search Control Control Control Control		2*δηο	0,55	0,55*V _{Rk} /3,5	1,5*δνο		
M16			85		0,31 0,31*V _F			

Injection System VMU plus for masonry	
Performances – Hollow Clay brick Thermopor TV8+	Annex C54
Group factors, characteristic resistance and displacements	

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C145. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow light weight concrete brick HBL 16DF

Table C151: Description

Brick type		Hollow light weight concrete brick HBL 16DF	
Density	ρ [kg/dm³]	≥ 1,0	
Normalised mean compressive strength	f _b [N/mm ²]	≥ 3,1	
Conversion factor for lowe strengths	r compressive	$(f_b / 3,1)^{0.5} \le 1,0$	
Norm	[-]	EN 771-3:2011+A1:2015	
Producer (country code)	[-]	e.g. KLB Klimaleichtblock (DE)	
Brick dimensions	[mm]	500 x 250 x 240	400
Drilling method	[-]	Rotary drilling	
	25 30 L 42.5 50 25	185 30 185 30 2 50 25 125 25 50 25 50 42	

Table C152: Installation parameter

Anchor size	Anchor size				M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤ 5	≤ 5	≤ 2	≤ 5	≤ 5
Edge distance (under fire exposure)	Ccr, (Ccr,fi)	[mm]	(fo	r shear loa	ads perpe	120 (2 h ndicular t	ef) the free e	edge: c _{cr} =	250)
Minimum edge distance	Cmin	[mm]	50						
Spacing (under fire	Scr, II (Scr,fi, II)	[mm]				500 (4 h	ef)		
exposure)	Scr, \(\pm(Scr,fi, \pm)\)	[mm]							
Minimum spacing	Smin, II; Smin, ±	[mm]	50						

Table C153: Reduction factors for single anchors at the edge

Tensio	n load		Shear load perpendicular to the free edge perpendicular to the free					e edge	
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	αedge,V II	
•	50	1,00		50	0,30		50	1,00	
	120	1,00		250	1,00		120	1,00	

Injection System VMU plus for masonry	
Performances – Hollow light weight concrete brick HBL 16DF Description, installation parameters, reduction factors	Annex C55



Brick type: Hollow light weight concrete brick HBL 16DF – continuation Table C154: Factors for anchor groups

	Position parallel	to horizon	Position perpendicular to horizontal joint					
		with c≥	with s ≥	Ctg II,N		with c≥	with s ≥	αg±,N
Tension load		50	50	2,00		50	50	1,55
		120	500	2,00		120	250	2,00
Chasuland		with c≥	with s≥	α _g II,V⊥	+	with c≥	with s ≥	αστ.ντ
Shear load		50	50	0,60		50	50	0,35
perpendicular to the free edge	0.0	120	50	2,00		120	50	1,15
to the free eage		120	500	2,00	+	120	250	2,00
Chassland	4	with c≥	with s≥	αg II,V II	+	with c≥	with s ≥	αgLVII
Shear load		50	50	1,30	•		50	4.00
parallel	[] [] []	120	250	2,00		50	50	1,00
to the free edge		120	500	2,00	4	120	250	2,00

Table C155: Characteristic resistance under tension and shear load

				Charact	eristic re	sistance	with c ≥	cor and s	≥ S _{cr}		
	VM-SH ancho	anaharaga		Use condition							
Anchor size				d/d		w/d w/w			d/d w/d w/w		
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges		
		her		V _{Rk,b} 1)							
		[mm]		[kN]							
	Nor	malised mea	n compr	essive st	rength fb	≥ 3,1 N/n	nm² ²)	1111			
M8 / M10/IG-M6	VM-SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	2,0		
M12 / IG-M8	VM-SH 20	≥ 85	4.5	1,5	4.0	4.5	4.5	1,2	3,0		
M16 / IG-M10	VM-SH 20	≥ 85	1,5		1,2	1,5	1,5		5,0		

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\) according to Annex C5

Table C156: Displacements

Anchor size	hef	δ _N / N	δινο	δn=	δ _V / V	δνο	δνα
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	M10 all 0,13 0,13*N _{Rk} / 3,5		2*δ _{N0}	0,55	0,55*V _{Rk} /3,5	1,5*δνο	
M16		0,10	5,.5	2 0110	0,31	0,31*V _{Rk} /3,5	.,,

Table C157: Characteristic resistance under fire exposure

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$				
		hef	R30	R60	R90	R120	
		[mm]	[kN]				
M8 / M10 /IG-M6	VM-SH 16	130	0.00	0.24	no performance		
M12 / IG-M8	VM-SH 20	≥ 130	0,29	0,21	assessed	no performance assessed	
M16 / IG-M10	VM-SH 20	≥ 130	0,29	0,21	0,12	assesseu	

Annex C56

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C151. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Hollow concrete brick Bloc Creux B40

Table C158: Description

Brick type	Hollow concrete brick Bloc Creux B40	
Density ρ [kg/dm ³]	≥ 0,8	
Normalised mean compressive strength f _b [N/mm ²]	≥ 5,2	
Conversion factor for lower compressive strengths	$(f_b / 5,2)^{0,5} \le 1,0$	
Norm [-]	EN 771-3:2011+A1:2015	
Producer (country code) [-]	e.g. Leroux (FR)	
Brick dimensions [mm]	500 x 200 x 200	
Drilling method [-]	Rotary drilling	
17 130	17 130 17 130 495	196

Table C159: Installation parameter

Anchor size		M8	M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	Tinst	[Nm]	≤4	≤ 4	≤ 4	≤ 4	≤4	≤ 4	≤ 4
Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 170)						
Minimum edge distance	Cmin	[mm]	50						
Cassian	Scr, II	[mm]				170			
Spacing	Scr, ⊥	[mm]	200						
Minimum spacing	Smin, II	[mm]	50						

Table C160: Reduction factors for single anchors at the edge

T	lan land	101			Shear	load		
rens	ion load		perpendicular	to the fre	perpendicular to the free edge			
	with c≥	Cledge,N		with c≥	αedge,V⊥		with c≥	αedge,∀Ⅱ
•	50	1,00		50	0,35	1	50	1,00
	120	1,00		170	1,00		120	1,00

Injection System VMU plus for masonry	
Performances – Hollow concrete brick Bloc Creux B40 Description, installation parameters, reduction factors	Annex C57



Brick type: Hollow concrete brick Bloc Creux B40 - continuation

Table C161: Factors for anchor groups

	Position parallel	to horizor	ntal joint		Position perpend	licular to	horizon	tal joint
		with c≥	with s ≥	α _g II,N		with c≥	with s ≥	α _{g1,N}
Tanalan land		50	50	1,50	•	50	50	1,40
Tension load		50	170	2,00		50 200 120 200 with c≥ with s≥ 50 50	2,00	
		120	170	2,00		120		2,00
		with c≥	with s≥	αg II,VI		with c≥	with s ≥	αστ.ντ
Shear load		50	50	0,55		50	50	0,35
perpendicular to the free edge		120	50	1,30		120	50	0,85
to the nee eage		120	170	2,00		120	200	2,00
2		with c≥	with s≥	α _g II,V II		with c≥	with s ≥	αστίνιι
Shear load		50	50	1 10	•	50	50	1,00
parallel o the free edge		30	50	1,10		50	200	2,00
to the nee eage		120	170	2,00		120	200	2,00

Table C162: Characteristic resistance under tension and shear load

			Characteristic resistance with c ≥ c _{cr} and s					≥ Scr		
Anchor size	Sleeve	Effective		Use condition						
		VM-SH	anchorage depth		d/d			w/d w/w		d/d w/d w/w
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges	
		hef		M rai	N _{Rk,b} = I	N _{Rkp} 1)	0.0	177.	V _{Rk,b} 1)	
		[mm]			[kN	١]			[kN]	
	No	rmalised mea	n compr	essive st	rength fb	≥ 5,2 N/n	nm² ²)	0.0		
M8 / M10 IG-M6	VM-SH 16	130	2.0	4.5	4.0	20	4.5	4.0	6,0	
M12 / M16 IG-M8 /IG-M10	VM-SH 20	≥ 130	2,0	1,5	1,2	2,0	1,5	1,2	6,0	

 $^{^{1)}\,}N_{Rk,b,c}$ = $N_{Rk,p,c}$ and $V_{Rk,c\,II}$ = $V_{Rk,c\,\perp}$ according to Annex C5

Table C163: Displacements

Ancheroine	hef	δ _N / N	δινο	δn∽	δv / V	δνο	δv=
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	all	0,13	0,13*N _{Rk} / 3,5	2*δηο	0,55	0,55*VRk/3,5	1,5*δνο
M16			2112 11121 212	2 010	0,31	0,31*V _{Rk} /3,5	1.000

Annex C58

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C158. For stones with higher strengths, the shown values are valid without conversion.



Brick type: Solid light weight concrete brick VBL

Table C164: Description

Brick type	Solid light weight concrete brick VBL		
Density	ρ	[kg/dm ³]	≥ 0,6
Normalised mean compressive strength	fb	[N/mm ²]	≥ 2
Conversion factor for lower strengths	r com	pressive	$(f_b / 2)^{0.5} \le 1.0$
Norm		[-]	EN 771-3:2011+A1:2015
Producer (country code)		[-]	e.g. Bisotherm (DE)
Brick dimensions		[mm]	≥ 240 x 300 x 113
Drilling method		[-]	Rotary drilling



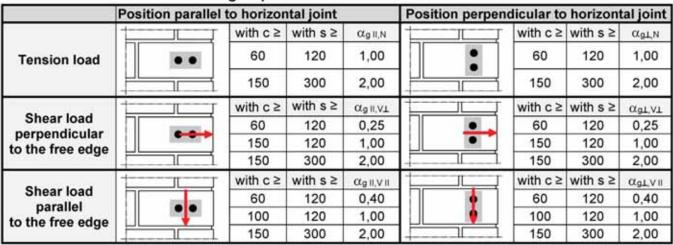
Table C165: Installation parameter

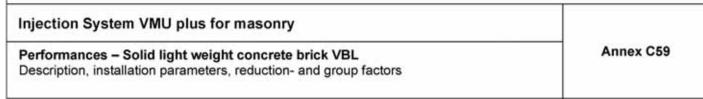
Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤2	≤ 2	≤ 2	≤2	≤ 2
Edge distance	Ccr	[mm]				150			•
Minimum edge distance	Cmin	[mm]				60			
Cassina	Scr, II	[mm]				300			
Spacing	Scr, ⊥	[mm]				300			
Minimum spacing	Smin, II	[mm]				120			

Table C166: Reduction factors for single anchors at the edge

Tonei	on load			Shear load							
Tensi	on load		perpendicular	to the free	perpendicular to the free edge						
	with c≥	αedge,N		with c≥	αedge,V⊥		with c≥	Ctedge,VII			
•	60	1,00		60	0,25		60	0,40			
	150	1,00		150	1,00	*	100	1,00			

Table C167: Factors for anchor groups







Brick type: Solid light weight concrete brick VBL – continuation Table C168: Characteristic resistance under tension and shear load

Anchor size	Sleeve VM-SH	Effective anchorage depth	Characteristic resistance with c ≥ c _{cr} and s ≥ s _{cr}							
			Use condition							
			d/d			w/d w/w			d/d w/d w/w	
			24°C / 40°C	50°C / 80°C	72°C / 120°C	24°C / 40°C	50°C / 80°C	72°C / 120°C	all temperature ranges	
		hef	$N_{Rk,b} = N_{Rk,p}$ 1)						V _{Rk,b} 1)	
		[mm]	[kN]					[kN]		
	No	rmalised me	an comp	ressive s	trength f	≥ 2 N/m	m² ²)		Fr. 15 - CL1	
M8	•	80	3,0	2,5	2,0	2,5	2,0	1,5	3,0	
M10 / IG-M6	-	90								
M12 / M16 / IG-M8 / IG-M10	(+):	100								
M8	VM-SH 12	80	2,5	2,5	2,0	2,5	2,0	1,5		
M8 / M10 IG-M6	VM-SH 16	≥ 85								
M12 / M16 / IG-M8 / IG-M10	VM-SH 20	≥ 85								

¹⁾ NRk,b,c = NRk,p,c and VRk,c II = VRk,c \(\pm \) according to Annex C5

Table C169: Displacements

Anchor size	her	δ _N / N	δινο	δn-	δv/V	δνο	δv∞
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 - M12 / IG-M6 - IG-M10	all	0,10	0,10*N _{Rk} / 3,5	2*δηο	0,30	0,30*V _{Rk} /3,5	1,5*δνο
M16					0,10	0,10*V _{Rk} /3,5	

Injection System VMU plus for masonry

Performances – Solid light weight concrete brick VBL
Characteristic resistance and displacements

Annex C60

²⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C164. For stones with higher strengths, the shown values are valid without conversion.