

PRESTATIEVERKLARING

MKT Injectiesysteem VMU Plus
voor massieve en holle steen

geldig voor
Injectieanker XV Plus

Dit document MÜPRO is alleen informatie en is niet onderworpen aan het bijwerken.
De volledige inhoud mag alleen worden gebruikt voor reclame of andere doeleinden na goedkeuring door de MÜPRO.
Alle rechten en wijzigingen.

PRESTATIEVERKLARING
DoP Nr. MKT- 621 - nl

1. Unieke identificatiecode van het producttype: **MKT Injectiesysteem VMU plus**
2. Type-, partij- of serienummer, dan wel een ander identificatiemiddel voor het bouwproduct, zoals voorgeschreven in artikel 11, lid 4:

ETA-13/0909, Bijlage A2 en A3
Chargennummer: zie verpakking

3. Beoogde gebruiken van het bouwproduct, overeenkomstig de toepasselijke geharmoniseerde technische specificatie, zoals door de fabrikant bepaald:

Producttype	verlijmd anker
Voor toepassing in	metselwerk
Optie	b, c & d
Belasting	statisch of quasi-statisch
Materiaal	<u>thermisch verzinkt staal:</u> alleen in droge binnenruimtes inbegrepen maten: VMU-A, V-A: M8, M10, M12, M16 VMU-IG: M6, M8, M10 <u>staal verzinkt:</u> alleen in droge binnenruimtes inbegrepen maten: VMU-A, V-A: M8, M10, M12, M16 VMU-IG: M6, M8, M10 <u>roestvrij staal (markering A4):</u> voor binnen- en buitenbereiken zonder bijzonder agressieve omstandigheden inbegrepen maten: VMU-A, V-A: M8, M10, M12, M16 VMU-IG: M6, M8, M10 <u>hoogcorrosiebestendig staal (markering HCR):</u> voor binnen- en buitenbereiken onder bijzonder agressieve omstandigheden inbegrepen maten: VMU-A, V-A: M8, M10, M12, M16 VMU-IG: M6, M8, M10
Temperatuurbereik (in voorkomende gevallen)	T _a : -40 °C - +40 °C T _b : -40 °C - +80 °C T _c : -40 °C - +120 °C

4. Naam, geregistreerde handelsnaam of geregistreerd handelsmerk en contactadres van de fabrikant, zoals voorgeschreven in artikel 11, lid 5:

MKT Metall-Kunststoff-Technik GmbH & Co. KG
Auf dem Immel 2
D - 67685 Weilerbach

5. Indien van toepassing, naam en contactadres van de gemachtigde wiens mandaat de in artikel 12, lid 2, vermelde taken bestrijkt: --
6. Het systeem of de systemen voor de beoordeling en verificatie van de prestatiebestendigheid van het bouwproduct, vermeld in bijlage V: **System 1**
7. Indien de prestatieverklaring betrekking heeft op een bouwproduct dat onder een geharmoniseerde norm valt: --

8. Indien de prestatieverklaring betrekking heeft op een bouwproduct waarvoor een Europese technische beoordeling is afgegeven:

Deutsches Institut für Bautechnik, Berlin

heeft het volgende afgegeven:

ETA-13/0909

op basis van

ETAG 029

De aangemelde instantie voor productcertificering 1343-CPR heeft het volgende uitgevoerd volgens systeem 1:

- i) de bepaling van het producttype op grond van typeonderzoek (inclusief bemonstering), typeberekening, getabelleerde waarden of een beschrijvende documentatie van het product;
- ii) de initiële inspectie van de productie-installatie en van de productiecontrole in de fabriek;
- iii) permanente bewaking, beoordeling en evaluatie van de productiecontrole in de fabriek.

en heeft het volgende afgegeven: Certificaat van prestatiebestendigheid 1343-CPR-M 550-14/08.14

9. Aangegeven prestatie:

Essentiële kenmerken	Beoordelingsmethode	Prestaties	Geharmoniseerde technische specificaties
Karakteristieke waarden van het draagvermogen van de plug in metselwerk	ETAG 029, bijlage C	ETA-13/0909, bijlage C	ETAG 029
Minimum as- en randafstanden	ETAG 029, bijlage C	ETA-13/0909, bijlage C	
Verschuiving in gebruikstoestand	ETAG 029, bijlage C	ETA-13/0909, bijlage C	

Indien overeenkomstig artikel 37 of 38 een specifieke technische documentatie is gebruikt, de eisen waaraan het product voldoet: --

10. De prestaties van het in de punten 1 en 2 omschreven product zijn conform de in punt 9 aangegeven prestaties. Deze prestatieverklaring wordt verstrekt onder de exclusieve verantwoordelijkheid van de in punt 4 vermelde fabrikant: Ondertekend voor en namens de fabrikant door:


Stefan Weustenhagen
(Director)
Weilerbach, 08.12.2016

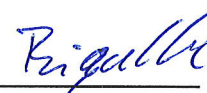
i.V. 
Dipl.-Ing. Detlef Bigalke
(Director of Product Development)



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

Brick-No. and abbreviation	Installation & Use category	β -Factor					
		$T_a: 40^{\circ}\text{C} / 24^{\circ}\text{C}$		$T_b: 80^{\circ}\text{C} / 50^{\circ}\text{C}$		$T_c: 120^{\circ}\text{C} / 72^{\circ}\text{C}$	
		d/d	w/d w/w	d/d	w/d w/w	d/d	w/d w/w
1 AAC6	All sizes	0,95	0,86	0,81	0,73	0,81	0,73
2 KS-NF	$d_0 \leq 14 \text{ mm}$	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16 \text{ mm}$	0,93	0,93	0,87	0,87	0,65	0,65
3 KSL-3DF	$d_0 \leq 12 \text{ mm}$	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16 \text{ mm}$	0,93	0,93	0,87	0,87	0,65	0,65
4 KSL-12DF	$d_0 \leq 12 \text{ mm}$	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16 \text{ mm}$	0,93	0,93	0,87	0,87	0,65	0,65
5 MZ-DF	all sizes	0,86	0,86	0,86	0,86	0,73	0,73
6 Hlz-16DF							
7 Porotherm Homebric							
8 BGV-Thermo							
9 Calibric R+							
10 Urbanbric							
11 Brique creuse C40							
12 Blocchi Leggeri							
13 Doppio Uni							
14 Bloc creux B40	$d_0 \leq 12 \text{ mm}$	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16 \text{ mm}$	0,93	0,93	0,87	0,87	0,65	0,65
15 Solid lightweight concrete	$d_0 \leq 12 \text{ mm}$	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16 \text{ mm}$	0,93	0,93	0,87	0,87	0,65	0,65

Injection System VMU plus for masonry

Performances

β - factors for job site testing under tension load

Annex C1

Table C2: Characteristic steel resistance under tension and shear load

Anchor type			VMU-IG			VMU-A, V-A			
Anchor size			M6	M8	M10	M8	M10	M12	M16
Characteristic tension resistance									
Steel, property class 4.6	N _{Rk,s}	[kN]	-	-	-	15	23	34	63
	γ _{Ms}	[-]	-			2,0			
Steel, property class 4.8	N _{Rk,s}	[kN]	-	-	-	15	23	34	63
	γ _{Ms}	[-]	-			1,5			
Steel, property class 5.6	N _{Rk,s}	[kN]	10	18	29	18	29	42	79
	γ _{Ms}	[-]	2,0			2,0			
Steel, property class 5.8	N _{Rk,s}	[kN]	10	17	29	18	29	42	79
	γ _{Ms}	[-]	1,5			1,5			
Steel, property class 8.8	N _{Rk,s}	[kN]	16	27	46	29	46	67	126
	γ _{Ms}	[-]	1,5			1,5			
Stainless steel A4 / HCR, property class 70	N _{Rk,s}	[kN]	14	26	41	26	41	59	110
	γ _{Ms}	[-]	1,87			1,87			
Stainless steel A4 / HCR, property class 80	N _{Rk,s}	[kN]	16	29	46	29	46	67	126
	γ _{Ms}	[-]	1,6			1,6			
Characteristic shear resistance									
Steel, property class 4.6	V _{Rk,s}	[kN]	-	-	-	7	12	17	31
	γ _{Ms}	[-]	-			1,67			
Steel, property class 4.8	V _{Rk,s}	[kN]	-	-	-	7	12	17	31
	γ _{Ms}	[-]	-			1,25			
Steel, property class 5.6	V _{Rk,s}	[kN]	5	9	15	9	15	21	39
	γ _{Ms}	[-]	1,67			1,67			
Steel, property class 5.8	V _{Rk,s}	[kN]	5	9	15	9	15	21	39
	γ _{Ms}	[-]	1,25			1,25			
Steel, property class 8.8	V _{Rk,s}	[kN]	8	14	23	15	23	34	63
	γ _{Ms}	[-]	1,25			1,25			
Stainless steel A4 / HCR, property class 70	V _{Rk,s}	[kN]	7	13	20	13	20	30	55
	γ _{Ms}	[-]	1,56			1,56			
Stainless steel A4 / HCR, property class 80	V _{Rk,s}	[kN]	8	15	23	15	23	34	63
	γ _{Ms}	[-]	1,33			1,33			
Characteristic bending moment									
Steel, property class 4.6	M _{Rk,s}	[Nm]	-	-	-	15	30	52	133
	γ _{Ms}	[-]	-			1,67			
Steel, property class 4.8	M _{Rk,s}	[Nm]	-	-	-	15	30	52	133
	γ _{Ms}	[-]	-			1,25			
Steel, property class 5.6	M _{Rk,s}	[Nm]	8	19	37	19	37	66	167
	γ _{Ms}	[-]	1,67			1,67			
Steel, property class 5.8	M _{Rk,s}	[Nm]	8	19	37	19	37	66	167
	γ _{Ms}	[-]	1,25			1,25			
Steel, property class 8.8	M _{Rk,s}	[Nm]	12	30	60	30	60	105	266
	γ _{Ms}	[-]	1,25			1,25			
Stainless steel A4 / HCR, property class 70	M _{Rk,s}	[Nm]	11	26	52	26	52	92	233
	γ _{Ms}	[-]	1,56			1,56			
Stainless steel A4 / HCR, property class 80	M _{Rk,s}	[Nm]	12	30	60	30	60	105	266
	γ _{Ms}	[-]	1,33			1,33			

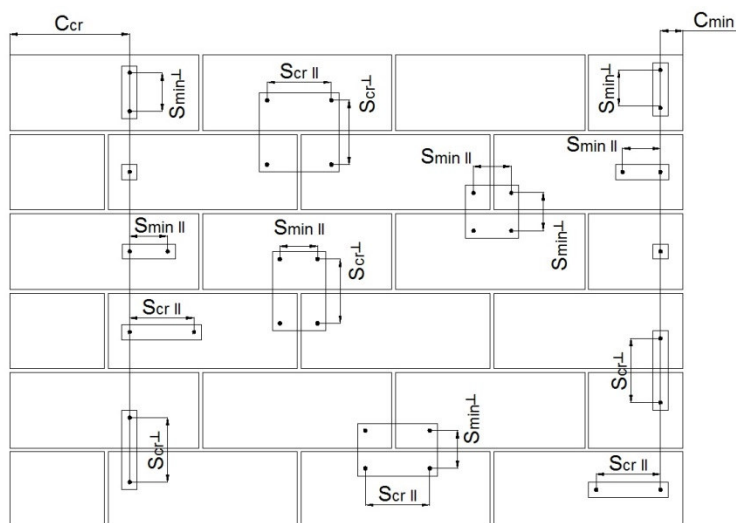
Injection System VMU plus for masonry

Performances

Characteristic steel resistance under tension and shear load

Annex C2

Spacing and edge distance



C_{cr} = Characteristic edge distance
 C_{min} = Minimum edge distance
 S_{cr} = Characteristic spacing
 S_{min} = Minimum spacing

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

Load direction Anchor position	Load direction		
	Tension load	Shear load parallel to free edge	Shear load perpendicular to free edge
Anchors places parallel to bed joint $S_{cr,II}$; $(S_{min,II})$			
Anchors places perpendicular to bed joint $S_{cr,\perp}$; $(S_{min,\perp})$			

$\alpha_{g,N,II}$ = Group factor in case of tension load for anchors placed parallel to the bed joint
 $\alpha_{g,V,II}$ = Group factor in case of shear load for anchors placed parallel to the bed joint
 $\alpha_{g,N,\perp}$ = Group factor in case of tension load for anchors placed perpendicular to the bed joint
 $\alpha_{g,V,\perp}$ = Group factor in case of shear load for anchors placed perpendicular to the bed joint

Group of 2 anchors:

$$N_{Rk}^g = \alpha_{g,N} * N_{Rk}$$

and

$$V_{Rk}^g = \alpha_{g,V} * V_{Rk}$$

Group of 4 anchors:

$$N_{Rk}^g = \alpha_{g,N,II} * \alpha_{g,N,\perp} * N_{Rk}$$

and

$$V_{Rk}^g = \alpha_{g,V,II} * \alpha_{g,V,\perp} * V_{Rk}$$

(N_{Rk} : $N_{Rk,b}$ or $N_{Rk,b,j}$ for C_{cr})

(V_{Rk} : $V_{Rk,c}$; $V_{Rk,c,j}$; $V_{Rk,b}$ or $V_{Rk,b,j}$ for C_{cr})

(with the relevant α_g)

Injection System VMU plus for masonry

Performances

Edge distance and Spacing

Annex C3

Brick type: Autoclaved Aerated Concrete – AAC6

Table C3: Description of the brick

Brick type	Autoclaved Aerated Concrete AAC6		
Bulk density	ρ [kg/dm ³]	0,6	
Compressive strength	$f_b \geq$ [N/mm ²]	6	
Code	EN 771-4		
Producer (country code)	e.g. Porit (DE)		
Brick dimensions	[mm]	499 x 240 x 249	
Drilling method	Rotary		

Table C4: Spacing and edge distance

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	$1,5 \cdot h_{ef}$
Minimum edge distance	$C_{min,N}$	[mm]	75
	$C_{min,V,II} (C_{min,v,\perp})^{1)}$	[mm]	75 ($1,5 \cdot h_{ef}$)
Spacing	S_{cr}	[mm]	$3 \cdot h_{ef}$
Minimum spacing	S_{min}	[mm]	100

¹⁾ $C_{min,V,II}$ for shear loading parallel to the free edge; $C_{min,v,\perp}$ for shear loading perpendicular free edge

Table C5: Group factor for anchor group in case of tension loading

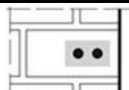
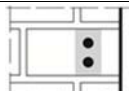
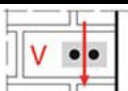
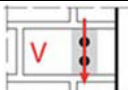
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		125 (120 for M8)	100	$\alpha_{g,N,II}$	[-]	1,8
		1,5*hef	3*hef			2,0
⊥: anchors placed perpendicular to horizontal joint		75	100	$\alpha_{g,N,\perp}$		1,4
		1,5*hef	3*hef			2,0

Table C6: Group factor for anchor group in case of shear loading parallel to free edge

Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint		75	100	$\alpha_{g,V,II}$	[-]	1,2
		$1,5 \cdot h_{ef}$	$3 \cdot h_{ef}$			2,0
$\perp$: anchors placed perpendicular to horizontal joint		$1,5 \cdot h_{ef}$	$3 \cdot h_{ef}$	$\alpha_{g,V,\perp}$		2,0

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Performances - Autoclaved Aerated Concrete - AAC6

Description of the brick, Spacing and edge distance, Group factors

Annex C4

Brick type: Autoclaved Aerated Concrete – AAC6

Table C7: Group factor for anchor group in case of shear loading perpendicular to free edge

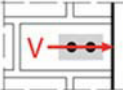
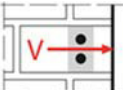
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		1,5*hef	3,0*hef	$\alpha_{g,V,II}$	[-]	2,0
I: anchors placed perpendicular to horizontal joint		1,5*hef	3,0*hef	$\alpha_{g,V,I}$		2,0

Table C8: Characteristic values of resistance under tension and shear loads

Anchor size	Effective anchorage depth	Characteristic resistance						
		Use category						
		d/d			w/w w/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 _{Rk,p} ¹⁾			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]							
Compressive strength f _b ≥ 6 N/mm ²								
M8	80	2,5 (2,0)	2,5 (1,5)	2,0 (1,2)	2,5 (1,5)	2,0 (1,5)	1,5 (1,2)	6,0
M10/IG-M6	90	4,0 (2,5)	3,0 (2,0)	2,5 (1,5)	3,5 (2,5)	3,0 (2,0)	2,5 (1,5)	10,0
M12/IG-M8	100	5,0 (3,5)	4,0 (3,0)	3,0 (2,5)	4,5 (3,0)	3,5 (2,5)	3,0 (2,5)	10,0
M16/IG-M10	100	6,5 (4,5)	5,5 (3,5)	4,0 (3,0)	5,5 (4,0)	5,0 (3,5)	4,0 (3,0)	10,0

¹⁾ Values are valid for c_{cr} , values in brackets are valid for single anchors with c_{min}

²⁾ For calculation of $V_{Rk,c}$ see ETAG029, Annex C;

³⁾ The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C9: Displacements

Anchor size	hef	N	$\delta N / N$	δN_0	δN_∞	V	δV_0	δV_∞
	[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	80	0,9	0,18	0,16	0,32	1,3	0,8	1,20
M10/IG-M6	90	1,4		0,26	0,51	1,8	1,2	1,80
M12/IG-M8	100	1,8	0,08	0,14	0,29	2,1	1,4	2,10
M16/IG-M10	100	2,3		0,19	0,37	2,3	1,5	2,25

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Performances - Autoclaved Aerated Concrete – AAC6

Group factor, Characteristic values of resistance, Displacements

Annex C5

Brick type: Calcium silicate solid brick KS-NF

Table C10: Description of the brick

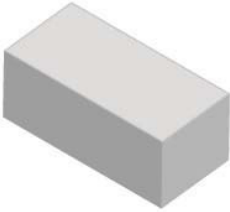
Brick type	Calcium silicate solid brick KS-NF	
Bulk density ρ [kg/dm ³]	2,0	
Compressive strength $f_b \geq$ [N/mm ²]	10, 20 or 27	
Code	EN 771-2	
Producer (country code)	e.g. Wemding (DE)	
Brick dimensions [mm]	240 x 115 x 71	
Drilling method	Hammer	

Table C11: Spacing and edge distance

Anchor size			All sizes
Edge distance	c_{cr}	[mm]	$1,5 \cdot h_{ef}$
Minimum edge distance	c_{min}	[mm]	60
Spacing	s_{cr}	[mm]	$3 \cdot h_{ef}$
Minimum spacing	s_{min}	[mm]	120

Table C12: Group factor for anchor group in case of tension loading

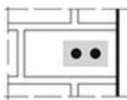
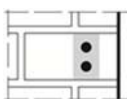
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	α _{g,N,II}	[-]	1,0
		140	120			1,5
		1,5*hef	3*h _{ef}			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	α _{g,N,⊥}		0,5
		1,5*hef	120			1,0
		1,5*hef	3*h _{ef}			2,0

Table C13: Group factor for anchor group in case of shear loading parallel to free edge

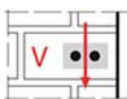
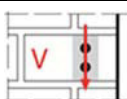
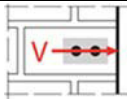
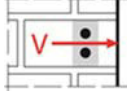
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	$\alpha_{g,V,II}$	[-]	1,0
		115	120			1,7
		1,5*hef	3*hef			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,V,\perp}$		1,0
		1,5*hef	120			1,0
		1,5*hef	3*hef			2,0

Table C14: Group factor for anchor group in case of shear loading perpendicular to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	$\alpha_{g,V,II}$	[-]	1,0
		1,5*hef	3*hef			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,V,\perp}$		1,0
		1,5*hef	3*hef			2,0

Injection System VMU plus for masonry

Performances - Calcium solid brick KS-NF
Description, Spacing and edge distance, Group factor

Annex C6

Brick type: Calcium silicate solid brick KS-NF

Table C15: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d w/w			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
			N _{Rk,b} = N _{Rk,p} ¹⁾			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]								
Compressive strength f _b ≥ 10 N/mm ²									
M8	-	80	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	2,5 (1,5)
M10 / IG-M6	-	90							3,0 (2,0)
M12 / IG-M8	-	100							2,5 (1,5)
M16 / IG-M10	-	100	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,0 (1,5)	3,5 (1,5)	2,0 (0,9)	2,5 (1,5)
M8	12x80	80	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,5 (1,5)	3,0 (1,5)	2,5 (1,2)	2,5 (1,5)
M8 / M10/ IG-M6	16x85	85	3,5 (1,5)	3,0 (1,5)	2,0 (0,9)	3,5 (1,5)	3,0 (1,5)	2,5 (1,2)	2,5 (1,5)
	16x130	130	3,5 (1,5)	3,0 (1,5)	2,0 (0,9)	3,5 (1,5)	3,0 (1,5)	2,5 (1,2)	2,5 (1,5)
M12 / M16 / IG-M8 / IG-M10	20x85	85	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	2,5 (1,5)
	20x130	130							
	20x200	200							
Compressive strength f _b ≥ 20 N/mm ²									
M8	-	80	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)
M10 / IG-M6	-	90							4,5 (2,5)
M12/ IG-M8	-	100							4,0 (2,5)
M16/ IG-M10	-	100	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)
M8	12x80	80	5,5 (2,5)	5,0 (2,5)	3,5 (1,5)	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	4,0 (2,5)
M8 / M10/ IG-M6	16x85	85	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,0 (2,5)
	16x130	130	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,0 (2,5)
M12 / M16 / IG-M8 / IG-M10	20x85	85	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,5)
	20x130	130							
	20x200	200							

1) Values are valid for c_{cr} , values in brackets are valid for single anchors with c_{min}

2) For c_{cr} calculation of $V_{Rk,c}$ see ETAG 029, Annex C; values in brackets $V_{Rk,c} = V_{Rk,b}$ for single anchors with c_{min}

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8.

Injection System VMU plus for masonry

Performances - Calcium solid brick KS-NF
Characteristic values of resistance

Annex C7

Brick type: Calcium silicate solid brick KS-NF

Table C16: Characteristic values of resistance under tension and shear loads (continue)

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d w/w			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 _{Rk,p} ¹⁾			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]								
Compressive strength f _b ≥ 27 N/mm ²									
M8	-	80	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M10 / IG-M6	-	90							5,5 (3,0)
M12 / IG-M8	-	100							4,5 (2,5)
M16 / IG-M10	-	100	6,0 (3,0)	5,5 (2,5)	4,5 (2,0)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M8	12x80	80	6,5 (3,0)	6,0 (3,0)	4,5 (2,0)	5,5 (2,5)	5,0 (2,5)	3,5 (1,5)	4,5 (2,5)
M8 / M10/ IG-M6	16x85	85	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	4,5 (2,5)
	16x130	130	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	4,5 (2,5)
M12 / M16 / IG-M8 / IG-M10	20x85	85	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,5 (2,5)
	20x130	130							
	20x200	200							

1) Values are valid for c_{gr} , values in brackets are valid for single anchors with c_{min}

2) For c_{gr} calculation of $V_{Rk,c}$ see ETAG 029, Annex C; values in brackets $V_{Rk,c} = V_{Rk,b}$ for single anchors with c_{min}

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C17: Displacements

Anchor size	Sleeve	h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{V0}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80	2,0	0,15	0,30	0,60	1,7	0,90	1,35
M10 / IG-M6	-	90					2,0	1,10	1,65
M12 / IG-M8	-	100					1,7	0,90	1,35
M16 / IG-M10	-	100	0,26		0,51				
M8	12x80	80	1,4		0,21	0,43			
M8 / M10/ IG-M6	16x85	85							
	16x130	130	1,3		0,19	0,39			
M12 / M16 IG-M8 / IG-M10	20x85	85							
	20x130	130							
	20x200	200							

Injection System VMU plus for masonry

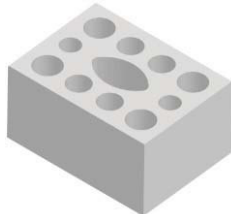
Performances - Calcium solid brick KS-NF

Characteristic values of resistance (continue), Displacements

Annex C8

Brick type: Calcium silicate hollow brick KSL-3DF

Table C18: Description of the brick

Brick type	Calcium silicate hollow brick KSL-3DF		
Bulk density	ρ [kg/dm ³]	1,4	
Compressive strength	$f_b \geq$ [N/mm ²]	8, 12 or 14	
Code		EN 771-2	
Producer (country code)		e.g. Wemding (DE)	
Brick dimensions	[mm]	240 x 175 x 113	
Drilling method		Rotary	

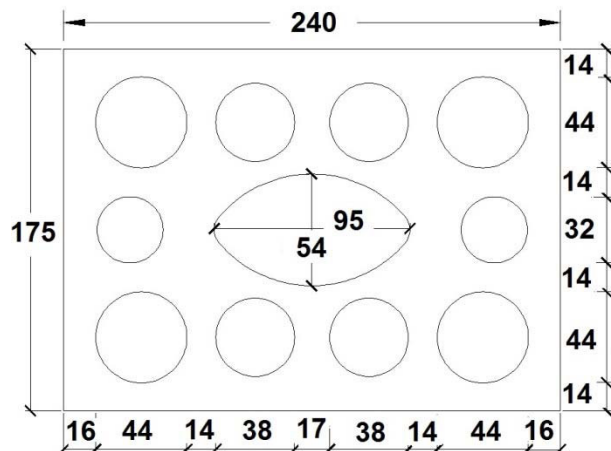
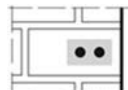
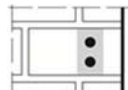


Table C19: Spacing and edge distance

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	C_{min}	[mm]	60
Spacing	$S_{cr,II}$	[mm]	240
	$S_{cr,\perp}$	[mm]	120
Minimum spacing	S_{min}	[mm]	120

¹⁾ Value in brackets for VM-SH 20x85; VM-SH 20x130 and VM-SH 20x200

Table C20: Group factor for anchor group in case of tension loading

Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint 		60	120	$\alpha_{g,N,II}$	[-]	1,5
		C_{cr}	240			2,0
		160	120			2,0
⊥: anchors placed perpendicular to horizontal joint 		60	120	$\alpha_{g,N,\perp}$		1,0
		C_{cr}	120			2,0

Injection System VMU plus for masonry

Performances - Calcium silicate hollow brick KSL-3DF
Description of the brick, Spacing and edge distance, Group factor

Annex C9

Brick type: Calcium silicate hollow brick KSL-3DF

Table C21: Group factor for anchor group in case of shear loading parallel to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	$\alpha_{g,V,II}$	[-]	1,0
		160	120			1,6
		C_{cr}	240			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,V,\perp}$	[-]	1,0
		C_{cr}	120			2,0

Table C22: Group factor for anchor group in case of shear loading perpendicular to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	$\alpha_{g,V,II}$	[-]	1,0
		C_{cr}	240			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,V,\perp}$	[-]	1,0
		C_{cr}	120			2,0

Table C23: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d; w/w			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
			N _{RK,b} = N _{RK,p} ¹⁾			N _{RK,b} = N _{RK,p} ¹⁾			V _{RK,b} ⁴⁾
[mm]		[kN]							
			Compressive strength f _b ≥ 8 N/mm ²						
M8	12x80	80	1,5	1,5	1,2	1,5	1,2	0,9	2,5 ²⁾ (0,9) ³⁾
M8 / M10 / IG-M6	16x85	85					1,5	1,2	4,0 ²⁾ (1,5) ³⁾
	16x130	130					1,5	1,2	4,0 ²⁾ (1,5) ³⁾
M12 / M16 / IG-M8 / IG-M10	20x85	85	4,5	4,0	3,0	4,5	4,0	3,0	4,0 ²⁾ (1,5) ³⁾
	20x130	130							
	20x200	200							
			Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	2,0	2,0	1,5	2,0	1,5	1,2	3,0 ²⁾ (1,2) ³⁾
M8 / M10 / IG-M6	16x85	85	2,0	2,0	1,5	2,0	2,0	1,5	4,5 ²⁾ (1,5) ³⁾
	16x130	130	2,5	2,5	1,5	2,5	2,5	1,5	4,5 ²⁾ (1,5) ³⁾
M12 / M16 / IG-M8 / IG-M10	20x85	85	6,0	5,5	4,0	6,0	5,5	4,0	4,5 ²⁾ (1,5) ³⁾
	20x130	130							
	20x200	200							

1) Values are valid for C_{cr} and C_{min}

2) $V_{Rk,c,II} = V_{Rk,b}$ valid for shear load parallel to free edge

3) $V_{Rk,c,\perp} = V_{Rk,b}$ (values in brackets) valid for shear load in direction to free edge

4) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Annex C10

Performances - Calcium silicate hollow brick KSL-3DF

Group factor, Characteristic values of resistance

Brick type: Calcium silicate hollow brick KSL-3DF

Table C24: Characteristic values of resistance under tension and shear loads (continue)

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d; w/w			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
			$N_{Rk,b} = N_{Rk,p}^{1)}$			$N_{Rk,b} = N_{Rk,p}^{1)}$			$V_{Rk,b}^{4)}$
		h_{ef}	$[kN]$						
		[mm]							
			Compressive strength $f_b \geq 14 \text{ N/mm}^2$						
M8	12x80	80	2,5	2,5	1,5	2,0	2,0	1,5	3,5 ²⁾ (1,5) ³⁾
M8 / M10 / IG-M6	16x85	85	2,5	2,5	1,5	2,5	2,5	1,5	6,0 ²⁾ (2,0) ³⁾
	16x130	130	2,5	2,5	2,0	2,5	2,5	2,0	6,0 ²⁾ (2,0) ³⁾
M12 / M16 / IG-M8 / IG-M10	20x85	85	6,5	6,0	4,5	6,5	6,0	4,5	6,0 ²⁾ (2,0) ³⁾
	20x130	130							
	20x200	200							

1) Values are valid for c_{cr} and c_{min}

2) $V_{Rk,c,II} = V_{Rk,b}$ valid for shear load parallel to free edge

3) $V_{Rk,c,I} = V_{Rk,b}$ (values in brackets) valid for shear load in direction to free edge

4) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C25: Displacements

Anchor size	Sleeve	h_{ef}	N	δ_N / N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$		
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]		
M8	12x80	80	0,71	0,90	0,64	1,29	1,0	1,0	1,50		
M8 / M10 / IG-M6	16x85	85					1,7	1,9	2,85		
	16x130	130			1,86					1,67	3,34
M12 / M16 / IG-M8 / IG-M10	20x85	85									
	20x130	130									
	20x200	200									

Injection System VMU plus for masonry

Performance - Calcium silicate hollow brick KSL-3DF
Characteristic values of resistance, Displacements

Annex C11

Brick type: Calcium silicate hollow brick KSL-12DF

Table C26: Description of the brick

Brick type		Calcium silicate hollow brick KSL-12DF	
Bulk density	ρ [kg/dm ³]	1,4	
Compressive strength	$f_b \geq$ [N/mm ²]	10, 12 or 16	
Code		EN 771-2	
Producer (country code)		e.g. Wemding (DE)	
Brick dimensions	[mm]	498 x 175 x 238	
Drilling method		Rotary	

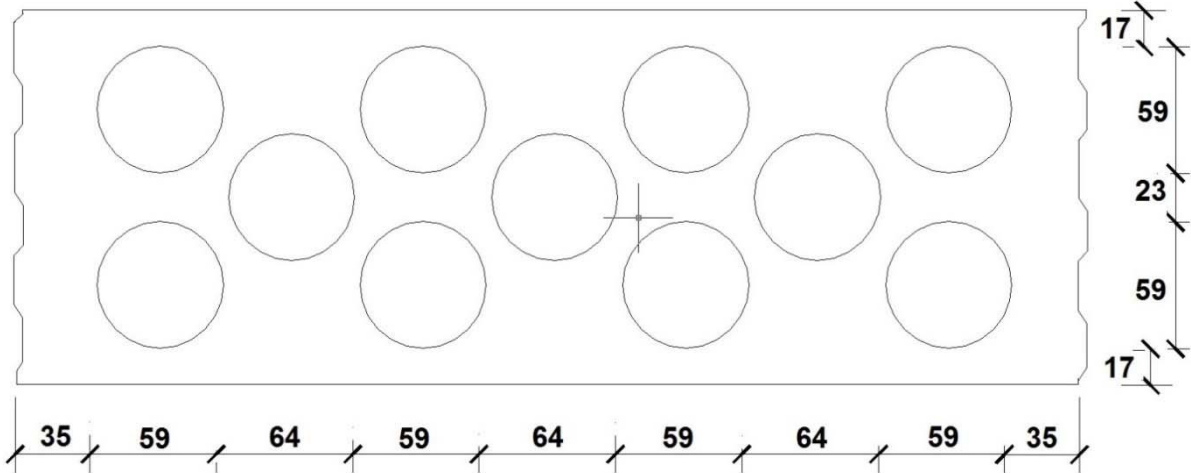


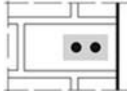
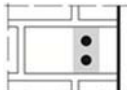
Table C27: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	498
	$S_{cr,\perp}$	[mm]	238
Minimum spacing	S_{min}	[mm]	120

1) Value in brackets for VM-SH 20x85 and VM-SH 20x130

2) For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C28: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		100	120	$\alpha_{g,N,II}$	[-]	1,0
		C_{Cr}	498			2,0
⊥: anchors placed perpendicular to horizontal joint		100	120	$\alpha_{g,N,\perp}$		1,0
		C_{Cr}	238			2,0

Injection System VMU plus for masonry

Performance - Calcium silicate hollow brick KSL-12DF

Description of the brick, Spacing and edge distances, Group factor

Annex C12

Brick type: Calcium silicate hollow brick KSL-12DF

Table C29: Group factor for anchor group in case of shear loading parallel to free edge

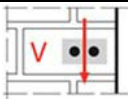
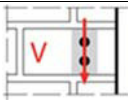
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{Cr}	498	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{Cr}	238	$\alpha_{g,V,\perp}$		2,0

Table C30: Group factor for anchor group in case of shear load perpendicular to free edge

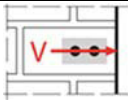
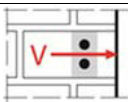
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{Cr}	498	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{Cr}	238	$\alpha_{g,V,\perp}$		2,0

Table C31: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d; w/w			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 _{Rk,p} ¹⁾			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]								
			Compressive strength f _b ≥ 10 N/mm ²						
M8	12x80	80	0,6	0,6	0,4	0,5	0,5	0,4	2,5
M8 / M10 / IG-M6	16x85	85	0,6	0,6	0,4	0,6	0,6	0,4	5,5
	16x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,5	1,5	0,9	1,5	1,5	0,9	5,5
	20x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
			Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	0,75	0,6	0,5	0,6	0,6	0,4	3,0
M8 / M10 / IG-M6	16x85	85	0,75	0,6	0,5	0,75	0,6	0,5	6,5
	16x130	130	3,0	3,0	2,0	3,0	3,0	2,0	6,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,5	1,5	1,2	1,5	1,5	1,2	6,5
	20x130	130	3,0	3,0	2,0	3,0	3,0	2,0	6,5

1) Values are valid for C_{Cr} and C_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 120 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Calcium silicate hollow brick KSL-12DF

Group factor, Characteristic values of resistance

Annex C13

Brick type: Calcium silicate hollow brick KSL-12DF

Table C32: Characteristic values of resistance under tension and shear loads (continue)

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d; w/w			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 _{Rk,p} ¹⁾			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]								
			Compressive strength f _b ≥ 16 N/mm ²						
M8	12x80	80	0,9	0,9	0,6	0,75	0,75	0,5	3,5
M8 / M10 / IG-M6	16x85	85	0,9	0,9	0,6	0,9	0,9	0,6	8,0
	16x130	130	4,0	3,5	2,5	4,0	3,5	2,5	8,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	2,0	2,0	1,5	2,0	2,0	1,5	8,0
	20x130	130	4,0	3,5	2,5	4,0	3,5	2,5	8,0

¹⁾ Values are valid for c_{cr} and c_{min}

²⁾ Calculation of V_{RR,c} see ETAG 029, Annex C, except for shear load parallel to free edge with c ≥ 120 mm: V_{RR,c,II} = V_{RR,b}

³⁾ The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply V_{RR,b} by 0,8

Table C33: Displacements

Anchor size	Sleeve	h _{ef} [mm]	N [kN]	δ _N / N [mm/kN]	δ _{N0} [mm]	δ _{N∞} [mm]	V [kN]	δ _{V0} [mm]	δ _{V∞} [mm]
M8	12x80	80	0,26	0,90	0,23	0,46	1,0	1,3	1,95
M8 / M10 / IG-M6	16x85	85			1,03	2,06	2,3	2,5	3,75
	16x130	130							
M12 / M16 / IG-M8 / IG-M10	20x85	85							
	20x130	130			1,03	2,06			

Injection System VMU plus for masonry

Performance - Calcium silicate hollow brick KSL-12DF
Characteristic values of resistance (continue), Displacements

Annex C14

Brick type: Clay solid brick Mz-DF

Table C34: Description of the brick

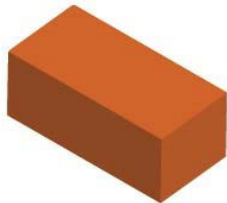
Brick type	Clay solid brick Mz-DF	
Bulk density ρ [kg/dm ³]	1,6	
Compressive strength $f_b \geq$ [N/mm ²]	10, 20 or 28	
Code	EN 771-1	
Producer (country code)	e.g. Unipor (DE)	
Brick dimensions [mm]	240 x 115 x 55	
Drilling method	Hammer	

Table C35: Spacing and edge distances

Anchor size			Alle Größen
Edge distance	c_{cr}	[mm]	$1,5 \cdot h_{ef}$
Minimum edge distance	c_{min}	[mm]	60
Spacing	s_{cr}	[mm]	$3 \cdot h_{ef}$
Minimum spacing	s_{min}	[mm]	120

Table C36: Group factor for anchor group in case of tension loading

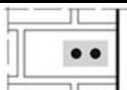
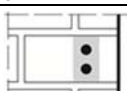
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	α _{g,N,II}	[-]	0,7
		1,5*hef	3*h _{ef}			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	α _{g,N,⊥}		0,5
		1,5*hef	120			1,0
		1,5*hef	3*h _{ef}			2,0

Table C37: Group factor for anchor group in case of shear loading parallel to free edge

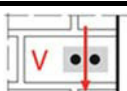
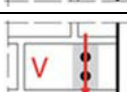
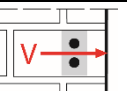
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	α _{g,V,II}	[-]	0,5
		90	120			1,1
		1,5*h _{ef}	3*h _{ef}			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	α _{g,V,⊥}		0,5
		1,5*h _{ef}	120			1,0
		1,5*h _{ef}	3*h _{ef}			2,0

Table C38: Group factor for anchor group in case of shear load perpendicular to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	$\alpha_{g,V,II}$	[-]	0,5
		1,5* h_{ef}	120			1,0
		1,5* h_{ef}	3* h_{ef}			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,V,\perp}$		0,5
		1,5* h_{ef}	120			1,0
		1,5* h_{ef}	3* h_{ef}			2,0

Injection System VMU plus for masonry

Annex C15

Performance - Clay solid brick Mz-DF

Description of the brick , Spacing and edge distances, Group factor

Brick type: Clay solid brick Mz-DF

Table C39: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
			$N_{Rk,b} = N_{Rk,p}^{1)}$			$V_{Rk,b}^{2)3)}$
		h_{ef}				
		[mm]	[kN]			
Compressive strength $f_b \geq 10 \text{ N/mm}^2$						
M8	-	80	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,5 (1,2)
M10 / IG-M6	-	90	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)
M12 / IG-M8	-	100	4,0 (2,0)	4,0 (2,0)	3,5 (1,5)	3,5 (1,2)
M16 / IG-M10	-	100	4,0 (2,0)	4,0 (2,0)	3,5 (1,5)	5,5 (1,5)
M8	12x80	80	3,5 (1,5)	3,5 (1,5)	3,0 (1,2)	3,5 (1,2)
M8 / M10 / IG-M6	16x85	85	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				
Compressive strength $f_b \geq 20 \text{ N/mm}^2$						
M8	-	80	4,5 (2,5)	4,5 (2,5)	4,0 (2,0)	5,0 (1,5)
M10 / IG-M6	-	90	5,5 (2,5)	5,5 (2,5)	4,5 (2,0)	5,0 (1,5)
M12 / IG-M8	-	100	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,0 (1,5)
M16 / IG-M10	-	100	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	8,0 (2,5)
M8	12x80	80	4,5 (2,5)	4,5 (2,5)	4,0 (2,0)	5,0 (1,5)
M8 / M10 / IG-M6	16x85	85	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				
Compressive strength $f_b \geq 28 \text{ N/mm}^2$						
M8	-	80	5,5 (2,5)	5,5 (2,5)	4,5 (2,5)	5,5 (2,0)
M10 / IG-M6	-	90	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
M12 / IG-M8	-	100	7,0 (3,5)	7,0 (3,5)	6,0 (3,0)	5,5 (2,0)
M16 / IG-M10	-	100	7,0 (3,5)	7,0 (3,5)	6,0 (3,0)	9,0 (3,0)
M8	12x80	80	5,5 (2,5)	5,5 (2,5)	4,5 (2,5)	5,5 (2,0)
M8 / M10 / IG-M6	16x85	85	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				

1) Values are valid for c_{cr} , values in brackets are valid for single anchors with c_{min}

2) For c_{cr} calculation of $V_{Rk,c}$ see ETAG 029, Annex C; for c_{min} values in brackets $V_{Rk,c} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8.

Injection System VMU plus for masonry

Performance - Clay solid brick Mz-DF
Characteristic values of resistance

Annex C16

Brick type: Clay solid brick Mz-DF

Table C40: Displacements

Anchor size	Sleeve	h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{V0}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80	1,3	0,15	0,19	0,39	1,9	1,00	1,50
M10 / IG-M6	-	90	1,6		0,24	0,47			
M12 / IG-M8	-	100	1,7		0,26	0,51	2,9		
M16 / IG-M10	-	100							
M8	12x80	80	1,3		0,19	0,39	1,9		
M8 / M10 / IG-M6	16x85	85							
	16x130	130							
M12 / M16 / IG-M8 / IG-M10	20x85	85							
	20x130	130							
	20x200	200							

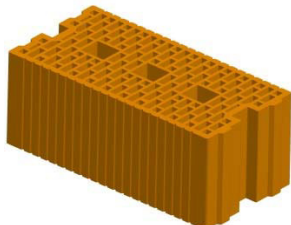
Injection System VMU plus for masonry

Performance - Clay solid brick Mz-DF
Displacements

Annex C17

Brick type: Clay hollow brick HLz-16-DF

Table C41: Description of the brick

Brick type		Clay hollow brick HLz-16-DF	
Bulk density	ρ [kg/dm ³]	0,8	
Compressive strength	$f_b \geq$ [N/mm ²]	6, 8, 12 or 14	
Code		EN 771-1	
Producer (country code)		e.g. Unipor (DE)	
Brick dimensions	[mm]	497 x 240 x 238	
Drilling method		Rotary	

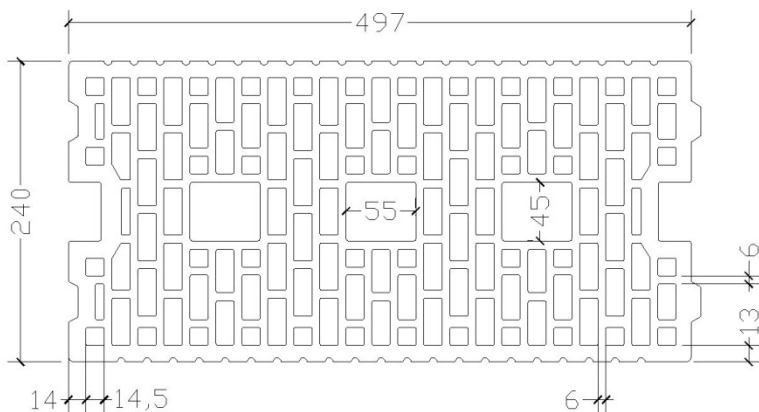


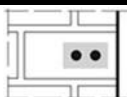
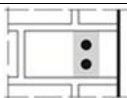
Table C42: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	497
	$S_{cr,\perp}$	[mm]	238
Minimum spacing	S_{min}	[mm]	100

¹⁾ Value in bracket for VM-SH 20x85; VM-SH 20x130 and VM-SH 20x200

²⁾ For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C43: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C _{cr}	100	α _{g,N,II}	[-]	1,3
		C _{cr}	497			2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr}	100	α _{g,N,⊥}		1,1
		C _{cr}	238			2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick HLz-16DF

Description of the brick, Spacing and edge distances, Group factor

Annex C18

Brick type: Clay hollow brick HLz-16-DF

Table C44: Group factor for anchor group in case of shear loading parallel to free edge

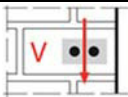
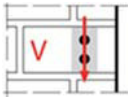
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	497	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	238	$\alpha_{g,V,\perp}$		2,0

Table C45: Group factor for anchor group in case of shear load perpendicular to free edge

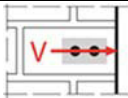
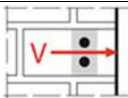
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	497	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	238	$\alpha_{g,V,\perp}$		2,0

Table C46: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 6 N/mm ²						
M8	12x80	80	2,5	2,5	2,0	2,5
M8 / M10/ IG-M6	16x85	85	2,5	2,5	2,0	4,5
	16x130	130	3,5	3,5	3,0	4,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	2,5	2,5	2,0	5,0
	20x130	130	3,5	3,5	3,0	6,0
	20x200	200	3,5	3,5	3,0	6,0
Compressive strength f _b ≥ 8 N/mm ²						
M8	12x80	80	3,0	3,0	2,5	3,0
M8 / M10/ IG-M6	16x85	85	3,0	3,0	2,5	5,5
	16x130	130	4,5	4,5	3,5	5,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	3,0	3,0	2,5	6,0
	20x130	130	4,5	4,5	3,5	7,0
	20x200	200	4,5	4,5	3,5	7,0

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 125 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick HLz-16DF

Group factor, Characteristic values of resistance

Annex C19

Brick type: Clay hollow brick HLz-16DF

Table C47: Characteristic values of resistance under tension and shear loads (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	3,5	3,5	3,0	4,0
M8 / M10/ IG-M6	16x85	85	3,5	3,5	3,0	6,5
	16x130	130	5,0	5,0	4,5	6,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	3,5	3,5	3,0	7,0
	20x130	130	5,0	5,0	4,5	9,0
	20x200	200	5,0	5,0	4,5	9,0
Compressive strength f _b ≥ 14N/mm ²						
M8	12x80	80	4,0	4,0	3,0	4,0
M8 / M10/ IG-M6	16x85	85	4,0	4,0	3,0	6,5
	16x130	130	5,5	5,5	4,5	6,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	4,0	4,0	3,0	7,0
	20x130	130	5,5	5,5	4,5	9,0
	20x200	200	5,5	5,5	4,5	9,0

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 125 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C48: Displacements

Anchor size	Sleeve	h_{ef}	N	δ_N / N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	1,14	0,10	0,11	0,23	1,10	1,20	1,80
M8 / M10/ IG-M6	16x85	85					1,86	1,50	2,25
	16x130	130	1,57		0,16	0,31			
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,14		0,11	0,23	1,86	1,50	2,25
	20x130	130	1,57		0,16	0,31	2,57	2,10	3,15
	20x200	200							

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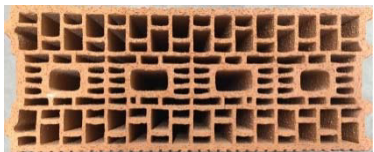
Performance - Clay hollow brick HLz-16DF

Characteristic values of resistance (continue), Displacements

Annex C20

Brick type: Clay hollow brick Porotherm Homebric

Table C49: Description of the brick

Brick type	Clay hollow brick Porotherm Homebric	
Bulk density ρ [kg/dm ³]	0,7	
Compressive strength $f_b \geq$ [N/mm ²]	4, 6 or 10	
Code	EN 771-1	
Producer (country code)	e.g. Wienerberger (FR)	
Brick dimensions [mm]	500 x 200 x 299	
Drilling method	Rotary	

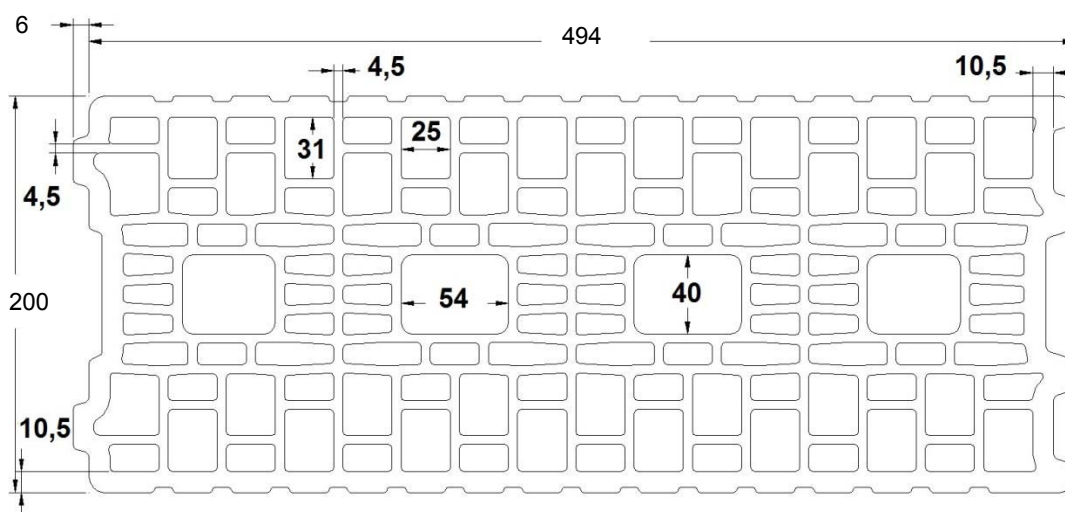


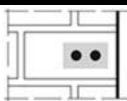
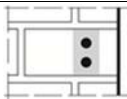
Table C50: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	500
	$S_{cr,\perp}$	[mm]	299
Minimum spacing	S_{min}	[mm]	100

1) Value in brackets for VM-SH 20x85 and VM-SH 20x130

2) For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C51: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		200	100	α _{g,N,II}	[-]	2,0
		C _{cr}	500			2,0
⊥: anchors placed perpendicular to horizontal joint		200	100	α _{g,N,⊥}		1,2
		C _{cr}	299			2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick Porotherm Homebric

Description of the brick, Spacing and edge distances, Group factor

Annex C21

Brick type: Clay hollow brick Porotherm Homebric

Table C52: Group factor for anchor group in case of shear loading parallel to free edge

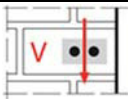
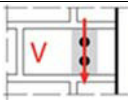
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	299	$\alpha_{g,V,\perp}$		2,0

Table C53: Group factor for anchor group in case of shear load perpendicular to free edge

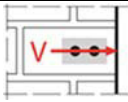
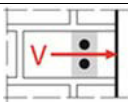
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	299	$\alpha_{g,V,\perp}$		2,0

Table C54: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 4 N/mm ²						
M8	12x80	80	0,9	0,9	0,75	2,0
M8 / M10 / IG-M6	16x85	85	0,9	0,9	0,75	2,0
	16x130	130	1,2	1,2	0,9	2,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,75	2,5
	20x130	130	1,2	1,2	0,9	2,5
Compressive strength f _b ≥ 6 N/mm ²						
M8	12x80	80	0,9	0,9	0,9	2,5
M8 / M10 / IG-M6	16x85	85	0,9	0,9	0,9	2,5
	16x130	130	1,2	1,2	1,2	2,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,9	3,0
	20x130	130	1,2	1,2	1,2	3,0

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 200 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick Porotherm Homebric
Group factor, Characteristic values of resistance

Annex C22

Brick type: Clay hollow brick Porotherm Homebric

Table C55: Characteristic values of resistance under tension and shear loads (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
		[mm]	[kN]			[kN]
Compressive strength f _b ≥ 10 N/mm ²						
M8	12x80	80	1,2	1,2	1,2	3,0
M8 / M10/ IG-M6	16x85	85	1,2	1,2	1,2	3,0
	16x130	130	1,5	1,5	1,5	3,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,2	1,2	1,2	4,0
	20x130	130	1,5	1,5	1,5	4,0

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 200 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C56: Displacements

Anchor size	Sleeve	h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{V0}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,34	0,80	0,27	0,55	0,9	1,20	1,80
M8 / M10/ IG-M6	16x85	85					0,9		
	16x130	130	0,43		0,34	0,69	1,0		
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,34		0,27	0,55	1,14		
	20x130	130	0,43		0,34	0,69			

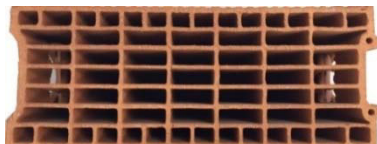
Injection System VMU plus for masonry

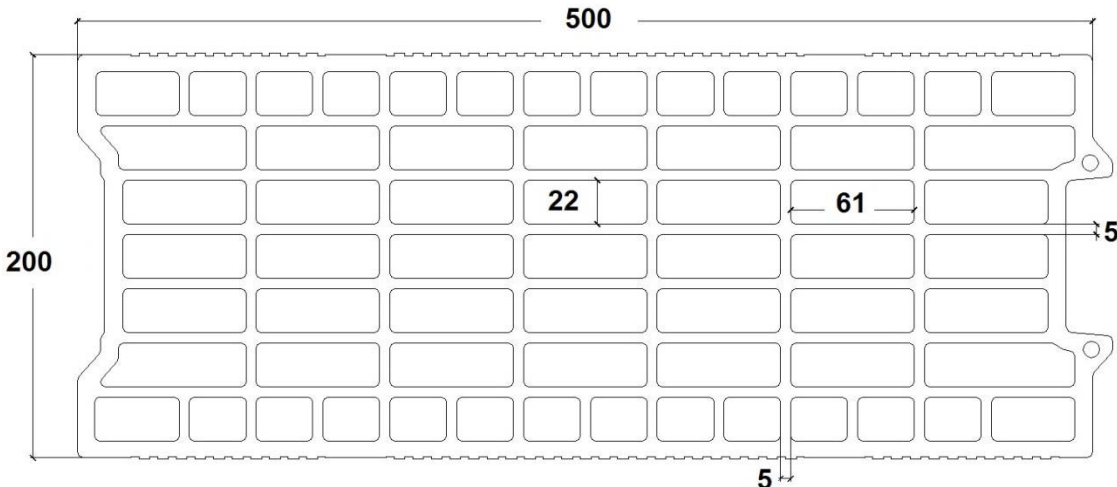
Performance - Clay hollow brick Porotherm Homebric
Characteristic values of resistance (continue), Displacements

Annex C23

Brick type: Clay hollow brick BGV Thermo

Table C57: Description of the brick

Brick type		Clay hollow brick BGV Thermo	
Bulk density	ρ [kg/dm ³]	0,6	
Compressive strength	$f_b \geq$ [N/mm ²]	4, 6 or 10	
Code		EN 771-1	
Producer (country code)		e.g. Leroux (FR)	
Brick dimensions	[mm]	500 x 200 x 314	
Drilling method		Rotary	



500

200

22

61

5

5

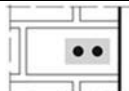
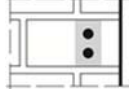
Table C58: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	500
	$S_{cr,\perp}$	[mm]	314
Minimum spacing	S_{min}	[mm]	100

¹⁾ Values in brackets for VM-SH 20x85 and VM-SH 20x130

²⁾ For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C59: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		200	100	α _{g,N,II}	[-]	1,7
		C _{cr}	500			2,0
⊥: anchors placed perpendicular to horizontal joint		200	100	α _{g,N,⊥}		1,1
		C _{cr}	314			2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick BGV Thermo

Description of the brick, Spacing and edge distances, Group factor

Annex C24

Brick type: Clay hollow brick BGV Thermo

Table C60: Group factor for anchor group in case of shear loading parallel to free edge

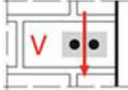
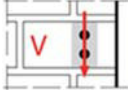
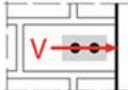
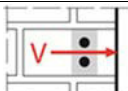
Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint		C_{Cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{Cr}	314	$\alpha_{g,V,\perp}$		2,0

Table C61: Group factor for anchor group in case of shear load perpendicular to free edge

Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint		C_{Cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{Cr}	314	$\alpha_{g,V,\perp}$		2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick BGV Thermo
Group factor

Annex C25

Brick type: Clay hollow brick BGV Thermo

Table C62: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 4 N/mm ²						
M8	12x80	80	0,6	0,6	0,6	2,0
M8 / M10/ IG-M6	16x85	85	0,6	0,6	0,6	2,0
	16x130	130	1,2	1,2	0,9	2,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,6	0,6	0,6	2,5
	20x130	130	1,2	1,2	0,9	2,5
Compressive strength f _b ≥ 6 N/mm ²						
M8	12x80	80	0,9	0,9	0,75	2,5
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,75	2,5
	16x130	130	1,5	1,5	1,2	3,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,75	3,0
	20x130	130	1,5	1,5	1,2	3,0
Compressive strength f _b ≥ 10 N/mm ²						
M8	12x80	80	0,9	0,9	0,9	3,5
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,9	3,5
	16x130	130	2,0	2,0	1,5	4,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,9	4,0
	20x130	130	2,0	2,0	1,5	4,0

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 250 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C63: Displacements

Anchor size	Sleeve	h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{v0}	δ _{v∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,26	0,80	0,21	0,41	0,7	1,00	1,50
M8 / M10/ IG-M6	16x85	85			0,34	0,69	0,86		
	16x130	130	0,43						
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,26		0,21	0,41			
	20x130	130	0,43		0,34	0,69			

Injection System VMU plus for masonry

Performance - Clay hollow brick BGV Thermo
Characteristic values of resistance, Displacements

Annex C26

Brick type: Clay hollow brick Calibric R+

Table C64: Description of the brick

Brick type	Clay hollow brick Calibric R+	
Bulk density ρ [kg/dm ³]	0,6	
Compressive strength $f_b \geq$ [N/mm ²]	6, 9 or 12	
Code	EN 771-1	
Producer (country code)	e.g. Terreal (FR)	
Brick dimensions [mm]	500 x 200 x 314	
Drilling method	Rotary	

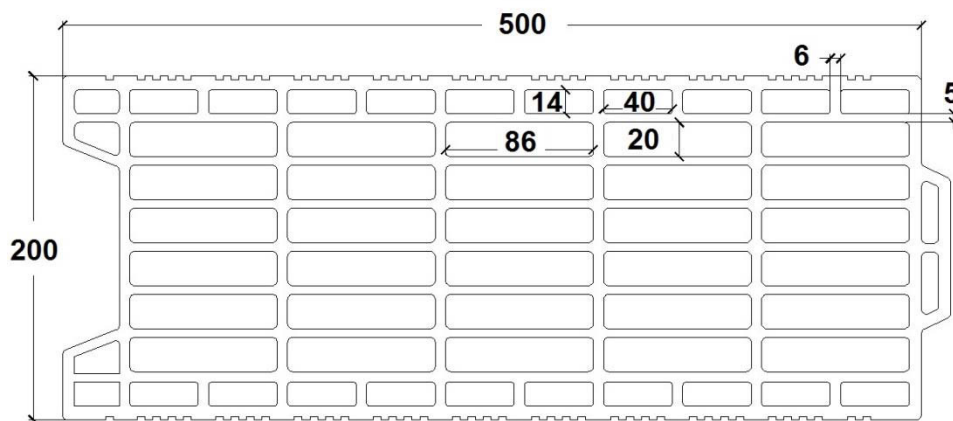


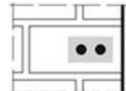
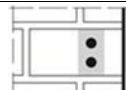
Table C65: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	500
	$S_{cr,\perp}$	[mm]	314
Minimum spacing	S_{min}	[mm]	100

¹⁾ Value in brackets for VM-SH 20x85 and VM-SH 20x130

²⁾ For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C66: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		175	100	α _{g,N,II}	[-]	1,7
		C _{cr}	500			2,0
⊥: anchors placed perpendicular to horizontal joint		175	100	α _{g,N,⊥}		1,0
		C _{cr}	314			2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick Calibric R+

Description of the brick, Spacing and edge distances, Group factor

Annex C27

Brick type: Clay hollow brick Calibric R+

Table C67: Group factor for anchor group in case of shear loading parallel to free edge

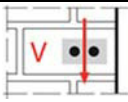
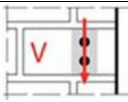
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	314	$\alpha_{g,V,\perp}$		2,0

Table C68: Group factor for anchor group in case of shear load perpendicular to free edge

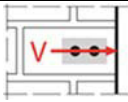
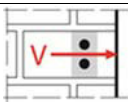
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	314	$\alpha_{g,V,\perp}$		2,0

Table C69: Characteristic values of resistance under tension and shear loads

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}^{1)}$			$V_{Rk,b}^{2)3)}$
[mm]	[kN]			[kN]		
Compressive strength $f_b \geq 6 \text{ N/mm}^2$						
M8	12x80	80	0,9	0,9	0,75	3,0
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,75	4,0
	16x130	130	1,2	1,2	0,9	4,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,75	6,0
	20x130	130	1,2	1,2	0,9	6,0
Compressive strength $f_b \geq 9 \text{ N/mm}^2$						
M8	12x80	80	1,2	1,2	0,9	3,5
M8 / M10/ IG-M6	16x85	85	1,2	1,2	0,9	5,0
	16x130	130	1,5	1,5	1,2	5,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,2	1,2	0,9	7,5
	20x130	130	1,5	1,5	1,2	7,5

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 250 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick Calibric R+
Group factor, Characteristic values of resistance

Annex C28

Brick type: Clay hollow brick Calibric R+

Table C70: Characteristic values of resistance under tension and shear load (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
		[mm]	[kN]			[kN]
Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	1,2	1,2	0,9	4,0
M8 / M10/ IG-M6	16x85	85	1,2	1,2	0,9	5,5
	16x130	130	1,5	1,5	1,2	5,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,2	1,2	0,9	8,5
	20x130	130	1,5	1,5	1,2	8,5

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 250 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C71: Displacements

Anchor size	Sleeve	h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{v0}	δ _{v∞}	
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]	
M8	12x80	80	0,34	0,80	0,27	0,55	1,0	1,10	1,65	
M8 / M10/ IG-M6	16x85	85				1,43	2,0	3,0		
	16x130	130			0,43				0,69	
M12 / M16 / IG-M8 / IG-M10	20x85	85			0,34	0,27			0,55	2,14
	20x130	130			0,43	0,34			0,69	

Injection System VMU plus for masonry

Performance - Clay hollow brick Calibric R+
Characteristic values of resistance, Displacements

Annex C29

Brick type: Clay hollow brick Urbanbric

Table C72: Description of the brick

Brick type	Clay hollow brick Urbanbric	
Bulk density ρ [kg/dm ³]	0,7	
Compressive strength $f_b \geq$ [N/mm ²]	6, 9 or 12	
Code	EN 771-1	
Producer (country code)	e.g. Imerys (FR)	
Brick dimensions [mm]	560 x 200 x 274	
Drilling method	Rotary	

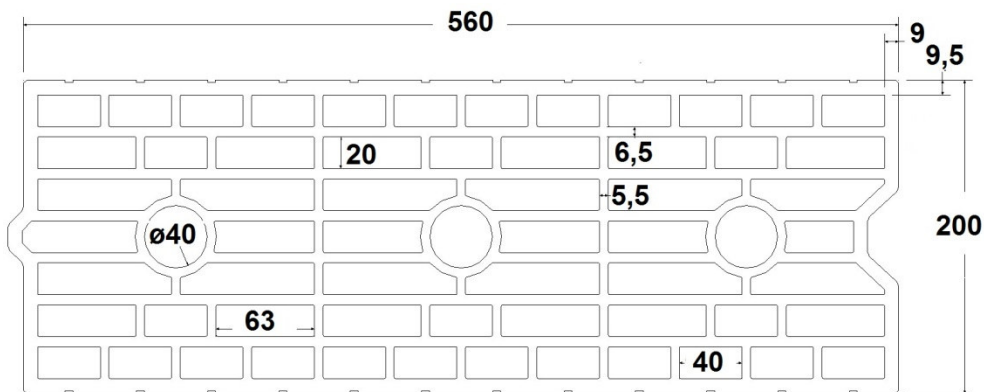


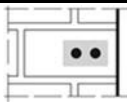
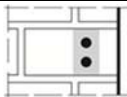
Table C73: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	560
	$S_{cr,\perp}$	[mm]	274
Minimum spacing	S_{min}	[mm]	100

¹⁾ Value in brackets for VM-SH 20x85 and VM-SH 20x130

²⁾ For $V_{Rk,c}$: c_{min} according to ETAG 029, Annex C

Table C74: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		185	100	$\alpha_{g,N,II}$	[-]	1,9
		C_{cr}	560			2,0
⊥: anchors placed perpendicular to horizontal joint		185	100	$\alpha_{g,N,\perp}$		1,1
		C_{cr}	274			2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick Urbanbric

Description of the brick, Spacing and edge distances, Group factor

Annex C30

Brick type: Clay hollow brick Urbanbric

Table C75: Group factor for anchor group in case of shear loading parallel to free edge

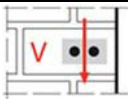
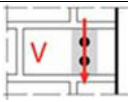
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	560	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	274	$\alpha_{g,V,\perp}$		2,0

Table C76: Group factor for anchor groups in case of shear load perpendicular to free edge

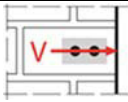
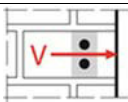
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	560	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	274	$\alpha_{g,V,\perp}$		2,0

Table C77: Characteristic values of resistance under tension and shear load

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 6 N/mm ²						
M8	12x80	80	0,9	0,9	0,75	3,0
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,75	3,0
	16x130	130	2,0	2,0	1,5	3,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,75	3,5
	20x130	130	2,0	2,0	1,5	3,5
Compressive strength f _b ≥ 9 N/mm ²						
M8	12x80	80	0,9	0,9	0,9	4,0
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,9	4,0
	16x130	130	2,5	2,5	2,0	4,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,9	4,5
	20x130	130	2,5	2,5	2,0	4,5

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 190 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick Urbanbric
Group factor, Characteristic values of resistance

Annex C31

Brick type: Clay hollow brick Urbanbric

Table C78: Characteristic values of resistance under tension and shear load (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	1,2	1,2	0,9	4,5
M8 / M10/ IG-M6	16x85	85	1,2	1,2	0,9	4,5
	16x130	130	3,0	3,0	2,5	4,5
M12 / M16 / IG-M8 / IG-M10	20x85	85	1,2	1,2	0,9	5,0
	20x130	130	3,0	3,0	2,5	5,0

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 190 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C79: Displacements

Anchor size	Sleeve	h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{V0}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,34	0,80	0,27	0,55	1,30	1,00	1,50
M8 / M10/ IG-M6	16x85	85			0,69	1,37			
	16x130	130	0,86		0,27	0,55	1,43		
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,34		0,69	1,37			
	20x130	130	0,86						

Injection System VMU plus for masonry

Performance - Clay hollow brick Urbanbric
Characteristic values of resistance, Displacements

Annex C32

Brick type: Clay hollow brick Brique creuse C40

Table C80: Description of the brick

Brick type		Clay hollow brick Brique creuse C40	
Bulk density	ρ [kg/dm ³]	0,7	
Compressive strength	$f_b \geq$ [N/mm ²]	4, 8 or 12	
Code		EN 771-1	
Producer (country code)		e.g. Terreal (FR)	
Brick dimensions	[mm]	500 x 200 x 200	
Drilling method		Rotary	

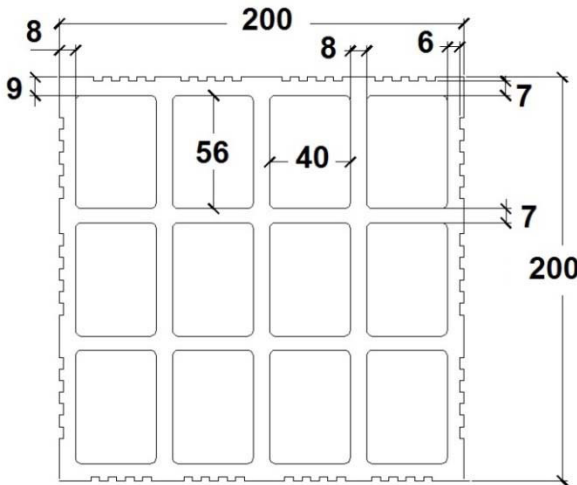


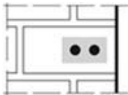
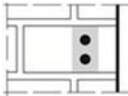
Table C81: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	500
	$S_{cr,\perp}$	[mm]	200
Minimum spacing	S_{min}	[mm]	200

¹⁾ Values in brackets for VM-SH 20x85 and VM-SH 20x130

²⁾ For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C82: Group factor for anchor group in case of tension loading

Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint		C_{cr}	200	$\alpha_{g,N,II}$	[-]	2,0
$\perp$: anchors placed perpendicular to horizontal joint		C_{cr}	200	$\alpha_{g,N,\perp}$		2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick Brique creuse C40

Description of the brick, Spacing and edge distances, Group factor

Annex C33

Brick type: Clay hollow brick Brique creuse C40

Table C83: Group factor for anchor group in case of shear loading parallel to free edge

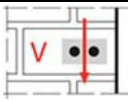
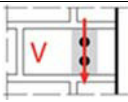
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	200	$\alpha_{g,V,\perp}$		2,0

Table C84: Group factor for anchor group in case of shear load perpendicular to free edge

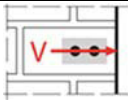
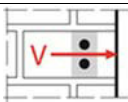
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	200	$\alpha_{g,V,\perp}$		2,0

Table C85: Characteristic values of resistance under tension and shear load

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}^{1)}$			$V_{Rk,b}^{2)3)}$
[mm]	[kN]			[kN]		
Compressive strength $f_b \geq 4 \text{ N/mm}^2$						
M8	12x80	80	0,6	0,6	0,6	0,9
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
Compressive strength $f_b \geq 8 \text{ N/mm}^2$						
M8	12x80	80	0,9	0,9	0,75	1,2
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick Brique creuse C40

Group factor, Characteristic values of resistance

Annex C34

Brick type: Clay hollow brick Brique creuse C40

Table C86: Characteristic values of resistance under tension and shear load (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
		[mm]	[kN]			[kN]
Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	1,2	1,2	0,9	1,5
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C87: Displacements

Anchor size	Sleeve	h_{ef} [mm]	N [kN]	δ_N / N [mm/kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{v0} [mm]	$\delta_{v\infty}$ [mm]
M8	12x80	80	0,17	0,80	0,14	0,27	0,3	0,9	1,35
M8 / M10/ IG- M6	16x85	85							
	16x130	130							
M12 / M16 / IG-M8 / IG-M10	20x85	85							
	20x130	130							

Injection System VMU plus for masonry

Performance - Clay hollow brick Brique creuse C40

Characteristic values of resistance, Displacements

Annex C35

Brick type: Clay hollow brick Blocchi Leggeri

Table C88: Description of the brick

Brick type		Clay hollow brick Blocchi Leggeri	
Bulk density	ρ [kg/dm ³]	0,6	
Compressive strength	$f_b \geq$ [N/mm ²]	4, 6, 8 or 12	
Code		EN 771-1	
Producer (country code)		e.g. Wienerberger (IT)	
Brick dimensions	[mm]	250 x 120 x 250	
Drilling method		Rotary	

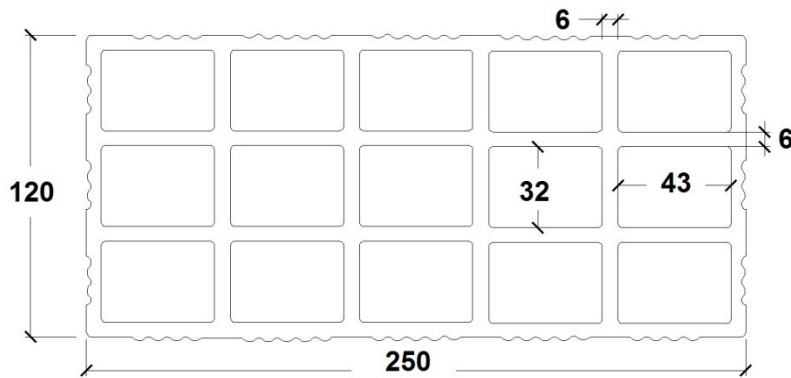
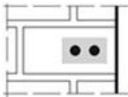
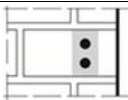


Table C89: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	C_{min}	[mm]	60
Spacing	$S_{cr,II}$	[mm]	250
	$S_{cr,\perp}$	[mm]	120
Minimum spacing	S_{min}	[mm]	100

¹⁾ Value in brackets for VM-SH 20x85; VM-SH 20x130 and VM-SH 20x200

Table C90: Group factor for anchor group in case of tension loading

Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint		60	100	$\alpha_{g,N,II}$	[-]	1,0
		C_{cr}	250			2,0
$\perp$: anchors placed perpendicular to horizontal joint		60	100	$\alpha_{g,N,\perp}$		2,0

Injection System VMU plus for masonry

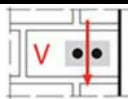
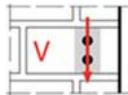
Performance - Clay hollow brick Blocchi Leggeri

Description of the brick, Spacing and edge distances, Group factor

Annex C36

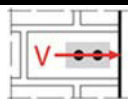
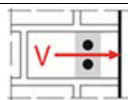
Brick type: Clay hollow brick Blocchi Leggeri

Table C91: Group factor for anchor group in case of shear loading parallel to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60 ¹⁾	100 ¹⁾	α _{g,V,II}	[-]	1,0
		C _{cr}	250			2,0
⊥: anchors placed perpendicular to horizontal joint		60 ¹⁾	100 ¹⁾	α _{g,V,⊥}		1,6
		C _{cr}	250			2,0

¹⁾ Only valid for $V_{Rk,b}$ according to Table C93 and C94 values in brackets

Table C92: Group factor for anchor group in case of shear load perpendicular to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60 ¹⁾	100 ¹⁾	α _{g,V,II}	[-]	1,0
		C _{cr}	250			2,0
⊥: anchors placed perpendicular to horizontal joint		60 ¹⁾	100 ¹⁾	α _{g,V,⊥}		1,6
		C _{cr}	250			2,0

¹⁾ Only valid for $V_{Rk,b}$ according to Table C93 and C94 values in brackets

Table C93: Characteristic values of resistance under tension and shear load

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ⁴⁾
			[mm]	[kN]		[kN]
Compressive strength f _b ≥ 4 N/mm ²						
M8	12x80	80	0,4	0,4	0,3	2,0 ²⁾ (0,9) ³⁾
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				

¹⁾ Values are valid for c_{cr} and c_{min}

²⁾ Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 125 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

³⁾ Values in brackets $V_{Rk,c} = V_{Rk,b}$ for anchors with c_{min}

⁴⁾ The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick Blocchi Leggeri

Group factor, Characteristic values of resistance

Annex C37

Brick type: Clay hollow brick Blocchi Leggeri

Table C94: Characteristic values of resistance under tension and shear load (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{RK,b} = N _{RK,p} ¹⁾			V _{RK,b} ⁴⁾
		[mm]	[kN]			[kN]
Compressive strength f _b ≥ 6 N/mm ²						
M8	12x80	80	0,5	0,5	0,4	2,5 ²⁾ (1,2) ³⁾
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				
Compressive strength f _b ≥ 8 N/mm ²						
M8	12x80	80	0,6	0,6	0,5	3,0 ²⁾ (1,2) ³⁾
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				
Compressive strength f _b ≥ 12 N/mm ²						
M8	12x80	80	0,6	0,6	0,6	3,5 ²⁾ (1,5) ³⁾
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				

1) Values are valid for C_{cr} and C_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 125 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) Values in brackets $V_{Rk,c} = V_{Rk,b}$ for anchors with C_{min}

4) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C95: Displacements

Anchor size	Sleeve	h_{ef}	N	δ_N / N	δ_{N0}	$\delta_{N\infty}$	V	δ_{v0}	$\delta_{v\infty}$
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
All sizes	All sizes	All sizes	0,17	1,20	0,21	0,41	0,9	1,20	1,80

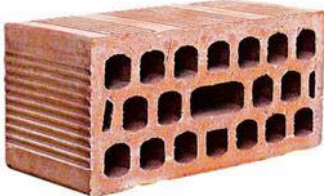
Injection System VMU plus for masonry

Performance - Clay hollow brick Blocchi Leggeri
Characteristic values of resistance, Displacements

Annex C38

Brick type: Clay hollow brick Doppio Uni

Table C96: Description of the brick

Brick type		Clay hollow brick Doppio Uni	
Bulk density	ρ [kg/dm ³]	0,9	
Compressive strength	$f_b \geq$ [N/mm ²]	10, 16, 20 or 28	
Code		EN 771-1	
Producer (country code)		e.g. Wienerberger (IT)	
Brick dimensions	[mm]	250 x 120 x 120	
Drilling method		Rotary	

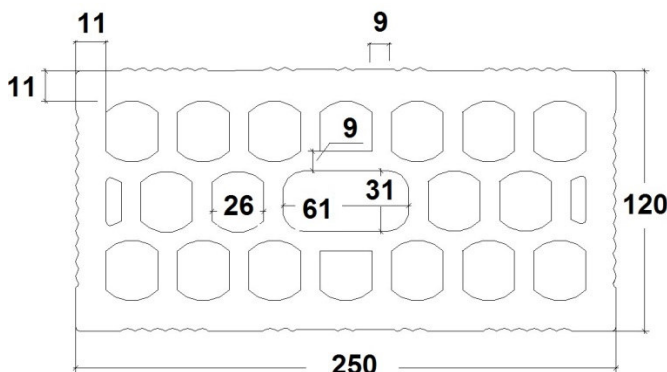


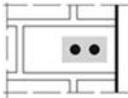
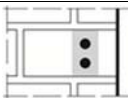
Table C97: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	60
Spacing	$S_{cr,II}$	[mm]	250
	$S_{cr,\perp}$	[mm]	120
Minimum spacing	$S_{min,II}$	[mm]	100
	$S_{min,\perp}$	[mm]	120

1) Value in brackets for VM-SH 20x85; VM-SH 20x130 and VM-SH 20x200

2) For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C98: Group factor for anchor group in case of tension loading

Configuration		with c [mm] $\geq$	with s [mm] $\geq$			
II: anchors placed parallel to horizontal joint		60	100	$\alpha_{g,N,II}$	[-]	1,0
		C_{cr}	250			2,0
$\perp$: anchors placed perpendicular to horizontal joint		60	100	$\alpha_{g,N,\perp}$		2,0

Injection System VMU plus for masonry

Performance - Clay hollow brick Doppio Uni

Description of the brick, Spacing and edge distances, Group factor

Annex C39

Brick type: Clay hollow brick Doppio Uni

Table C99: Group factor for anchor group in case of shear loading parallel to free edge

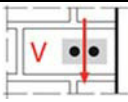
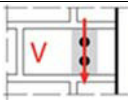
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	250	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	120	$\alpha_{g,V,\perp}$		2,0

Table C100: Group factor for anchor group in case of shear load perpendicular to free edge

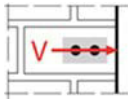
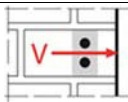
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	250	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		C_{cr}	120	$\alpha_{g,V,\perp}$		2,0

Table C101: Characteristic values of resistance under tension and shear load

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
		[mm]	[kN]			[kN]
Compressive strength f _b ≥ 10 N/mm ²						
M8	12x80	80	0,6	0,6	0,5	1,5
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				

1) Values are valid for C_{cr} and C_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Injection System VMU plus for masonry

Performance - Clay hollow brick Doppio Uni
Group factor, Characteristic values of resistance

Annex C40

Brick type: Clay hollow brick Doppio Uni

Table C102: Characteristic values of resistance under tension and shear load (continue)

Anchor size	Sleeve	Effective Anchorage depth	Characteristic resistance			
			Use category			
			d/d w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h _{ef}	N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
[mm]	[kN]			[kN]		
Compressive strength f _b ≥ 16 N/mm ²						
M8	12x80	80	0,75	0,75	0,6	2,0
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				
Compressive strength f _b ≥ 20 N/mm ²						
M8	12x80	80	0,9	0,9	0,75	2,0
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				
Compressive strength f _b ≥ 28 N/mm ²						
M8	12x80	80	1,2	1,2	0,9	2,5
M8 / M10/ IG-M6	16x85	85				
	16x130	130				
M12 / M16 / IG-M8 / IG-M10	20x85	85				
	20x130	130				
	20x200	200				

1) Values are valid for c_{cr} and c_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C103: Displacements

Anchor size	Sleeve	h_{ef}	N	δ_N / N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
All sizes	All sizes	All sizes	0,26	1,20	0,31	0,62	0,6	0,3	0,45

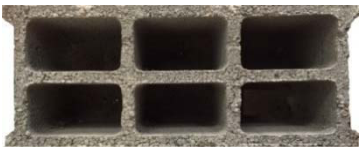
Injection System VMU plus for masonry

Performance - Clay hollow brick Doppio Uni
Characteristic values of resistance, Displacements

Annex C41

Brick type: Hollow lightweight concrete Bloc creux B40

Table C104: Description of the brick

Brick type	Hollow Lightweight concrete Bloc creux B40		
Bulk density ρ [kg/dm ³]	0,8		
Compressive strength $f_b \geq$ [N/mm ²]	4		
Code	EN 771-3		
Producer (country code)	e.g. Sepa (FR)		
Brick dimensions [mm]	494 x 200 x 190		
Drilling method	Rotary		

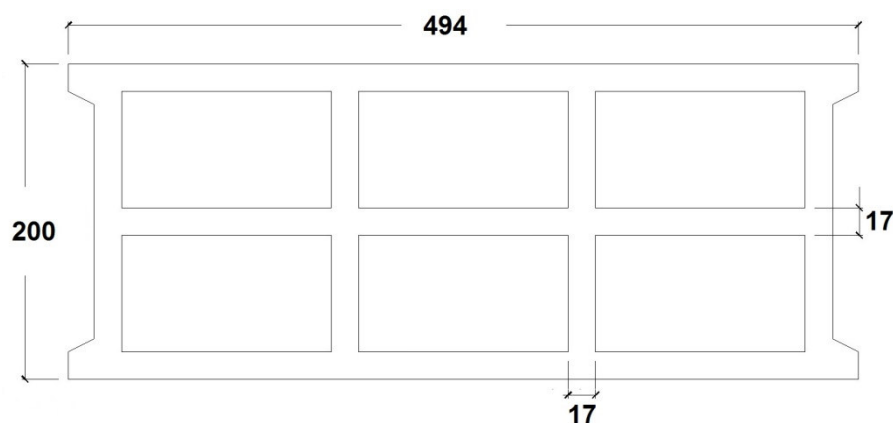


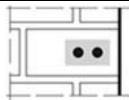
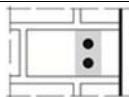
Table C105: Spacing and edge distances

Anchor size			All sizes
Edge distance	C_{cr}	[mm]	100 (120) ¹⁾
Minimum edge distance	$C_{min}^{2)}$	[mm]	100 (120) ¹⁾
Spacing	$S_{cr,II}$	[mm]	494
	$S_{cr,\perp}$	[mm]	190
Minimum spacing	S_{min}	[mm]	100

¹⁾ Value in brackets for VM-SH 20x85 and VM-SH 20x130

²⁾ For $V_{Rk,c}$: C_{min} according to ETAG 029, Annex C

Table C106: Group factor for anchor group in case of tension loading

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		100	100	α _{g,N,II}	[-]	1,5
		C _{cr}	494			2,0
⊥: anchors placed perpendicular to horizontal joint		100	100	α _{g,N,⊥}		1,0
		C _{cr}	190			2,0

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Annex C42

Performance - Hollow Lightweight concrete Bloc creux B40

Description of the brick, Spacing and edge distances, Group factor

Brick type: Hollow lightweight concrete Bloc creux B40

Table C107: Group factor for anchor group in case of shear loading parallel to free edge

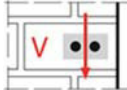
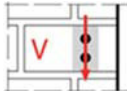
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		50	100	$\alpha_{g,V,II}$	[-]	1,1
		C_{cr}	494			2,0
⊥: anchors placed perpendicular to horizontal joint		100	100	$\alpha_{g,V,\perp}$		1,1
		C_{cr}	190			2,0

Table C108: Group factor for anchor group in case of shear load perpendicular to free edge

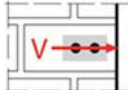
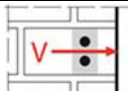
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		C_{cr}	494	$\alpha_{g,V,II}$	[-]	2,0
I: anchors placed perpendicular to horizontal joint		C_{cr}	190	$\alpha_{g,V,I}$		2,0

Table C109: Characteristic values of resistance under tension and shear load

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d w/w			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
			N _{Rk,b} = N _{Rk,p} ¹⁾			N _{Rk,b} = N _{Rk,p} ¹⁾			V _{Rk,b} ²⁾³⁾
h _{ef}		[kN]							
[mm]									
Compressive strength f _b ≥ 4 N/mm ²									
M8	12x80	80	1,2	0,9	0,75	0,9	0,9	0,75	3,0
M8 / M10/ IG-M6	16x85	85				1,2			
	16x130	130				1,2			
	M12 / M16 / IG-M8 / IG-M10	20x85				85			
	20x130	130				1,2			

1) Values are valid for C_{cr} and C_{min}

2) Calculation of $V_{Rk,c}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \geq 250 \text{ mm}$: $V_{Rk,c,II} = V_{Rk,b}$

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C110: Displacements

Anchor size	Sleeve	h_{ef} [mm]	N [kN]	δ_N / N [mm/kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
All sizes	All sizes	All sizes	0,34	0,90	0,31	0,62	0,86	0,9	1,35

Injection System VMU plus for masonry

Performance - Hollow lightweight concrete Bloc creux B40

Group factor, Characteristic values of resistance, Displacements

Annex C43

Brick type: Solid lightweight concrete - LAC

Table C111: Description of the brick

Brick type	Solid lightweight concrete LAC		
Bulk density	ρ [kg/dm³]	0,6	
Compressive strength	$f_b \geq$ [N/mm²]	2	
Code	EN 771-3		
Producer (country code)	e.g. Bisotherm (DE)		
Brick dimensions	[mm]	300 x 123 x 248	
Drilling method	Rotary		

Table C112: Spacing and edge distances

Anchor size			All sizes
Edge distance	c_{cr}	[mm]	$1,5 \cdot h_{ef}$
Minimum edge distance	c_{min}	[mm]	60
Spacing	s_{cr}	[mm]	$3 \cdot h_{ef}$
Minimum spacing	s_{min}	[mm]	120

Table C113: Group factor for anchor group in case of tension loading

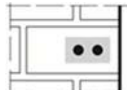
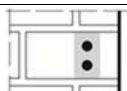
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		90	120	$\alpha_{g,N,II}$	[-]	1,1
		1,5*hef	3*hef			2,0
⊥: anchors placed perpendicular to horizontal joint		124	120	$\alpha_{g,N,\perp}$		1,1
		1,5*hef	3*hef			2,0

Table C114: Group factor for anchor group in case of shear loading parallel to free edge

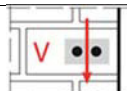
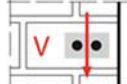
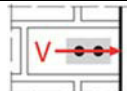
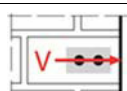
Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	$\alpha_{g,V,II}$	[-]	0,6
		90	120			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,V,\perp}$		0,6
		124	120			2,0

Table C115: Group factor for anchor group in case of shear load perpendicular to free edge

Configuration		with c [mm] ≥	with s [mm] ≥			
II: anchors placed parallel to horizontal joint		60	120	α _{g,V,II}	[-]	0,6
		90	120			2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	α _{g,V,⊥}		0,6
		1,5* <i>h</i> _{ef}	120			1,0
		1,5* <i>h</i> _{ef}	3* <i>h</i> _{ef}			2,0

Injection System VMU plus for masonry

Annex C44

Performance - Solid lightweight concrete - LAC

Description of the brick, Spacing and edge distances, Group factor

Brick type: Solid lightweight concrete - LAC

Table C116: Characteristic values of resistance under tension and shear load

Anchor size	Sleeve	Effective anchorage depth	Characteristic resistance						
			Use category						
			d/d			w/d w/w			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 _{RK,p} ¹⁾			N _{RK,b} = N _{RK,p} ¹⁾		
		[mm]	[kN]						
Compressive strength f _b ≥ 2 N/mm ²									
M8	-	80	3,0	2,5	2,0	2,5	2,0	1,5	3,0
M8 / M10/ IG-M6	-	90	3,0	3,0	2,0	2,5	2,5	2,0	3,0
M10 / IG-M8	-	100	3,5	3,0	2,5	3,0	2,5	2,0	3,0
M16 / IG-M10	-	100	3,0	3,0	2,0	3,0	3,0	2,0	3,0
M8	12x80	80	2,5	2,5	2,0	2,5	2,0	1,5	3,0
M8 / M10/ IG-M6	16x85	85	3,0	2,5	2,0	3,0	2,5	2,0	3,0
	16x130	130	3,0	2,5	2,0	3,0	2,5	2,0	3,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	2,5	2,5	2,0	2,5	2,5	2,0	3,0
	20x130	130							
	20x200	200							

1) Values are valid for c_{cr} , values in brackets are valid for single anchors with c_{min}

2) For calculation of $V_{Rk,c}$ see ETAG029, Annex C

3) The values are valid for steel 5.6 or higher. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8

Table C117: Displacements

Anchor size	Sleeve	h _{ef}	N	δ_N / N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80	0,86	0,50	0,43	0,86	0,9	0,25	0,38
M8 / M10/ IG-M6	-	90							
M10 / IG-M8	-	100							
M16 / IG-M10	-	100							
M8	12x80	80	0,71	0,35	0,25	0,50	0,9	0,25	0,38
M8 / M10/ IG-M6	16x85	85							
	16x130	130							
M12 / M16 / IG-M8 / IG-M10	20x85	85							
	20x130	130							
	20x200	200							

Injection System VMU plus for masonry

Performance - Solid lightweight concrete - LAC

Characteristic values of resistance, Displacements

Annex C45