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European Technical Assessment Body for construction products



European Technical Assessment

ETA-20/0557 of 20 August 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

Chemofast Injection system VK, VK Nordic for masonry

Metal Injection anchors for use in masonry

CHEMOFAST Anchoring GmbH Hanns-Martin-Schleyer-Straße 23 47877 Willich DEUTSCHLAND

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

EAD 330076-01-0604, Edition 10/2022

ETA-20/0557 issued on 23 September 2020

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Specific Part

1 Technical description of the product

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

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

The product description is given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for static and quasi-static loading	See Annexes B 5, B 6 C 1 to C 56
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 C2, C7, C8, C13, C14, C17, C18, C19, C20, C37, C38, C43, C44, C45, C46, C51 and C52

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

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

The system to be applied is: 1

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

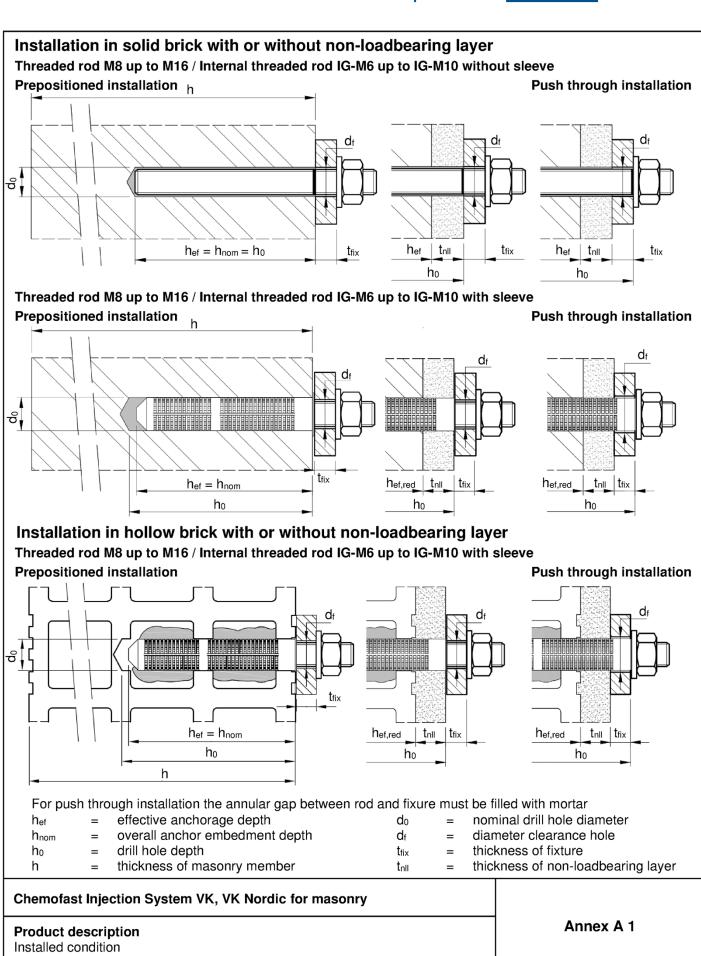
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 20 August 2023 by Deutsches Institut für Bautechnik

Beatrix Wittstock Head of Section beglaubigt: Baderschneider

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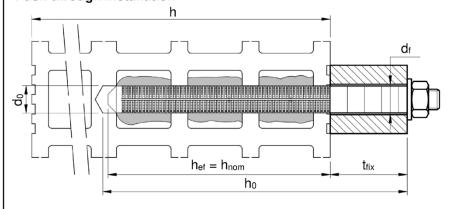


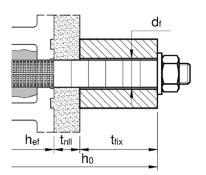




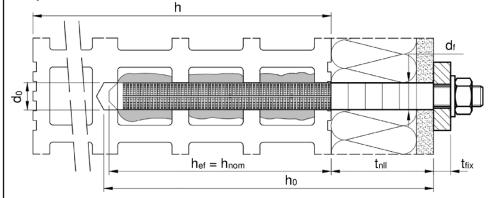
Installation in hollow brick with or without non-loadbearing layer and / or thermal isolation

Threaded rod M8 and M10 / Internal threaded rod IG-M6 with sleeve SH 16x130/330 Push through installation

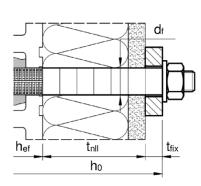




Prepositioned installation



Push through installation



hef = effective anchorage depth

h_{nom} = overall anchor embedment depth

 h_0 = drill hole depth

h = thickness of masonry member

d₀ = nominal drill hole diameter

d_f = diameter clearance hole

t_{fix} = thickness of fixture

t_{nll} = thickness of non-loadbearing layer

Chemofast Injection System VK, VK Nordic for masonry

Product description

Installed condition

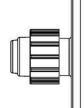
Annex A 2



Cartridge system

Coaxial Cartridge:

150 ml, 160ml, 280 ml, 300 ml up to 333 ml and 380 ml up to 420 ml



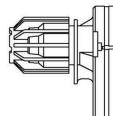
Imprint:

VK or VK Nordic

Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Side-by-Side Cartridge:

235 ml, 345 ml up to 360 ml and 825 ml



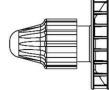
Imprint:

VK or VK Nordic

Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Foil Tube Cartridge:

165 ml and 300 ml



Imprint:

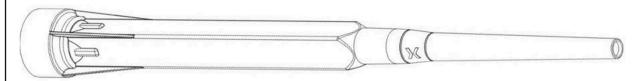
VK or VK Nordic

Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Static mixer SM-14W



Static mixer PM-19E



Mixer extension VL



Chemofast Injection System VK, VK Nordic for masonry

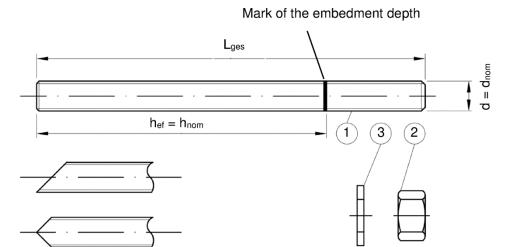
Product description

Injection system

Annex A 3



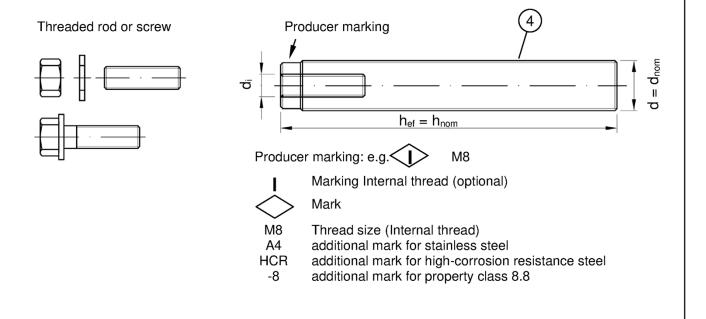
Threaded rod M8 up to M16 with washer and hexagon nut



Commercial standard rod with:

- Materials, dimensions and mechanical properties acc. to Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004. The document shall be stored
- Marking of embedment depth

Internal threaded rod IG-M6 to IG-M10



Chemofast Injection System VK, VK Nordic for masonry	
Product description Threaded rod and Internal threaded rod	Annex A 4



art	Designation	Material				
Ste	el, zinc plated (Steel acc. to	EN ISO 683-4:2018 or EN	1 102	63:2017)		
	nc plated ≥ 5 µm	acc. to EN ISO 4042:202				
		acc. to EN ISO 1461:202 acc. to EN ISO 17668:20		d EN ISO 10684:2004+AC	0:2009 or	
- 51	lerardized £ 40 µm	Property class	10	Characteristic steel ultimate tensile strength	Characteristic steel	Elongation a
			4.6	f _{uk} = 400 N/mm ²	f _{VK} = 240 N/mm ²	A ₅ > 8%
	Thursday			f _{uk} = 400 N/mm ²	f _{VK} = 320 N/mm ²	A ₅ > 8%
1	Threaded rod	acc. to		f _{uk} = 500 N/mm ²	f _{VK} = 300 N/mm ²	A ₅ > 8%
		EN ISO 898-1:2013		f _{uk} = 500 N/mm ²	f _{VK} = 400 N/mm ²	$A_5 > 8\%$
				f _{uk} = 800 N/mm ²	$f_{VK} = 640 \text{ N/mm}^2$	$A_5 > 8\%$
				for anchor rod class 4.6		A ₅ > 0 / 0
2	 Hexagon nut	acc. to	4 5	for anchor rod class 4.6		
_	Tiexagori flut	EN ISO 898-2:2022	8	for anchor rod class 8.8	01 3.0	
_		Steel, zinc plated, hot-		alvanised or sherardized		
3	Washer			ISO 7089:2000, EN ISO	7093:2000 or EN IS	O 7094:2000
	Internal threaded	Property class		Characteristic steel ultimate tensile strength	<u> </u>	Elongation a fracture
4	anchor rod ²⁾	acc. to	5.8	$f_{uk} = 500 \text{ N/mm}^2$	$f_{yk} = 400 \text{ N/mm}^2$	$A_5 > 8\%$
		EN ISO 898-1:2013	8.8	f _{uk} = 800 N/mm ²	f _{VK} = 640 N/mm ²	A ₅ > 8%
	inless steel A4 (Material 1.4 h corrosion resistance ste				Characteristic steel	Elongation a
4	Threaded rod ¹⁾		50	f _{uk} = 500 N/mm ²	f _{VK} = 210 N/mm ²	A ₅ > 8%
1		acc. to	70	f _{uk} = 700 N/mm ²	f _{VK} = 450 N/mm ²	A ₅ > 8%
		EN ISO 3506-1:2020	80	f _{UK} = 800 N/mm ²	f _{VK} = 600 N/mm ²	$A_5 > 8\%$
			50	for anchor rod class 50	yk	1.5
2	Hexagon nut ¹⁾	acc. to	70	for anchor rod class 70		
		EN ISO 3506-1:2020		for anchor rod class 80		
3	Washer	Stainless steel A2, A4 (e.g.: EN ISO 887:200	or H	•	7093:2000 or EN IS	O 7094:200
	Internal threaded	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation a fracture
4	anchor rod ²⁾	acc. to	50	f _{uk} = 500 N/mm ²	f _{VK} = 210 N/mm ²	A ₅ > 8%
		EN ISO 3506-1:2020	70	f _{UK} = 700 N/mm ²	f _{Vk} = 450 N/mm ²	A ₅ > 8%
() α	roperty class 80 only for stain Ising internally threaded anchord and strength class of the interna-	or rod screws and threaded			<i>y</i>	the material
	stic perforated sleeve ve sleeve SH			Polypropylene (PP)		
316	ve sieeve of i			_[гојургорујене (г г)		
Ch	emofast Injection System	n VK, VK Nordic for mas	onry	,		
— Pr	oduct description				Annex A	. 5



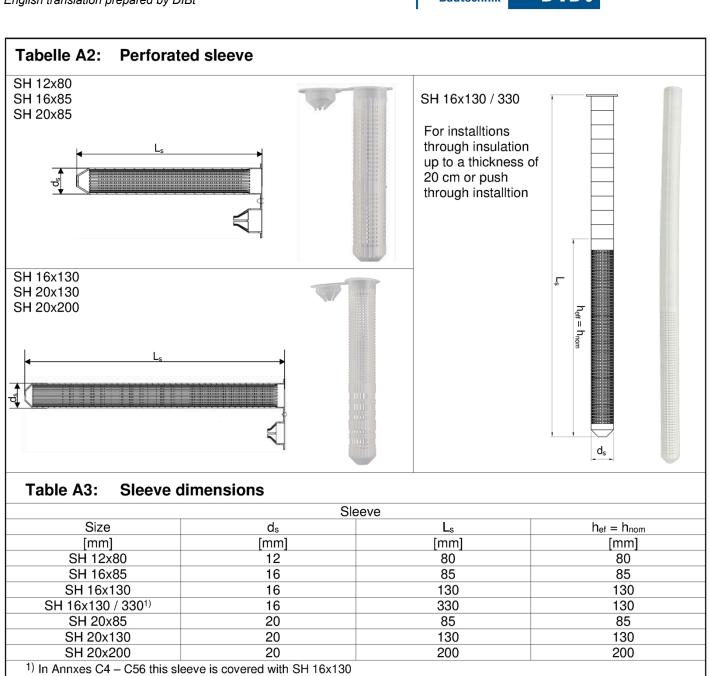


Table A4: Steel parts

Anchor rod							
Size	$d = d_{nom}$	di	I _{ges}				
[mm]	[mm]	[mm]	[mm]				
IG-M6 ¹⁾	10	6	with all and by English				
IG-M8 ¹⁾	12	8	with sleeve: h _{ef} - 5mm without sleeve: h _{ef}				
IG-M10 ¹⁾	16	10	without sieeve. Her				
M8	8	-	$h_{ef} + t_{fix} + 9,5$				
M10	10	-	$h_{ef} + t_{fix} + 11,5$				
M12	12	-	$h_{ef} + t_{fix} + 17,5$				
M16	16	-	$h_{ef} + t_{fix} + 20,0$				

¹⁾ Internal threaded rod with metric external thread

Chemofast Injection System VK, VK Nordic for masonry	
Product description Sleeves and steel parts	Annex A 6



Specifications of intended use								
Anchorages subject to:	Static and quasi-static loads, fire exposure under tension and shear loads M8 up to M16, IG-M6 up to IG-M10 (with and without sleeve)							
Base material	Masonry group b: Solid brick masonry Annex B 2 Masonry group c: Hollow brick masonry Annex B 2 to B 4 Masonry group d: Autoclaved Aerated Concrete Annex B 2							
	Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2016. For other bricks in solid masonry and in hollow masonry or in autoclaved aerated concrete, the characteristic resistance of the anchor may be determined by job site tests according to EOTA TR 053, Edition July 2022 under consideration of the β-factor according to Annex C 1, Table C1.							
Hole drilling	See Annex C 4 – C 56							
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)							
Temperature Range	T _a : - 40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C) T _b : - 40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C) T _a : - 40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C)							

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.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006+ A2:2020 corresponding to corrosion resistance classes Annex A (stainless steel and high corrosion resistant steel)

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:
 - $N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$
 - $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$
- For the calculation of pulling out a brick under tension loading N_{Rk,pb} or pushing out a brick under shear loading V_{Rk,pb} see EOTA Technical Report TR 054, Edition July 2022.
- $N_{\text{Rk,s}},\,V_{\text{Rk,s}}$ and $M^0_{\text{Rk,s}}$ see annexes C1-C 2
- For application with sleeve with drill bit size ≤ 15mm installed in joints not filled with mortar:
 - $N_{Rk,p,j} = 0.18 * N_{Rk,p}$ and $N_{Rk,b,j} = 0.18 * N_{Rk,b}$ ($N_{Rk,p} = N_{Rk,b}$ see Annex C4 to C56)
 - $V_{Rk,c,j} = 0.15 * V_{Rk,c}$ and $V_{Rk,b,j} = 0.15 * V_{Rk,b}$ ($V_{Rk,b}$ see Annex C4 to C56; and $V_{Rk,c}$ see Annex C3)
- Application without sleeve installed in joints not filled with mortar is not allowed.

Installation:

- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Chemofast Injection System VK, VK Nordic for masonry	
Intended use Specifications	Annex B 1



Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve	Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated
lollow light weigh N 771-4:2011+A1	it concrete brick a :2015	cc. to		Hollow light weigh EN 771-3:2011+A1		acc. to	
AAC $\rho = 0.35 - 0.60$ ≥ 499x240x249 Table C4 - C10	1	M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	VBL ρ≥ 0,6 ≥ 240x300x113 Table C187 - C193		M8 - M16 IG-M6 - IG-M10	12x80 16x89 16x13 20x89 20x13 20x20
	Hollow light v	veight cond	crete brid	ck acc. to EN 771-3	3:2011+A1:2015		
HBL 16DF ρ ≥ 1,0 500x250x240 Table C172 - C179	Res -	M8 - M16 IG-M6 - IG-M10	16x85 16x130 20x85 20x130 20x200	Bloc creux B40 ρ ≥ 0,8 495x195x190 Table C180 - C186	EFE	M8 - M16 IG-M6 - IG-M10	16x13 20x13
	Calcium si	lica bricks	acc. to E	N 771-2:2011+A1:	2015		
KS ρ≥ 2,0 ≥ 240x115x71 Table C11 - C18		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	KSL-3DF ρ≥1,4 240x175x113 Table C19 - C25	333	M8 - M16 IG-M6 - IG-M10	16x85 16x13 20x85 20x13
KSL-8DF ρ≥ 1,4 248x240x238 Table C26 - C32	888	M8 - M16 IG-M6 - IG-M10	16x130 20x130 20x200	KSL-12DF ρ≥ 1,4 498x175x238 Table C33 - C40		M8 - M16 IG-M6 - IG-M10	16x13 20x13
	Solid	l clay brick	s acc. to	EN 771-1:2011+A	1:2015		
Mz-1DF ρ ≥ 2,0 ≥ 240x115x55 Table C41 - C47		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Mz – 2 DF ρ ≥ 2,0 ≥ 240x115x113 Table C48 - C55		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x13 20x85 20x13 20x20



Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve	Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated
	Hollov	w clay brick	s acc. to	EN 771-1:2011+A	1:2015		
Hlz-10DF ρ≥ 1,25 300x240x249 Table C56 - C63		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Porotherm Homebric ρ≥0,7 500x200x299 Table C64 - C70		M8 - M16 IG-M6 - IG-M10	12x8 16x8 16x1 20x8 20x1
BGV Thermo ρ≥ 0,6 500x200x314 Table C71 - C77		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130	Brique creuse C40 ρ≥ 0,7 500x200x200 Table C92 - C98		M8 - M16 IG-M6 - IG-M10	12xi 16xi 16x1 20xi 20x1
Calibric R+ ρ ≥ 0,6 500x200x314 Table C78 - C84		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130	Blocchi Leggeri		M8 - M16 IG-M6 - IG-M10	12x 16x 16x1 20x 20x1
Urbanbric ρ ≥ 0,7 560x200x274 Table C85 - C91		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130	Doppio Uni ρ ≥ 0,9 250x120x120 Table C106 - C112		M8 - M16 IG-M6 - IG-M10	12x 16x 16x1 20x 20x1
	Hollow clay brick	s with ther	mal insu	lation acc. to EN 77	71-1:2011+A1:201	5	
Coriso WS07 ρ≥ 0,55 248x365x249 Mineral wool Table C113 - C119		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	T8P ρ ≥ 0,56 248x365x249 Perlite Table C128 - C134		M8 - M16 IG-M6 - IG-M10	12x 16x 16x1 20x 20x1 20x2
T7MW ρ≥ 0,59 248x365x249 Mineral wool Table C120 - C127		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	MZ90-G ρ ≥ 0,68 248x365x249 Mineral wool Table C135 - C141		M8 - M16 IG-M6 - IG-M10	12x 16x 16x1 20x 20x1 20x2



Table B1:	Overview brick elements (Anch				esponding fast	ening	
Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve	Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve
	Hollow clay brick	s with ther	mal insu	lation acc. to EN 7	71-1:2011+A1:201	5	
Poroton FZ27,5 ρ≥ 0,90 248x365x249 Mineral wool Table C142 - C149		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Poroton FZ9 ρ ≥ 0,90 248x365x249 Mineral wool Table C150 - C157		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200
Poroton S9 ρ≥ 0,85 248x365x249 Perlite Table C158 - C164		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Thermopor TV8+ ρ ≥ 0,70 248x365x249 Mineral wool Table C165 - C171		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200

Chemofast Injection System VK, VK Nordic for masonry	
Intended use Brick types and properties with corresponding fastening elements	Annex B 4



Table B2:	Installation (without slee							-		
Anchor size				М8	M10	IG-M6	M12	IG-M8	M16	IG-M10
Nominal drill hol	e diameter	d ₀	[mm]	10	1	12	1	4		18
Drill hole depth		h ₀	[mm]] h _{ef} + t _{fix} 1)						
Effective anchorage depth		h _{ef}	[mm]	80	≥ 90 ≥ 100		100	≥ 100		
Diameter of	Prepositioned installation	d _f ≤	[mm]	9	12	7	14	9	18	12
clearance hole in the fixture	Push through installation	d _f ≤	[mm]	12	14	14	16	16	20	20
Maximum installation torque T _{inst} [Nm]					See An	nexes C	4 – C 56			
Minimum thickne	ss of member	h _{min}	[mm]] h _{ef} + 30						
Minimum spacing		S _{min}	[mm]	See Annexes C 4 – C 56						
Minimum edge distance		C _{min}	[mm]							

¹⁾ Consider t_{fix} in case of push through installation.

Table B3: Installation parameters in solid and hollow brick (with perforated sleeve) for prepositioned installation

Anchor size			М8		M8 / M10 IG-M6	1		M12 / M16 -M8 / IG-N	
Perforated sleeve SH			12x80	16x85	16x130	16x130/330	20x85	20x130	20x200
Nominal drill hole diameter	d ₀	[mm]	12	16	16	16	20	20	20
Drill hole depth	h ₀	[mm]	85	90	135	330	90	135	205
Effective anchorage depth	h _{ef}	[mm]	80	85	130	130	85	130	200
Diameter of clearance hole in the fixture d _f ≤ [mm]		9		7 (IG-M6) M8) / 12 (I			18) / 12 (10 112) / 18		
Maximum installation torque	T _{inst}	[Nm]	See Annexes C 4 – C 56						
Minimum thickness of member	h _{min}	[mm]	115	115	195	195	115	195	240
Minimum spacing S _{min} [mm]			0.00 Approved 0.4 . 0.50						
Minimum edge distance	c _{min}	[mm]	See Annexes C 4 – C 56						

Chemofast Injection System VK, VK Nordic for masonry	
Intended use Installation parameters	Annex B 5



Table B4: Installation parameters in solid and hollow bricks (with perforated sleeve) for prepositioned installation through non-load-bearing layers and/or push-through installation

	.						
Anchor size					M10 / M6	M12 / M16 / IG-M8 / IG-M10	
Perforated sleeve SH				16x130	16x130/330	20x130	20x200
Nominal drill hol	e diameter	d ₀	[mm]	16	16	20	20
Drill hole depth		h ₀	[mm]	$h_{ef} + 5mm + t_{nll} + t_{fix}$ 1)			
Effective	Prepositioned installation	h _{ef}	[mm]	130	130	130	200
embedment depth	Push through installation	h _{ef}	[mm]	85	130	85	85
Maximum thickn loadbearing laye	Maximum thickness of non- loadbearing layer		[mm]	45	200	45	115
Diameter of	Prepositioned installation	d _f ≤	[mm]	7 (IG-M6) / 9 (M8) / 12 (M10)		9 (IG-M8) / 12 (IG-M10) / 14 (M12) / 18 (M16)	
in the fixture Push through installation		d _f ≤	[mm]	18		22	
Maximum installation torque T _{ins}			[Nm]		See Annexes C 4 – C 56		
Minimum thickne	Minimum thickness of member		[mm]	195 (115)	195	195 (115)	240 (115)
Minimum spacin	g	s _{min}	[mm]	See Anneyee C.A. C.E.C.			
Minimum edge o	distance	C _{min}	[mm]	See Annexes C 4 – C 56			

¹⁾ Consider $t_{\mbox{nII}}$ and/or $t_{\mbox{fix}}$ in case of non-loadbearing layers and/or push through installation.

Chemofast Injection System VK, VK Nordic for masonry	
Intended use Installation parameters	Annex B 6



				_www.	hillinin.
	-			a Mendille,	
Anchor rod	Perforated sleeve	d₀ Drill bit - Ø HD, CA	В	d₀ rush - Ø	d _{b,min} min. Brush - Ø
[mm]		[mm]		[mm]	[mm]
	Autoaerted ACC	and solid maso	nry (withou	ut sleeve)	·
M8	-	10	RBT10	12	10,5
M10	-	12	RBT12	14	12,5
M12	-	14	RBT14	16	14,5
M16	-	18	RBT18	20	18,5
	Solid and	hollow masonry	(with slee	ve)	
M8	SH 12x80	12	RBT12	14	12,5
	SH 16x85				
M8 / M10 / IG-M6	SH 16x130	16	RBT16	18	16,5
	SH 16x130/330				
M12 / M16 /	SH 20x85				
IG-M8 / IG-M10	SH 20x130	20	RBT20	22	20,5
	SH 20x200				

Cleaning and installation tools

Hand pump (Volume ≥ 750 ml)



Compressed air tool (min 6 bar)



Brush RBT



Brush extension RBL



Chemofast Injection System VK, VK Nordic for masonry	
Intended use Cleaning and installation tools	Annex B 7



Tempera	ture in bas	e material	Maximum working time	Minimum curing time 1)
	Т		t _{work}	t _{cure}
- 10°C	to	- 6°C	90 min ²⁾	24 h
- 5°C	to	- 1 °C	90 min	14 h
0°C	to	+ 4 °C	45 min	7 h
+ 5°C	to	+ 9°C	25 min	2 h
+ 10°C	to	+ 19°C	15 min	80 min
+ 20 °C	to	+ 24 °C	6 min	45 min
+ 25 °C	to	+ 29 °C	4 min	25 min
+ 30 °C	to	+ 39 °C	2 min	20 min
	+ 40 °C		1,5 min	15 min
Cartridge temperature			+5°C to	+40°C

¹⁾ The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.

Table B7: Working and curing time - VK Nordic

Tempera	ture in bas	e material	Maximum working time	Minimum curing time 1)		
	Т		t _{work}	t _{cure}		
- 20 °C	to	- 16°C	75 min	24 h		
- 15°C	to	- 11 °C	55 min	16 h		
- 10°C	to	- 6°C	35 min	10 h		
- 5°C	to	- 1 °C	20 min	5 h		
0°C	to	+ 4°C	10 min	2,5 h		
+ 5°C	to	+ 9°C	6 min	80 min		
	+ 10 °C		6 min	60 min		
Cart	ridge tempe	rature	-20°C to +10°C			

¹⁾ The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.

Chem	nofast Injection System VK, VK Nordic for masonry	
	ded use ing and curing time	Annex B 8

²⁾ Cartridge temperature must be at minimum +15°C



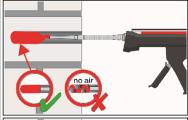
Installation instructions Drill a hole to the required embedment depth with drilling method according to Annex C 4 - C 56. Drill bit diameter according to Table B5. Blow the bore hole clean minimum 2x from the bottom or back by hand pump or compressed air tool (Annex B 7). For applications in solid masonry with a bore hole depth $h_0 > 100$ mm cleaning with compressed air is required. Attach brush RBT according to Table B5 to a drilling machine or a cordless screwdriver. Brush the bore hole minimum 2x with brush over the entire embedment depth in a twisting motion (if necessary, use a brush extension RBL). Finally blow the bore hole clean minimum 2x from the bottom or back by hand pump or compressed air tool (Annex B 7). For applications in solid masonry with a bore hole depth $h_0 > 100$ mm cleaning with compressed air is required. Screw on static-mixing nozzle SM-14W / PM-19E, and load the cartridge into an appropriate dispensing tool. If necessary, cut off the foil tube clip before use. For every working interruption longer than the maximum working time twork (Annex B 8) as well as for new cartridges, a new static-mixer shall be used. Mark setting position on the anchor rod. Consider t_{nll} and/or t_{fix} in case of installation through non-loadbearing layers and/or push through installation. The anchor rod shall be free of dirt, grease, oil or other foreign material. Not proper mixed mortar is not sufficient for fastening. Dispense and discard mortar until an uniform grey colour is shown (at least 3 full strokes; for foil tube cartridges at least 6 full strokes).

Chemofast Injection System VK, VK Nordic for masonry	
Intended use Installation instructions	Annex B 9

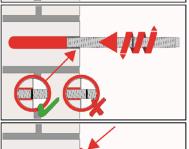


Installation instructions (continuation)

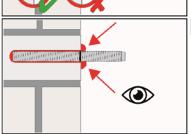
Installation without sleeve



Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension VL shall be used.) Slowly withdraw of the static mixing nozzle avoid creating air pockets Observe the temperature related working time t_{work} (Annex B 8).



Insert the anchor rod while turning slightly up to the embedment mark.



Annular gap between anchor rod and base material must be completely filled with mortar. For push through installation the annular gap between anchor rod and fixture must be filled with mortar.

Otherwise, the installation must be repeated starting from step 6 before the maximum working time $t_{\rm work}$ has expired.

Installation with sleeve



Insert the perforated sleeve into the hole flush with the surface of the masonry. Never modify the sleeve in anchoring area ($h_{\rm ef}$).

For installation with sleeve SH 16x130/330 through a non-load-bearing layer and/or fixture the clamping area may be reduced to the thickness of the non-load-bearing layer and/or attachment.



Starting from the bottom or back fill the sleeve with mortar. (If necessary, a mixer nozzle extension VL shall be used.)

Refer to the cartridge label or the technical data sheet for the exact amount of mortar. For push-through installation through the fixture the sleeve must also be completely filled with mortar up to the fixture.

Observe the temperature related working time twork (Annex B 8).

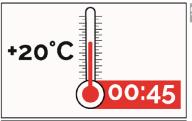


Insert the anchor rod with a slight twist up to the mark

Chemofast Injection System VK, VK Nordic for masonry	
Intended use Installation instructions (continuation)	Annex B 10



Installation instructions (continuation)



Temperature related curing time $t_{\rm cure}$ (Annex B 8) must be observed. Do not move or load the fastener during curing time.



Install the fixture by using a calibrated torque wrench. Observe maximum installation torque (Annex C 4 to C 56).

Chemofast Injection System VK, VK Nordic for masonry

Intended use
Installation instructions (continuation)

Annex B 11



					Anchor	age	β-Factor						
Base material	anchor	size	Perforate sleeve S	- 1	dept		T _a : 40°C / 24°C		24°C	T _b : 80°C	C / 50°C	T _c : 120°	°C / 72°C
					h _{ef}		C	d/d	w/d w/w	d/d	w/d w/w	d/d	w/d w/w
Autoclaved aerated concrete	all siz	es	with and without S		all		0	,95	0,86	0,81	0,73	0,81	0,73
	d ₀ ≤14	mm					0	,93	0,80	0,87	0,74	0,65	0,56
	d ₀ ≥ 16	mm	with SH	¹	all		0	,93	0,93	0,87	0,87	0,65	0,65
Calcium silica	d ₀ ≤ 14	mm					0	,93	0,80	0,87	0,74	0,65	0,56
bricks	d ₀ ≥ 16		without S	6H	≤ 100 r	nm			0,93	0,87	0,87	0,65	0,65
	all siz		without S	Н	> 100 r	nm			0,56	0,87	0,52	0,65	0,40
			with SH		all			· -	0,86	0,86	0,86	0,73	0,73
Clay Bricks	all siz	es	without S		≤ 100 r	nm			0,80	0,87	0,74	0,65	0,56
Olay Briono	un 012	.00	without S		> 100 r				0,43	0,86	0,43	0,73	0,37
	d ₀ ≤ 12	mm			<i>></i> 100 1			· -	0,43	0,87	0,43	0,75	0,57
Concrete bricks	$d_0 \ge 12$ $d_0 \ge 16$		with and without S		all	-			0,80	0,87	0,74	0,65	0,56
	U0 ≥ 10	111111	Without	,, , , , , , , , , , , , , , , , , , ,				,93	0,93	0,67	0,07	0,65	0,65
	haracte	ristic	steel resi	stanc	е	T			T	T	T	I	I
Anchor size						M8	-	M10	M12	M16	IG-M6	IG-M8	IG-M10
Cross section area				A _s	[mm²]	36,6	6	58	84,3	157	-	-	-
Characteristic tens	ion resis						_				1 0	l 0)	l 0)
Steel, Property class		4.6 a				15 (13	3)	23 (21)	34	63	_3)	_3)	_3)
		5.6 a	nd 5.8	N _{Rk,s}	kN]	18 (17	7)	29 (27)	42	78	10	17	29
		8.8		N _{Rk,s}	[kN]	29 (2	7)	46 (43)	67	125	16	27	46
Stainless steel A2, A	44 and	50	N _R			18		29	42	79	_3)	_3)	_3)
HCR, class	· · and	70		N _{Rk,s}	[kN]	26		41	59	110	14	26	41
(A2 only class 50 ar	nd 70)	80			_	29		46	67	126	_3)	_3)	_3)
Characteristic tens	ion resis	stance	Partial fac		, -					1	I		l
					Ms,N [-]		2,0					_3)	
Steel, Property clas	S	4.8. 5	5.8 and 8.8	γ _{Ms,N}	1		<u> </u>			1,5	l		
Ot-:t	\	50		γ _{Ms,N}	1			2,86				_3)	
Stainless steel A2, <i>I</i> HCR, class	44 and	70		γ _{Ms,N}		+				1,87	l		
(A2 only class 50 ar	nd 70)	80		γ _{Ms,N}				1	,6	1,07		_3)	
Characteristic she	ar recieta		Steel failure			arm 1)	1	<u>'</u>	,,,		1	· · · · · · · · · · · · · · · · · · ·	
	1031310	T	nd 4.8	V ⁰ Rk	s [kN]	7 (6)	-	12 (10)	17	31	_3)	_3)	_3)
Ctool Dropostical	•			1 - RK	S [INN]	+	-		+	_	E		1.5
Steel, Property clas	5		nd 5.8	V ⁰ Rk	,s [kN]	9 (8)	-	15 (13)	21	39	5	9	15
		8.8		V ⁰ Rk	,s [kN]	15 (13	3)	23 (21)	34	63	8	14	23
Stainless steel A2, A	A4 and	50		\V ⁰ Rk.	_{.s} [kN]	9		15	21	39	_3)	_3)	_3)
HCR, class		70		V ⁰ Rk.	_{,s} [kN]	13		20	30	55	7	13	20
(A2 only class 50 ar	nd 70)	80		V ⁰ Rk	,s [kN]	15		23	34	63	_3)	_3)	_3)
Chemofast Injec	tion Syst	tom VI	✓ VK Nord			rv.							
Chemofast Injection System VK, VK Nordic for masonry									_				
Performances β-factors for job site testing under tension load								Anne	x C 1				



Table C2: Characteristic steel resistance (continuation)											
Anchor size	М8	M10	M12	M16	IG-M6	IG-M8	IG-M10				
Cross section area A _s [mm ²]					58	84,3	157	-	-	-	
Characteristic shear resistance, Steel failure with lever arm ¹⁾											
	4.6 and 4.8	М ⁰ _{Rk,s}	[Nm]	15 (13)	30 (27)	52	133	_3)	_3)	_3)	
Steel, Property class	5.6 and 5.8	М ⁰ _{Rk,s}	[Nm]	19 (16)	37 (33)	65	166	8	19	37	
	8.8	М ⁰ _{Rk,s}	[Nm]	30 (26)	60 (53)	105	266	12	30	60	
Stainless steel A2, A4 and	50	М ⁰ _{Rk,s}	[Nm]	19	37	66	167	_3)	_3)	_3)	
HCR, class	70	М ⁰ Rk,s	[Nm]	26	52	92	232	11	26	52	
(A2 only class 50 and 70)	80	М ⁰ _{Rk,s}	[Nm]	30	59	105	266	_3)	_3)	_3)	
Characteristic shear resista	nce, Partial facto	r ²⁾									
Stool Proporty class	4.6 and 5.6	γ _{Ms,V}	[-]		1,6	6 7			_3)		
Steel, Property class	4.8, 5.8 and 8.8	γ _{Ms,V}	[-]				1,25				
Stainless steel A2, A4 and	50	γ _{Ms,V}	[-]		2,3	88			_3)		
HCR, class (A2 only class 50 and 70)	70	γ _{Ms,V}	[-]				1,56				
	80	γ _{Ms,V}	[-]		1,3	33	·		_3)		

¹⁾ Values are only valid for the given stress area A_s. Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot-dip galvanised threaded rods according to EN ISO 10684:2004+AC:2009.

Table C3: Characteristic steel resistance under fire exposure 1)

Anchor size		М8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Characteristic tension resistance, Steel failure										
	R30	$N_{Rk,s,fi}$	[kN]	1,1	1,7	3,0	5,7	0,3	1,1	1,7
Steel, Property class 5.8, and higher;	R60	$N_{Rk,s,fi}$	[kN]	0,9	1,4	2,3	4,2	0,2	0,9	1,4
Stainless steel A2, A4 and HCR, class 50 and higher	R90	$N_{Rk,s,fi}$	[kN]	0,7	1,0	1,6	3,0	0,2	0,7	1,0
3	R120	$N_{Rk,s,fi}$	[kN]	0,5	0,8	1,2	2,2	0,1	0,5	0,8
Characteristic shear resistance, Ste	el failure	without	lever a	arm						
	R30	$V_{Rk,s,fi}$	[kN]	1,1	1,7	3,0	5,7	0,3	1,1	1,7
Steel, Property class 5.8, and higher; Stainless steel A2. A4 and HCR.	R60	$V_{Rk,s,fi}$	[kN]	0,9	1,4	2,3	4,2	0,2	0,9	1,4
class 50 and higher	R90	$V_{Rk,s,fi}$	[kN]	0,7	1,0	1,6	3,0	0,2	0,7	1,0
3	R120	$V_{Rk,s,fi}$	[kN]	0,5	0,8	1,2	2,2	0,1	0,5	0,8
Characteristic shear resistance, Ste	el failure	with lev	er arm							
	R30	$M_{Rk,s,fi}$	[Nm]	1,1	2,2	4,7	12,0	0,2	1,1	2,2
Steel, Property class 5.8, and higher;	R60	M _{Rk,s,fi}	[Nm]	0,9	1,8	3,5	9,0	0,2	0,9	1,8
Stainless steel A2, A4 and HCR, class 50 and higher	R90	M _{Rk,s,fi}	[Nm]	0,7	1,3	2,5	6,3	0,1	0,7	1,3
3	R120	M _{Rk,s,fi}	[Nm]	0,5	1,0	1,8	4,7	0,1	0,5	1,0

¹⁾ partial factor in case of fire is 1,0 for all steel types and load directions.

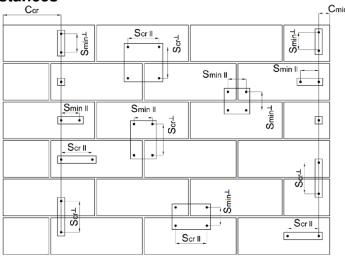
Chemofast Injection System VK, VK Nordic for masonry	
Performances Characteristic steel resistance under tension and shear load – under fire exposure	Annex C 2

²⁾ in absence of national regulation

³⁾ Fastener type not part of the ETA







 C_{cr} = Char. Edge distance C_{min} = Minimum Edge distance

S_{cr,II}; (S_{min,II}) = Characteristic (minimum) spacing for anchors placed parallel to horizontal joint

 $S_{cr,\perp}$; $(S_{min,\perp})$ = Characteristic (minimum) spacing for anchors placed perpendicular to horizontal joint

Load direction Anchor position	Tensio	n load		arallel to free e V II	Shear load perpendicular to free edge V ⊥		
Anchors parallel to horizontal joint s _{cr,II} ; (s _{min,II})		α_g II,N	V	α _g ,۷	V	$\alpha_{g \text{ II,V} \perp}$	
Anchors vertical to horizontal joint $s_{cr,\perp}$; $(s_{min,\perp})$		$\alpha_{g\perp,N}$	V	$\alpha_{g\perp,V}$ II	V •	$\alpha_{g\perp,V\perp}$	

 $\alpha_{\text{edge},N}$ = Reduction factor for tension loads at the free edge (single anchor)

 $\alpha_{\text{edge,V}\perp}$ = Reduction factor for shear loads perpendicular to the free edge (single anchor)

 $\alpha_{\text{edge,V II}}$ = Reduction factor for shear loads parallel to the free edge (single anchor) = Group factor for anchors parallel to horizontal joint under tension load

 $\alpha_{g\perp,N}$ = Group factor for anchors perpendicular to horizontal joint under tension load

 $\alpha_{g \parallel,V \parallel}$ = Group factor for anchors parallel to horizontal joint under shear load parallel to the free edge

 $\alpha_{g \perp, V \parallel}$ = Group factor for anchors perpendicular to horizontal joint under shear load parallel to the free edge = Group factor for anchors parallel to horizontal joint under shear load perpendicular to the free edge

 $\alpha_{g\perp,V\perp}$ = Group factor for anchors perpendicular to hor. joint under shear load perpendicular to the free edge

Single anchor at the edge: $N_{Rk,b,c} = \alpha_{edge,N} * N_{RK,b}$ resp. $N_{Rk,p,c} = \alpha_{edge,N} * N_{RK,p}$

 $V_{Rk,c \, II} = \alpha_{edge,V \, II} * V_{Rk,b}$ $V_{Rk,c \, \perp} = \alpha_{edge,V \, \perp} * V_{Rk,b}$

Group of 2 anchors: $N^{g}_{Rk} = \alpha_{g,N} * N_{RK,b}$

 $V^{g}_{Rk \, II} \ = \alpha_{g,V \, II} \,^{\star} \, V_{Rk,b} \qquad \qquad \text{resp.} \ V^{g}_{Rk \, \bot} \ = \alpha_{g,V \, \bot} \,^{\star} \, V_{Rk,b} \qquad \qquad (\text{for } c \geq c_{cr})$

 $V^{g}_{Rk,c \mid I} = \alpha_{g,V \mid I} * V_{Rk,b} \qquad \qquad \text{resp. } V^{g}_{Rk,c \perp} = \alpha_{g,V \perp} * V_{Rk,b} \qquad \qquad (\text{for } c \geq c_{min})$

Group of 4 anchors: $N^{g}_{Rk} = \alpha_{g \; II,N} * \alpha_{g \; \bot,N} * N_{RK,b}$

 $V^g_{Rk \, II} = \alpha_g \, _{II,V \, II} \, ^* \alpha_g \, _{\bot,V \, II} \, ^* V_{Rk,b} \quad resp. \quad V^g_{Rk \, \bot} = \alpha_g \, _{II,V \, \bot} \, ^* \alpha_g \, _{\bot,V \, \bot} \, ^* V_{Rk,b} \quad (for \, c \geq c_{cr})$

 $V^g_{\mathsf{Rk},c\,\,|\,\,} = \alpha_g\,_{\mathsf{II},\mathsf{V}\,\,|\,\,}^*\alpha_g\,_{\mathsf{L},\mathsf{V}\,\,|\,\,}^*V_{\mathsf{Rk},b} \quad \text{resp.} \quad V^g_{\mathsf{Rk},c\,\,\perp} = \alpha_g\,_{\mathsf{II},\mathsf{V}\,\,\perp}^*\alpha_g\,_{\mathsf{L},\mathsf{V}\,\,\perp}^*V_{\mathsf{Rk},b} \quad \text{(for } c \geq c_{\mathsf{min}})$

Equations depend on anchor position and load direction (see table above). Reduction factor, group factor and resistances see annex C 4 - C 56. Reduction for installation in joints see annex B 1.

Performances Definition of the reduction- and group factors

Annex C 3



Brick type: Autoclaved aerated concrete - AAC

Table C4: Stone description

Brick type		Autoclaved aerated concrete AAC
Density	ρ [kg/dm³]	0,35 – 0,6
Normalised mean compressive strenght	f_b [N/mm ²]	≥ 2, ≥ 4 or ≥ 6
Code		EN 771-4:2011+A1:2015
Producer (Country)		e.g. Porit (DE)
Brick dimensions	[mm]	≥ 499 x 240 x 249
Drilling method		Rotary drilling



Table C5: Installation parameter

Table col motanati	on pan	umoto									
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	Tinst	[Nm]	≤5 ≤5 ≤10 ≤10 ≤5 ≤5 ≤10								
Char. Edge distance	Ccr	[mm]	150 (for shear loads perpendicular to the free edge: ccr = 210)								
Minimum Edge Distance	Cmin	[mm]	50								
Characteristic Spacing	Scr, II	[mm]		300							
Characteristic Spacing	Scr, ⊥	[mm]		250							
Minimum Spacing	Smin, II;	[mm]	50								
Williman Spacing	Smin, ⊥	[111111]		30							

Table C6: Reduction factors for single anchors at the edge

Tension load			Shear load							
'	ension load		Perpendic	ular to the fre	ee edge	Parallel to the free edge				
+	with c ≥	αedge, N	11	with c ≥	αedge, V⊥		with c ≥	αedge, V II		
	50	50 0,85		50	0,12	ţ	50	0,70		
	30	0,03		125	0,50		125	0,85		
	150	1,00		210	1,00		150	1,00		

Table C7: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
1	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	αg ⊥, N	
	50	50	1,10	•	50	50	0,75	
	150	50	1,25		150	50	0,90	
	150	300	2,00		150	250	2,00	

Table C8: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load		with c ≥	with s ≥	α _g II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
perpendicular		50	50	0,20		50	50	0,25
to the free		210	50	1,60		210	50	1,80
edge	•	210	300	2,00	.,	210	250	2,00
Shear load		with c ≥	with s ≥	α _g II,V II	•	with c ≥	with s ≥	αg ⊥,V II
parallel to the	••	50	50	1,15		50	50	0,80
free edge		150	50	1,60		150	50	1,10
l lice cage		150	300	2,00		150	250	2,00

Chemofast Injection System VK, VK Nordic for masonry

Performances Autoclaved Aerated Concrete - AAC

Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 4



Brick type: Aut	oclave	ed aerat	ed concr	ete – AA	C				
Table C9: Ch	aracte	istic val	ues of ten		shear loa				
	Ф			Charac	cteristic Res			and s ≥ s _{cr}	
	eev	a)				Use condit	ion		
Anakanasa	Perforated sleeve	Effecitve Anchorage depth		d/d			w/d w/w		d/d w/d w/w
Anchor size	Perfor	Anc	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
	ds	h _{ef}	N _{Bk,b} = N	$_{Rk,p} = N_{Rk,b,}$	$c = N_{Bk,p,c}$	N _{Bk,b} = N	$I_{Rk,p} = N_{Rk,b}$	$L_{p,c} = N_{Bk,p,c}$	V _{Rk,b} 1)
	[mm]	[mm]	, .	, , , , , , , , , , , , , , , , , , ,	,p,-	[kN]	,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	- 1111,0
	ed mear		ssive stren					≥ 0,35 kg/d	
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	SH 12	80	1,2	0,9	0,9	0,9	0,9	0,9	1,5
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	0,9	0,9	0,9	0,9	0,9	2,5
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	2,0	1,5	1,5	1,5	1,5	1,5	2,5
1) $V_{Rk,c II} = V_{Rk,c} \perp ac$	cording to	Annex C	3						
				Charac	cteristic Res	istances w	rith c≥c _{cr} a	and s ≥ s _{cr}	
	eve					Use condit	ion		
	Perforated sleeve	Effecitve Anchorage depth	d/d				w/d w/w		d/d w/d w/w
Anchor size	Perfor	Anc	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
	ds	h _{ef}	$N_{Bk,b} = N$	$_{Rk,p} = N_{Rk,b,p}$	$_{c} = N_{Rk,p,c}$	$N_{Bk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$N_{Rk,p,c} = N_{Rk,p,c}$	V _{Rk,b} 1)
	[mm]	[mm]	1 110,0	riide riide	,	[kN]		,,0	T III,D
	ed mear		ssive stren	T	N/mm²;			≥ 0,50 kg/d	
M8	-	80	3,0	2,5	2,0	2,5	2,0	2,0	4,5
M10 / IG-M6	-	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	SH 12	80	3,0	2,5	2,0	2,5	2,0	2,0	4,5
M8 / M10/ IG-M6	SH 16	≥ 85	3,0	2,5	2,0	2,5	2,0	2,0	7,5
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	5,0	4,5	4,0	4,5	4,0	4,0	7,5
1) V _{Rk,c II} = V _{Rk,c} ⊥ac	cording to	Annex C	3						
Chemofast Injecti	on Syst	em VK, V	K Nordic f	or masonr	у				
	erformances autoclaved aerated concrete - AAC haracteristic Resistances and Displacements Annex C 5								
							•		



Brick type: Aut	toclave	d aerat	ed concr	ete – AA	С				
				Charac	cteristic Res	sistances w	rith c≥c _{cr} a	and s ≥ s _{cr}	
			Use condition						
Angharaina	d sleeve	Effecitve Anchorage depth	d/d			w/d w/w			d/d w/d w/w
Anchor size	Perforated sleeve	And	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
	"	h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b,p}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	V _{Rk,b} 1)
		[mm]				[kN]			
Normalis	ed mear	compre	ssive strer	ight f _b ≥ 6	N/mm²;		Density ρ	≥ 0,65 kg/d	lm³
M8	-	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	-	100	7,0	6,0	5,5	6,5	5,5	5,5	10,0
M8	SH 12	80	4,0	3,5	3,0	3,5	3,0	3,0	6,0
M8 / M10/ IG-M6	SH 16	≥ 85	4,0	3,5	3,0	3,5	3,0	3,0	10,0
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	7,0	6,0	5,5	6,5	5,5	5,5	10,0

¹⁾ $V_{Rk,c II} = V_{Rk,c} \perp according to Annex C 3$

Table C10: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	0,1*N _{Rk} / 2,8	2*δN0	0,3	0,3*V _{Rk} / 2,8	1,5*δνο
M16	all	,	,		0,1	0,1*V _{Rk} /2,8	1,5*δνο

Chemofast Injection System VK, VK Nordic for masonry

Performances autoclaved aerated concrete – AAC
Characteristic Resistances and Displacements

Annex C 6



Brick type: Solid calcium silica brick KS-NF

Table C11: Stone description

Brick type		Solid calcium silica brick KS-NF
Density	ρ [kg/dm³]	≥ 2,0
Normalised mean compressive strenght	f _b [N/mm²]	≥ 28
Conversion factor for low compressive strengths	/er	$(f_b / 28)^{0,5} \le 1,0$
Code		EN 771-2:2011+A1:2015
Producer (Country)		e.g. Wemding (DE)
Brick dimensions	[mm]	≥ 240 x 115 x 71
Drilling method		Hammer drilling



Table C12: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T _{inst}	[Nm]	≤ 10	≤ 10	≤ 15	≤ 15	≤ 10	≤ 10	≤ 10
Char. Edge distance (under fire conditions)	Ccr; (Ccr,fi)	(for shear loads perpendicular to the free edge: c						dge: c _{cr} =	: 240)
Minimum Edge Distance	Cmin	[mm]	60						
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]	240 (4 h _{ef})						
(under fire conditions)	Scr, ⊥; (Scr,fi, ⊥)	[mm]	150 (4 h _{ef})						
Minimum Spacing	Smin, II; Smin, ⊥	[mm]	75						

Table C13: Reduction factors for single anchors at the edge

-	Tension load		Shear load perpendicular to free edge			Shear load parallel to free edge		
	with c ≥	αedge, N		with c ≥	αedge, V ⊥		with c ≥	αedge, V II
	60 ¹⁾	0,50		60	0,30		60	0,60
•	100 ¹⁾	0,50		100	0,50	•	100	1,00
	150 ¹⁾	1,00		240	1.00		150	1.00
	180	1,00		240	1,00		130	1,00

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

Table C14: Factors for anchor groups under tension load

Ar	nchor position p	arallel to hor. jo	int	Anch	or position perp	endicular to hor	. joint
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$lpha_{g\perp}$, N
	60 ¹⁾	75	0,70		60 ¹⁾	75	1,15
	150 ¹⁾	75	1,40		150 ¹⁾	75	2,00
• •	150 ¹⁾	240	2,00		150 ¹⁾	150	2,00
	180 ²⁾	75	1,00		180 ²⁾	75	1,15
	180 ²⁾	240	1,70		180 ²⁾	150	2.00
	240 ²⁾	240	2,00		100-7	130	2,00

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

Table C15: Factors for anchor groups under shear load

	Ancho	r position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load		with c ≥	with s ≥	αg II,V ⊥		with c ≥	with s ≥	$\alpha_{\text{g}}\bot,\text{V}\bot$
perpendicular	• • •	60	75	0,75		60	75	0,90
to the free		150	75	2,00		150	75	2,00
edge		150	240	2,00		150	150	2,00
Shear load		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	αg ⊥,V II
parallel to the	• •	60	75	2,00	•	60	75	2,00
free edge		150	75	2,00		150	75	2,00
l		150	240	2,00		150	150	2,00

Chemofast Injection System VK, VK Nordic for masonry

Performances solid calcium silica brick KS-NF

Description of the stone, Installation parameters, Reduction- and Group factors

Annex C7

²⁾ Only for application with $h_{ef} = 200$ mm and without sleeve



Brick type: Solid calcium silica brick KS-NF

Table C16: Characteristic values of tension and shear load resistances

Tubic OTO. Of	ulucto	iotic vait	acs or ter	ision and	Silcui iou	u i coiota	1003		
				Chara	cteristic Re	sistances v	vith c≥c _{cr}	and s ≥ s _{cr}	
	Ф	<u>. o</u>				Use condi	tion		
	sleev	Effecitve Anchorage depth		d/d			w/d w/w		d/d w/w (w/d)
Anchor size	Perforated sleeve	Eff Anc d	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
	A A	h _{ef}	$N_{Rk,b} = N$	$J_{Rk,p} = N_{Rk,b}$	$_{p,c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,t}$	$_{o,c} = N_{Rk,p,c}$	V _{Rk,b} 2)
		[mm]				[kN]			
		Normalis	ed mean d	ompressi	ve strength	f _b ≥ 28 N/	mm² 1)		
M8	-	80							
M10 / IG-M6	-	≥ 90	7,0	6,5	5,0	6,0	5,5	4,0	
M12 / IG-M8	-	≥ 100							
M16 / IG-M10	-	≥ 100	7,0	6,5	5,0	7,0	6,5	5,0	
M10 / M12 / M16 / IG-M6 / IG-M8 / IG-M10	-	200	9,0	8,5	6,5	5,5	5,0	4,0	7,0
M8	SH 12	80	7,0	6,5	5,0	6,0	5,5	4,0	
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	7,0	6,5	5,0	7,0	6,5	5,0	

Table C17: Displacements

•							
Anghor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0.1	0.1*N / 2.5	0*5	0,3	0,3*V _{Rk} / 3,5	1,5*δvo
M16	all	0,1	0,1*N _{Rk} / 3,5	2*δΝο	0,1	0,1*V _{Rk} /3,5	1,5*δνο

Table C18: Characteristic values of tension and shear load resistances under fire exposure

	Perforated	Effective anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,b,fi} = V_{Rk,b,fi}$						
Anchor size	sleeve	h _{ef}	R30	R60	R90	R120			
		[mm]		[k	N]				
M8	-	80							
M10 / IG-M6	-	≥ 90	0.40	0.41	0.24	0.20			
M12 / IG-M8	-	≥ 100	0,48	0,41	0,34	0,30			
M16 / IG-M10	-	≥ 100							
M8	SH 12	80							
M8 / M10 /IG-M6	SH 16	≥ 85	0,47	0,26	_ 1)	_ 1)			
M12 / M16 / IG-M8 /IG-M10	SH 20	≥ 85	0,47	0,20	- '/	- '/			

¹⁾ no performance assessed

Chemofast Injection System VK, VK Nordic for masonry	
Performances solid calcium silica brick KS-NF Characteristic Resistances and Displacements	Annex C 8

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Calcium silica brick KSL-3DF

Table C19: Stone description

Brick type		Hollow calcium silica brick KSL-3DF		
Density	ρ [kg/dm³]	≥ 1,4		
Normalised mean compressive strenght	f _b [N/mm²]	≥ 14		
Conversion factor for low compressive strengths	ver	$(f_b / 14)^{0.75} \le 1.0$		
Code		EN 771-2:2011+A1:2015		
Producer (Country)		e.g. KS-Wemding (DE)		
Brick dimensions	[mm]	≥ 240 x 175 x 113		
Drilling method		Rotary drilling		



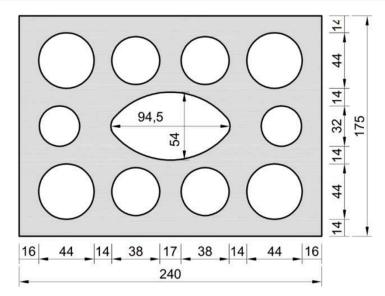


Table C20: Installation parameter

Table 020. Illatallativ	Table 020. Installation parameter										
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	T _{inst}	[Nm]	≤ 5	≤ 5	≤ 8	≤ 8	≤ 5	≤ 8	≤ 8		
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: $c_{cr} = 240$)								
Minimum Edge Distance	Cmin	[mm]	60								
Characteristic Spacing	Scr, II	[mm]	240								
Characteristic Spacing	Scr, ⊥	[mm]		120							
Minimum Spacing	Smin, II;	[mm]	mm] 120								
Williman Spacing	Smin, ⊥	[]	120								

Table C21: Reduction factors for single anchors at the edge

Tension load			Shear load							
'	ension load		Perpendic	ular to the fre	ee edge	Parallel to the free edge				
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II		
•	60	1,00	→	60	0,30	<u> </u>	60	1,00		
	120	1,00		240	1,00		120	1,00		

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow calcium silica brick KSL-3DF

Description of the stone, Installation parameters, Reductionfactors

Annex C 9



Brick type: Hollow Calcium silica brick KSL-3DF

Table C22: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
11	with c ≥	with s ≥	αg II, N	ļ <u>1</u>	with c ≥	with s ≥	$\alpha_{g\perp,N}$	
60 120 1,50		60	120	1,00				
	120	20 120 2,00	120 2,00		00	120	1,00	
	120	240	2,00		120	120	2,00	

Table C23: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load		with c ≥	with s ≥	αg II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
perpendicular		60	120	0,30		60	120	0,30
to the free		120	120	1,00		00	120	0,30
edge		120	240	2,00		240	120	2,00
Shear load		with c ≥	with s ≥	αg II,V II	+	with c ≥	with s ≥	αg ⊥,V II
parallel to the	••	60	120	1,00	•	60	120	1,00
free edge		120	120	1,60		60	120	1,00
	·	120	240	2,00		120	120	2,00

Table C24: Characteristic values of tension and shear load resistances

		Effecitve Anchorage depth		Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$								
	0		Use condition									
Anchor size	d sleeve			d/d			d/d w/d w/w					
	Perforated sleeve		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
		h _{ef}	$N_{Rk,b} = N$	$_{Rk,p} = N_{Rk,b}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$J_{Rk,p} = N_{Rk,b}$	$_{p,c} = N_{Rk,p,c}$	V _{Rk,b} 2)			
		[mm]				[kN]						
		Normalis	ed mean c	ompressi	ve strength	f _b ≥ 14 N/	mm² 1)					
M8 / M10/	SH 16	≥ 85	2,5	2,5	1,5	2,5	2,5	1,5	6,0			
IG-M6	SH 10	130	2,5	2,5	2,0	2,5	2,5	2,0	6,0			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	6,5	6,0	4,5	6,5	6,0	4,5	6,0			

¹⁾ 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.

Table C25: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2 *δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,			0,31	0,31*V _{Rk} / 3,5	1,5 *δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow calcium silica brick KSL-3DF Group factors, characteristic Resistances and Displacements	Annex C 10

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Calcium silica brick KSL-8DF

Table C26: Stone description

Brick type		Hollow Calcium silica brick KSL-8DF
Density	ρ [kg/dm³]	≥ 1,4
Normalised mean compressive strenght	f_b [N/mm ²]	≥ 12
Conversion factor for low compressive strengths	ver	$(f_b / 12)^{0.75} \le 1.0$
Code		EN 771-2:2011+A1:2015
Producer (Country)		e.g. KS-Wemding (DE)
Brick dimensions	[mm]	≥ 248 x 240 x 238
Drilling method		Rotary drilling



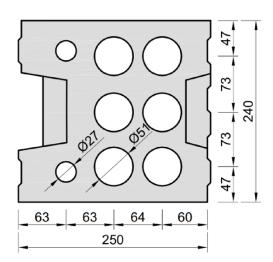


Table C27: Installation parameter

Anchor size		[-]	M8	M8 M10 M12 M16 IG-M6 IG-M8 IG-N							
Installation torque	Tinst	[Nm]	≤ 5	≤ 5	≤ 8	≤ 8	≤ 5	≤ 8	≤ 8		
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: $c_{cr} = 240$)								
Minimum Edge Distance	Cmin	[mm]	50								
-	Scr, II	[mm]		250							
Characteristic Spacing	Scr, ⊥	[mm]	120								
Minimum Spacing	Smin, II;	[mm]	50								
William Spacing	Smin, ⊥	[[,,,,,,,]	30								

Table C28: Reduction factors for single anchors at the edge

Tension load			Shear load							
'	ension load		Perpendic	ular to the fro	ee edge	Parallel to the free edge				
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II		
•	50	1,00	→	50	0,30] <u>•</u>	50	1,00		
	120	1,00		250	1,00		120	1,00		

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow calcium silica brick KSL-8DF

Description of the stone, Installation parameters, Reductionfactors

Annex C 11



Brick type: Hollow Calcium silica brick KSL-8DF

Table C29: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$lpha_{g\perp}$, N	
• •	50	50	1,00		50	50	1,00	
	120	250	2,00		120	120	2,00	

Table C30: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint				
Shear load	-	with c ≥	with s ≥	αg II,V ⊥	1	with c ≥	with s ≥	$\alpha_g \perp$, $\vee \perp$	
perpendicular	•••	50	50	0,45		50	50	0,45	
to the free		250	50	1,15		250	50	1,20	
edge	· · · · · · · · · · · · · · · · · · ·	250	250	2,00		250	250	2,00	
Shear load		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _g ⊥,ν II	
parallel to the		50	50	1,30		50	50	1,00	
free edge		120	250	2,00		120	250	2,00	

Table C31: Characteristic values of tension and shear load resistances

				Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$								
	0			Use condition								
	eve	Effecitve Anchorage depth					w/d		d/d			
	s S	Effecitve Anchorage depth		d/d			w/w		w/d			
Anchor size	g	<u>#</u> 5 5					w/w					
	Perforated sleeve	An							All			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	Temperature			
									ranges			
		h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b,p}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$_{p,c} = N_{Rk,p,c}$	$V_{Rk,b}^{2)}$				
		[mm]	[kN]									
		Normalis	ed mean d	ed mean compressive strength f _b ≥ 12 N/mm ^{2 1)}								
M8 / M10/ IG-M6	SH 16	130	5,0	4,5	3,5	5,0	4,5	3,5	3,5			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 130	5,0	4,5	3,5	5,0	4,5	3,5	6,0			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C26. For stones with higher strengths, the shown values are valid without conversion.

Table C32: Displacements

-							
Anchor size	hef	δn / N	δΝο	δN∞	δv / V	δνο	δ∨∞
Afficior Size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	, ,		0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow calcium silica brick KSL-8DF Group factors, characteristic Resistances and Displacements	Annex C 12

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Calcium silica brick KSL-12DF

Table C33: Stone description

	Hollow Calcium silica brick KSL-12DF
ρ [kg/dm³]	≥ 1,4
f _b [N/mm ²]	≥ 12
er compressive	$(f_b / 12)^{0.75} \le 1.0$
	EN 771-2:2011+A1:2015
	e.g. KS-Wemding (DE)
[mm]	≥ 498 x 175 x 238
	Rotary drilling
	f _b [N/mm²] er compressive



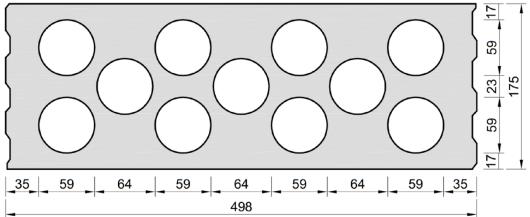


Table C34: Installation parameter

Anchor size	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	T _{inst}	[Nm]	≤ 4	≤ 4	≤ 5	≤ 5	≤ 4	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	Ccr; (Ccr,fi)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: $c_{cr} = 500$)						
Minimum Edge Distance	Cmin	[mm]	50						•
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]				500 (4 h _{ef})		
(under fire conditions)	Scr, ⊥; (Scr,fi, ⊥)	[mm]	120 (4 h _{ef})						
Minimum Spacing	Smin, II; Smin, ⊥	[mm] 50							

Table C35: Reduction factors for single anchors at the edge

Tension load			Shear load							
			Perpendic	ular to the fr	ee edge	Parallel to the free edge				
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II		
•	50	1,00		50	0,45	•	50	1,00		
	120	1,00		500	1,00		120	1,00		

Table C36: Factors for anchor groups under tension load

Anchor position	on parallel to he	or. joint		Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$\alpha_{g\perp\!\!\!\!\!\perp,N}$	
• •	50	50	1,50		50	50	1,00	
	120	500	2,00		120	240	2,00	

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow calcium silica brick KSL-12DF

Description of the stone, Installation parameters, Reductionfactors

Annex C 13

free edge



120

250

2,00

Brick type: Hollow Calcium silica brick KSL-12DF Table C37: Factors for anchor groups under shear load Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with c ≥ Shear load with s ≥ with c ≥ with s ≥ lphag II,V $oldsymbol{\perp}$ $\alpha_{\text{g}}\,\bot,\,\text{V}\,\bot$ perpendicular 50 50 0,55 50 50 0,50 to the free 500 50 1,00 500 50 1,00 edae 500 500 2,00 500 250 2,00 with c ≥ with s ≥ with c ≥ with s ≥ Shear load α_g II,V II $\alpha_{g\perp,V\;II}$ parallel to the 50 50 2,00 50 50 1,30

2,00

Table C38: Characteristic values of tension and shear load resistances

500

120

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	Ф	Effecitve Anchorage depth		Use condition								
	sleeve			d/d			w/d w/w					
Anchor size	tec	Anc Hill							All			
	Perforated	h _{ef}	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
									ranges			
			$N_{Rk,b} = N$	$N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c} \qquad N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c} \qquad V_{Rk,b} = N_{Rk,b,c} = $								
		[mm]		[kN]								
		Normalis	sed mean c	ompressi	ve strength	f _b ≥ 12 N/	mm² 1)					
M8 / M10/ IG-M6	SH 16	130	3,5	3,5	2,5	3,5	3,5	2,5	3,5			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 130	3,5	3,5	2,5	3,5	3,5	2,5	7,0			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C33. For stones with higher strengths, the shown values are valid without conversion.

Table C39: Displacements

<i>-</i>							
Anghar aiza	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	3,13			0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Table C40: Characteristic values of tension and shear load resistances under fire exposure

		Effective	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$						
Ancher eize	Perforated	anchorage depth							
Anchor size	sleeve	h _{ef}	R30	R60	R90	R120			
		[mm]	[kN]						
M8 / M10 /IG-M6	SH 16	130				_1)			
M12 / IG-M8	SH 20	≥ 130	0,37	0,27	0,17	- ' /			
M16 / IG-M10	SH 20	≥ 130				0,12			

¹⁾ no performance assessed

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow calcium silica brick KSL-12DF Group factors, characteristic Resistances and Displacements	Annex C 14

²⁾ V_{Rk,c II} = V_{Rk,c} + according to Annex C 3



Brick type: Solid clay brick 1DF

Table C41: Stone description

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

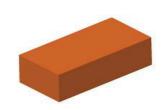


Table C42: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque T _{inst}		[Nm]	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Char. Edge distance	Ccr	[mm]	150 (for shear loads perpendicular to the free edge: $c_{cr} = 24$					240)	
Minimum Edge Distance	[mm]	60							
Characteristic Specing	Scr, II	[mm]	240						
Characteristic Spacing	Scr, ⊥	[mm]				130			
Minimum Spacing	Smin, II;	[mm]				65			
Willimum Spacing	Smin, ⊥	[111111]				00			

Table C43: Reduction factors for single anchors at the edge

Tension load			Shear load						
'	ension load		Perpendicular to the free edge			Parallel to the free edge			
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II	
	60	0,75		60	0,10		60	0,30	
	150	1,00		100	0,50	Ţ	100	0,65	
·	180	1,00		240	1,00		150	1,00	

Table C44: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N	1	with c ≥	with s ≥	αg ⊥, N	
	60	65	0,85	•	60	65	1,00	
• •	150	65	1,15		150	65	1,20	
	150	240	2,00		150	130	2,00	

Table C45: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load		with c ≥	with s ≥	α _g II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
perpendicular		60	65	0,40		60	65	0,30
to the free		240	65	2,00		240	65	2,00
edge		240	240	2,00		240	130	2,00
Shear load		with c ≥	with s ≥	α _g II,V II		with c ≥	with s ≥	α _{g ⊥,} ν II
parallel to the	60	65	1,75	•	60	65	1,10	
free edge		150	65	2,00	•	150	65	2,00
l liee eage		150	240	2,00		150	130	2,00

Chemofast Injection System VK, VK Nordic for masonry	
Performances solid clay brick 1DF Description of the stone, Installation parameters, Reduction- and Group factors	Annex C 15



Brick type: Sol	id clay	brick 1	DF								
Table C46: Ch	naracte	ristic val	ues of ter	sion and	shear loa	d resista	nces				
				Charac	cteristic Res	istances w	rith c≥c _{cr} a	and s ≥ s _{cr}			
	0					Use condit	ion				
)eve	tve age h					w/d		d/d		
Anchor size Sleeve		Effecitve Anchorage depth		d/d			w/d w/w				
		And							All		
	for		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C			
	Per								ranges		
	_	h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b,p}$	$_{,c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{p,c} = N_{Rk,p,c}$	$V_{Rk,b}^{2}$		
		[mm]		[kN]							
		Normalis	sed mean c	ompressi	ve strength	f _b ≥ 20 N/	mm² 1)				
M8	-	80									
M10 / IG-M6	-	≥ 90	7,0	6,0	6,0	7,0	6,0	6,0	8,0		
M12 / IG-M8	-	≥ 100									
M16 / IG-M10	-	≥ 100	8,0	6,5	6,5	8,0	6,5	6,5	12,0		
M8	SH 12	80									
M8 / M10/ IG-M6	SH 16	> 0.5	7,0	6,0	6,0	7,0	6,0	6,0	8,0		
M12 / IG-M8	SH 20	≥ 85									
M16 / IG-M10	SH 20	≥ 85	8,0	6,5	6,5	8,0	6,5	6,5	12,0		

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C41. For stones with higher strengths, the shown values are valid without conversion.

Table C47: **Displacements**

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	0,1*N _{Rk} / 3,5	2 *δN0	0,3	0,3*V _{Rk} / 3,5	1,5*δνο
M16	all	·	,		0,1	0,1*V _{Rk} /3,5	1,5*δvo

Chemofast Injection System VK, VK Nordic for masonry	
Performances solid clay brick 1DF Characteristic Resistances and Displacements	Annex C 16

²⁾ $V_{Rk,c | I} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Solid clay brick 2DF

Table C48: Stone description

Brick type		Solid clay brick Mz- 2DF	
Density	ρ [kg/dm³]	≥ 2,0	
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 28	
Conversion factor for lowe strengths	$(f_b / 28)^{0.5} \le 1.0$		
Code		EN 771-1:2011+A1:2015	
Producer (Country)		e.g. Wienerberger (DE)	
Brick dimensions	[mm]	≥ 240 x 115 x 113	
Drilling method		Hammer drilling	

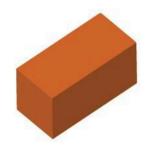


Table C49: Installation parameter

Anchor size	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	T _{inst}	[Nm]	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10		
Char. Edge distance	0 (0 %)	[mm]			•	150 (2 h _{ef})				
(under fire conditions)	C _{cr;} (C _{cr,fi})	[IIIIIII]	(for shear loads perpendicular to the free edge: $c_{cr} = 240$)								
Minimum Edge Distance	Cmin	[mm]	50								
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]	240 (4 h _{ef})								
(under fire conditions) $s_{cr, \perp; (S_{cr,fi, \perp})}$		[mm]	240 (4 h _{ef})								
Minimum Spacing	[mm]	50									

Table C50: Reduction factors for single anchors at the edge

7	Tension load		Shear load pe	rpendicular t	o free edge	Shear load parallel to free edge		
+	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II
	50 ¹⁾	1,00		50	0,20		50	1.00
	150 ¹⁾	1,00		125	0,50	Ţ	50	1,00
	180	1,00		240	1,00]	150	1,00

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

Table C51: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$lpha_g oldsymbol{\perp}$, N	
	50 ¹⁾	50	1,50		50 ¹⁾	50	0,80	
	150 ¹⁾	240	2,00		150 ¹⁾	240	2,00	
	180 ²⁾	60	1,00		180 ²⁾	60	1,00	
	180 ²⁾	240	1,55		180 ²⁾	100	2,00	
	240 ²⁾	240	2,00		100-7	120	2,00	

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

Table C52: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint			
Shear load		with c ≥	with s ≥	α _g II,V ⊥		with c ≥	with s ≥	$\alpha_{g\perp}, v_{\perp}$
1		50	50	0,40		50	50	0,20
perpendicular to the free	•••	240	50	1,20	-	240	50	0,60
edge		240	240	2,00		240	125	1,00
eage		240	240	2,00		240	240	2,00
Shear load		with c ≥	with s ≥	α _g 11,V 11		with c ≥	with s ≥	αg ⊥,V II
parallel to the free edge	• •	50	50	1,20	•	50	50	1,00
		150	240	2,00		50	125	1,00
nee eage				2,00		150	240	2,00

Chemofast Injection System VK, VK Nordic for masonry

Performances solid clay brick 2DF

Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 17

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



Brick type: Solid clay brick 2DF

Table C53: Characteristic values of tension and shear load resistances

Table Cos. Ci	iaracter	istic vai	ues or ter	ision and	Silear Ioa	u resista	lices					
			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	d sleeve	Perforated sleeve Effecitve Anchorage depth		Use condition								
Andread				d/d			d/d w/d w/w					
Anchor size	Perforate		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
		h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,t}$	$_{p,c} = N_{Rk,p,c}$	V _{Rk,b} 2)			
		[mm]				[kN]						
		Normalis	sed mean c	ompressi	ve strength	f _b ≥ 28 N/	mm² 1)					
M8	-	80						7.5	0.5			
M10 / IG-M6	-	≥ 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			
M16 / IG-M10	-	≥ 100	9,0	9,0	7,5	9,0	9,0	7,5	12 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	SH 12	80	0.0	0.0	7.5	0.0	0.0	7.5	0.5			
M8 / M10/ IG-M6	SH 16	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	9,5			
M12 / IG-M8	SH 20	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	12,0			
M16 / IG-M10	SH 20	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	12,0 ³⁾			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C48. For stones with higher strengths, the shown values are valid without conversion.

Table C54: Displacements

Anghor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	0,1*N _{Rk} / 3,5	2*δΝ0	0,3	0,3*V _{Rk} / 3,5	1,5*δνο
M16	all	,			0,1	0,1*V _{Rk} /3,5	1,5*δνο

Table C55: Characteristic values of tension and shear load resistances under fire exposure

		Effecitve	Characteristic Resistances						
Anchor size	Perforated	Anchorage depth	Anchorage depth $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$						
Anchor size	sleeve h _{ef}		R30	R60	R90	R120			
		[mm]	[kN]						
M8	-	80							
M10 / IG-M6	-	≥ 90	0,51	0,44	0,36	0,33			
M12 / IG-M8	-	≥ 100	0,51			0,33			
M16 / IG-M10	-	≥ 100							
M8	SH 12	80	0,36	0,26	0,15	0,10			
M8 / M10 /IG-	SH 16	≥ 85	0,36	0,26	0,15	0,10			
M6	SH 16	130	0,92	0,74	0,57	0,49			
M12 / M16 /	SH 20	≥ 85	0,36	0,26	0,15	0,10			
IG-M8 /IG-M10	3H ZU	≥ 130	0,92	0,74	0,57	0,49			

Chemofast Injection System VK, VK Nordic for masonry	
Performances solid clay brick 2DF Characteristic Resistances and Displacements	Annex C 18

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3

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



Brick type: Hollow clay brick 10 DF

Table C56: Stone description

Brick type		Hollow clay brick HLZ-10DF	
Density	ρ [kg/dm³]	≥ 1,25	
Normalised mean compressive strenght	f _b [N/mm²]	≥ 20	
Conversion factor for low strengths	$(f_b / 20)^{0.5} \le 1.0$		
Code		EN 771-1:2011+A1:2015	
Producer (Country)		e.g. Wienerberger (DE)	
Brick dimensions	[mm]	300 x 240 x 249	
Drilling method		Rotary drilling	



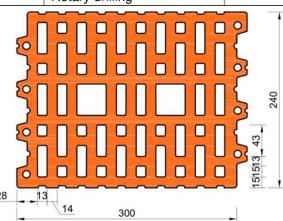


Table C57: Installation parameter

	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
T _{inst}	[Nm]	≤ 5	≤ 10	≤ 10	≤ 10	≤ 5	≤ 5	≤ 10
Cer; (Cer,fi)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 300)						
Cmin	[mm]	<u> </u>						
Scr, II; (Scr,fi, II)	[mm]	300 (4 h _{ef})						
$Scr, \perp; (Scr,fi, \perp)$	[mm]	250 (4 h _{ef})						
Smin, II; Smin, ⊥	[mm]	50						
	Ccr; (Ccr,fi) Cmin Scr, II; (Scr,fi, II) Scr, ⊥; (Scr,fi, ⊥)	$\begin{array}{ccc} T_{inst} & [Nm] \\ \\ C_{cr;}(C_{cr,fi}) & [mm] \\ \\ C_{min} & [mm] \\ \\ S_{cr,\; l;}(S_{cr,fi,\; l}) & [mm] \\ \\ S_{cr,\; \bot;}(S_{cr,fi,\; \bot}) & [mm] \\ \end{array}$	$\begin{array}{c c} T_{inst} & [Nm] & \leq 5 \\ \hline c_{cr;}(c_{cr,fi}) & [mm] & (for s) \\ \hline c_{min} & [mm] \\ \hline s_{cr, ll;}(s_{cr,fi, ll}) & [mm] \\ \hline s_{cr, \bot;}(s_{cr,fi, \bot}) & [mm] \\ \hline \end{array}$	$ \begin{array}{c cccc} T_{inst} & [Nm] & \leq 5 & \leq 10 \\ \hline C_{cr;}(C_{cr,fi}) & [mm] & \\ \hline C_{min} & [mm] \\ \hline S_{cr, II;}(S_{cr,fi, II}) & [mm] \\ \hline S_{cr, $	$\begin{array}{c cccc} T_{inst} & [Nm] & \leq 5 & \leq 10 & \leq 10 \\ \hline C_{cr;}(C_{cr,fi}) & [mm] & \\ \hline C_{min} & [mm] & \\ \hline S_{cr, II;}(S_{cr,fi, II}) & [mm] & \\ \hline S_{cr, \bot;}(S_{cr,fi, \bot}) & [mm] & \\ \hline \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

Table C58: Reduction factors for single anchors at the edge

,	Tension load			Shear load							
<u>'</u>	ension load		Perpendic	ular to the fro	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V ⊥		with c ≥	αedge, V II			
•	50	1,00		50	0,20	<u> </u>	50	1,00			
	120	1,00		300	1,00		120	1,00			

Table C59: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	αg⊥, N	
• •	50	50	1,55		50	50	1,00	
	120	300	2,00		120	250	2,00	

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick HLZ 10DF

Description of the stone, Installation parameters, Reductionfactors

Annex C 19



Brick type: Hollow clay brick 10 DF											
Table C60:	Table C60: Factors for anchor groups under shear load										
	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint						
Shear load perpendicular to the free		with c ≥	with s ≥	α _g II,V ⊥	-t	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$			
	•••	50	50	0,30		50	50	0,20			
		300	50	1,40		300	50	1,00			
edge		300	300	2,00		300	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	•	50	50	1,85		50	50	1,00			
free edge		120	300	2,00		120	250	2,00			

Table C61: Characteristic values of tension and shear load resistances

				Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$								
	0	Effective Anchorage depth		Use condition								
	eve.						w/d		d/d			
	sle	ffectiv chora depth		d/d			w/w		w/d			
Anchor size	g	iffe Ich de					w/w					
Anchor Size	Perforated sleeve	An							All			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
									ranges			
		h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$V_{Rk,b}^{2)}$					
		[mm]				[kN]						
		Normalis	sed mean c	ompressi	ve strength	f _b ≥ 20 N/	mm² 1)					
M8	SH 12	80	0.5	0.5	0.0	0.5	0.5	0.0	0.0			
M8 / M10/ IG-M6	SH 16	≥ 85	2,5	2,5	2,0	2,5	2,5	2,0	8,0			
M12 / IG-M8	SH 20	≥ 85	5,0	5,0	4,5	5,0	5,0	4,5	8,0			
M16 / IG-M10	SH 20	≥ 85	5,0	5,0	4,5	5,0	5,0	4,5	11,5			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C56. For stones with higher strengths, the shown values are valid without conversion.

Table C62: Displacements

Anchor size	hef	δη / Ν	δΝ0	δN∞	δv / V	δνο	δ∨∞
Afficion size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all				0,31	0,31*V _{Rk} / 3,5	1,5 *δvo

Table C63: Characteristic values of tension and shear load resistances under fire exposure

		Effecitve	Characteristic Resistances					
Anchor size	Perforated	Anchorage depth	$pth \qquad \qquad N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$					
	sleeve	h _{ef}	R30	R60	R90	R120		
		[mm]	[kN]					
M8 / M10 /IG-M6	SH 16	130						
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130	0,57	0,39	0,21	0,12		

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick HLZ 10DF Group factors, characteristic Resistances and Displacements	Annex C 20

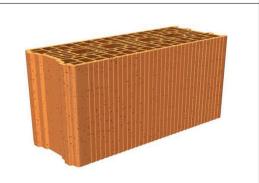
²⁾ $V_{Rk,c | II} = V_{Rk,c} \perp according to Annex C 3$



Brick type: Hollow Clay brick Porotherm Homebric

Table C64: Stone description

	Hollow clay brick Porotherm Homebric			
ρ [kg/dm³]	≥ 0,70			
f _b [N/mm²]	≥ 10			
Conversion factor for lower compressive strengths				
	EN 771-1:2011+A1:2015			
	e.g. Wienerberger (FR)			
[mm]	500 x 200 x 300			
	Rotary drilling			
	f _b [N/mm²] wer compressive			



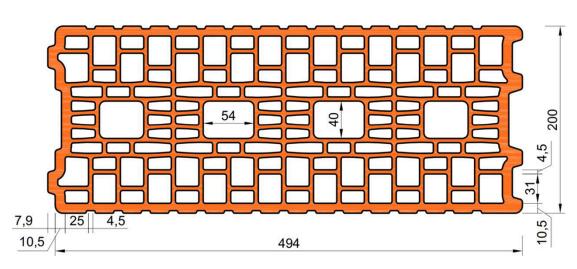


Table C65: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	T _{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2		
Char. Edge distance	Ccr	[mm]	, , , , , , , , , , , , , , , , , , , ,								
Minimum Edge Distance	Cmin	[mm]	120								
Characteristic Spacing	Scr, II	[mm]	500								
Characteristic Spacing	Scr, ⊥	[mm]	300								
Minimum Spacing	Smin, II;	[mm]	120								
Timming Spasing	Smin, ⊥	[]				0					

Table C66: Reduction factors for single anchors at the edge

Tension load		Shear load						
Tension load			Perpendicular to the free edge Parallel to the free edg				edge	
1	with c ≥	αedge, N	1	with c ≥	αedge, V⊥		with c ≥	αedge, V II
	120	1,00		120	0,30		120	0,60
	120	1,00		250	0,60	Ţ	120	0,00
- i	120	1,00		500	1,00		200	1,00

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick Porotherm Homebric

Description of the stone, Installation parameters, Reductionfactors

Annex C 21



Brick type: Hollow Clay brick Porotherm Homebric

Table C67: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint					
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	αg⊥, N		
	120	100	1,00	•	120	100	1,00		
	200	100	2,00		200	100	1,20		
· james and harmond	120	500	2,00	i	120	300	2,00		

Table C68: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint								
		with c ≥	with s ≥	αg II,V ⊥		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$					
Shear load		120	100	0,30		120	100	0,30					
perpendicular to the free	• • •	250	100	0,60		250	100	0,60					
edge		500	100	1,00		120	300	2,00					
		120	500	2,00		120	300	2,00					
Shear load parallel to the free edge		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _{g ⊥,} ν II					
	• •	120	100	1,00		120	100	1,00					
		120	500	2,00		120	300	2,00					

Table C69: Characteristic values of tension and shear load resistances

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
		Effective Anchorage depth		Use condition								
	Perforated sleeve		4/4				w/d		d/d w/d			
Anchor size	ls p			d/d			w/w					
Afficitor Size	rate	ΑĀ							All			
	Ţ.		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
	l Be								ranges			
		h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b,p}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{p,c} = N_{Rk,p,c}$	$V_{Rk,b}^{(2)}$			
		[mm]				[kN]						
		Normalis	sed mean compressive strength f _b ≥ 10 N/mm ^{2 1)}									
M8	SH 12	80			1,	2			3,0			
M8 / M10/	SH 16	≥ 85		1,2					3,0			
IG-M6	SH 16	130	1,5				3,5					
M12 / M16/	SH 20	≥ 85		1,2								
IG-M8 / IG-M10	311 20	≥ 130			1,	5			4,0			

¹⁾ 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.

Table C70: Displacements

Anchor size	hef	δn / N	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	,		0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Porotherm Homebric Group factors, characteristic Resistances and Displacements	Annex C 22

²⁾ $V_{Rk,c | I} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Clay brick BGV Thermo Table C71: **Stone description** Hollow clay brick Brick type **BGV Thermo** Density ρ [kg/dm³] ≥ 0,60 Normalised mean f_b [N/mm²] ≥ 10 compressive strenght Conversion factor for lower compressive $(f_b / 10)^{0.5} \le 1.0$ strengths EN 771-1:2011+A1:2015 Code Producer (Country) e.g. Leroux (FR) [mm] Brick dimensions 500 x 200 x 314 Drilling method Rotary drilling

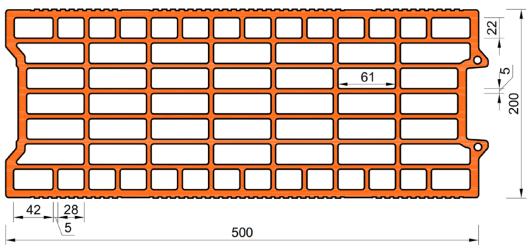


Table C72: Installation parameter											
Anchor size	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	T _{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2		
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: $c_{cr} = 500$)								
Minimum Edge Distance	Cmin	[mm]	120								
Characteristic Spacing	Scr, II	[mm]	500								
Characteristic Spacing	Scr, ⊥	[mm]				315					
Minimum Spacing	[mm]	120									

Table C73:	Reducti	on factors	for single an	chors at th	ie edge					
Tension load			Shear load							
'	ension load		Perpendic	ular to the fro	ee edge	Parallel to the free edge				
	with c ≥	αedge, N	1	with c ≥	αedge, V⊥	+	with c ≥	αedge, V II		
	120	1.00		120	0,30		120	0,60		
	120	1,00		250	0,60	Ţ	120	0,00		
	120	1,00		500	1,00		250	1,00		

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick BGV Thermo Description of the stone, Installation parameters, Reductionfactors	Annex C 23



Brick type: Hollow Clay brick BGV Thermo

Table C74: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
1	with c ≥	with s ≥	αg II, N	ļ <u>-</u>	with c ≥	with s ≥	α _{g ⊥, N}	
	120	100	1,00	•	120	100	1,00	
	200	100	1,70		200	100	1,10	
	120	500	2,00		120	315	2,00	

Table C75: Factors for anchor groups under shear load

1	Table 6.6. Table 10. anone groups and a rough												
	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint								
Shear load		with c ≥	with s ≥	αg II,V ⊥		with c ≥	with s ≥	$\alpha_g \perp$, $\vee \perp$					
perpendicular to the free	•••	120	100	1,00	-	120	100	1,00					
edge		120	500	2,00		120	315	2,00					
Shear load		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _{g ⊥,} ν II					
parallel to the	•	120	100	1,00]	120	100	1,00					
free edge		120	500	2,00		120	315	2,00					

Table C76: Characteristic values of tension and shear load resistances

			Characteristic Resistances with c ≥ c _{cr} and s ≥ s _{cr}								
			Use condition								
	eve	Effecitve Anchorage depth					w/d		d/d		
	sle	ffecity Ichora depth		d/d			w/w		w/d		
A	ō	를 당 용					•••		w/w		
Anchor size	ate	A A							All		
	Perforated sleeve	ertor	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature		
									ranges		
		h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$_{o,c} = N_{Rk,p,c}$	$V_{Rk,b}^{2)}$			
		[mm]				[kN]					
		Normalis	sed mean compressive strength f _b ≥ 10 N/mm ^{2 1)}								
M8	SH 12	80			0,	9			3,5		
M8 / M10/	SH 16	≥ 85			0,	9			3,5		
IG-M6	SH 10	130	2	,0	1,5	2	:,0	1,5	4,0		
M12 / M16	SH 20	≥ 85		0,9					4,0		
IG-M8 / IG-M10	3H 20	≥ 130	2	,0	1,5	2	2,0	1,5	4,0		

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C71. For stones with higher strengths, the shown values are valid without conversion.

Table C77: Displacements

Anghar siza	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	- ,	, , ,	_ = 5.1.5	0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick BGV Thermo Group factors, characteristic Resistances and Displacements	Annex C 24

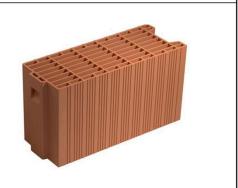
²⁾ $V_{Rk,c II} = V_{Rk,c} \perp according to Annex C 3$



Brick type: Hollow Clay brick Calibric R+

Table C78: Stone description

Brick type		Hollow clay brick Calibric R+
Density	ρ [kg/dm³]	≥ 0,60
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 12
Conversion factor for low strengths	ver compressive	$(f_b / 12)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Leroux (FR)
Brick dimensions	[mm]	500 x 200 x 314
Drilling method		Rotary drilling



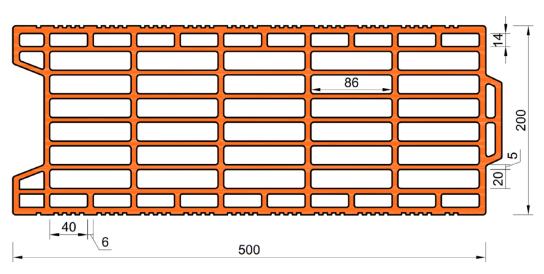


Table C79: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	T _{inst}	[Nm]] \(\leq 2 \) \(\							
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)							
Minimum Edge Distance	Cmin	[mm]	120							
Characteristic Spacing	Scr, II	[mm]	500							
Characteristic Spacing	Scr, ⊥	[mm]	315							
Minimum Spacing	Smin, II;	[mm]	120							
	Smin, ⊥									

Table C80: Reduction factors for single anchors at the edge

Tension load			Shear load						
			Perpendic	ular to the fr	ee edge	Parallel to the free edge			
	with c ≥	αedge, N	!	with c ≥	αedge, V⊥		with c ≥	αedge, V II	
	120	1,00		120	0,15		120	0,30	
	120	1,00		250	0,30	Ţ	120	0,30	
	120	1,00		500	1,00		250	1,00	

Performances hollow clay brick Calibric R+

Description of the stone, Installation parameters, Reductionfactors

Annex C 25



Brick type: Hollow Clay brick Calibric R+

Table C81: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	pint	Ancho	r position perp	endicular to ho	r. joint
1	with c ≥	with s ≥	αg II, N	+	with c ≥	with s ≥	α _{g ⊥, N}
	120	100	1,00		120	100	1,00
	175	100	1,70		175	100	1,10
- in the second	120	500	2,00		120	315	2,00

Table C82: Factors for anchor groups under shear load

	<u> </u>									
	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint					
Shear load		with c ≥	with s ≥	αg II,V ⊥		with c ≥	with s ≥	$\alpha_g \perp$, $\vee \perp$		
perpendicular to the free	•••	120	100	1,00	-	120	100	1,00		
edge		120	500	2,00		120	315	2,00		
Shear load		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _{g ⊥,} ν II		
parallel to the	• •	120	100	1,00		120	100	1,00		
free edge		120	500	2,00		120	315	2,00		

Table C83: Characteristic values of tension and shear load resistances

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
			Use condition									
Anchor size	Perforated sleeve	Effective Anchorage depth		d/d			d/d w/d w/w					
	rate	A F							All			
	ا و		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
	er								ranges			
		h _{ef}	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	N _{Rk,b} = N	$V_{Rk,b}^{2}$					
		[mm]		[kN]								
		Normalis	sed mean	compressi	ve strengt	h f _b ≥ 12 N	/mm² 1)					
M8	SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	4,0			
M8 / M10/	CH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	5,5			
IG-M6 SH 16	130	1,5	1,5	1,2	1,5	1,5	1,2	5,5				
M12 / M16	SH 20	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	8,5			
IG-M8 /IG-M10	SH 20	≥ 130	1,5	1,5	1,2	1,5	1,5	1,2	8,5			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C78. For stones with higher strengths, the shown values are valid without conversion.

Table C84: Displacements

Anghor size	hef	δ_N / N	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2 *δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all		,		0,31	0,31*V _{Rk} / 3,5	1,5*δvo

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow Clay brick Calibric R+ Group factors, characteristic Resistances and Displacements	Annex C 26

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Clay brick Urbanbric Table C85: Stone description Hollow clay brick Brick type Urbanbric Density ≥ 0,70 ρ [kg/dm³] Normalised mean $f_b [N/mm^2]$ ≥ 12 compressive strenght Conversion factor for lower compressive $(f_b / 12)^{0.5} \le 1.0$ strengths EN 771-1:2011+A1:2015 Code Producer (Country) e.g. Imerys (FR) **Brick dimensions** [mm] 560 x 200 x 274 Drilling method Rotary drilling 5,5 Ø40 5 Ó, 63 40_ 9,5 560 Table C86: Installation parameter Anchor size IG-M6 IG-M8 IG-M10 [-] M8 M10 M12 M₁₆ ≤ 2 ≤ 2 ≤ 2 ≤ 2 Installation torque Tinst [Nm] ≤ 2 ≤ 2 ≤ 2 Char. Edge distance 120 (for shear loads perpendicular to the free edge: $c_{cr} = 500$) [mm] Ccr Minimum Edge Distance 120 [mm] Cmin [mm] 560 Scr, II Characteristic Spacing 275 [mm] Scr, ⊥ Smin, II; Minimum Spacing [mm] 100 Smin, ⊥ Reduction factors for single anchors at the edge Table C87: Shear load Tension load Perpendicular to the free edge Parallel to the free edge with c ≥ with c ≥ with c ≥ α edge, V \perp αedge, V II αedge, N 120 0,25 120 1,00 120 0,50 250 0,50 500 120 1.00 250 1.00 1.00 Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick Urbanbric
Description of the stone, Installation parameters, Reductionfactors

Annex C 27



Brick type: Hollow Clay brick Urbanbric Table C88: Factors for anchor groups under tension load Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with s ≥ with c ≥ with s ≥ with c ≥ αg II, N $\alpha_{g\perp\!,\;N}$ 120 100 1,00 120 100 1,00 185 100 1,90 185 100 1,10 120 560 2.00 120 275 2.00

Table C89: Factors for anchor groups under shear load Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with c ≥ with s ≥ with c ≥ with s ≥ Shear load αg II,V ⊥ $\alpha_{g\,\perp,\,V\,\perp}$ perpendicular 120 100 1.00 120 100 1.00 to the free 2,00 120 560 2,00 120 275 edge with c ≥ with s ≥ with c ≥ with s ≥ αg II,V II αg ⊥,V II Shear load 120 100 120 100 1,00 1,00 parallel to the free edge 120 560 2,00 120 275 2,00

Table C90: Characteristic values of tension and shear load resistances										
			Characteristic Resistances with c ≥ c _{cr} and s ≥ s _{cr}							
	0					Use condit	ion			
	Perforated sleeve	Effective Anchorage depth	d/d					d/d w/d w/w		
Auchor size Such a size		erforate E An	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges	
	"	h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{R_{k,b,p}}$	$c = N_{Rk,p,c}$	N _{Rk,b} = N	$N_{\text{Rk},\text{b}} = N_{\text{Rk},\text{p}} = N_{\text{Rk},\text{b},\text{c}} = N_{\text{Rk},\text{p},\text{c}}$			
		[mm]				[kN]				
		Normalis	sed mean c	ompressi	ve strength	f _b ≥ 12 N/	mm² 1)			
M8	SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	4,5	
M8 / M10/	SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	4,5	
IG-M6	SH 10	130	3,0	3,0	2,5	3,0	3,0	2,5	4,5	
M12 / M16	SH 20	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	5,0	
IG-M8 / IG-M10		≥ 130	3,0	3,0	2,5	3,0	3,0	2,5	5,0	

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C85. For stones with higher strengths, the shown values are valid without conversion.

Table C91: Displacements

Anghar siza	hef	δη / Ν	δΝ0	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all]	,	- 5,10	0,31	0,31*V _{Rk} / 3,5	1,5*δvo

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Urbanbric Group factors, characteristic Resistances and Displacements	Annex C 28

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Clay brick Brique creuse C40

Table C92: Stone description

Brick type		Hollow clay brick Brique creuse C40
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 12
Conversion factor for low strengths	er compressive	$(f_b / 12)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Terreal (FR)
Brick dimensions	[mm]	500 x 200 x 200
Drilling method		Rotary drilling



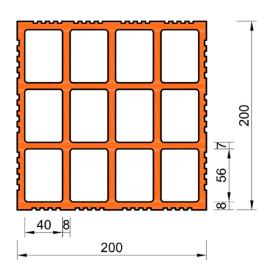


Table C93: Installation parameter

The second secon											
Anchor size	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	T _{inst}	[Nm]	≤2 ≤2 ≤2 ≤2 ≤2 ≤2 ≤2 ≤2 = 2 = 2 = 2 = 2						≤ 2		
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 500)								
Minimum Edge Distance	Cmin	[mm]	120								
Characteristic Spacing	Scr, II	[mm]	500								
Characteristic Spacing	Scr, ⊥	[mm]		200							
Minimum Spacing	[mm]	200									
Williman Spacing	Smin, ⊥	[111111]		200							

Table C94: Reduction factors for single anchors at the edge

T	ension load					Shea	r load			
				Perpendic	Perpendicular to the free edge Parallel to the free edge					
		with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II	
	•	120	1,00		120	0,83	1 !	120	1,00	
25		120	1,00		500	1,00		250	1,00	

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Brique Creuse C40 Description of the stone, Installation parameters, Reductionfactors	Annex C 29



Table C95:	Factors	for ancho	or aro	Jups ur	nder ten	sion I	oad					
	nor position							nor po	sition perp	endicul	ar to hor.	joint
	with c ≥	with	s≥	αg	ı II, N				with c ≥	h c ≥ with s ≥		α _{g ⊥, N}
••	120	50	0	0 2,00			•		120	20	00	2,00
Table C96:	Factors	or gro	ups ur	nder she	ear loa	ad						
		hor positio						ncho	r position p	erpendi	cular to h	or. joint
Shear load		with	2 ≥	with s ≥	≥ ag II,	, Λ Τ	L		with c	≥ \	with s ≥	$\alpha_{g\perp,V\perp}$
perpendicular to the free edge		120)	500	2,0	00		•	120		200	2,00
Shear load		with	2 ≥	with s ≥	≥ α _{g II}	,V II			with c	≥ \	with s ≥	αg ⊥,V II
parallel to the free edge	allel to the)	500	2,0			‡	120		200	2,00
Table C97:	Characte	eristic va	lues o	of tens						·		
					Charac	cteristic			es with c≥	c _{cr} and	s ≥ s _{cr}	
	l ske	e Ge						Jse c	ondition		d/d	
Anchor size	ed slee	ated sleeve Effective Anchorage		d/d					w/ w/			w/d w/w
Allohor 6/20	Perforated sleeve	A F		/24°C 80	0°C/50°C	120°C/	72°C	40°C/	24°C 80°C/5	0°C 120	0°C/72°C	All temperatu ranges
		h _{ef}	NR	$k_{a,b} = N_{Rk}$	$k_{p} = N_{Rk,b}$	c = N _{Rk}	,p,c	N _{Rk}	$_{b} = N_{Rk,p} = I$	V _{Rk,b,c} =	N _{Rk,p,c}	V _{Rk,b} 2)
		[mm]	[kN]									
			sed m	ean cor	mpressiv	ve stre	ngth	f _b ≥ 1	12 N/mm ^{2 1)}			
M8 / M4 0 /	SH 12	2 80	-									
M8 / M10/ IG-M6 M12 / M16 /	SH 16	5 ≥ 85	1	,2	1,2	1,2 0,9		1,2 1,2		2	0,9	1,5
IG-M8 / IG-M1) ≥ 85										
 For lower corwith higher st V_{Rk,c II} = V_{Rk,c} 	trengths, the	shown valu	ues are				e conv	/ersioi	n factor acco	rding to	Table C92	?. For stones
Table C98:	Displace											
A a.la a	<u> </u>	hef	δι	N/N	δη	10	81	V∞	δν / V		δνο	δ∨∞
Ancho	r size	[mm] [m	m/kN]	[mı	m]	[m	ım]	[mm/kN]		[mm]	[mm]
1 – 8M		all							0,55	0,55	*V _{Rk} / 3,5	1,5*δv
IG-M6 · M1		all	- '	0,13	0,13*Ni	_{Rk} / 3,5	2*8	δN0	0,31	0.31	*V _{Rk} / 3,5	1,5*δν
									6,0.	, ,,,,	***************************************	1,000
Chemofast Inj	ection Sys	stem VK, V	/K No	rdic for	masonr	у						



Brick type: Hollow Clay brick Blocchi Leggeri

Table C99: Stone description

Brick type		Hollow clay brick Blocchi Leggeri
Density	ρ [kg/dm³]	≥ 0,60
Normalised mean compressive strenght	f _b [N/mm²]	≥ 12
Conversion factor for low strengths	er compressive	$(f_b / 12)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (IT)
Brick dimensions	[mm]	250 x 120 x 250
Drilling method		Rotary drilling



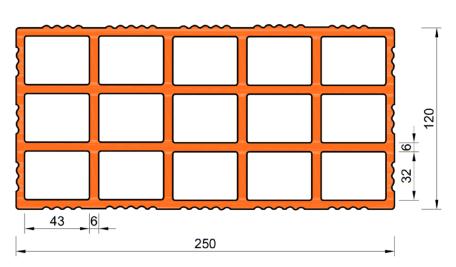


Table C100: Installation parameter

Table 0 100: Illotaliati	able 0100. Instantation parameter								
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	Tinst	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	Ccr	[mm]	120	(for shear	loads perp	endicular t	the free	edge: c _{cr} =	250)
Minimum Edge Distance	Cmin	[mm]	60						
Characteristic Spacing	Scr, II	[mm]				250			
Characteristic Spacing	Scr, ⊥	[mm]	250						
Minimum Spacing	Smin, II;	[mm]				100			
1	Smin, ⊥	[]							

Table C101: Reduction factors for single anchors at the edge

т	Tension load			Shear load								
'	ension load		Perpendic	ular to the fr	ee edge	Paralle	el to the free	to the free edge				
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II				
•	60	1,00		60	0,40	1 •	60	0,40				
	120	1,00		250	1,00		120	1,00				

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Blocchi Leggeri Description of the stone, Installation parameters, Reductionfactors	Annex C 31

Shear load

free edge

parallel to the



with c ≥

60

120

120

with s ≥

100

100

250

 $\alpha_g \perp$, ν II

0,40

1,00

2,00

Brick type: Hollow Clay brick Blocchi Leggeri Table C102: Factors for anchor groups under tension load Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with c ≥ with s ≥ with c ≥ with s ≥ $\alpha_{g\perp\!\!\!\!\!\!\perp,\;N}$ α_g II, N 60 100 1,00 60 100 2,00 120 250 2,00 120 250 2,00 Factors for anchor groups under shear load Table C103: Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with c ≥ with s ≥ with c ≥ with s ≥ α_g II,V \perp $\alpha_{g\,\perp,\,V\,\perp}$ Shear load 0,40 perpendicular 60 100 60 100 0,40 to the free 250 100 1,00 250 100 1,00 edge 250 250 2,00 250 250 2,00

αg II,V II

0,40

1,00

2,00

Tubic Oloti. Olialacteristic values of terision and silear reastances	Table C104:	Characteristic values of tension and shear load resistances
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with s ≥

100

100

250

with c ≥

60

120

120

Table C104: Cr	iaractei	istic vai	ues of ten	ision and	snear ioa	a resista	nces					
			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	0		Use condition									
Anchor size	ed sleeve	Effective Anchorage depth	d/d				w/d w/w		d/d w/d w/w			
Androi Size	Perforated sleeve Effective Anchorage	An	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
	_	h _{ef}	$N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ $N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$						$V_{Rk,b}^{2)}$			
		[mm]		[kN]								
		Normalis	sed mean c	ompressiv	ve strength	f _b ≥ 12 N/	mm² ¹⁾					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	0,6	0,6	0,6	0,6	0,6	0,6	3,5			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85			- , -							

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C99. For stones with higher strengths, the shown values are valid without conversion.

Table C105: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm] [mm]		[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2 *δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δvo
M16	all	,	,	_ = 1.10	0,31	0,31*V _{Rk} / 3,5	1,5 *δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Blocchi Leggeri Group factors, characteristic Resistances and Displacements	Annex C 32

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow Clay brick Doppio Uni

Table C106: Stone description

Brick type		Hollow clay brick Doppio Uni
Density	ρ [kg/dm³]	≥ 0,90
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 28
Conversion factor for lowe strengths	er compressive	$(f_b / 28)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (IT)
Brick dimensions	[mm]	250 x 120 x 120
Drilling method		Rotary drilling



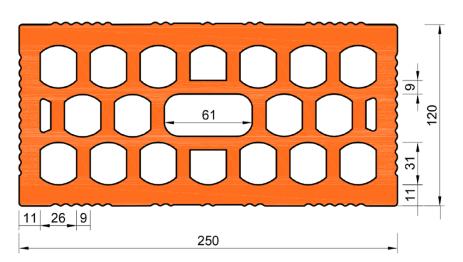


Table C107: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T _{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 250)						
Minimum Edge Distance	Cmin	[mm]	100						
Characteristic Spacing	Scr, II	[mm]				250			
Characteristic Spacing	Scr, ⊥	[mm]	120						
Minimum Spacing Smin, II; Smin, 1		[mm]	100						
		[[[]]]				100			

Table C108: Reduction factors for single anchors at the edge

Tension load				Shear load							
'	ension load		Perpendic	Perpendicular to the free edge Parallel to the free edge							
	with c ≥	αedge, N		with c ≥	αedge, V ⊥		with c ≥	αedge, V II			
•	100	1,00	→	100	0,50	<u> </u>	100	1,00			
	120	1,00		250	1,00		120	1,00			

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Doppio Uni Description of the stone, Installation parameters, Reductionfactors	Annex C 33



Brick type: Hollow Clay brick Doppio Uni

Table C109: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$\alpha_{g\perp,N}$	
• •	100	100	1,00		100	120	2,00	
	120	250	2,00		120	120	2,00	

Table C110: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load		with c ≥	with s ≥	α _g II,V ⊥		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
perpendicular	•••	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 ≥	$\alpha_{g\perp,V}$ II
parallel to the	• •	100	100	1,00		100	100	1,00
free edge		120	250	2,00		120	120	2,00

Table C111: Characteristic values of tension and shear load resistances

				Characteristic Res			istances with c ≥ c _{cr} and s ≥ s _{cr}					
	0	-		Use condition								
Anchor size	Perforated sleeve	Effective Anchorage depth	ffective chorage depth	ffective chorage depth	ffective chorage depth		d/d		w/d w/w d/d w/w			w/d
Anchor size	erforate	An	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
	"	h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b,}$	$c = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	V _{Rk,b} 2)			
		[mm]				[kN]						
		Normalis	sed mean c	ompressiv	e strength	f _b ≥ 28 N/	mm² 1)					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	2,5			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85										

¹⁾ 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: Displacements

Anghor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13			0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	,,	2*δΝ0	0,31	0,31*V _{Rk} / 3,5	1,5*δνο

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Doppio Uni Group factors, characteristic Resistances and Displacements	Annex C 34

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow clay brick Coriso WS07 with insulation

Table C113: Stone description

Brick type		Hollow clay brick Coriso WS07
Insulationmaterial		Rock wool
Density	ρ [kg/dm³]	≥ 0,55
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 6
Conversion factor for lowe strengths	r compressive	$(f_b / 6)^{0,5} \le 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)	-	e.g. Unipor (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



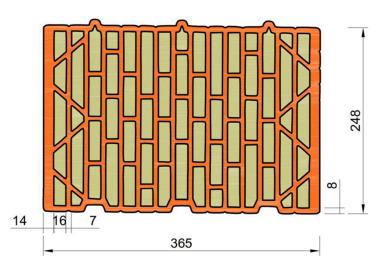


Table C114: Installation parameter

Table Citin Instanti	o pa	4								
Anchor size		[-]	M8	M8 M10 M12 M16 IG-M6 IG-M8 IG-						
Installation torque	Tinst	[Nm]	≤5 ≤5 ≤10 ≤5 ≤5 ≤5							
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: ccr = 250)							
Minimum Edge Distance	Cmin	[mm]	50							
Characteristic Spacing	Scr, II	[mm]	250							
Characteristic Spacing	Scr, ⊥	[mm]				250				
Minimum Spacing	Smin, II;	[mm]	mml 50							
- William Spacing	Smin, ⊥	[111111]				30				

Table C115: Reduction factors for single anchors at the edge

,	Tension load			Shear load							
'	ension load		Perpendic	ular to the fro	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00	→	50	0,30	1 !	50	1,00			
	120	1,00		250	1,00		120	1,00			

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick Coriso WS07 with insulationDescription of the stone, Installation parameters, Reduction factors

Annex C 35



Brick type: Hollow clay brick Coriso WS07 with insulation

Table C116: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint					
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$\alpha_{g\perp,N}$		
• •	50	50	1,50		50	50	1,00		
	120	250	2,00		120	250	2,00		

Table C117: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint				
Shear load perpendicular to the free edge		with c ≥	with s ≥	α _g II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$	
	50	50	0,40		50	50	0,40		
	250	50	1,00		250	50	1,20		
	· ;	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 ⊥,ν II	
parallel to the	el to the	50	50	1,65		50	50	1,00	
free edge		120	250	2,00		120	250	2,00	

Table C118: Characteristic values of tension and shear load resistances

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	0	Effective Anchorage depth		Use condition								
Anchor size	Perforated sleeve			d/d			d/d w/d w/w					
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
		h _{ef}	$N_{Rk,b} = N$	$N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ $N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$								
		[mm]				[kN]						
		Normali	sed mean d	compressi	ve strengtl	n f _b ≥ 6 N/n	nm² ¹⁾					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	1,5	1,5	1,5	1,5	1,5	1,5	5,0			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85										

¹⁾ 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.

Table C119: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	,		0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow Clay brick Coriso WS07 with insulation Group factors, characteristic Resistances and Displacements	Annex C 36

²⁾ V_{Rk,c II} = V_{Rk,c} + according to Annex C 3



Brick type: Hollow clay brick T7 MW with insulation

Table C120: Stone description

Brick type		Hollow clay brick T7 MW
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,59
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 8
Conversion factor for lowe strengths	er compressive	$(f_b / 8)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



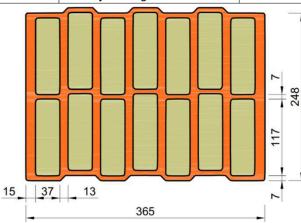


Table C121: Installation parameter

	•									
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10	
Installation torque	nstallation torque T _{inst}			≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5	
Char. Edge distance	[mm]				120 (2 h _{ef})				
(under fire conditions)	[iiiiii	(for shear loads perpendicular to the free edge: $c_{cr} = 250$)								
Minimum Edge Distance	Cmin	[mm]	50							
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]	250 (4 h _{ef})							
(under fire conditions)	[mm]	250 (4 h _{ef})								
Minimum Spacing	[mm]	50								
	•									

Table C122: Reduction factors for single anchors at the edge

Tension load				Shear load							
'	ension load		Perpendic	ular to the fr	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00		50	0,35	•	50	1,00			
	120	1,00		250	1,00	V	120	1,00			

Table C123: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint					
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$\alpha_{g\perp}$, N		
• •	50	50	1,40	•	50	50	1,15		
	120	250	2,00		120	250	2,00		

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick T7 MW with insulation

Description of the stone, Installation parameters, Reductionfactors

Annex C 37



Brick type:	Brick type: Hollow clay brick T7 MW with insulation												
Table C124: Factors for anchor groups under shear load													
	Anchor	Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint											
Shear load		with c ≥	with s ≥	α _g II,V ⊥		with c ≥	with s ≥	α _{g ⊥} , v ⊥					
perpendicular	•••		50 50 0	0,60		50	50	0,40					
to the free		250	50	1,55		250	50	1,00					
edge		250	250	2,00		250	250	2,00					
Shear load		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _{g ⊥,V II}					
parallel to the	•	50	50	2,00	1	50	50	1,20					
free edge		120	250	2,00		120	250	2,00					

Table C125: Characteristic values of tension and shear load resistances

				Charac	storictic Pec	ietancee w	ith c > c	and $e > e$					
			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$										
	0	•		Use condition									
) Ae	/e rge					/-1		d/d				
	<u> </u>	ctiv ora pth		d/d			w/d w/w		w/d				
A	ρ	Effective Anchorage depth					w/w						
Anchor size	Perforated sleeve	A A							All				
	for		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature				
)er								ranges				
	_	h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b,}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{o,c} = N_{Rk,p,c}$	$V_{Rk,b}^{2)}$				
		[mm]				[kN]							
		Normali	sed mean o	compressi	ve strengtl	n f _b ≥ 8 N/n	nm² ¹⁾						
M8	SH 12	80											
M8 / M10/ IG-M6	SH 16	≥ 85					0.0		3,0				
M12 / IG-M8	SH 20	≥ 85	2,0	2,0	1,5	2,0	,0 2,0	1,5					
M16 / IG-M10	SH 20	≥ 85							4,5				

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C120. For stones with higher strengths, the shown values are valid without conversion.

Table C126: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2 *δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	,		0,31	0,31*V _{Rk} / 3,5	1,5 *δvo

Table C127: Characteristic values of tension and shear load resistances under fire exposure

		Effecitve	Characteristic Resistances						
Anchor size Perforated		Anchorage depth	$N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$						
Afficitor size	sleeve	h _{ef}	R30	R60	R90	R120			
		[mm]	[kN]						
M8 / M10 /IG-M6	SH 16	130							
M12 / M16 /	SH 20	≥ 130	0,64	0,37	0,11	_1)			
IG-M8 IG-M10	31120	2 130							

¹⁾ no performance assessed

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick T7 MW with insulation Group factors, characteristic Resistances and Displacements	Annex C 38

²⁾ V_{Rk,c II} = V_{Rk,c} ± according to Annex C 3



Brick type: Hollow clay brick T8 P with insulation

Table C128: Stone description

Brick type		Hollow clay brick T8 P
Insulation material		Perlite
Density	ρ [kg/dm³]	≥ 0,56
Normalised mean compressive strenght	f _b [N/mm²]	≥ 6
Conversion factor for lowe strengths	er compressive	$(f_b / 6)^{0,5} \le 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



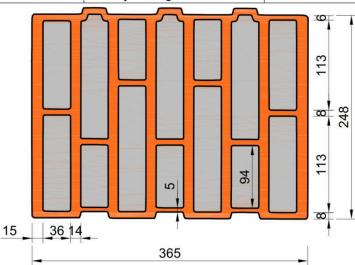


Table C129: Installation parameter

Table Cizer michanan	o pa										
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	T _{inst}	[Nm]	≤ 4	≤ 4	≤ 10	≤ 10	≤ 4	≤ 4	≤ 4		
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: $c_{cr} = 250$)								
Minimum Edge Distance	Cmin	[mm]	50								
	Scr, II	[mm]	250								
Characteristic Spacing	Scr, ⊥	[mm]				250					
Minimum Spacing	Smin, II;	[mm]			50						
William Spacing	Smin, ⊥	[[,,,,,,,]		50							

Table C130: Reduction factors for single anchors at the edge

Tension load			Shear load								
'	ension load		Perpendic	ular to the fre	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00	→	50	0,25	<u> </u>	50	1,00			
	120	1,00		250	1,00		120	1,00			

Chemofast In	jection S	vstem V	/K, VK	Nordic	for	masonry

Performances hollow clay brick T8 P with insulation

Description of the stone, Installation parameters, Reductionfactors

Annex C 39



Brick type: Hollow clay brick T8 P with insulation

Table C131: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$lpha_{g\perp}$, N	
• •	50	50	1,30		50	50	1,10	
	120	250	2,00		120	250	2,00	

Table C132: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	α _g II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g \perp, V \perp}$
	50	50	0,40		50	50	0,30	
	250	50	1,35		250	50	1,20	
	•	250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	α _g II,V II		with c ≥	with s ≥	α _{g ⊥,} ν II
	• •	50	50	1,70		50	50	1,00
		120	250	2,00		120	250	2,00

Table C133: Characteristic values of tension and shear load resistances

Tubic 0 100.	ididete	istic vai	ucs or ter	ision and	Silcui lou	a resista	1003					
			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	0	Effective Anchorage depth	Use condition									
Anchereize	d sleeve			d/d			d/d w/d w/w					
Auchorated sleeve	eriorate E An	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges				
		h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b,p}$	$c = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{\text{c,c}} = N_{\text{Rk,p,c}}$	$V_{Rk,b}^{2)}$			
		[mm]				[kN]						
		Normali	sed mean o	compressi	ve strengtl	h f _b ≥6 N/n	nm² ¹⁾					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	1,5	1,5	1,5	1,5	1,5	1,5	4,5			
M12 / IG-M8	SH 20	≥ 85										
M16 / IG-M10	SH 20	≥ 85	2,5	2,5	2,0	2,5	2,5	2,0	7,0			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C128. For stones with higher strengths, the shown values are valid without conversion.

Table C134: Displacements

Anchoroiza	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2 *δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	, -	,	= 3110	0,31	0,31*V _{Rk} / 3,5	1,5*δνο

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick T8 P with insulation Group factors, characteristic Resistances and Displacements	Annex C 40

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



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

Table C135: Stone description

Brick type		Hollow clay brick Thermoplan MZ90-G
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,68
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 12
Conversion factor for lowe strengths	er compressive	$(f_b / 12)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Mein Ziegelhaus (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



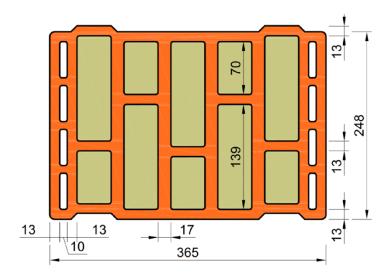


Table C136: Installation parameter

Anchor size		[-]	M8	M8 M10 M12 M16 IG-M6 IG-M8 I							
Installation torque	T _{inst}	[Nm]	≤4 ≤4 ≤10 ≤10 ≤4 ≤4 ≤4								
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: $c_{cr} = 250$)								
Minimum Edge Distance	Cmin	[mm]	50								
Characteristic Spacing	[mm]	250									
Characteristic Spacing	Scr, ⊥	[mm]				250					
Minimum Spacing	Smin, II;	[mm]	50								
William Spacing	Smin, ⊥	[[[]]]				30					

Table C137: Reduction factors for single anchors at the edge

Tension load				Shear load							
rension load			Perpendic	ular to the fro	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00		50	0,25	1 •	50	1,00			
	120	1,00		250	1,00		120	1,00			

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Thermoplan MZ90-G with insulation Description of the stone, Installation parameters, Reductionfactors	Annex C 41



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

Table C138: Factors for anchor groups under tension load

An	chor position pa	arallel to hor. jo	oint	Ancho	or position perp	endicular to ho	r. joint
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$\alpha_{g\perp,N}$
• •	50	50	1,00		50	50	1,00
	120	250	2,00		120	250	2,00

Table C139: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor p	nchor position perpendicular to hor. joint			
Shear load	-	with c ≥	with s ≥	αg II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$	
perpendicular to the free edge		50	50	0,75		50	50	0,50	
	250	50	2,00		250	50	1,70		
	· ;	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 ⊥,ν II	
parallel to the free edge	•	50	50	1,65		50	50	1,15	
		120	250	2,00		120	250	2,00	

Table C140: Characteristic values of tension and shear load resistances

				Charac	teristic Res	istances w	ith c≥c _{cr} a	and s ≥ s _{cr}				
	0		Use condition									
	Perforated sleeve	Effective Anchorage depth	d/d			w/d w/w			d/d w/d w/w			
Anchor size	Perforate	erforate E An	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
	L L	h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b,p}$	$c = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$N_{Rk,p,c}$	V _{Rk,b} 2)			
		[mm]				[kN]						
		Normalis	sed mean c	ompressiv	e strength	f _b ≥ 12 N/	mm² 1)					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	3,0	3,0	2,5	3,0	3,0	2,5	4,0			
M12 / IG-M8	SH 20	≥ 85										
M16 / IG-M10	SH 20	≥ 85	3,5	3,5	3,0	3,5	3,5	3,0	7,5			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C135. For stones with higher strengths, the shown values are valid without conversion.

Table C141: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	,	_ = 1.10	0,31	0,31*V _{Rk} / 3,5	1,5*δνο

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Thermoplan MZ90-G with insulation Group factors, characteristic Resistances and Displacements	Annex C 42

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow clay brick Poroton FZ27,5 with insulation

Table C142: Stone description

Brick type		Hollow clay brick Poroton FZ27,5
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 8
Conversion factor for lowe strengths	er compressive	$(f_b / 8)^{0,5} \le 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Schlagmann (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



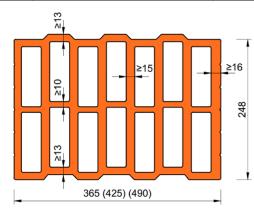


Table C143: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T _{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	Ccr; (Ccr,fi)	[mm]	m] 120 (2 h _{ef}) (for shear loads perpendicular to the free edge: c _{cr} = 250)						= 250)
Minimum Edge Distance	Cmin	[mm]				50			
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]			:	250 (4 h _{ef})		
(under fire conditions)	Scr, ⊥; (Scr,fi, ⊥)	[mm]	250 (4 h _{ef})						
Minimum Spacing	Smin, II; Smin, ⊥	[mm]	50						

Table C144: Reduction factors for single anchors at the edge

_	ension load		Shear load								
'	ension load		Perpendic	ular to the fr	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00		50	0,35	1	50	1,00			
	120	1,00		250	1,00		120	1,00			

Table C145: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	αg ⊥, N	
• •	50	50	1,40		50	50	1,15	
	120	250	2,00		120	250	2,00	

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick Poroton FZ27,5 with insulation Description of the stone, Installation parameters, Reductionfactors

Annex C 43

free edge



120

250

2,00

Brick type: Hollow clay brick Poroton FZ27,5 with insulation												
Table C146: Factors for anchor groups under shear load												
	Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint											
Shear load		with c ≥	with s ≥	α _g II,V ⊥		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$				
perpendicular	•••	50	50	0,60		50	50	0,40				
to the free		250	50	1,55		250	50	1,00				
edge		250	250	2,00		250	250	2,00				
Shear load	••	with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _{g ⊥,V II}				
parallel to the		50	50	2,00	•	50	50	1,20				

2,00

Table C147: Characteristic values of tension and shear load resistances

250

120

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	0			Use condition								
	eve	Effective Anchorage depth						d/d				
	se l	ffectiv chora depth		d/d			w/d w/w		w/d			
Anchor size	g	iffe ch de					VV/ VV					
Anchor Size	Perforated sleeve	A	40°C/24°C						All			
				80°C/50°C 1	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
) er								ranges			
		h _{ef}	$N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ $N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p}$					$_{\text{c,c}} = N_{\text{Rk,p,c}}$	$V_{Rk,b}^{2)}$			
		[mm]		[kN]								
		Normali	sed mean compressive strength f _b ≥ 8 N/mm ^{2 1)}									
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	2.0	2.0	1.5	2.0	2.0	1.5	3,0			
M12 / IG-M8	SH 20	≥ 85	2,0	2,0	1,5	2,0	2,0	1,5				
M16 / IG-M10	SH 20	≥ 85							4,5			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C142. For stones with higher strengths, the shown values are valid without conversion.

Table C148: Displacements

Anghar siza	hef	δη / Ν	δηο δη		δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all		, ,		0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Table C149: Characteristic values of tension and shear load resistances under fire exposure

						-			
		Effecitve	Effecitve Characteristic Resistances						
Anchar siza	Perforated	Anchorage depth							
Anchor size	sleeve	h _{ef}	R30	R60	R90	R120			
		[mm]	[kN]						
M8 / M10 /IG-M6	SH 16	130							
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130	0,64	0,37	0,11	_1)			

¹⁾ no performance assessed

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Poroton FZ27,5 with insulation Group factors, characteristic Resistances and Displacements	Annex C 44

²⁾ V_{Rk,c II} = V_{Rk,c} + according to Annex C 3



Brick type: Hollow clay brick Poroton FZ9 with insulation

Table C150: Stone description

Brick type		Hollow clay brick Poroton FZ9
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,90
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 10
Conversion factor for lowe strengths	er compressive	$(f_b / 10)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Schlagmann (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



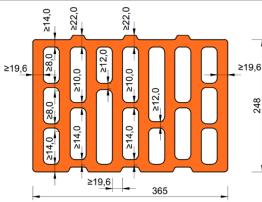


Table C151: Installation parameter

Anchor size	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	T _{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5		
Char. Edge distance	Ccr; (Ccr,fi)	[mm]				120 (2 h _{ef}	,				
(under fire conditions)	Ger; (Ger, 11)	[[,,,,,,,]	(for shear loads perpendicular to the free edge: $c_{cr} = 250$)								
Minimum Edge Distance	Cmin	[mm]				50					
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]			2	250 (4 h _{ef}	•)				
(under fire conditions)											
Minimum Spacing	Smin, II; Smin, ⊥	[mm]	50								

Table C152: Reduction factors for single anchors at the edge

,	Tension load			Shear load							
'	ension ioau		Perpendic	ular to the fr	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00	→	50	0,35	<u> </u>	50	1,00			
	120	1,00		250	1,00		120	1,00			

Table C153: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	αg⊥, N	
• •	50	50	1,40		50	50	1,15	
	120	250	2,00		120	250	2,00	

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick Poroton FZ9 with insulationDescription of the stone, Installation parameters, Reduction factors

Annex C 45

free edge



120

250

2,00

Brick type: Hollow clay brick Poroton FZ9 with insulation Table C154: Factors for anchor groups under shear load Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with c ≥ with s ≥ with c ≥ with s ≥ lphag II,V $oldsymbol{\perp}$ $\alpha_{\text{g}}\, \bot,\, \text{V}\, \bot$ Shear load 50 50 0,60 50 50 0,40 perpendicular to the free 250 50 1,55 250 50 1,00 edge 250 250 2,00 250 250 2,00 with c ≥ with s ≥ with c ≥ with s ≥ αg II,V II αg ⊥,V II Shear load parallel to the 50 50 2,00 50 50 1,20

2,00

Table C155: Characteristic values of tension and shear load resistances

250

120

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
				Use condition								
	Perforated sleeve	Effective Anchorage depth					w/d		d/d			
Anchor size	sle	ffectiv ichora depth		d/d			w/u w/w		w/d			
	þe	를 할 말					w/w					
	rate	₽ ₹							All			
	l je		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
	Pe								ranges			
	-	h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b,}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	$V_{Rk,b}^{2)}$			
		[mm]		[kN]								
		Normalis	sed mean compressive strength f _b ≥ 10 N/mm ^{2 1)}									
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	20	2.0	1.5	2.0	2.0	1.5	3,0			
M12 / IG-M8	SH 20	≥ 85	2,0	2,0	1,5	2,0	2,0	1,5				
M16 / IG-M10	SH 20	≥ 85							4,5			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C150. For stones with higher strengths, the shown values are valid without conversion.

Table C156: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all		,		0,31	0,31*V _{Rk} / 3,5	1,5*δvo

Table C157: Characteristic values of tension and shear load resistances under fire exposure

		Effecitve	Characteristic Resistances						
Ancher eize	Perforated	Anchorage depth		$N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$					
Anchor size	sleeve	h _{ef}	R30	R60	R90	R120			
		[mm]		[kN]					
M8 / M10 /IG-M6	SH 16	130							
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130	0,64	0,37	0,11	_1)			

¹⁾ no performance assessed

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Poroton FZ9 with insulation Group factors, characteristic Resistances and Displacements	Annex C 46

²⁾ V_{Rk,c II} = V_{Rk,c} + according to Annex C 3



Brick type: Hollow clay brick Poroton S9 with insulation

Table C158: Stone description

Brick type		Hollow clay brick Poroton S9
Insulationmaterial		Perlite
Density	ρ [kg/dm³]	≥ 0,85
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 12
Conversion factor for lowe strengths	er compressive	$(f_b / 12)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Schlagmann (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



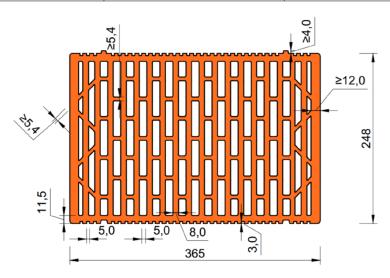


Table C159: Installation parameter

Table Greet Interange	Table 5 Tool Motanation parameter								
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T _{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 250)						
Minimum Edge Distance	Cmin	[mm]	50						
Characteristic Spacing	Scr, II	[mm]	250						
Characteristic Spacing	Scr, ⊥	[mm]	250						
Minimum Spacing	Smin, II;	[mm]	50						
Smin, 1		[[,,,,,,]	50						

Table C160: Reduction factors for single anchors at the edge

Tension load				Shear load						
'	ension load		Perpendic	ular to the fro	ee edge	Paralle	llel to the free edge			
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II		
•	50	1,00		50	0,30	1 •	50	1,00		
	120	1,00		250	1,00		120	1,00		

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow clay brick Poroton S9 with insulationDescription of the stone, Installation parameters, Reduction factors

Annex C 47



Brick type: Hollow clay brick Poroton S9 with insulation

Table C161: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	α _{g ⊥, N}
• •	50	50	1,50		50	50	1,00
	120	250	2,00		120	250	2,00

Table C162: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	joint	Anchor position perpendicular to hor. joint			
Shear load	-	with c ≥	with s ≥	α _g II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
perpendicular	•••	50	50	0,40		50	50	0,40
to the free		250	50	1,00		250	50	1,20
edge	.,	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 ⊥,ν II
parallel to the	•	50	50	1,65		50	50	1,00
free edge		120	250	2,00		120	250	2,00

Table C163: Characteristic values of tension and shear load resistances

				Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$								
	0	ated sleeve Effective Anchorage		Use condition								
	d sleeve		d/d			w/d w/w			d/d w/d w/w			
Anchor size	Perforated sleeve	And	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature			
	ď	h _{ef}	$N_{Rk,b} = N$	$N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ N_F				$_{,c} = N_{Rk,p,c}$	ranges V _{Rk,b} 2)			
		[mm]				[kN]						
		Normalis	ed mean c	ompressiv	e strength	f _b ≥ 12 N/	mm² 1)					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	1,5	1,5	1,5	1,5	1,5	1,5	5,0			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85										

¹⁾ 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.

Table C164: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,	,		0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Poroton S9 with insulation Group factors, characteristic Resistances and Displacements	Annex C 48

²⁾ V_{Rk,c II} = V_{Rk,c} + according to Annex C 3



Brick type: Hollow clay brick Thermopor TV8+ with insulation

Table C165: Stone description

Brick type		Hollow clay brick Thermopor TV8+
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 10
Conversion factor for lowe strengths	er compressive	$(f_b / 10)^{0.5} \le 1.0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. THERMOPOR GmbH (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



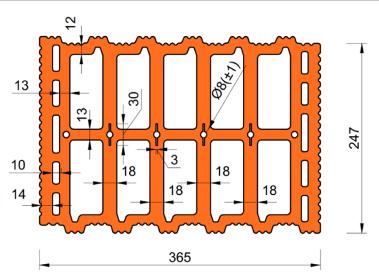


Table C166: Installation parameter

Table 0100. Illstallati	Table 0100. Installation parameter											
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10			
Installation torque	T _{inst}	[Nm]	≤ 4 ≤ 4 ≤ 10 ≤ 10 ≤ 4 ≤ 4									
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: $c_{cr} = 250$)									
Minimum Edge Distance	Cmin	[mm]	50									
Characteristic Spacing	Scr, II	[mm]	250									
Characteristic Spacing	Scr, ⊥	[mm]				250						
Minimum Spacing	Smin, II;	[mm]	50									
Williman Spacing	Smin, ⊥	[,,,,,,	30									

Table C167: Reduction factors for single anchors at the edge

Tension load			Shear load								
'	ension load		Perpendic	ular to the fro	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II			
•	50	1,00		50	0,25	1 •	50	1,00			
	120	1,00		250	1,00		120	1,00			

Performances hollow clay brick Thermopor TV8+ with insulation

Description of the stone, Installation parameters, Reductionfactors

Annex C 49



Brick type: Hollow clay brick Thermopor TV8+ with insulation

Table C168: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	α _{g ⊥, N}	
• •	50	50	1,00		50	50	1,00	
	120	250	2,00		120	250	2,00	

Table C169: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	α _g II,V ⊥	1	with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
		50	50	0,75		50	50	0,50
		250	50	2,00		250	50	1,70
		250	250	2,00	· i · · · · · · · · · · · · · · · · · ·	250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	αg II,V II		with c ≥	with s ≥	α _g ⊥,ν II
	•	50	50	1,65]	50	50	1,15
		120	250	2,00		120	250	2,00

Table C170: Characteristic values of tension and shear load resistances

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	0	Effective Anchorage depth		Use condition								
Anchor size	d sleeve			d/d			d/d w/d w/w					
	Perforated sleeve		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges			
		h _{ef}	N _{Rk,b} = N	$_{Rk,p} = N_{Rk,b,p}$	$_{,c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$I_{Rk,p} = N_{Rk,b}$	$_{p,c} = N_{Rk,p,c}$	V _{Rk,b} 2)			
		[mm]					[kN]					
		Normalis	sed mean c	ompressi	ve strength	f _b ≥ 10 N/	mm² 1)					
M8	SH 12	80										
M8 / M10/ IG-M6	SH 16	≥ 85	3,0	3,0	2,5	3,0	3,0	2,5	3,5			
M12 / IG-M8	SH 20	≥ 85				-						
M16 / IG-M10	SH 20	≥ 85	3,5	3,5	3,0	3,5	3,5	3,0	7,0			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C165. For stones with higher strengths, the shown values are valid without conversion.

Table C171: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor Size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δvo
M16	all	,,,,,	,,-	= 3110	0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow clay brick Thermopor TV8+ with insulation Group factors, characteristic Resistances and Displacements	Annex C 50

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Hollow light weight concrete brick HBL 16DF

Table C172: Stone description

Brick type		Hollow light weight concrete brick HBL 16DF	
Density	ρ [kg/dm³]	≥ 1,0	
Normalised mean compressive strenght	f _b [N/mm²]	≥ 3,1	
Conversion factor for low strengths	$(f_b/3,1)^{0,5} \le 1,0$		
Code		EN 771-3:2011+A1:2015	
Producer (Country)		e.g. KLB Klimaleichtblock (DE)	
Brick dimensions	[mm]	500 x 250 x 240	
Drilling method		Rotary drilling	



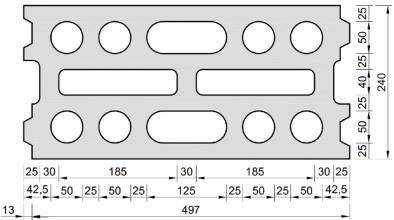


Table C173: Installation parameter

Anchor size			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	T _{inst}	[Nm]	≤ 2	≤ 2	≤ 5	≤ 5	≤ 2	≤ 5	≤ 5		
Char. Edge distance	C _{cr;} (C _{cr,fi})	[mm]				120 (2 h _{ef}	,				
(under fire conditions)	Ger; (Ger, ii)	[[,,,,,,,]	(for shear loads perpendicular to the free edge: $c_{cr} = 250$)								
Minimum Edge Distance	Cmin	[mm]				50					
Characteristic Spacing	Scr, II; (Scr,fi, II)	[mm]	500 (4 h _{ef})								
(under fire conditions)	Scr, ⊥; (Scr,fi, ⊥)	[mm]	250 (4 h _{ef})								
Minimum Spacing	Smin, II; Smin, ⊥	[mm]	50								

Table C174: Reduction factors for single anchors at the edge

Tension load			Shear load							
'	rension load		Perpendic	ular to the fr	ee edge	Parallel to the free edge				
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II		
•	50	1,00		50	0,30	<u> </u>	50	1,00		
	120	1.00		250	1.00	*	120	1.00		

Table C175: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	$\alpha_{g\perp,N}$	
• •	50	50	2,00		50	50	1,55	
	120	500	2,00		120	250	2,00	

Chemofast Injection System VK, VK Nordic for masonry

Performances hollow light weight concrete brick HBL 16DFDescription of the stone, Installation parameters, Reduction factors

Annex C 51

free edge



120

250

2,00

Brick type: Hollow light weight concrete brick HBL 16DF Table C176: Factors for anchor groups under shear load Anchor position parallel to hor. joint Anchor position perpendicular to hor. joint with s ≥ with c ≥ with s ≥ αg II,V ⊥ with c ≥ $\alpha_{\text{g}}\, \bot,\, \text{V}\, \bot$ Shear load 50 50 0,60 50 50 0,35 perpendicular to the free 120 50 2,00 120 50 1,15 edge 120 500 2,00 120 250 2,00 with c ≥ with s ≥ with c ≥ with s ≥ αg II,V II αg ⊥,V II Shear load 50 50 1,30 parallel to the 50 50 1,00

2,00

2,00

Table C177: Characteristic values of tension and shear load resistances

250

500

120

120

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
	0			Use condition								
	sleeve	Effective Anchorage depth					w/d		d/d			
	sle	ffectiv chora depth	d/d				w/d					
Anchor size	<u>R</u>	# 2 ⊅							w/w			
Allohol dizo	rate	A A	40°C/24°C						All			
	Perforated			80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	'			
									ranges			
	_	h _{ef}	$N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ $N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$					$V_{Rk,b}^{2)}$				
		[mm]				[kN]						
		Normalis	ed mean c	ompressiv	e strength	f _b ≥ 3,1 N/	mm² 1)					
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	2,0			
M12 / IG-M8	SH 20	≥ 85	1.5	1 5	1.0	1,5		1.0	3,0			
M16 / IG-M10	SH 20	≥ 85	1,5	1,5	1,2		1,5	1,2	5,0			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C172. For stones with higher strengths, the shown values are valid without conversion.

Table C178: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2*δΝο	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	,			0,31	0,31*V _{Rk} / 3,5	1,5*δ∨0

Table C179: Characteristic values of tension and shear load resistances under fire exposure

		Effecitve Characteristic Resistances						
Ancher size	Perforated	Anchorage depth $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$						
Anchor size	sleeve	h _{ef}	R30	R60	R90	R120		
		[mm]	[kN]					
M8 / M10 / IG-M6	SH 16	130	0.20	0.01	-1)	_1)		
M12 / IG-M8	SH 20	≥ 130	0,29	0,21	-17	-17		
M16 / IG-M10	SH 20	≥ 130	0,29	0,21	0,12	_1)		

¹⁾ no performance assessed

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow light weight concrete brick HBL 16DF Group factors, characteristic Resistances and Displacements	Annex C 52

²⁾ V_{Rk,c II} = V_{Rk,c} + according to Annex C 3



Brick type: Hollow concrete brick Bloc Creux B40

Table C180: Stone description

Brick type		Hollow concrete brick Bloc Creux B40	
Density	ρ [kg/dm³]	≥ 0,8	
Normalised mean compressive strenght	f _b [N/mm ²]	≥ 5,2	
Conversion factor for low strengths	$(f_b / 5,2)^{0,5} \le 1,0$		
Code		EN 772-1	
Producer (Country)		e.g. Leroux (FR)	
Brick dimensions	[mm]	500 x 200 x 200	
Drilling method		Rotary drilling	



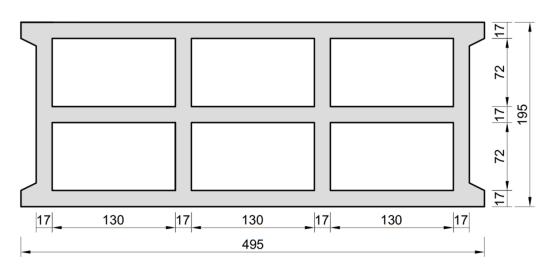


Table C181: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque	T _{inst}	[Nm]	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4		
Char. Edge distance	Ccr	[mm]	120 (for shear loads perpendicular to the free edge: c _{cr} = 170)								
Minimum Edge Distance	Cmin	[mm]	50								
	Scr, II	[mm]	170								
Characteristic Spacing	Scr, ⊥	[mm]	200								
Minimum Spacing	Smin, II;	[mm]	50								
Williman Spacing	Smin, ⊥	[i'''i'j	50								

Table C182: Reduction factors for single anchors at the edge

Tension load				Shear load							
'	ension load		Perpendic	ular to the fr	ee edge	Parallel to the free edge					
	with c ≥	αedge, N		with c ≥	αedge, V ⊥		with c ≥	αedge, V II			
•	50	1,00	→	50	0,35	<u> </u>	50	1,00			
	120	1,00		170	1,00		120	1,00			

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow concrete brick Bloc Creux B40 Description of the stone, Installation parameters, Reductionfactors	Annex C 53



Brick type: Hollow concrete brick Bloc Creux B40

Table C183: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	αg⊥, N	
	50	50	1,50	•	50	50	1,40	
	50	170	2,00		50	200	2,00	
	120	170	2,00	·	120	200	2,00	

Table C184: Factors for anchor groups under shear load

3											
	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint						
Shear load perpendicular to the free edge		with c ≥	with s ≥	αg II,V ⊥		with c ≥	with s ≥	$\alpha_g \perp$, v \perp			
		50	50	0,55		50	50	0,35			
		120	50	1,30		120	50	0,85			
		120	170	2,00		120	200	2,00			
		with c ≥	with s ≥	αg II,V II	1	with c ≥	with s ≥	αg ⊥,V II			
Shear load	••	50	50	1,10	•	50	50	1,00			
parallel to the free edge	*	120	170	2,00		50	200	2,00			
nee eage		120	170	2,00		120	200	2,00			

Table C185: Characteristic values of tension and shear load resistances

			Characteristic Resistances with $c \ge c_{cr}$ and $s \ge s_{cr}$									
				Use condition								
Anchor size		Effective Anchorage depth					w/d		d/d			
	Perfor	ffectiv ichora depth		d/d			w/u w/w		w/d w/w			
	ated	풀호짱					VV/ VV					
	sleeve	l m ≰							All			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	temperature			
									ranges			
		h _{ef}	$N_{Rk,b} = N$	$R_{k,p} = N_{Rk,b,p}$	$_{c} = N_{Rk,p,c}$	$N_{Rk,b} = N$	$V_{Rk,b}^{2)}$					
		[mm]				[kN]						
		Normalis	ed mean c	ompressiv	e strength	$f_b \geq 5,2 \text{ N/}$	mm ^{2 1)}					
M8 / M10/ IG-M6	SH 16	130	2,0	1,5	1,2	2,0	1,5	1.0	6,0			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 130	2,0	1,5	1,2	2,0	1,5	1,2	0,0			

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C180. For stones with higher strengths, the shown values are valid without conversion.

Table C186: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N _{Rk} / 3,5	2 *δN0	0,55	0,55*V _{Rk} / 3,5	1,5*δνο
M16	all	.,			0,31	0,31*V _{Rk} / 3,5	1,5 *δ∨0

Chemofast Injection System VK, VK Nordic for masonry	
Performances hollow concrete brick Bloc Creux B40 Group factors, characteristic Resistances and Displacements	Annex C 54

²⁾ $V_{Rk,c | I} = V_{Rk,c} \perp$ according to Annex C 3



Brick type: Solid light weight concrete brick

Table C187: Stone description

Brick type		Solid light weight concrete brick
Density	ρ [kg/dm³]	≥ 0,6
Normalised mean compressive strenght	f_b [N/mm ²]	≥ 2
Conversion factor for low strengths	er compressive	$(f_b / 2)^{0.5} \le 1.0$
Code		EN 771-3:2011+A1:2015
Producer (Country)		e.g. Bisotherm (DE)
Brick dimensions	[mm]	≥ 240 x 300 x 113
Drilling method		Rotary drilling



Table C188: Installation parameter

Anchor size	[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10		
Installation torque T _{inst}		[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	
Char. Edge distance	Ccr	[mm]	150							
Minimum Edge Distance	Cmin	[mm]	60							
Characteristic Cressins	Scr, II	[mm]	300							
Characteristic Spacing	Scr, ⊥	[mm]	300							
Minimum Spacing	Smin, II; Smin, ⊥	[mm]	120							

Table C189: Reduction factors for single anchors at the edge

Tension load			Shear load							
'	i ension load		Perpendic	ular to the fr	ee edge	Parallel to the free edge				
	with c ≥	αedge, N		with c ≥	αedge, V⊥		with c ≥	αedge, V II		
•	60	1,00	→	60	0,25	1 •	60	0,40		
	150	1,00		150	1,00		100	1,00		

Table C190: Factors for anchor groups under tension load

An	chor position p	arallel to hor. jo	oint	Anchor position perpendicular to hor. joint				
	with c ≥	with s ≥	αg II, N		with c ≥	with s ≥	α _{g ⊥, N}	
• •	60	120	1,00		60	120	1,00	
	150	300	2,00		150	300	2,00	

Table C191: Factors for anchor groups under shear load

	Anchor	position pa	rallel to hor.	. joint	Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	α _g II,V ⊥		with c ≥	with s ≥	$\alpha_g \perp$, v \perp
	•••	60	120	0,25		60	120	0,25
		150	120	1,00		150	120	1,00
	· i	150	300	2,00	· i · · · · · · · · · · · · · · · · · ·	150	300	2,00
Shear load parallel to the free edge	<u> </u>	with c ≥	with s ≥	α _g II,V II		with c ≥	with s ≥	α _{g ⊥,} ν II
		60	120	0,40	•	60	120	0,40
		100	120	1,00		100	120	1,00
		150	300	2,00		150	300	2,00

Chemofast Injection System VK, VK Nordic for masonry

Performances solid light weight concrete brick

Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 55



Brick type: Solid light weight concrete brick

Table C192: Characteristic values of tension and shear load resistances

			Characteristic Resistances with c ≥ c _{cr} and s ≥ s _{cr}								
	0	Effective Anchorage depth	Use condition								
	Perforated sleeve			d/d			d/d w/d w/w				
Anchor size	Perforate	An	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges		
	"	h _{ef}	N _{Rk,b} = N	$I_{Rk,p} = N_{Rk,b}$	$_{,c} = N_{Rk,p,c}$	N _{Rk,b} = N	$J_{Rk,p} = N_{Rk,t}$	$_{p,c} = N_{Rk,p,c}$	V _{Rk,b} 2)		
		[mm]									
		Normali	sed mean	compress	ve strengtl	h f _b ≥ 2 N/r	nm² 1)				
M8	-	80									
M10 / IG-M6	-	90	3,0	2,5	2,0	2,5	2,0	1,5			
M12 / M16 / IG-M8 / IG-M10	-	100							2.0		
M8	SH 12	80							3,0		
M8 / M10/ IG-M6	SH 16	≥ 85	2,5	2,5	2,0	2,5	2,0	1,5			
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85									

¹⁾ For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C187. For stones with higher strengths, the shown values are valid without conversion.

Table C193: Displacements

Anchor size	hef	δη / Ν	δΝο	δN∞	δv / V	δνο	δ∨∞
Anchor size	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	0,1*N _{Rk} / 3,5	2*δΝο	0,3	0,3*V _{Rk} / 3,5	1,5*δνο
M16	all				0,1	0,1*V _{Rk} /3,5	1,5*δvo

Chemofast Injection System VK, VK Nordic for masonry

Performances solid light weight concrete brick
Characteristic Resistances and Displacements

Annex C 56

²⁾ $V_{Rk,c II} = V_{Rk,c} \perp$ according to Annex C 3