



Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



European Technical Assessment

ETA-12/0543 of 15 December 2016

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

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

Deutsches Institut für Bautechnik

Friulsider Injection system KEM-UP + Vinylester for masonry

Injection system for use in masonry

Friulsider S.p.A. Via Trieste 1 33048 SAN. GIOVANNI AL NATISONE ITALIEN

Friulsider S.p.A., Plant 2 Germany

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

Guideline for European technical approval of "Metal Injection Anchors for Use in Masonry", ETAG 029, April 2013,

used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.



European Technical Assessment ETA-12/0543 English translation prepared by DIBt

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Specific Part

1 Technical description of the product

The Friulsider Injection system KEM-UP Vinylester is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar KEM-UP Vinylester, a perforated sleeve and an anchor rod with hexagon nut and washer. The steel elements are made of zinc coated steel or stainless steel.

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

The Illustration and the description of the product are given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for steel elements	See Annex C2
Characteristic resistance for anchors in masonry units	See Annex C3 – C45
Displacements under shear and tension loads	See Annex C4 – C45
Reduction Factor for job site tests (β-Factor)	See Annex C1
Edge distances and spacing	See Annex C3 – C45
Group factor for group fastenings	See Annex C3 – C45

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.



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3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 029, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [97/177/EC]. The system to be applied is: 1

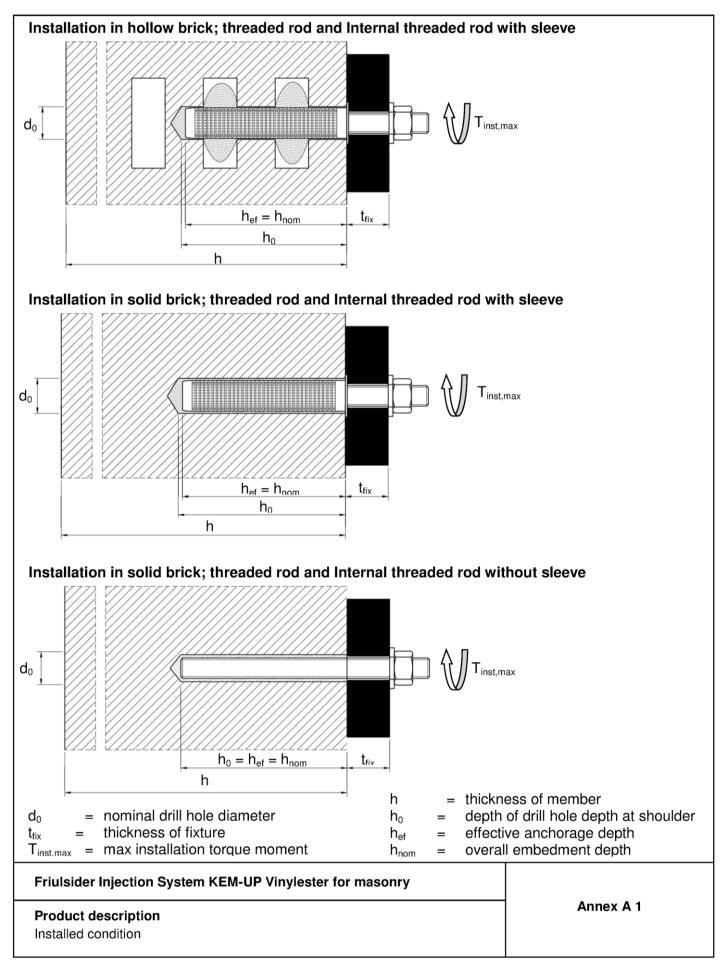
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

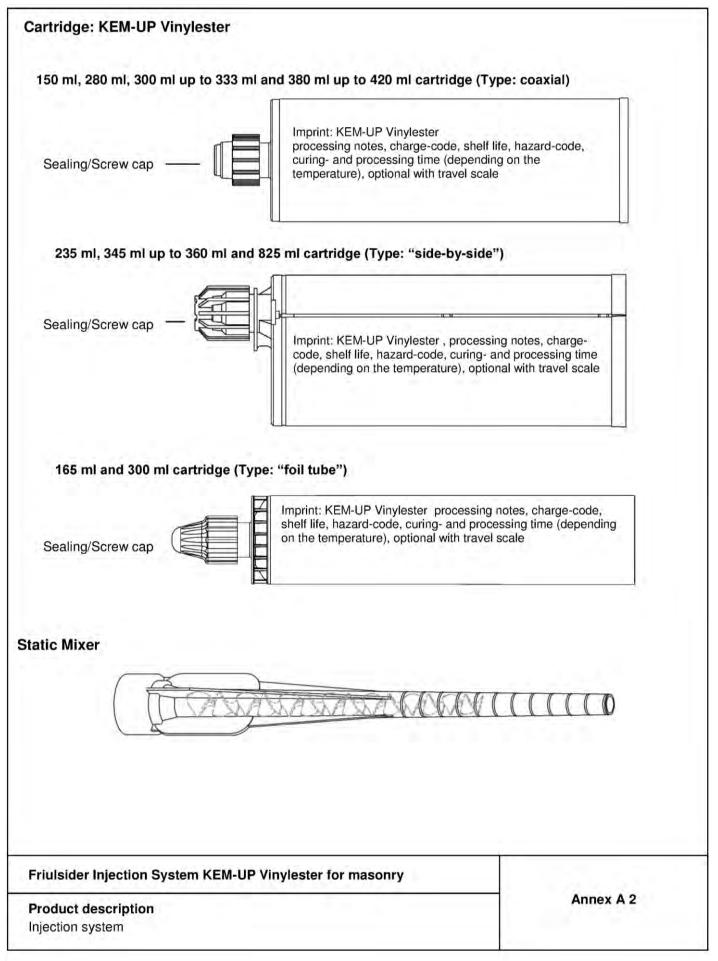
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Uwe Bender Head of Department *beglaubigt:* Baderschneider









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	Material					
Steel, zinc plated ≥ 5 μm acc. to EN ISO 4042: hot-dip galvanised ≥ 40 μm acc. to EN ISO 146						
Anchor rod	Steel, EN 10087:1998 or EN 10263:2001 Property class 4.6, 4.8, 5.6, 5.8, 8.8 acc. EN 1993-1-8:2005+AC:2009 A _s > 8% fracture elongation					
Hexagon nut, EN ISO 4032:2012	Steel acc. EN 10087:1998 or EN 10263:2001 Property class 4 (for class 4.6, 4.8 rod) EN ISO 898-2:2012 Property class 5 (for class 5.6, 5.8 rod) EN ISO 898-2:2012 Property class 8 (for class 8.8 rod) EN ISO 898-2:2012					
Washer, EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000, or EN ISO 7094:2000	Steel, zinc plated or hot-dip galvanised					
Internal threaded rod	Steel, zinc plated Property class 5.6, 5.8 and 8.8 EN ISO 898-1:2013					
Stainless steel	·					
Anchor rod	Material 1.4401 / 1.4404 / 1.4571, EN 10088-1:2014, Property class 70 EN ISO 3506-1:2009 Property class 80 EN ISO 3506-1:2009 Material 1.4401 / 1.4404 / 1.4571 EN 10088-1:2014,					
Hexagon nut, EN ISO 4032:2012	Material 1.4401 / 1.4404 / 1.4571 EN 10088-1:2014, Property class 70 (for class 70 rod) EN ISO 3506-2:2009 Property class 80 (for class 80 rod) EN ISO 3506-2:2009					
Washer, EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000, or EN ISO 7094:2000	Material 1.4401, 1.4404 or 1.4571, EN 10088-1:2014					
Internal threaded rod	Stainless steel: 1.4401 / 1.4404 / 1.4571, EN 10088-1:2014 Property class 70 (for class 70 rod) EN ISO 3506-1:2009					
High corrosion resistant steel (HCR)	·					
Anchor rod	Material 1.4529 / 1.4565, EN 10088-1:2014, Property class 70 EN ISO 3506-1:2009 Property class 80 EN ISO 3506-1:2009					
Hexagon nut, EN ISO 4032:2012	Material 1.4529 / 1.4565, EN 10088-1:2014, Property class 70 (for class 70 rod) EN ISO 3506-2:2009 Property class 80 (for class 80 rod) EN ISO 3506-2:2009					
Washer, EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000, or EN ISO 7094:2000	Material 1.4529 / 1.4565, EN 10088-1:2014					
Internal threaded rod	Stainless steel: 1.4529 / 1.4565, EN 10088-1:2014 Property class 70 (for class 70 rod) EN ISO 3506-1:2009					
Plastic sleeve						
Perforated sleeve	Material: Polypropylene					



Table A2: Sleeve (Plastic)									
SH 12x80 SH 16x85 SH 20x85 d _s			L _S =	h _{ef} = h _{nor}					
SH 16x130 SH 20x130 SH 20x200 d _s			L _s = h _{ef} =	= h _{nom}					
Table A3: Sizes sleeve									
		SI	eeve	12x80	16x85	16x130	20x85	20x130	20x200
Diameter of sleeve	d _s = d _{nor}		[mm]	12	16	16	20	20	20
Length of sleeve	Ls		[mm]	80	85	130	85	130	200
Effective anchorage depth	h _{ef}	[[mm]	80	85	130	85	130	200
Overall anchor embedment	h _{nor}	n [[mm]	80	85	130	85	130	200
Table A4: Steel									
	Anchor	rod	IG-M6	IG-M8	IG-M10	M8	M10	M12	M16
Outside diameter of anchor	$d_1 = d_{nom}$	[mm]	10 ¹⁾	12 ¹⁾	16 ¹⁾	8	10	12	16
Diameter of internal thread	d ₂	[mm]	6	8	10	-	-	-	-
Thread engagement length Min/max	l _{IG}	[mm]	8/20	8/20	10/25	-	-	-	-
Total length of steel element	I _{ges}	[mm]		sleeve: he thout sleev		hef + t _{fix} + 9,5	hef + t _{fix} + 11,5	hef + t _{fix} + 17,5	hef + t _f + 20,0
¹⁾ Internal threaded rod with me	etric exte	ernal thr	ead						
Friulsider Injection System Product description Sleeves	n KEM-	UP Vir	nylester f	or mason	ry		Ar	nnex A 5	



Specifications of intended use

Anchorages subject to:

Static and quasi-static loads

Base materials:

- Autoclaved Aerated Concrete (Use category d) according to Annex B2
- Solid brick masonry (Use category b), according to Annex B2.
- Hollow brick masonry (use category c), according to Annex B2 and B3
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010.
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by job site tests according to ETAG 029, Annex B under consideration of the β-factor according to Annex C1, Table C1.

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

Temperature Range:

- T_a: 40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C)
- T_{b} : 40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)
- T_c: 40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C)

Use conditions (Environmental conditions):

- Dry and wet structure (regarding injection mortar).
- Structures subject to dry internal conditions (zinc coated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist (high corrosion resistant steel).

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

Use categories in respect of installation and use:

- Category d/d: Installation and use in dry masonry
- Category w/w: Installation and use in dry or wet masonry (incl. w/d installation in wet masonry and use in dry masonry)

Design:

- Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings.
- The anchorages are designed in accordance with the ETAG 029, Annex C, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.
- $N_{Bk,p} = N_{Bk,b}$ see Annex C4 to C45; $N_{Bk,s}$ see Annex C3; $N_{Bk,pb}$ see ETAG 029, Annex C
- V_{Bk,b} and V_{Bk,c} see Annex C4 to C45; V_{Bk,s} see Annex C3; V_{Bk,pb} see ETAG 029, Annex C
- For application with sleeve with drill bit size ≤ 15 mm installed in joints not filled with mortar:

•
$$N_{Bkpi} = 0.18 * N_{Bkp}$$
 and $N_{Bkpi} = 0.18 * N_{Bkp}$ ($N_{Bkp} = N_{Bkp}$ see Annex C4 to C45)

$$\circ V_{Bkci} = 0.15 * V_{Bkc} \text{ and } V_{Bkbi} = 0.15 * V_{Bkb}$$
 (V_{Bkb} and V_{Bkc} see Annex C4 to C45)

- Application without sleeve installed in joints not filled with mortar is not allowed.

Installation:

- Dry or wet structures.
- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Fastening screws or threaded rods (incl. nut and washer) must comply with the appropriate material and property class of the Internal threaded rod .

Friulsider Injection System KEM-UP Vinylester for masonry

Intended Use

Specifications

Annex B 1



Brick-No.	Brick type	Picture	Brick size length width height	Compressive strength	Bulk density	Sleeve - Anchor type	Annex
			[mm]	[N/mm ²]	[kg/dm ³]		
Auto	claved aerated co	ncrete units acco	ording EN 771	-4			
1	Autoclaved Aerated Concrete AAC6	1.	499 240 249	6	0,6	M8/M10/M12/M16/IG-M6/IG-M8/IG-N	/10 C4 - C5
Calc	ium silicate masor	nry units accordi	ng EN 771-2				
2	Calcium silicate solid brick KS-NF	-	240 115 71	10 20 27	2,0	M8/M10/M12/M16/IG-M6/IG-M8/IG-M SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M1 SH 20x200 – M12/M16/IG-M8/IG-M1	C6 - C8
3	Calcium silicate hollow brick KSL-3DF		240 175 113	8 12 14	1,4	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M1 SH 20x200 – M12/M16/IG-M8/IG-M1	0
4	Calcium silicate hollow brick KSL-12DF	· tete	498 175 238	10 12 16	1,4	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M1	
Clay	masonry units ac	cording EN 771-1	1				
5	Clay solid brick Mz – DF		240 115 55	10 20 28	1,6	M8/M10/M12/M16/IG-M6/IG-M8/IG-M SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M1 SH 20x200 – M12/M16/IG-M8/IG-M1	C15 C17
6	Clay hollow brick Hlz-16DF		497 240 238	6 8 12 14	0,8	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M1 SH 20x200 – M12/M16/IG-M8/IG-M1	0
7	Clay hollow brick Porotherm Homebric		500 200 299	4 6 10	0,7	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M1	
lr	riulsider Injection Itended Use rick types and pro					Annex B	2



Brick-No.	Brick type	Picture	Brick size length width height	Compressive strength	Bulk density	Sleeve - Anchor type	Annex
			[mm]	[N/mm ²]	[kg/dm ³]		
Clay	masonry units	according EN 7	71-1				
8	Clay hollow brick BGV Thermo		500 200 314	4 6 10	0,6	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C24 C26
9	Clay hollow brick Calibric R+		500 200 314	6 9 12	0,6	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C27- C29
10	Clay hollow brick Urbanbric		560 200 274	6 9 12	0,7	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C30 C32
11	Clay hollow brick Brique creuse C40		500 200 200	4 8 12	0,7	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C33 C35
12	Clay hollow brick Blocchi Leggeri		250 120 250	4 6 8 12	0,6	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C36 C38
13	Clay hollow brick Doppio Uni		250 120 120	10 16 20 28	0,9	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C39 C41
Ligh	t weight concre	te according EN	771-3				
14	Hollow light weight concrete Bloc creux B40		494 200 190	4	0,8	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C42 C43
15	Solid light weight concrete		300 123 248	2	0,6	M8/M10/M12/M16/IG-M6/IG-M8/IG-M10 SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C44 C45
h	ntended Use			ester for masor		Annex B 3	



Installation: Steel Brush



Table B2: Installation parameters in autoclaved aerated concrete AAC and solid masonry (without sleeve)

Anchor size			M8	M10	IG-M6	M12	IG-M8	M16	IG-M10
Nominal drill hole diameter	[mm]	10	10 12 14 18				18		
Drill hole depth	h _o	[mm]	80 90 100 1				00		
Effective anchorage depth	h _{ef}	[mm]	80	9	90 100 100				00
Minimum wall thickness	h _{min}	[mm]	h _{ef} + 30						
Diameter of clearance hole in the fixture	d _f ≤	[mm]	9	12	7	14	9	18	12
Diameter of steel brush	d _b	[mm]	12	12 14 16			6	20	
Minimum diameter of steel brush	d _{b,min}	[mm] 10,5 12,5			2,5	14	4,5	18	8,5
Max installation torque moment									

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

Anchor size		M8	M8 / M1	0 / IG-M6	M12 / M	16 / IG-M8	/ IG-M10	
	\$	Sleeve	12x80	16x85	16x130	20x85	20x130	20x200
Nominal drill hole diameter	d ₀	[mm]	12	16	16	20	20	20
Drill hole depth	h ₀	[mm]	85	90	135	90	135	205
Effective anchorage depth	h _{ef}	[mm]	80	85	130	85	130	200
Minimum wall thickness	h _{min}	[mm]	115	115	175	115	175	240
Diameter of clearance hole in the fixture	d _f ≤	[mm]	9		-M6) / 12 (M10)		//8) / 12 (IG //12) / 18 (I	
Diameter of steel brush	d _b	[mm]	14	1	8		22	
Minimum diameter of steel brush	d _{b,min}	[mm]	12,5	16	3,5		20,5	
Max installation torque moment	T _{inst,max}	[Nm]			2	2		

Friulsider Injection System KEM-UP Vinylester for masonry

Intended Use

Installation parameters and cleaning brush

Annex B 4

1)



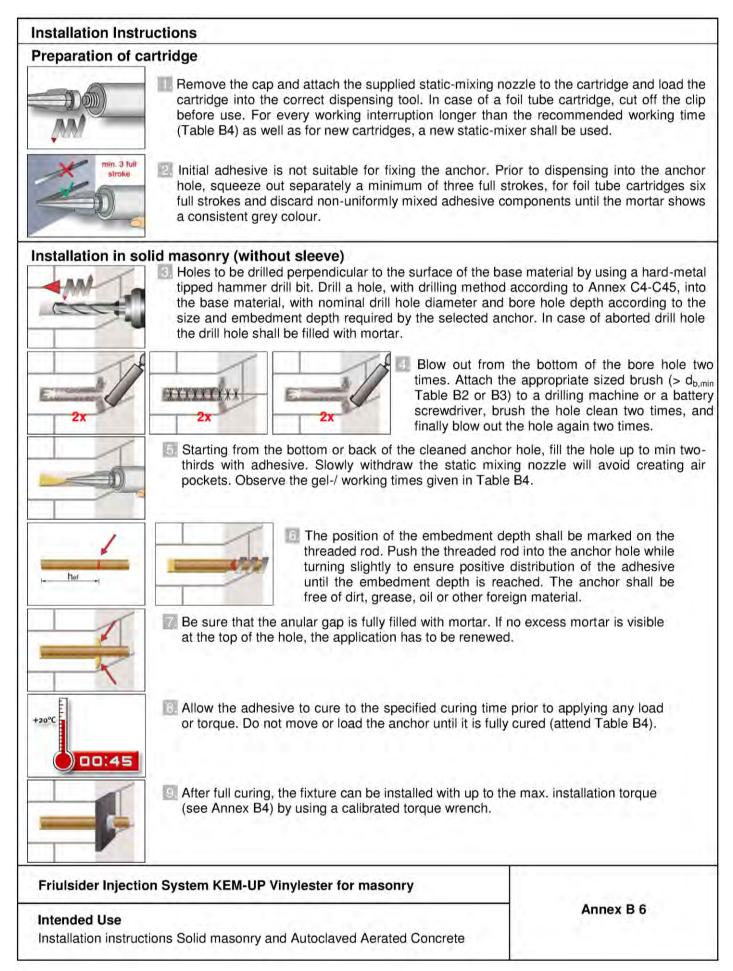
Table B4		aximum w EM-UP Vin	orking time and minimun ylester	n curing time	
	Temperature in the base material T		Temperature of cartridge	Gelling- / working time	Minimum curing time in dry base material ¹⁾
- 10°C	to	- 6°C	+15°C to +40°C	90 min	24 h
- 5°C	to	- 1°C		90 min	14 h
0°C	to	+ 4 °C		45 min	7 h
+ 5 °C	to	+ 9 °C		25 min	2 h
+ 10 °C	to	+ 19 °C	+5°C to +40°C	15 min	80 min
+ 20 °C	to	+ 29 °C	+5°C (0 +40°C	6 min	45 min
+ 30 °C	to	+ 34 °C		4 min	25 min
+ 35 °C				2 min	20 min
+	40°	C		1,5 min	15 min

In wet base material the curing time **must** be doubled

Friulsider Injection System KEM-UP Vinylester for masonry

Intended Use Gelling and Curing times Annex B 5

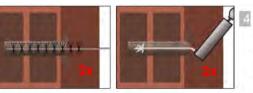






Installation in solid and hollow masonry (with sleeve)

Holes to be drilled perpendicular to the surface of the base material by using a hardmetal tipped hammer drill bit. Drill a hole, with drill method according to Annex C4 – C45, into the base material, with nominal drill hole diameter and bore hole depth according to the size and embedment depth required by the selected anchor.



Blow out from the bottom of the bore hole two times. Attach the appropriate sized brush (> $d_{b,min}$ Table B3) to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.

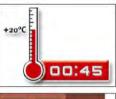


Insert the perforated sleeve flush with the surface of the masonry or plaster. Only use sleeves that have the right length. Never cut the sleeve.

5. Starting from the bottom or back fill the sleeve with adhesive. For embedment depth equal to or larger than 130 mm an extension nozzle shall be used. For quantity of mortar attend cartridges label installation instructions. Observe the gel-/ working times given in Table B4.



The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



8 Allow the adhesive to cure to the specified curing time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B4).



In After full curing, the fixture can be installed with up to the max. installation torque (see Annex B4) by using a calibrated torque wrench.

Friulsider Injection System KEM-UP Vinylester for masonry

Intended Use

Installation instructions hollow brick

Annex B 7



Brick-No.	Installation & Use			β-fa	ctor		
and	category	T _a : 40°C / 24°C Τ _b : 80			C / 50°C	T _c : 120°	°C / 72°C
abbreviation		d/d	w/d w/w	d/d	w/d w/w	d/d	w/d w/w
1 AAC6	For all sizes	0,95	0,86	0,81	0,73	0,81	0,73
2	d₀ ≤ 14 mm	0,93	0,80	0,87	0,74	0,65	0,56
KS-NF	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
3	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
KSL-3DF	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
4	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
KSL-12DF	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
5 MZ-DF							
6 Hlz-16DF							
7 Porotherm Homebric							
8 BGV-Thermo							
9 Calibric R+	For all sizes	0,86	0,86	0,86	0,86	0,73	0,73
10 Urbanbric							
11 Brique creuse C40							
12 Blocchi Leggeri							
13 Doppio Uni							
14	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
Bloc creux B40	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
15	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
Solid light weight concrete	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65

 β -factors for job site testing under tension load



Size			IG-M6	IG-M8	IG-M10	M8	M10	M12	M16
Characteristic tension resistance									
steel, property class 4.6	N _{Rk,s}	[kN]	-	-	-	15	23	34	63
steel, property class 4.0	γMs	[-]		-			2,	0	
steel, property class 4.8	N _{Rk,s}	[kN]	-	-	-	15	23	34	63
steel, property class 4.0	γMs	[-]		-			1,		
steel, property class 5.6	N _{Rk,s}	[kN]	10	18	29	18	29	42	79
	γMs	[-]		2,0			2,		
steel, property class 5.8	N _{Rk,s}	[kN]	10	17	29	18	29	42	79
	ΎMs	[-]		1,5	- 10		1,		100
steel, property class 8.8	N _{Rk,s}	[kN]	16	27	46	29	46	67	126
	γ _{Ms}	[-]	14	1,5	41	06	1,		110
Stainless steel A4 / HCR, property class 70	N _{Rk,s}	[kN]	14	26	41	26	41	59	110
	γ _{Ms}	[-] [kN]	16	1,87 29	46	29	46	67	126
Stainless steel A4 / HCR, property class 80	N _{Rk,s}	[-]	10	1,6	40	29	<u> 40</u> 1,		120
Characteristic shear resistance	γMs	[-]		1,0				0	
		TL N II		1			10	47	
steel, property class 4.6	V _{Rk,s}	[kN]	-	-	-	7	12	17	31
	ΎMs	[-]		-		7	1,6	17	01
steel, property class 4.8	V _{Rk,s}	[kN]	-	-	-	/	1,2		31
	γ _{Ms}	[-] [kN]	5	- 9	15	9	15	25	39
steel, property class 5.6	V _{Rk,s}	[-]	5	1,67	15	9	39		
	$\frac{\gamma_{Ms}}{V_{Rk,s}}$	[kN]	5	9	15	9	1,6 15	21	39
steel, property class 5.8		[-]		1,25		5	1,2		00
	γ_{Ms} V _{Rk,s}	[kN]	8	14	23	15	23	34	63
steel, property class 8.8	¥ Rk,s γMs	[-]		1,25	20	10	1,2		00
	V _{Rk,s}	[kN]	7	13	20	13	20	30	55
Stainless steel A4 / HCR, property class 70	γ _{Ms}	[-]		1,56			1,		
	V _{Rk,s}	[kN]	8	15	23	15	23	34	63
Stainless steel A4 / HCR, property class 80	γMs	[-]		1,33			1,:	33	
Characteristic bending moment	1110		-		I				
	M _{Rk,s}	[Nm]	-	-	-	15	30	52	133
steel, property class 4.6	γ _{Ms}	[-]		-			1,6		
	M _{Rk,s}	[Nm]	-	-	-	15	30	52	133
steel, property class 4.8	γMs	[-]		-			1,2		
	M _{Rk,s}	[Nm]	8	19	37	19	37	66	167
steel, property class 5.6	γMs	[-]		1,67			1,6	57	
steel, property class 5.8	M _{Rk,s}	[Nm]	8	19	37	19	37	66	167
steer, property class 5.6	γMs	[-]		1,25			1,2	25	
steel, property class 8.8	M _{Rk,s}	[Nm]	12	30	60	30	60	105	266
סנפט, אוטאפונץ טומסט ט.ס	γMs	[-]		1,25			1,2	25	
Stainless steel A4 / HCR, property class 70	M _{Rk,s}	[Nm]	11	26	52	26	52	92	233
Stamess steel At / HOR, property class /0	γMs	[-]		1,56			1,	56	
Stainless steel A4 / HCR, property class 80	$M_{Rk,s}$	[Nm]	12	30	60	30	60	105	266
oramess steel A4 / non, property class ou	γMs	[-]		1,33			1,:	33	

Friulsider Injection System KEM-UP Vinylester for masonry

Performances

Characteristic resistance under tension and shear load - steel failure



_ Cc		C	nin
		Current Contraction of the contr	
		Smin I	
	E Let	Smin II	
		U U U U U U U U U U U U U U U U U U U	
		ŭ Ü	
	Scr II	- - •	
		Sort L	
	, signature and a second secon	Scr II	
	ristic edge distance Edge distance		
	ristic spacing		
S _{min} = Minimum			
		for anchors placed parallel to	
$S_{cr,\perp}; (S_{min,\perp}) = Character$	ristic (minimum) spacing	for anchors placed perpendic	cular to bed joint
Load direction			
Anchor	Tension load	Shear load parallel to free edge	e Shear load perpendicul to free edge
Anchors places parallel to bed oint $s_{cr,II}$; ($s_{min,II}$)			V
Anchors places perpendicular o bed joint $s_{cr, \perp}$ ($s_{min, \perp}$)			
Group factor in	a case of tension load for	anchors placed parallel to th	e bed joint
		anchors placed parallel to the	
		anchors placed perpendicula	
$\alpha_{g,V,\perp} = Group factor in$	n case of shear load for a	anchors placed perpendicular	to the bed joint
Group of two anchors: N ⁹ F	$\alpha_{g,N} * N_{RK}$	and $V^g_{Rk} = \alpha_{g,V} * V_{Rk}$	
Diaria of forman and and NIG	$\alpha_{g,N,II}^* \alpha_{g,N,\perp} * N_{RK}$	and $V^{g}_{Rk} = \alpha_{g,V,II}^{*} \alpha_{g}$,ν,⊥ * V _{Rk}
	Rk: NRk,b or NRk,b,j for Ccr)	the for cm	
(N ₁	VPK .: VPK al: VPK b Or VP		
(Nr (Vr	$\mathbf{W}_{Rk,c}; V_{Rk,c,j}; V_{Rk,b} \text{ or } V_{Rk,b}$ th the relevant α_{g})		
(Nr (Vr			
(Nr (Vr	th the relevant α_g)		
(Nr (Vr (wi	th the relevant α_g)		Annex C 3



	Autoclaved Aera AAC6							
Bulk density	ρ [kg/dm ³]	0,6				Sec.		
	$b \ge [N/mm^2]$	6					in a	-
Code	0 = [EN 771-4						
Producer (country code)		e.g. Porit (DE)						
Brick dimensions	[mm]	499 x 240 x 249	è			-		2
Drilling method	[init]	Rotary					~	
Table C4: Installation p	parameter							
Anchor size			[-]	M8	M10/IG-M6	M12/IG	i-M8	M16/IG-M10
Effective anchorage depth			[mm]	80	90	100		100
Edge distance	r	[mm]		3.2	1,5*hei			
	nin,N	[mm]			75			
Minimum edge distance	nin,V,II $(C_{\min,v}, \perp)^{1}$	[mm]			75 (1,5*he	f)		
Spacing	r	[mm]	3*h _{ef}					
Minimum spacing	nin	[mm]		100 erpendicular the free edge				
Configuration II: anchors placed parallel to horizontal	for anchor g	with c ≥ 125 (M8:120			with s ≥ 100 3*bef	α _{g,N,II}	-	1,8
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	for anchor g	with c ≥ 125 (M8:120 1,5*hef 75			100 3*hef 100	α _{g,N,I}	(-)	2,0 1,4
II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef	0)		100 3*hef 100 3*hef	α _{g,N,⊥}	[-]	2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C6: Group factor		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef	0)	ng par	100 3*hef 100 3*hef callel to free e	α _{g,N,⊥}	[-]	2,0 1,4
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C6: Group factor Configuration		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef group in case of s with c ≥	0)	ng par	100 3*hef 100 3*hef rallel to free e with s ≥	α _{g,N,⊥}	[-]	2,0 1,4 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C6: Group factor		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef	0)	ng par	100 3*hef 100 3*hef callel to free e	α _{g,N,⊥}	[-]	2,0 1,4 2,0 1,2 2,0



	Configuration		_	wi	thc≥	11.5	with	S≥	1.000.000	Ť.	
II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint		л [V	1,5*hef		3,0*hef		hef	α _{g,V,II}		2,0	
		V		1,	5*hef		3,0*	hef	α _{g,V,⊥} [-]		2,0
Table C8: C	haracteristi	c value	s of r	esistance u	Inder tension	n and she	ear I	oads			
					Char	acteristic	resi	stance			
						Use cate	gor	Y			
	Effective		d/d					w/w w/d			d/d w/d w/w
Anchor size	anchorage depth	40°C/2	24°C	80°C/50°C	120°C/72°C	40°C/24	°C	80°C/50°C	120°C	/72°C	For all temperatur range
	h _{ef}			$N_{\text{Rk},b} = N_{\text{Rk},p}^{1)}$			- 3	$N_{Rk,b} = N_{Rk,p}$	12		V _{Rk,b} ²⁾³⁾
[mm]		_	ARK,D - TARK,D	[kN]		HK,D - THK,D	6.		* HK,D		
				Compressi	ve strength f						
M8	80	2.5 (2	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		3,0 (2,0)	2,5 (1,5)	3,5 (2,5	-	3,0 (2,0)	2,5 (10,0
M12/IG-M8	100	5,0 (3		4,0 (3,0)	3,0 (2,5)	4,5 (3,0		3,5 (2,5)	3,0 (10,0
M16/IG-M10	100	6,5 (4		5,5 (3,5)	4,0 (3,0)	5,5 (4,0		5,0 (3,5)	4,0 (10,0
3) The value	s are valid for	steel 5.6	or gre	eater, For ste	el 4.6 and 4.8 r	nultiply V _{RI}	κ,b b)	0,8			
Table C9: D	isplacemen	ts									
	1		δι	1/N	δΝο	δN∞	1.0	v	δνο		δι/m
Table C9: D	h _{ef}	N		1 / N n/kN1		δ _{N∞}	_		δvo [mm]		δγ∞ [mm]
Anchor size	h _{ef} [mm]	N [kN]	[mr	n/kN]	[mm] [mm]	[k	:N]	[mm]]	[mm]
Anchor size M8	h _{ef} [mm] 80	N [kN] 0,9	[mr		[mm] [0,16	mm] 0,32	[k 1	N] ,3	[mm] 0,8	1	[mm] 1,20
Anchor size M8 M10/IG-M6	h _{ef} [mm] 80 90	N [kN] 0,9 1,4	[mr	n/kN]	[mm] [0,16 0,26	mm] 0,32 0,51	[k 1 1	:N] ,3 ,8	[mm] 0,8 1,2]	[mm] 1,20 1,80
Anchor size M8	h _{ef} [mm] 80	N [kN] 0,9	[mr 0	n/kN]	[mm] [0,16 0,26 0,14	mm] 0,32	[k 1 1 2	N] ,3	[mm] 0,8		[mm] 1,20



Brick type	Calcium silicate solid brick KS-NF	
Bulk density ρ [kg/dm ³]	2,0	
Compressive strength $f_b \ge [N/mm^2]$	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	

Anchor size		[-]	All sizes		
Edge distance	Ccr	[mm]	1,5*h _{ef}		
Minimum edge distance	Cmin	[mm]	60		
Spacing	Scr	[mm]	3*h _{el}		
Minimum spacing	Smin	[mm]	120		

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

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

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

Configuration		with c ≥	with s ≥			
II: anchors placed	Here I have been seen as a second sec	60	120			1,0
arallel to horizontal joint	V	115	120	α _g , v, ii		1,7
		1,5*hef	3*h _{ef}			2,0
⊥: anchors placed		60	120		FI	1,0
perpendicular to	V 1	1,5*hef	120	ag,v,1		1,0
horizontal joint		1,5*hef	3*h _{ef}			2,0

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

Configuration	with c ≥	with s ≥	111111111	111	
II: anchors placed parallel to horizontal joint	60	120			1,0
	1,5*hef	3*h _{ef}	α _{g,V,II}		2,0
L: anchors placed	60	120	11	E	1,0
perpendicular to horizontal joint	1,5*hef	3*het	$\alpha_{g,V,\perp}$		2,0

Friulsider Injection System KEM-UP Vinylester for masonry

Performances calcium solid brick KS-NF

Installation parameters



Brick	type: Cal	cium silicat	e solid br	ick KS-NF								
Table (C15: Cł	naracteristic	values of r	esistance u	under tensio	on and she	ar loads					
					Cha	racteristic r	esistance					
				Use category								
Anchor	Clasura	Effective anchorage depth		d/d			d/d w/d w/w					
size	Sleeve	h _{ef} [mm]	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For All temperature range			
		h _{ef}		$N_{Rk,b} = N_{Rk,c}$	1)		$N_{Rk,b} = N_{Rk,p}$	1)	$V_{Rk,b}^{2)3)}$			
		[mm]				[kN]						
			Con	npressive s	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	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,0 (2,0)			
M12 / IG-M8	-	100	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)			
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 /	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)			
M10/ IG-M6	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/	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)			
M16 /	20x130	130	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)			
IG-M8 / IG-M10	20x200	200	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)			
		1			strength f _b ≥							
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	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,5 (2,5)			
M12/ IG- M8	-	100	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)			
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 /	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)			
M10/ IG- M6	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 /	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)			
M16 /	20x130	130	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)			
IG-M8 / IG-M10	20x200	200	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)			

1)

Values are valid for c_{cr} , values in brackets are valid for single anchors with c_{min} For c_{cr} calculation of $V_{Rk,c}$ see ETAG 029, Annex C; values in brackets $V_{Rk,b} = V_{Rk,c}$ for single anchors with c_{min} The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8 2)

3)

Friulsider Injection System KEM-UP Vinylester for masonry

Performances calcium solid brick KS-NF

Characteristic values of resistance under tension and shear load



			alues of resistance under tension and shear loads (continue) Characteristic resistance									
				Use category								
Anchor Sleeve	Effective anchorage depth		d/d			d/d w/d w/w						
size	size Sieeve h _{ef} [mm]	h _{ef} [mm]	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For All temperature range			
		h _{ef}		$N_{\text{Rk},\text{b}} = N_{\text{Rk},\text{p}}^{1} \qquad \qquad N_{\text{Rk},\text{b}} = N_{\text{Rk},\text{p}}^{1}$				$V_{Rk,b}^{(2)3)}$				
		[mm]				[kN]						
			Com	pressive s	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	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,5 (3,0)			
M12 / IG-M8	-	100	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)			
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 /	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)			
M10/ IG- M6	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 /	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)			
M16 /	20x130	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)	4,5 (2,5)			
IG-M8 / IG-M10	20x200	200	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)			

1)

Values are valid for c_{cr} , values in brackets are valid for single anchors with c_{min} For c_{cr} calculation of $V_{Rk,c}$ see ETAG 029, Annex C; values in brackets $V_{Rk,b} = V_{Rk,c}$ for single anchors with c_{min} The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8 2)

3)

Table C17: Displacements

Anchor size	Anchor size Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ_{N0}	δ _{N∞}	V	δ_{V0}	δ∨∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80					1,7	0,90	1,35
M10 / IG-M6	-	90	2,0	0,30	0,60	2,0	1,10	1,65	
M12 / IG-M8	-	100							
M16 / IG-M10	-	100		0,15	0,26	0,51			
M8	12x80	80		0,15	0,20	,			
M8 / M10/	16x85	85	1.4		0,21	0,43	1,7	0,90	1,35
IG-M6	16x130	130	1,4		0,21	0,43			
M12 / M16 /	20x85	85							
IG-M8 /	20x130	130	1,3		0,19	0,39			
IG-M10	20x200	200							

Friulsider Injection System KEM-UP Vinylester for masonry	
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Performances calcium solid brick KS-NF

Characteristic values of resistance under tension and shear load (continue) Displacements



Brick type		Calcium silicate holl KSL-3DF	low brick				
Bulk density	ρ [kg/dm ³]	1,4		1	1.10	S	
	$f_b \ge [N/mm^2]$	8, 12 or 14			2.3	1 m	1
Code		EN 771-2			100		-
Producer (country code)		e.g. Wemding (DE)				÷ .	J
Brick dimensions	[mm]	240 x 175 x 113				87	
Drilling method	[hind]	Rotary				T	
	175			14 44 14 32 14			
	<u>16</u>	5, 44 14, 38 17,	38 14	44 14 44 16			
	n parameters			14			
Anchor size	n parameters		6	14	All sizes)	
Anchor size Edge distance				14	All sizes 100 (120) ¹ 60)	
Anchor size Edge distance Minimum edge distance	n parameters		[-] [mm]	14	100 (120) ¹)	
Anchor size Edge distance Minimum edge distance Spacing	n parameters		[-] [mm] [mm] [mm]	14	100 (120) ¹ 60 240 120)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	n parameters	s 	[-] [mm] [mm]	14	100 (120) ¹ 60 240)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SI	n parameters	s 	[-] [mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 60 240 120)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SI	n parameters	s 130 and SH20x200	[-] [mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 60 240 120	}	
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SI Table C20: Group fac Configuration	n parameters	s 130 and SH20x200 or group in case of te	[-] [mm] [mm] [mm] [mm] [mm]	14 44 16	100 (120) ¹ 60 240 120		1,5
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SI Table C20: Group fac Configuration II: anchors placed parallel to horizontal	n parameters	s 130 and SH20x200 or group in case of te with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	14 44 16 ading with s ≥	100 (120) ¹ 60 240 120)	1,5
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SI Table C20: Group fac Configuration	n parameters	s 130 and SH20x200 or group in case of te with c ≥ 60	[-] [mm] [mm] [mm] [mm] [mm]	14 44 16 44 16 ading with s ≥ 120	100 (120) ¹ 60 240 120 120)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SI Table C20: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	n parameters	s 130 and SH20x200 or group in case of te with c ≥ 60 c _{cr}	[-] [mm] [mm] [mm] [mm] [mm]	14 44 16 44 16 ading with s ≥ 120 240	100 (120) ¹ 60 240 120 120		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SI Table C20: Group fac Configuration II: anchors placed parallel to horizontal joint	n parameters	s 130 and SH20x200 or group in case of te with c ≥ 60 c _{cr} 160	[-] [mm] [mm] [mm] [mm] [mm]	14 44 16 44 16 ading with s ≥ 120 240 120	100 (120) ¹ 60 240 120 120		2,0 2,0



	0 "	1. M. 1. C		ALC: NOT THE REAL PROPERTY OF		5 6 6 E		_	-	
	Configur	ation	r	with c ≥ 60		with s a	2		-	10
II: ancho	rs placed horizontal	TV .		160		120				1,0
joi			-	Ccr		240	u	g,V,II	1	2,0
1 : ancho	rs placed	I III	T	60		120			[-]	1,0
perpend		V 1		60		176.2	α	g,V,⊥		
horizon	tal joint		1	Ccr		120	-			2,0
Table C2		p factor for a	inchor grou	2.1.2.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	of shear loa	() () () () () () () () () ()		o free	edge	
A	Configur	ation	1	with c ≥		with s	2	_	_	
II: ancho	rs placed horizontal	V		60		120				1,0
joi				Ccr		240	u	g,V,II	24	2,0
⊥: ancho	rs placed		T	60		120			[-]	1,0
perpend	icular to	V						g,V,L		
horizon	tal joint	10.710	1	Ccr		120			-	2,0
Table C2	3: Char	acteristic va	lues of res	istance und	der tension	and shear	loads			I
					Char	acteristic re				
		-				Use catego	ory			1
Anchor		Effective anchorage	1100	d/d	1.1		w/d; w/w			d/d; w/d; w/w
size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120%	C/72°C	For all temperatur range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		N _{Rk,b} = N _{Rk,}	1) p		V _{Rk,b} ⁴⁾
		[mm]				[kN]				
_		G			ength $f_b \ge 8$	3 N/mm ²			1.00	1 0) 6
M8	12x80	80	1,5	1,5	1,2	1,5	1,2	-),9	$2,5^{2}(0,9)^{3}$
M8/M10	16x85	85	1,5	1,5	1,2	1,5	1,5	-	,2	$4,0^{2}$ (1,5) ³
/ IG-M6	16x130	130	1,5	1,5	1,2	1,5	1,5	-	,2	$4,0^{2}$ (1,5) ³
M12 / M16 /	20x85	85	4,5	4,0	3,0	4,5	4,0	-	3,0	$4,0^{2}$ (1,5) ³
IG-M8 /	20x130	130	4,5	4,0	3,0	4,5	4,0	3	3,0	$4,0^{2}$ (1,5) ³
IG-M10	20x200	200	4,5	4,0	3,0	4,5	4,0	3	3,0	$4,0^{2}$ (1,5) ³
-			Comp	ressive str	ength $f_b \ge 1$	2 N/mm ²			-	
M8	12x80	80	2,0	2,0	1,5	2,0	1,5		,2	$3,0^{2}$ (1,2) ³
M8 / M10	16x85	85	2,0	2,0	1,5	2,0	2,0		,5	$4,5^{2}(1,5)^{3}$
/ IG-M6	16x130	130	2,5	2,5	1,5	2,5	2,5		,5	$4,5^{2}(1,5)^{3}$
M12 / M16 /	20x85	85	6,0	5,5	4,0	6,0	5,5	4	1,0	$4,5^{2}(1,5)^{3}$
IG-M8 /	20x130	130	6,0	5,5	4,0	6,0	5,5	4	1,0	$4,5^{2}(1,5)^{3}$
IG-M10	20x200	200	6,0	5,5	4,0	6,0	5,5	4	1,0	$4,5^{2}$ $(1,5)^{3}$
2) V _{Rk,c,II} 3) V _{Rk,c,1}	= V _{Rk,b} valic = V _{Rk,b} (valu	or c _{cr} and c _{min} I for shear load ues in brackets Ilid for steel 5.6) valid for she	ear load in di			8			
Friuleic	ler Iniectio	on System K	EM-UP Vin	ylester for	masonry					



		racteristic va					acteristic re	•	-	
							Use catego			
Angless		Effective anchorage		d/d				w/d w/w		d/d; w/d; w/w
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°	C 120°C/	72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		$N_{Rk,b} = N_{R}$	1) k,p			$N_{Rk,b} = N_{Rk,p}$	1)	V _{Rk,b} ⁴⁾
		[mm]					[kN]			
			Comp	Compressive strength f _b ≥ 14 N/mm ²						
M8	12x80	80	2,5	2,5	1,		2,0	2,0	1,5	$3,5^{2}(1,5)^{3}$
M8 / M10	16x85	85	2,5	2,5	1,	5	2,5	2,5	1,5	$6,0^{2}$ $(2,0)^{3}$
/ IG-M6	16x130	130	2,5	2,5	2,0	C	2,5	2,5	2,0	$6,0^{2}$ $(2,0)^{3}$
M12 /	20x85	85	6,5	6,0	4,5	5	6,5	6,0	4,5	6,0 ²⁾ (2,0) ³⁾
M16 / IG-M8 /	20x130	130	6,5	6,0	4,	5	6,5	6,0	4,5	$6,0^{2}$ $(2,0)^{3}$
IG-M10	20x200	200	6,5	6,0	4,	5	6,5	6,0	4,5	$6,0^{2}$ $(2,0)^{3}$
 V_{Rk,c,II} V_{Rk,c,⊥} The va Table C2 	= V _{Rk,b} valid = V _{Rk,b} (val alues are va 5: Disp	an	s) valid for sh	ear load in For steel 4.			oly V _{Rk,b} by 0,	8 V	δνο	δγ∞
Anchor siz		eve de	epth h _{ef} [mm]	[kN] [mr	n/kN]	[mm] [mm] [kN]	[mm]	[mm]
M8	12	x80	80			[IIIIII	l fuun	1,0	1,0	1,50
		5x85		0,71		0,64	1.00		1,0	1,50
M8 / M10 IG-M6	·	x85 x130	130	5,71		0,64	1,29			
				O	,90 –				10	0.05
M12 / M16	6/ 20	x85	85					1,7	1,9	2,85

1,67

3,34

Friulsider Injection System KEM-UP Vinylester for masonry

130

200

1,86

Performances calcium hollow brick KS L-3DF Characteristic values of resistance under tension and shear load (continue) Displacements Annex C 11

IG-M8 /

IG-M10

20x130

20x200



KSL-12DF g/dm³] 1,4 /mm²] 10, 12 or 16 EN 771-2 e.g. Wemding (DE [mm] 498 x 175 x 238 Rotary	E)			ii	r
/mm ²] 10, 12 or 16 EN 771-2 e.g. Wemding (DE [mm] 498 x 175 x 238	E)			is .	r
EN 771-2 e.g. Wemding (DE [mm] 498 x 175 x 238				12	r
e.g. Wemding (DE [mm] 498 x 175 x 238			_	7	
[mm] 498 x 175 x 238					
	\bigcirc				
	\bigcirc				
54 , 59 , 64	/ <u>59</u>	64	59 , 35	59 17	
ameters	[-]		All sizes)	
C _{cr} Cmin ²⁾	[mm] [mm]		$\frac{100 (120)^1}{100 (120)^1}$		
S _{cr,II}	[mm]		498		
S _{cr,⊥}	[mm]		238		
S _{min}	[mm]		120		
5 and SH20x130 AG 029, Annex C r anchor group in case of with c ≥	tension load	ding with s ≥			
100		120			1,0
Ccr		498	α _{g,N,II}		2,0
				[-]	1,0
the second		238	α _{g,N,L}		2,0
5 and AG	029, Annex C Ichor group in case of with c ≥	d SH20x130 029, Annex C achor group in case of tension load with c ≥ 100 c _{cr}	d SH20x130 029, Annex C achor group in case of tension loading with c ≥ with s ≥ 100 120 c _{cr} 498	d SH20x130 029, Annex C achor group in case of tension loading $\begin{array}{c ccc} \hline & with c \ge & with s \ge & \\ \hline & 100 & 120 & \\ \hline & c_{cr} & 498 & \\ \hline \end{array}$	d SH20x130 029, Annex C achor group in case of tension loading $\begin{array}{c ccc} \hline & with c \ge & with s \ge & \\ \hline & 100 & 120 & \\ \hline & c_{cr} & 498 & \\ \hline \end{array}$

Z78767.16

Installation parameters



1	Configuration			with c ≥		with s ≥			
II: anchors p parallel to hor joint	laced	V		Ccr		498		g,V,II	2,0
⊥: anchors p perpendicul horizontal j	ar to	V		Ccr		238	α	g.V	2,0
Table C30:	Group fac	ctor for anch	or group	in case of	shear load	ling perpe	ndicular t	o free edge	
(Configuration	n T	1	with c ≥		with s ≥	5		
II: anchors p parallel to hor joint	laced	V		Ccr		498	α	g,V,II	2,0
⊥: anchors p perpendicul horizontal j	ar to	V		Cer		238	α	g,V,_	2,0
Table C31:	Characte	eristic values	of resist	ance unde	1.10.001110.0		1 K 1 K 1		
			1.6		Char	acteristic r			_
	Effective		d/d			Use category w/d w/w			d/d w/d w/w
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{et}		N _{Rk,b} = N _{Rk}	1) P	P.	I _{Rk,b} = N _{Rk,}	1) P	V _{Rk,b} ²⁾³⁾
		[mm]			1	[kN]			
			Compres	ssive stren	gth $f_b \ge 10$	N/mm ²			
M8	12x80	80	0,6	0,6	0,4	0,5	0,5	0,4	2,5
M8 / M10 /	16x85	85	0,6	0,6	0,4	0,6	0,6	0,4	5,5
IG-M6	16x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
M12/M16/	20x85	85	1,5	1,5	0,9	1,5	1,5	0,9	5,5
IG-M8 / IG-M10	20x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
					gth f _b ≥ 12				
M8	12x80	80	0,75	0,6	0,5	0,6	0,6	0,4	3,0
M8 / M10 /	16x85	85	0,75	0,6	0,5	0,75	0,6	0,5	6,5
IG-M6	16x130	130	3,0	3,0	2,0	3,0	3,0	2,0	6,5
M12/M16/	20x85	85	1,5	1,5	1,2	1,5	1,5	1,2	6,5
IG-M8 / IG-M10	20x130	130	3,0	3,0	2,0	3,0	3,0	2,0	6,5
 Values ar Calculation 		and c _{min} e ETAG 029, A or steel 5.6 or g						120 mm: V _{Rk}	$\mathbf{V}_{RK,b}$
Friulsider	Injection S	ystem KEM-	UP Vinyle	ester for m	asonry			Annex C	12



Brick type:	Calcium s	ilicate holle	ow brick	KS L-120)F				
Table C32:	Characte	ristic values	of resista	ance unde	r tension a	nd shear l	loads (cor	ntinue)	
					Char	acteristic r	esistance		
						Use categ	gory		
Anabaraiza	Cleave	Effective anchorage depth		d/d			w/d w/w		d/d w/d w/w
Anchor size	Sleeve	deptri	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}	1	$N_{Rk,b} = N_{Rk,b}$	1) p	1	$V_{Rk,b} = N_{Rk,b}$	1) p	V _{Rk,b} ²⁾³⁾
		[mm]			P	[kN]			
		· · ·	Compres	sive stren	gth 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 /	16x85	85	0,9	0,9	0,6	0,9	0,9	0,6	8,0
IG-M6	16x130	130	4,0	3,5	2,5	4,0	3,5	2,5	8,0
M12 / M16 /	20x85	85	2,0	2,0	1,5	2,0	2,0	1,5	8,0
IG-M8 / IG-M10	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_{Rk,c} see ETAG 029, Annex C, except for shear load parallel to free edge with $c \ge 120 \text{ mm}$: V_{Rk,c,II} = V_{Rk,b} ³⁾ The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V_{Rk,b} by 0,8

Table C33:Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	Ν	δ _N / N	δ _{N0}	δ _{N∞}	V	δ_{V0}	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,26		0,23	0.46	1,0	1,3	1,95
M8 / M10 /	16x85	85	0,20		0,23	0,46			
IG-M6	16x130	130	1,14	0.90	1,03	2,06			
M12 / M16	20x85	85	0,57		0,51	1,03	2,3	2,5	3,75
/ IG-M8 / IG-M10	20x130	130	1,14		1,03	2,06			

Friulsider Injection System KEM-UP Vinylester for masonry

Performances calcium hollow brick KS L-12DF Characteristic values of resistance under tension and shear load (continue) Displacements



Brick type		Clay solid brick Mz-DF			-	1	
Bulk density	ρ [kg/dm ³]	1,6			1		
Compressive strength fb	, ≥ [N/mm ²]	10, 20 or 28			1000		
Code		EN 771-1			1 m		
Producer (country code)		e.g. Unipor (DE)		1		1	
Brick dimensions	[mm]	240 x 115 x 55		1			
Drilling method		Hammer					
Table C35: Installation	n parameter						
	n parameter		[-]		All sizes		
Anchor size			[-] [mm]		All sizes 1,5*h _{ef}	1.1.	
Anchor size Edge distance						5 D.	
Anchor size Edge distance Minimum edge distance	Ccr		[mm]		1,5*h _{ef}		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min}		[mm] [mm]		1,5*h _{ef} 60		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing Table C36: Group facto	C _{cr} C _{min} S _{cr} S _{min}	r group in case of	[mm] [mm] [mm] [mm]	ading with s≥	1,5*h _{ef} 60 3*h _{ef}		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} S _{cr} S _{min}		[mm] [mm] [mm] [mm]		1,5*h _{ef} 60 3*h _{ef}		0,7

parallel to horizontal joint	1,5*hef	3*h _{ef}	Ctg,N,II		2,0
⊥: anchors placed	60	120		E-	0,5
perpendicular to	1,5*hef	120	$\alpha_{g,N,\perp}$		1,0
horizontal joint	1,5*hef	3*her			2,0

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

Configurati	on	with c ≥	with s ≥		1 a 1 a 1	
II: anchors placed		60	120			0,5
parallel to horizontal	V	90	120	α _{g,V,II}		1,1
joint		1,5*hef	3*her	11 6.3	71	2,0
⊥: anchors placed		60	120		[-]	0,5
perpendicular to	V 8	1,5*hef	120	α _{g,V,⊥}		1,0
horizontal joint		1,5*hef	3*hef			2,0

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

Configurat	tion	with c ≥	with s ≥			
II: anchors placed		60	120			0,5
parallel to horizontal	V	1,5*hef	120	α _g ,v,ii		1,0
joint		1,5*hef	3*her	+- 1 100 L	11	2,0
⊥: anchors placed		60	120		[-]	0,5
perpendicular to	V	1,5*hef	120	$\alpha_{g,V,\perp}$		1,0
horizontal joint	E IC	1,5*hef	3*het		_	2,0

Friulsider Injection System KEM-UP Vinylester for masonry

Performances clay solid brick Mz-DF

Description of the brick

Installation parameters



Table C39: Ch	aracteristic value	es of resistance u	nder tension a	ind shear load	ds		
					ristic resistance		
				d/d	category	d/d	
		Effective		w/d		w/d	
		anchorage		w/w		w/w	
Anchor size	Sleeve	depth				For all	
			40°C/24°C	80°C/50°C	120°C/72°C	temperature range	
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$)	$V_{\text{Rk,b}}^{(2)3)}$	
		[mm]			[kN]	▼ KK,D	
		Compressive s	trength $f_{\rm L} > 10$	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 /	16x85	85	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)	
IG-M6	16x130	130	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)	
M12 / M16 /	20x85	85	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)	
IG-M8 /	20x130	130	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)	
IG-M10	20x200	200	3,5 (1,5)	3,5 (1,5)	3,0 (1,5)	3,5 (1,2)	
	20/200	Compressive s			0,0 (1,0)	0,0 (1,2)	
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 /	16x85	85	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)	
IG-M6	16x130	130	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)	
M12/M16/	20x85	85	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)	
IG-M8 /	20x130	130	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)	
IG-M10	20x200	200	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)	
I		Compressive s					
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 /	16x85	85	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)	
IG-M6	16x130	130	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)	
M12 / M16 /	20x85	85	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)	
IG-M8 /	20x130	130	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)	
IG-M10	20x200	200	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)	

For c_{cr} calculation of $V_{Rk,c}$ see ETAG 029, Annex C; for c_{min} values in brackets $V_{Rk,b} = V_{Rk,c}$ 3)

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

Friulsider Injection System KEM-UP Vinylester for masonry

Performances clay solid brick Mz-DF

Characteristic values of resistance under tension and shear load



Brick type: Clay solid brick Mz-DF										
Table C40: Displacements										
Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ_{V0}	δγ∞	
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]	
M8	-	80	1,3		0,19	0,39	1,9	1,00		
M10 / IG-M6	-	90	1,6		0,24	0,47				
M12 / IG-M8	-	100	47		0.06	0.51				
M16 / IG-M10	-	100	1,7		0,26	0,51	2,9			
M8	12x80	80		0.15	0,19	0,39	1,9		1 50	
M8 / M10 /	16x85	85		0,15					1,50	
IG-M6	16x130	130	1.0							
M12 / M16 /	20x85	85	1,3							
IG-M8 /	20x130	130	1							
IG-M10	20x200	200	1							

Friulsider Injection System KEM-UP Vinylester for masonry

Performances clay solid brick Mz-DF Displacements



HLz-16-DF [kg/dm³] 0,8 [N/mm²] 6, 8, 12, 14 EN 771-1 e.g. Unipor DE) [mm] 497 x 240 x 238 Rotary 497					
[N/mm ²] 6, 8, 12, 14 EN 771-1 e.g. Unipor DE) [mm] 497 x 240 x 238 Rotary					
EN 771-1 e.g. Unipor DE) [mm] 497 x 240 x 238 Rotary					
e.g. Unipor DE) [mm] 497 x 240 x 238 Rotary					
[mm] 497 x 240 x 238 Rotary				<u> </u>	
Rotary					
	6-#				
C _{or} [mr			$(120)^{1/}$ $(120)^{1/}$		
(mr			97		
C _{min} ²⁾ [mr		4	238		
S _{cr,II} [mr	m]				
Scr,II [mr Scr,⊥ [mr Smin [mr	m] m]	2			
Scr.II [mr Scr.⊥ [mr Smin [mr (85; SH20x130 and SH20x200 [mr ETAG 029, Annex C [mr for anchor group in case of tension [mr with c ≥ [mr	m] m] on loading with s 2	1	38		
s _{cr,II} [mr s _{cr,⊥} [mr s _{min} [mr κ85; SH20x130 and SH20x200 ETAG 029, Annex C for anchor group in case of tension [mr	m] m] on loading with s = 100	1	238 00		1,3
Scr.II [mr Scr.⊥ [mr Smin [mr (85; SH20x130 and SH20x200 [mr ETAG 029, Annex C [mr for anchor group in case of tension [mr with c ≥ [mr	m] m] on loading with s = 100 497	2 1 ≥	238 00	[-]	2,0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	m] m] on loading with s = 100	2 1 ≥	N,II	[-]	
arai	meters	meters	meters [-] All	meters	meters



Config	juration	with c	2	with s ≥				
II: anchors placed parallel to horizontal joint		C _{cr}	C _{cr}		α _{g,V,II}	EI	2,0	
⊥: anchors placed perpendicular to horizontal joint	V	C _{cr}		238	$\alpha_{g,V,\perp}$	(F)	2,0	
Table C45: Gro	oup factor for and	hor group in case	e of shear load	ding perpendi	cular to free e	dge		
Config	juration	with c	2	with s ≥				
II: anchors placed parallel to horizonta joint		Ccr		497	α _g ,v,li	[-]	2,0	
⊥: anchors placed perpendicular to horizontal joint		C _{cr}		238	$\alpha_{g,v,\perp}$	[-]	2,0	
Table C46: Ch	aracteristic value	es of resistance u	nder tension a		55			
)		ristic resistance			
		Effective anchorage depth			category	1	Territ T	
Anchor size	-			d/d w/d w/w			d/d w/d w/w	
	Sleeve		40°C/24°C	80°C/50°C	120°C/72°C	For all temperati range		
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$		V _{Rk,b} ²⁾³⁾		
		[mm]	([kN]	- 116.0			
		Compressive s	strength $f_b \ge 6$				-	
M8	12x80	80	2,5	2,5	2,0	1.00	2,5	
M8 / M10/ IG-	16x85	85	2,5	2,5	2,0	1000	4,5	
M6	16x130	130	3,5	3,5	3,0		4,5	
M12/M16/IG-	20x85	85	2,5	2,5	2,0		5,0	
M8 / IG-M10	20x130	130	3,5	3,5	3,0		6,0	
	20x200	200	3,5	3,5	3,0		6,0	
		Compressive s	strength $f_b \ge 8$	N/mm ²				
M8	12x80	80	3,0	3,0	2,5		3,0	
M8 / M10/ IG-	16x85	85	3,0	3,0	2,5		5,5	
M6	16x130	130	4,5	4,5	3,5		5,5	
M12/M16/IG-	20x85	85	3,0	3,0	2,5		6,0	
M8 / IG-M10	20x130	130	4,5	4,5	3,5		7,0	
	20x200	200	4,5			3,5 7,		
²⁾ Calculation		29, Annex C, except 6 or greater. For stee				nm: V _{Rk}	$_{c,II} = V_{Rk,b}$	
		I-UP Vinylester fo						



Brick type: Cla	ay hollow brick HL	.z-16-DF									
Table C47: Characteristic values of resistance under tension and shear loads (continue)											
			Characteristic resistance								
		Effective		d/d							
		anchorage		w/d							
Anchor size	Sleeve	depth		w/w							
Anchor Size	JIEEVE	Gopur	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range					
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$							
		[mm]		V _{Rk,b} ²⁾³⁾							
[mm] [kN] [kN] [kN]											
M8	12x80	80	3,5	3,5	3,0	4,0					
M8 / M10/ IG-	16x85	85	3,5	3,5	3,0	6,5					
M6	16x130	130	5,0	5,0	4,5	6,5					
	20x85	85	3,5	3,5	3,0	7,0					
M12 / M16 / IG- M8 / IG-M10	20x130	130	5,0	5,0	4,5	9,0					
	20x200	200	5,0	5,0	4,5	9,0					
		Compressive s	trength f _b ≥ 14	N/mm ²							
M8	12x80	80	4,0	4,0	3,0	4,0					
M8 / M10/ IG-	16x85	85	4,0	4,0	3,0	6,5					
M6	16x130	130	5,5	5,5	4,5	6,5					
	20x85	85	4,0	4,0	3,0	7,0					
M12 / M16 / IG- M8 / IG-M10	20x130	130	5,5	5,5	4,5	9,0					
	20×200	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 $c \ge 125$ mm: $V_{Rk,c,II} = V_{Rk,b}$ 3)

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

Table C48: **Displacements**

Anchor size	Sleeve	Effective anchorage depth 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	1,14	0,10	0,11	0,23	1,10	1,20	1,80
M8 / M10/ IG- M6	16x85	85					1.96	1 50	0.05
	16x130	130			0,16	0,31	1,86	1,50	2,25
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	0.15
	20x200	200							3,15

Friulsider Injection System KEM-UP Vinylester for masonry

Performances clay hollow brick HLz-16DF

Characteristic values of resistance under tension and shear load (continue) Displacements



Brick type Bulk density Compressive strength fb Code Producer (country code) Brick dimensions Drilling method
Compressive strength f _b Code Producer (country code) Brick dimensions Drilling method
Code Producer (country code) Brick dimensions Drilling method
Producer (country code) Brick dimensions Drilling method
Brick dimensions Drilling method
Drilling method
6
200
Anchor size Edge distance
Table C50: Installation Anchor size Edge distance Minimum edge distance Minimum edge distance
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SH2 2) For V _{Rk,c} : c _{min} according to the term of the term of term
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Configuration II: anchors placed parallel to horizontal Image: Configuration
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to the term of the term of the term of term



Configurati	on	with	IC≥	with s	2		
II: anchors placed parallel to horizontal joint	V	c	cr	500	α _{g,V}		2,0
⊥: anchors placed perpendicular to horizontal joint	V	c	cr	299	α _{g,v}	[-] م	2,0
able C53: Group	factor for and	chor group in ca	ase of shear l	oading perp	endicular to i	iree edge	
Configurati	on	with	C≥	with s	2		
II: anchors placed parallel to horizontal joint		c	cr	500	α _{g,V}	·	2,0
⊥: anchors placed perpendicular to horizontal joint		c	cr	299	α _{g,v}	.i.	2,0
able C54: Charac	cteristic value	es of resistance	under tensio	on and shear	loads		
	1			Chara	cteristic resist	ance	
					Use category	unoc	
		Effective		d/d	Ose category	d/c	4
		anchorage		w/d		w/c	
Anchor size	Sleeve	depth		w/w		w/v	
		Dedea	40°C/24°C	80°C/50°C	120°C/72°C	For all tem ranç	ae
		h _{ef}	1	$N_{Rk,b} = N_{Rk,p}^{1}$	- 270 T N 724	V _{Rk,b}	2)3)
		[mm]			[kN]		
	1 08 80 1		e strength f _b				_
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	
energy of a solution	16x130	130	1,2	1,2	0,9	2,0	
M12/M16/	20x85	85	0,9	0,9	0,75	2,5	
IG-M8 / IG-M10	20x130	130	1,2	1,2	0,9	2,5	5
	I Server I		e strength f _b		1		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/	20x85	85	0,9	0,9	0,9	3,0	
	20x130	130	1,2	1,2	1,2	3,0)
	Rk,c see ETAG 0	130 29, Annex C, exce 6 or greater. For s				3,0 ≥ 200 mm: V _{Rk}	
Friulsider Injection	System KEN	I-UP Vinylester	for masonry		-		

Г



			Characteristic resistance					
					Use category			
Anchor size	Sleeve	Effective anchorage depth		d/d w/d w/w		d/d w/d w/w		
Anchor Size			40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range		
		h _{ef}		$V_{Rk,b}^{(2)3)}$				
		[mm]	$N_{Rk,b} = N_{Rk,p}^{1} V_{Rk,b}^{2)3}$ [kN]					
		Compressive	strength f _b ≥	: 10 N/mm²				
M8	12x80	80	1,2	1,2	1,2	3,0		
	16x85	85	1,2	1,2	1,2	3,0		
M8 / M10/ IG-M6	16x130	130	1,5	1,5	1,5	3,5		
M12 / M16 /	20x85	85	1,2	1,2	1,2	4,0		
IG-M8 / IG-M10	20x130	130	1,5	1,5	1,5	4,0		

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 $c \ge 200 \text{ mm}$: V_{Rk,c,II} = V_{Rk,b} ³⁾ The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V_{Rk,b} by 0,8

Table C56: Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	Ν	δ _N / N	δ_{N0}	δ _{N∞}	V	δ_{V0}	δ√∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,34		0,27	0.55	0,9		
M8 / M10/	16x85	85	0,34		0,27	0,55	0,9		
IG-M6	16x130	130	0,43	0,80	0,34	0,69	1,0	1,20	1,80
M12 / M16 /	20x85	85	0,34		0,27	0,55		,	
IG-M8 / IG-M10	20x130	130	0,43		0,34	0,69	1,14		

Friulsider Injection System KEM-UP Vinylester for masonry

Performances clay hollow brick Porotherm Homebric Characteristic values of resistance under tension and shear load (continue) Displacements

Annex C 23



Brick type		Clay hollow bric BGV Thermo	:k				
	ρ [kg/dm ³]	0,6					
	$\geq [N/mm^2]$	4, 6 or 10					
Code	- [rwnnin]	EN 771-1					
Producer (country code)		e.g. Leroux (FR)				
Brick dimensions	[mm]	500 x 200 x 314					
Drilling method	[,]	Rotary					
			500 —				T
200			22	61		;5	
(5							
	parameters			5			
Anchor size			[-]	5	All sizes		
Anchor size Edge distance	Ccr	3	[mm]	5	100 (120) ¹		
Anchor size Edge distance Minimum edge distance				5			
Anchor size Edge distance Minimum edge distance Spacing	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥}	3	[mm] [mm] [mm] [mm]	5	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o ETAG 029,	20x130 Annex C	[mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o ETAG 029,	20x130 Annex C	[mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C59: Group factor Configuration II: anchors placed	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o ETAG 029,	120x130 Annex C or group in case o	[mm] [mm] [mm] [mm] [mm]	pading	100 (120) ¹ 100 (120) ¹ 500 314 100		1,7
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C59: Group factor Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o ETAG 029,	120x130 Annex C or group in case o with c ≥ 200	[mm] [mm] [mm] [mm] [mm]	oading with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C59: Group factor Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o ETAG 029,	20x130 Annex C or group in case of with c ≥ 200 c _{cr}	[mm] [mm] [mm] [mm] [mm]	2000000000000000000000000000000000000	100 (120) ¹ 100 (120) ¹ 500 314 100		1,7 2,0 1,1
Anchor size Edge distance Animum edge distance Spacing Animum spacing Value in brackets for SH2 Value in brackets for SH2 For V _{Rk,c} : c _{min} according to Table C59: Group facto Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o ETAG 029,	120x130 Annex C or group in case o with c ≥ 200	[mm] [mm] [mm] [mm] [mm]	oading with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314 100		



Configurat	ion	with c ≥	with s ≥			
II: anchors placed parallel to horizontal joint	V	Ccr	500	α _{g,V,II}	11	2,0
⊥: anchors placed perpendicular to horizontal joint	V	Cor	314	$\alpha_{g,V,\perp}$	[-]	2,0
Table C61: Group	factor for anchor	group in case of shear	loading perpendic	ular to free	edge	
Configurat	ion	with c ≥	with s ≥			
II: anchors placed parallel to horizontal joint		Cer	500	$\alpha_{g,V,II}$	[-]	2,0
⊥: anchors placed perpendicular to horizontal joint		Ccr	314	$\alpha_{g,V,\perp}$	[-]	2,0



Brick type:	Clay hollow	brick BGV The	rmo				
Table C62:	Characterist	tic values of resis	stance under t	ension and she	ear loads		
					teristic resistan	се	
					Jse category		
		Effective		d/d		d/d	
.		anchorage		w/d w/w		w/d	
Anchor size	Sleeve	depth		w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range	
		h _{ef}		$V_{Rk,b}^{(2)3)}$			
		[mm]		$N_{Rk,b} = N_{Rk,p}^{1)}$	[kN]		
		Compi	ressive streng	th f _b ≥ 4 N/mm ²			
M8	12x80	80	0,6	0,6	0,6	2,0	
M8 / M10/	16x85	85	0,6	0,6	0,6	2,0	
IG-M6	16x130	130	1,2	1,2	0,9	2,5	
M12 / M16 / IG-M8 /	20x85	85	0,6	0,6	0,6	2,5	
IG-M10	20x130	130	1,2	1,2	0,9	2,5	
		Comp	ressive streng	th f _b ≥ 6 N/mm²	2		
M8	12x80	80	0,9	0,9	0,75	2,5	
M8 / M10/	16x85	85	0,9	0,9	0,75	2,5	
IG-M6	16x130	130	1,5	1,5	1,2	3,0	
M12 / M16 / IG-M8 /	20x85	85	0,9	0,9	0,75	3,0	
IG-M10	20x130	130	1,5	1,5	1,2	3,0	
		Compr	essive strengt	th f _b ≥ 10 N/mm	2		
M8	12x80	80	0,9	0,9	0,9	3,5	
M8 / M10/	16x85	85	0,9	0,9	0,9	3,5	
IG-M6	16x130	130	2,0	2,0	1,5	4,0	
M12 / M16 / IG-M8 /	20×85	85	0,9	0,9	0,9	4,0	
IG-M10	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 ≥ 250 mm: V_{Rk,c,II} = V_{Rk,b} 3)

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

Table C63: **Displacements**

Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ_{V0}	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,26		0,21	0,41	0.7		
M8 / M10/	16x85	85	0,20		0,21	0,41	0,7		
IG-M6	16x130	130	0,43	0,80	0,34	0,69		1,00	1,50
M12 / M16 /	20x85	85	0,26		0,21	0,41	0,86	,	,
IG-M8 / IG-M10	20x130	130	0,43		0,34	0,69			

Friulsider Injection System KEM-UP Vinylester for masonry

Performances clay hollow brick BGV Thermo Characteristic values of resistance under tension and shear load Displacements

Annex C 26



EN 771-1 Solution code) e.g. Terreal (FR) [mm] 500 x 200 x 314 Rotary Fotary 500 6 f 200 6 f 200 86 20 200 86 20 tallation parameters tallation parameters (ance (mm) 100 (120) ¹⁰ scr.1 (mm) 500 scr.1 (mm) 100 (120) ¹⁰ scr.1 (mm) 100 smin (mm) 100 ets for SH20x85 and SH20x130 (mm) 100 ecording to ETAG 029, Annex C (metal and context) (metal and context)								
Implify $f_b \ge [N/mm^2]$ 6, 9 or 12 EN 771-1 EN 771-1 EN 771-1 For any Implify and the second	Compressive strength f _b Code Producer (country code)		0,0			Caller?		
EN 771-1 code) e.g. Terreal (FR) [mm] 500 x 200 x 314 Rotary Image: Comparison of Comp	Code Producer (country code)	- [iwiiiii]	6 9 or 12			1.0	57	-
code) e.g. Terreal (FR) [mm] 500 x 200 x 314 Rotary Imm] 500 6 6 200 6 200 6 114 40 5 6 200 6 114 40 5 6 200 6 114 40 5 6 200 6 200 6 114 40 5 86 20 200 6 6 7 200 6 7 5 200 6 7 5 200 10 100 120 ¹⁷ 100 120 ¹⁷ 100 120 ¹⁷ 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100	Producer (country code)					1	100	1
[mm] 500 x 200 x 314 Rotary Image: Solution of the second secon	and the second		1200 St. 2 S					
Rotary 500 6 6 5 200 86 20 5 200 9 9 9 9 tallation parameters 14 40 40 5 ance [-] All sizes 100 (120) ¹¹ ance [mm] 100 (120) ¹¹ 100 ser.il [mm] 500 5 ser.il [mm] 100 100 sts for SH20x85 and SH20x130 imm] 100 100 secording to ETAG 029, Annex C 6 10 10		[mm]			-		< II	S
500 6 6 5 200 86 20 5 200 9 9 9 cor [] All sizes 100 (120) ¹¹ ance [] [] All sizes srr,l [] [] 100 (120) ¹¹ srr,l [] [] 11 srr,l [] [] 314 smin [] [] 100 ets for SH20x85 and SH20x130 iscording to ETAG 029, Annex C [] []	Drilling method	[]					-	
14 40 86 20 20 86 20 9 20								
14 40 86 20 20 86 20 9 20				500		,		
14 40 5 20 86 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 20 986 20 4 100 120 98 20 100 98 20 20 98 20 20 99 20 20 90 20 20 90 20 20 90 20 20 90 20 20 90 20 20 90 20 20 90 20 20 90 20				500	6	5 +1		
86 20 200 36 200 30 extallation parameters 100 (120) ¹⁰ ance [-] All sizes 100 (120) ¹⁰ scr.,I [mm] smin [mm] stall stor SH20x85 and SH20x130 according to ETAG 029, Annex C				14	กกระนายการระนายการ	5	5	
$\frac{200}{200}$ $\frac{200}{100}$ $\frac{1}{100}$								
tallation parameters ince $\begin{bmatrix} -1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ Scr.II [mm] Scr.II [mm] Scr.II [mm] Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Start [mm] Start [mm] Start 100	1							
tallation parameters ince $\begin{bmatrix} -1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ Scr.II [mm] Scr.II [mm] Scr.II [mm] Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Start [mm] Start [mm] Start 100								
tallation parameters ince $\begin{bmatrix} -1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ Scr.II [mm] Scr.II [mm] Scr.II [mm] Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Scr.II [mm] Stallation 100 Start [mm] Start [mm] Start 100	200							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						2		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Table C65: Installation	parameters						
scr.it [mm] 500 scr.⊥ [mm] 314 smin [mm] 100 ets for SH20x85 and SH20x130 according to ETAG 029, Annex C [mm] 100	Anchor size		5			the second se)	
S _{or,1} [mm] 314 s _{min} [mm] 100 ets for SH20x85 and SH20x130 100 according to ETAG 029, Annex C Image: Content of the second	Anchor size Edge distance	Cor	3	[mm]		100 (120) ¹		
ets for SH20x85 and SH20x130 according to ETAG 029, Annex C	Anchor size Edge distance Minimum edge distance	C _{cr}		[mm] [mm]		100 (120) ¹ 100 (120) ¹		
according to ETAG 029, Annex C	Anchor size Edge distance Minimum edge distance	C _{Cr} C _{min} ²⁾ S _{cr,II}	3	[mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500		
oup factor for anchor group in case of tension loading	Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} 2) S _{cr,II} S _{cr,⊥} S _{min}		[mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500 314		
the second	Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according t	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	I20x130 Annex C	[mm] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500 314		
	Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according t Table C66: Group facto Configuration	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	l20x130 Annex C or group in case o with c ≥	[mm] [mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹ 100 (120) ¹ 500 314		
C _{or} 500	Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according t Table C66: Group facto Configuration II: anchors placed	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	l20x130 Annex C or group in case o with c ≥	[mm] [mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹ 100 (120) ¹ 500 314 100		1,7
	Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according t Table C66: Group facto Configuration	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	20x130 Annex C or group in case o with c ≥ 175	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314		1,7
175 100	Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C66: Group factor Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	l20x130 Annex C or group in case o with c ≥ 175 c _{cr}	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100		-
guration	Table C65:InstallationAnchor sizeEdge distanceMinimum edge distanceSpacing	Ccr Cmin Scr.II		s	[-] [mm] [mm] [mm]	[-] [mm] [mm] [mm]	[-] All sizes [mm] 100 (120) ¹ [mm] 100 (120) ¹ [mm] 500	[-] All sizes [mm] 100 (120) ¹⁾ [mm] 100 (120) ¹⁾ [mm] 500
Ger 500 ri	chor size ge distance imum edge distance acing imum spacing Value in brackets for SH2 For V _{Rk,c} : c _{min} according t ble C66: Group facto Configuration : anchors placed rallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	20x130 Annex C or group in case o with c ≥ 175	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314 100		-
	nchor size dge distance linimum edge distance pacing linimum spacing Value in brackets for SH2 For V _{Rk,c} : c _{min} according tr Table C66: Group facto Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	l20x130 Annex C or group in case o with c ≥ 175 c _{cr}	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100		2,0
$\frac{175}{c_{cr}} \frac{100}{314} \alpha_{g,N,\perp}$	Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C66: Group factor Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min} 20x85 and SH to ETAG 029,	l20x130 Annex C or group in case o with c ≥ 175 c _{or} 175	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100 500 100	100 (120) ¹ 100 (120) ¹ 500 314 100		2,0



	S	1				-	1
	Configuration	UC T	with c ≥	with s ≥		-	
II: anchors p parallel to hor joint			Ccr	500	α _g ,∨,⊪	[-]	2,0
⊥: anchors p perpendicul horizontal j	ar to V		C _{cr}	314	$\alpha_{g,V,\bot}$	171	2,0
Table C68:	Group factor fo	or anchor group ir	case of shear	loading perpend	licular to free e	dge	
(Configuration	A	with c ≥	with s ≥			
II: anchors pl parallel to hor joint		• • •	C _{cr}	500	α _{g,V,II}	[-]	2,0
⊥: anchors p perpendicul horizontal j	ar to V-		C _{cr}	314	$\alpha_{g,v,\perp}$	[-]	2,0
Table C69:	Characteristic	values of resistar	nce under tensio	on and shear lo	ads		
				Character	istic resistance		
					category	-1	
Anchor size	Sleeve	Effective anchorage depth		d/d w/d w/w			d/d w/d w/w
Anchor size	Sleeve	depin	40°C/24°C	80°C/50°C	120°C/72°C	te	For all mperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{(1)}$	1		V _{Rk,b} ²⁾³⁾
		[mm]			[kN]		
			sive strength fb			1	
M8	12x80	80	0,9	0,9	0,75		3,0
M8 / M10/	16x85	85	0,9	0,9	0,75	_	4,0
IG-M6	16x130	130	1,2	1,2	0,9	-	4,0
M12 / M16 / IG-M8 /	20x85	85	0,9	0,9	0,75		6,0
IG-M10	20x130	130	1,2	1,2	0,9		6,0
		Compres	sive strength f	, ≥ 9 N/mm ²			
M8	12x80	80	1,2	1,2	0,9		3,5
M8 / M10/	16x85	85	1,2	1,2	0,9		5,0
IG-M6	16x130	130	1,5	1,5	1,2		5,0
M12/M16/	20x85	85	1,2	1,2	0,9		7,5
IG-M8 / IG-M10	20x130	130	1,5	1,5	1,2		7,5
²⁾ Calcul		nd c _{min} TAG 029, Annex C, e teel 5.6 or greater. Fo				nm: V _{Rk}	$_{\rm c,ll} = V_{\rm Rk,b}$



Brick type:	Clay hollow b	rick Calibric R+							
Table C70:	Characteristic	values of resistan	ce under tensio	on and shear loa	ads (continue)				
			Characteristic resistance						
				Use	category				
		Effective		d/d		d/d			
		anchorage		w/d		w/d			
Amelanyaina	Cleave	depth		w/w		w/w			
Anchor size	Sleeve	depth				For all			
			40°C/24°C	80°C/50°C	120°C/72°C	temperature			
						range			
		h _{ef}	$N_{Rk,b} = N_{Rk,p}^{(1)} V_{Rk,b}$						
		[mm]							
		Compress	ive strength fb						
M8	12x80	80	1,2	1,2	0,9	4,0			
M8 / M10/	16x85	85	1,2	1,2	0,9	5,5			
IG-M6	16x130	130	1,5	1,5	1,2	5,5			
M12 / M16 /	20x85	85	1,2	1,2	0,9	8,5			
IG-M8 / IG-M10	20x130	130	1,5	1,5	1,2	8,5			

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

²⁾ Calculation of $V_{\text{Rk,c}}$ see ETAG 029, Annex C, except for shear load parallel to free edge with $c \ge 250 \text{ mm}$: $V_{\text{Rk,c,II}} = V_{\text{Rk,b}}$ ³⁾ The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{\text{Rk,b}}$ by 0,8

Table C71: Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	Ν	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		0,27	0,55	1,0	1,10	1,65
M8 / M10/	16x85	85	0,34		0,27	0,55	1,43		
IG-M6	16x130	130	0,43	0,80	0,34	0,69	1,43		
M12 / M16 /	20x85	85	0,34	ŕ	0,27	0,55		2,00	3,00
IG-M8 / IG-M10	20x130	130	0,43		0,34	0,69	2,14		

Friulsider Inject	tion System	KEM-UP Viny	ylester for	masonry
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Performances clay hollow brick Calibric R+ Characteristic values of resistance under tension and shear load (continue) Displacements

Annex C 29



Urbanbric (g/dm ³] 0,7 N/mm ²] 6, 9 or 12 EN 771-1 e.g. Imerys (FR) [mm] 560 x 200 x 274 Rotary 560	6,5		9 _{9,5}		>
N/mm ²] 6, 9 or 12 EN 771-1 e.g. Imerys (FR) [mm] 560 x 200 x 274 Rotary 560			9 _{9,5}		
EN 771-1 e.g. Imerys (FR) [mm] 560 x 200 x 274 Rotary 560			9 _{9,5}		
e.g. Imerys (FR) [mm] 560 x 200 x 274 Rotary 560			99,5		
[mm] 560 x 200 x 274 Rotary 560			99,5		
Rotary 560			99,5		
560 20			99,5		
			99,5		
	IC F		- h	Ē.	
	-5,5		20	10	
40)			20	0	
		- TC			
63					
		40 -			
C _{cr}	[mm]		100 (120) ¹⁾		
Smin					
35 and SH20x130 TAG 029, Annex C or anchor group in case of t	ension load				
with c ≥		with s ≥	- 14	(<u></u>	1.00
		100	- C - N -		1,9
••		560	α _{g,N,II}		20
•• C _{cr} 185		560 100	α <u>g</u> ,η,η	[-]	2,0 1,1
0 5 5 5	2) Gor,II Gor,⊥ Gmin 5 and SH20x130	[-] Cor [mm] Comin ²⁾ [mm] Socr.11 [mm] Socr.⊥ [mm] Socr.⊥ [mm] Socr.⊥ [mm] Socr.130	[-] Cor [mm] Cmin ² [mm] Scr.II [mm] Scr.⊥ [mm] Smin [mm] Grad SH20x130 [mm]	[-] All sizes Cor [mm] 100 (120) ¹ Omin ² [mm] 100 (120) ¹ Ser,11 [mm] 560 Ser,1 [mm] 274 Simin [mm] 100 Ser,1 [mm] 274	[-] All sizes Cor [mm] 100 (120) ¹⁾ Cmin ²⁾ [mm] 100 (120) ¹⁾ Cor, 1 [mm] 560 Cor, 1 [mm] 274 Cor, 1 [mm] 100 Cor, 1 [mm] 100 Cor, 1 [mm] 100



Conf	guration	with c	2	with s ≥			1
II: anchors placed parallel to horizont joint		C _{cr}		560	α _{g,v,li}		2,0
⊥: anchors placed perpendicular to horizontal joint		Cer		274	$\alpha_{g,V,\perp}$	[-]	2,0
Table C76: Gr	oup factor for anc	hor group in case	e of shear load	ding perpendi	cular to free e	dge	
Confi	guration	with c	2	with s ≥			
II: anchors placed parallel to horizont joint	al V	C _{cr}		560	$\alpha_{g,v,u}$	ī.i	2,0
⊥: anchors place perpendicular to horizontal joint		Ccr		274	$\alpha_{g,V,\perp}$	[-]	2,0
Table C77: C	haracteristic value	s of resistance u	nder tension a	and shear loa	ds		
					ristic resistance	11	
					category	1	
Anchor size	Effective anchorag Sleeve depth		14/10			d/d w/d w/w	
Anonor size	0166V6		40°C/24°C	80°C/50°C	120°C/72°C	tem	For all perature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$)	V	2)3) Rk,b
		[mm]			[kN]		
		Compressive s					
M8	12x80	80	0,9	0,9	0,75	-	3,0
M8 / M10/	16x85	85	0,9	0,9	0,75	-	3,0
IG-M6	16x130	130	2,0	2,0	1,5		3,0
M12/M16/	20x85	85	0,9	0,9	0,75	-	3,5
IG-M8 / IG-M10	20x130	130	2,0	2,0	1,5		3,5
M8	12x80	Compressive s	$\frac{1}{0,9}$		0.0		4,0
and a strength large state.	16x85	85		0,9	0,9		
M8 / M10/ IG-M6	16x85	130	0,9 2,5	0,9 2,5	0,9 2,0		4,0
M12/M16/	20x85	85	0,9	0,9	0,9		4,0
IG-M8 / IG-M10	20x130	130	2,5	2,5	2,0		4,5
 Calculation ³⁾ The values 	valid for c_{cr} and c_{min} of $V_{Rk,c}$ see ETAG 02 are valid for steel 5.6	29, Annex C, except or greater. For stee	for shear load pa I 4.6 and 4.8 mu	arallel to free ec	ge with c ≥ 190 r	nm: V _{Rk}	-
Performances	ction System KEM clay hollow brick neters (continue)		r masonry		Anne	x C 31	



Brick type: Cl	ay hollow brick Ur	banbric				
Table C78: C	Characteristic values	s of resistance un	der tension a	and shear loa	ds (continue)	
				Characte	ristic resistance	
				Use	e category	
		Effective		d/d		d/d
		anchorage		w/d		w/d
Anchor size	Sleeve	depth		w/w		w/w
Anchor Size	Sieeve	dopti				For all
			40°C/24°C	80°C/50°C	120°C/72°C	temperature
						range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$)	V _{Rk,b} ²⁾³⁾
		[mm]			[kN]	
		Compressive st	rength f _b ≥ 12	N/mm ²		
M8	12x80	80	1,2	1,2	0,9	4,5
M8 / M10/	16x85	85	1,2	1,2	0,9	4,5
IG-M6	16x130	130	3,0	3,0	2,5	4,5
M12 / M16 /	20x85	85	1,2	1,2	0,9	5,0
IG-M8 / IG-M10	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 $c \ge 190 \text{ mm}$: V_{Rk,c,II} = V_{Rk,b}

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

Table C79: Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	Ν	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		0,27	0,55			
M8 / M10/	16x85	85	0,34		0,27	0,55	1,30		
IG-M6	16x130	130	0,86	0,80	0,69	1,37		1,00	1,50
M12 / M16 /	20x85	85	0,34		0,27	0,55		,	,
IG-M8 / IG-M10	20x130	130	0,86		0,69	1,37	1,43		

Friulsider Injection System KEM-UP Vinylester for masonry	Friulsider	Injection \$	System	KEM-UP	Vinylester	for	masonry
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Performances clay hollow brick Urbanbric Characteristic values of resistance under tension and shear load (continue) Displacements

Annex C 32



Clay hollow brid Brique creuse (ρ [kg/dm ³] 0,7 $f_b \ge [N/mm^2]$ 4, 8 or 12 EN 771-1 e.g. Terreal (FF [mm] 500 x 200 x 20 Rotary	3)				
ρ [kg/dm3] 0,7 $ f_b ≥ [N/mm2] 4, 8 or 12 $ EN 771-1 e.g. Terreal (FF [mm] 500 x 200 x 20 Rotary	3)				
f _b ≥ [N/mm ²] 4, 8 or 12 EN 771-1 e.g. Terreal (FF [mm] 500 x 200 x 200 Rotary 20			H		
EN 771-1 e.g. Terreal (FF [mm] 500 x 200 x 20 Rotary				-	
e.g. Terreal (FF [mm] 500 x 200 x 20 Rotary				1	
[mm] 500 x 200 x 20 Rotary					
Rotary					
24					
9	00 6	7			
on parameters	- 40 - /	200	100 (120) ¹⁾ 500 200		
smin SH20x85 and SH20x130 ng to ETAG 029, Annex C ctor for anchor group in case	[mm] of tension loa	ading	200		
n with c≥		with s ≥			(<u> </u>
Ccr		200	α _{g,N,II}	[-]	2,0
			1.1.1.1.1.1.1.1.1.1.1	1-1	2,0
C _{cr}		[mm]	[mm]	[mm] 100 (120) ¹⁾	[mm] 100 (120) ¹⁾



II: anchors placed parallel to horizontal joint V ccr 500 $\alpha_{g,V,II}$ [-] 1: anchors placed perpendicular to horizontal joint V ccr 200 $\alpha_{u,V,II}$ [-] Table C84: Group factor for anchor group in case of shear loading perpendicular to free edge Configuration with $c \ge$ with $s \ge$ [-] II: anchors placed parallel to horizontal joint V ccr 500 $\alpha_{g,V,II}$ [-] II: anchors placed perpendicular to horizontal joint V ccr 500 $\alpha_{g,V,II}$ [-] Table C85: Characteristic values of resistance under tension and shear loads Table C85: Characteristic values of resistance under tension and shear loads Marchorage depth Marchor size Sleeve Effective anchorage depth d/d d'/d d'/d Marchorage depth [Marchor State	Config	uration	with c	2	with s ≥			
1: anchors placed perpendicular to forizontal joint $v \bullet i$ c_{cr} 200 $a_{a,V,L}$ Table C84: Group factor for anchor group in case of shear loading perpendicular to free edge Configuration with $c \ge$ with $s \ge$ i II: anchors placed parallel to horizontal joint $v \bullet i$ c_{cr} 500 $a_{g,V,R}$ [·] 1: anchors placed parallel to horizontal joint $v \bullet i$ c_{cr} 200 $a_{g,V,R}$ [·] Li anchors placed parallel to horizontal joint Characteristic values of resistance under tension and shear loads Table C85: Characteristic values of resistance under tension and shear loads Characteristic resistance Use category d/d d/d d/d $Machor size$ Sleeve Effective anchorage depth d/d d/d d/d Name $v \bullet k_{B,L}$ $Mathol/$ 16x85 85 0,6 0,6 0,6 Compressive strength $f_b \ge 4$ M/mm ² Compressive strength $f_b \ge 4$ M/mm ² M8 12x80 80 0,6 <td< td=""><td>II: anchors placed parallel to horizonta</td><td>5-14-</td><td></td><td></td><td></td><td>α_{g,V,II}</td><td>71</td><td>2,0</td></td<>	II: anchors placed parallel to horizonta	5-14-				α _{g,V,II}	71	2,0
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	perpendicular to	V	Ccr		200	$\alpha_{g,v,\perp}$	[-]	2,0
II: anchors placed parallel to horizontal joint	Table C84: Gro	up factor for and	hor group in case	of shear load	ding perpendi	cular to free e	dge	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Config	uration	with c	2	with s ≥			
L: anchors placed perpendicular to horizontal joint	parallel to horizonta	∨	C _{cr}		500	α(g, V,II		2,0
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	perpendicular to		C _{cr}		200	$\alpha_{g,V,\bot}$	[-]	2,0
Anchor size Sleeve Effective anchorage depth w/d w/w w/d w/w w/d w/w w/d w/w Anchor size Sleeve $anchoragedepth w/d w/w w/w w/w Anchor size Sleeve anchoragedepth anchoragedepth w/w w/w w/w h_{ef} N_{Rk,b} = N_{Rk,p}^{-1} V_{Rk,p} ran h_{ef} N_{Rk,b} = N_{Rk,p}^{-1} V_{Rk,p} ran M8 12x80 80 0,6 0,6 0,6 0,6 M8 12x80 80 0,6 0,6 0,6 0,6 0,6 0,6 M10/ 16x85 85 0,6 0,6 0,6 0,6 0,6 0,6 G-M6 12x80 80 0,9 0,9 0,75 1, M8 12x80 80 0,9 0,9 0,75 1, M8 / M10/ 16x85 85 0,9 0,9 0,75 1$	Table C85: Ch	aracteristic value		nder tension a	Character Use	ristic resistance	2	d/d
$\begin{tabular}{ c c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	Apphoreize	Sleave	anchorage		w/d			a/a w/d w/w
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Anchor size	Sieeve	Jophn	40°C/24°C	80°C/50°C	120°C/72°C	tem	For all perature range
[mm] [kN] Compressive strength $f_b \ge 4$ N/mm² M8 12x80 80 0,6 0,6 0,6 0,6 M8 / M10/ 16x85 85 0,6 0,6 0,6 0,6 0,6 M8 / M10/ 16x85 85 0,6 <td></td> <td></td> <td>hat</td> <td>-</td> <td>Ners = Ners</td> <td>)</td> <td></td> <td>the second s</td>			hat	-	Ners = Ners)		the second s
Compressive strength $f_b \ge 4 \text{ N/mm}^2$ M8 12x80 80 0,6 0,75 <th< td=""><td></td><td></td><td></td><td></td><td>·</td><td></td><td></td><td>nn,o</td></th<>					·			nn,o
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$				trength $f_b \ge 4$	N/mm ²			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	M8	12x80	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0,6		0,9
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	M8 / M10/	16x85	85	0,6	0,6	0,6		0,9
G-M8 / IG-M10 20x130 130 0,6 0,75 1, 0,75 1, 0,16 16x130 130 0,9 0,9 0,75 1, 0,16 16x130 130 0,9 0,9 0,75 1, 0,16 0,16 10 20x130 130 0,9 0,9 0,75 1, 0,16 0,16 10 20x130 130 0,9 0,9 0,75 1, 1, <th< td=""><td>IG-M6</td><td>16x130</td><td>130</td><td>0,6</td><td>0,6</td><td>0,6</td><td></td><td>0,9</td></th<>	IG-M6	16x130	130	0,6	0,6	0,6		0,9
Compressive strength $f_b ≥ 8 \text{ N/mm}^2$ M8 12x80 80 0,9 0,9 0,75 1, M8 / M10/ 16x85 85 0,9 0,9 0,75 1, IG-M6 16x130 130 0,9 0,9 0,75 1, M12 / M16 / 20x85 85 0,9 0,9 0,75 1, G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, 1) Values are valid for c _{cr} and c _{min} 2) Calculation of V _{Bk,c} see ETAG 029, Annex C 5 5 5 5		20x85	85	0,6	0,6	0,6		0,9
M8 12x80 80 0,9 0,9 0,75 1, M8 / M10/ IG-M6 16x85 85 0,9 0,9 0,75 1, M8 / M10/ IG-M6 16x130 130 0,9 0,9 0,75 1, M12 / M16 / G-M8 / IG-M10 20x85 85 0,9 0,9 0,75 1, M12 / M16 / G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, M12 / M16 / G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, M2 / IG-M10 20x130 130 0,9 0,9 0,75 1, M12 / M16 / G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1,	G-M8 / IG-M10	20x130				0,6		0,9
M8 / M10/ IG-M6 16x85 85 0,9 0,9 0,75 1, 1, 0,9 M8 / M10/ IG-M6 16x130 130 0,9 0,9 0,75 1, 1, 0,9 M12 / M16 / G-M8 / IG-M10 20x85 85 0,9 0,9 0,75 1, 1, 0,9 M12 / M16 / G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, 1, 0,9 M10 / M10 20x130 130 0,9 0,9 0,75 1, 1, 0,9 0,9 0,75 1, 1, 0,9 M10 / G-M10 20x130 130 0,9 0,9 0,75 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1			Compressive s	trength $f_b \ge 8$	N/mm ²			
IG-M6 16x130 130 0,9 0,9 0,75 1, M12 / M16 / 20x85 85 0,9 0,9 0,75 1, G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, 1) Values are valid for c _{cr} and c _{min} 2) Calculation of V _{Rk,c} see ETAG 029, Annex C 5 1	M8					Contraction of the local distance of the loc		1,2
M12 / M16 / 20x85 85 0,9 0,9 0,75 1, G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, 1) Values are valid for c _{cr} and c _{min} 2) Calculation of V _{Bk,c} see ETAG 029, Annex C 0				-				1,2
G-M8 / IG-M10 20x130 130 0,9 0,9 0,75 1, 1) Values are valid for c _{cr} and c _{min} 2) Calculation of V _{Bk,c} see ETAG 029, Annex C 0,9 0,9 0,75 1,				-				1,2
 Values are valid for c_{cr} and c_{min} Calculation of V_{Rk,c} see ETAG 029, Annex C 			111 - 211 is				-	1,2
	 Values are v Calculation 	valid for c_{cr} and c_{min} of $V_{Rk,c}$ see ETAG 0	29, Annex C					1,2
Friulsider Injection System KEM-UP Vinylester for masonry	Friulsider Injec	tion System KEN	I-UP Vinylester fo	r masonry	1	- 		



						Characte	ristic resist	ance		
							category			
			Effective	e		d/d				d/d
		a	nchorag	ge		w/d w/w				w/d w/w
Anchor size	Sleev	/e	depth						F	or all
				4)°C/24°C	80°C/50°C	120°C/72	2°C		perature
									r	ange
			h _{ef}			$N_{Rk,b} = N_{Rk,p}^{1}$)		V	2)3) Rk,b
			[mm]			2	[kN]			
			-	ve strenç	gth f _b ≥ 12					
M8	12x8		80		1,2	1,2	0,9			1,5
M8 / M10/	16x8		85		1,2	1,2	0,9			1,5
IG-M6	16x1		130		1,2	1,2	0,9			1,5
M12 / M16 / G-M8 / IG-M1	0 20x8		<u>85</u> 130		1,2	1,2	0,9			1,5
4)	are valid for c_{cr}		130		1,2	1,2	0,9			1,5
	-	Effective		a (N						
		anchorage	N	δ _N / N	δ _{N0}	δ _{N∞}	v	δ	VO	δ _{V∞}
Anchor size	Sleeve	depth h _{ef}				01100			vo	
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[m	m]	[mm
M8	12x80	80	0,17		0,14	0,27				
M8 / M10/	16x85	85	0,17		0,14	0,27				
IG-M6	16x130	130	0,14	0,80	0,11	0,23	0,3	0	,9	1,35
M12 / M16 /	20x85	85	0,17		0,14	0,27				
IG-M8 / IG-M10	20x130	130	0,14		0,11	0,23				



Blocchi Legge /dm³] 0,6 mm²] 4, 6, 8 or 12 EN 771-1 e.g. Wienerbe [mm] 250 x 120 x 29 Rotary Rotary	rger (IT)	6-11	6		
mm ²] 4, 6, 8 or 12 EN 771-1 e.g. Wienerbe [mm] 250 x 120 x 25	50		6		
EN 771-1 e.g. Wienerbe [mm] 250 x 120 x 29	50		6		
e.g. Wienerbe [mm] 250 x 120 x 25	50		6	-	
[mm] 250 x 120 x 25	50		6		
			6		
	32		6		
	32		26		
	32		26		
		2 - 43 -			
	250		식		
meters	6		All sizes		
cr					
min	[mm]		60		
cr,II	[mm]		250		_
cr,⊥	[mm]		120		
	Imml				
sH20x130 and SH20x20 anchor group in case		ading	100		
anchor group in case	o of tension lo	with s ≥			
min ; SH20x130 and SH20x20 anchor group in case with c a 60	o of tension lo	A STATISTICS AND ADDRESS OF			1,0
anchor group in case	o of tension lo	with s ≥	α _{g,N,II}	[-]	1,0
cr mi cr	in	[-] [mm] n [mm] [mm]	neters [-] [mm] n [mm] 	Image: Image of the system Image of the	Image: Second system Image: Second system <th< th=""></th<>



Configu	uration	with c ≥		with s ≥			
II: anchors placed	E-II	60 ¹⁾		100 ¹⁾			1,0
parallel to horizontal joint	V	-		250	α _{g,V,II}		2,0
		60 ¹⁾				[-]	
⊥: anchors placed perpendicular to	V 1	60.7		100 ¹⁾	α,ν,⊥		1,6
horizontal joint		Ccr		250	- BIA17		2,0
¹⁾ Only valid for V _{Rk,b} a	according to Table C	93 and C94 values in	brackets				
Table C92: Gro	up factor for anch	or group in case	of shear loadi	ng perpendic	ular to free ed	ge	
Configu	uration	with c ≥		with s ≥			
II: anchors placed		60 ¹⁾		100 ¹⁾			1,0
parallel to horizontal joint	V	Cor		250	α _{g,V,II}	_	2,0
⊥: anchors placed		60 ¹⁾		100 ¹⁾		[-]	1.6
perpendicular to	V				α,ν,1		
horizontal joint ¹⁾ Only valid for V _{Rk,b} a		Cor		250			2,0
Sec. ma		anchorage		d/d;	w/d; w/w		For all
		Effective			category w/d; w/w		
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	tem	For all perature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$, ⁱ⁾ V _R	
		[mm]			[kN]		
		Compressive st	ength $f_b \ge 4 N$	/mm [*]		-	
M8	12x80	80	rength f _b ≥ 4 N	/mm²			
M8 / M10/	16x85	80 85	rength f _b ≥ 4 N	/mm*			
	16x85 16x130	80 85 130			0.3	2.0	$(0.9)^{3}$
M8 / M10/ IG-M6	16x85 16x130 20x85	80 85 130 85	ength f _b ≥ 4 N 0,4	/ mm² 0,4	0,3	2,0	9 ²⁾ (0,9) ³⁾
M8 / M10/ IG-M6 M12 / M16 /	16x85 16x130 20x85 20x130	80 85 130 85 130			0,3	2,0	9 ²⁾ (0,9) ³⁾
M8 / M10/ IG-M6	16x85 16x130 20x85	80 85 130 85 130 200	0,4	0,4	0,3	2,0	9 ²⁾ (0,9) ³⁾
M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10	16x85 16x130 20x85 20x130 20x200	80 85 130 85 130 200 Compressive st	0,4	0,4	0,3	2,0	^{,2)} (0,9) ³⁾
M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8	16x85 16x130 20x85 20x130 20x200 12x80	80 85 130 85 130 200 Compressive st 80	0,4	0,4	0,3	2,0	9 ²⁾ (0,9) ³⁾
M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/	16x85 16x130 20x85 20x130 20x200 12x80 16x85	80 85 130 85 130 200 Compressive st 80 85	0,4	0,4	0,3	2,0	^{,2)} (0,9) ³⁾
M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130	80 85 130 85 130 200 Compressive st 80 85 130	0,4	0,4	0,3		(0,9) ³⁾ (0,9) ³⁾
M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130 20x85	80 85 130 85 130 200 Compressive st 80 85 130 85 130	0,4 ength f _b ≥ 6 N	0,4 / mm ²			
M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/ IG-M6	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130	80 85 130 85 130 200 Compressive st 80 85 130	0,4 ength f _b ≥ 6 N	0,4 / mm ²			



						Characte	ristic resis	stance		
						Use	category	/		
			⊏ff	ective			d/d			
				horage			w/d			
Anchor size	e 5	Sleeve		epth -		1	w/w			
			_		40°C/24°C	80°C/50°C	120°C	/72°C	tem	For all perature range
				h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)			V _{Rk,b} ⁴⁾
				mm]			 [kN]			• HK,D
							[]			
			Compre	essive strer	igth f _b ≥ 8 N	/mm ²				
M8	-	12x80		80						
M8 / M10/	, -	16x85		85						
IG-M6	1	6x130		130	0.0	0.0		_	0.0	$(1 - 1)^{(2)}$
		20x85		85	0,6	0,6	0,	5	3,0	$(1,2)^{3}$
M12 / M16		0x130		130						
G-M8 / IG-N		0x200	:	200						
	·	Ć	Compre	essive stren	gth f _b ≥ 12 N	l/mm ²				
M8	-	12x80		80						
M8 / M10/	, .	16x85		85						
IG-M6	1	6x130		130	0.6	0.6		6	2 5	$5^{(2)}$ (1,5) ³⁾
	, 2	20x85		85	0,6	0,6	0,	0,6 3		5 (1,5)
M12 / M16		0x130								
	110	07130		130						
¹⁾ Value ²⁾ Calcu	es are valid for ulation of V _{Rk,c}	0x200 ^r c _{cr} and c _{min} see ETAG 029,	: Annex C	200 C, except for s	hear load par	allel to free edg	ge with c ≥	: 125 mm	: V _{Rk,c}	c,II = V _{Rk,b}
²⁾ Calco ³⁾ Value ⁴⁾ The v	es are valid for ulation of V _{Rk,c} es in brackets values are vali	0x200 r_{cr} and c_{min} see ETAG 029, $V_{Rk,c} = V_{Rk,b}$ for a d for steel 5.6 or	Annex C anchors	200 C, except for s with c _{min}	-	_	-	: 125 mm	: V _{Rk,c}	$\mathbf{V}_{R,H} = \mathbf{V}_{RK,b}$
¹⁾ Value ²⁾ Calcu ³⁾ Value	es are valid for ulation of V _{Rk,c} es in brackets	0x200 c_{cr} and c_{min} see ETAG 029, $V_{Rk,c} = V_{Rk,b}$ for a d for steel 5.6 or ments	Annex C anchors	200 C, except for s with c _{min}	-	_	-	: 125 mm	: V _{Rk,c}	b,II = V _{Rk,b}
1) Value 2) Calcu 3) Value 4) The v Table C95:	es are valid for ulation of V _{Rk,c} es in brackets values are vali Displace	0x200 Cor and Cmin see ETAG 029, V _{Rk,c} = V _{Rk,b} for a d for steel 5.6 or ments Effective anchorage	Annex C anchors	200 C, except for s with c _{min}	-	_	-	: 125 mm δ _{V0}		$b, II = V_{Rk,b}$ $\delta_{V^{\infty}}$
¹⁾ Value ²⁾ Calca ³⁾ Value ⁴⁾ The v Table C95:	es are valid for ulation of V _{Rk,c} es in brackets values are vali	0x200 Cor and Cmin see ETAG 029, V _{Rk,c} = V _{Rk,b} for a d for steel 5.6 or ments Effective anchorage depth h _{ef}	Annex C anchors greater.	200 C, except for s with c _{min} . For steel 4.6 δ _N / N	and 4.8 multi δ _{N0}	ply V _{Rk,b} by 0,8 δ _{N∞}	V	δ _{νο}	1	δ _{V∞}
¹⁾ Value ²⁾ Calcu ³⁾ Value ⁴⁾ The v Table C95:	es are valid for ulation of V _{Rk,c} es in brackets values are vali Displace	0x200 Cor and Cmin see ETAG 029, V _{Rk,c} = V _{Rk,b} for a d for steel 5.6 or ments Effective anchorage	Annex C anchors greater.	200 C, except for s with c _{min} . For steel 4.6	and 4.8 multi	ply V _{Rk,b} by 0,8			1]	
1) Value 2) Calcu 3) Value 4) The v Table C95: Anchor size All sizes	III0 2 es are valid for ulation of V _{Rk,c} es in brackets values are valid Displace Sleeve All sizes	0x200 Cor and Cmin see ETAG 029, V _{Rk,c} = V _{Rk,b} for a d for steel 5.6 or ments Effective anchorage depth h _{ef} [mm]	Annex C anchors greater. N [kN] 0,17	200 C, except for s with c _{min} . For steel 4.6 δ _N / N [mm/kN] 1,20	and 4.8 multi δ _{№0} [mm] 0,21	ply V _{Rk,b} by 0,8 δ _{N∞} [mm]	V [kN]	δ _{vo} [mm	1]	δ _{√∞} [mm]



Table C96: Description of		Clay hollow brick		T			
Brick type		Doppio Uni		-			
Bulk density p	[kg/dm ³]	0,9			10.15		-
	[N/mm ²]	10, 16, 20 or 28					
Code		EN 771-1					44
Producer (country code)		e.g. Wienerberger (l'	T)				
Brick dimensions	[mm]	250 x 120 x 120				-	
Drilling method		Rotary					
		26 (<u>61 - 3</u>			0		
		250		,			
Table C97: Installation pathematical Anchor size	arameters	3	[-]	,	All sizes		
Anchor size Edge distance	Ccr	3	[-] [mm]	,	100 (120) ¹)	
Anchor size Edge distance	C _{cr} C _{min} ²⁾	3	[-] [mm]		100 (120) ¹ 60)	
· · · · · · · · · · · · · · · · · · ·	C _{cr} C _{min} ²⁾ S _{cr,II}	3	[-] [mm] [mm]	,	100 (120) ¹ 60 250)	
Anchor size Edge distance Minimum edge distance Spacing	Ccr Cmin ²⁾ Scr,II Scr,⊥	3	[-] [mm] [mm] [mm]		100 (120) ¹ 60 250 120)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} ²⁾ S _{cr,II}	3	[-] [mm] [mm]		100 (120) ¹ 60 250)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to E Table C98: Group factor	C _{cr} C _{min} ²⁾ S _{cr,11} S _{cr,⊥} S _{min,11} S _{min,⊥} x85; SH20x ETAG 029,	s (130 and SH20x200 Annex C or group in case of ter	[-] [mm] [mm] [mm] [mm] [mm]	Y 1070	100 (120) ¹ 60 250 120 100)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to E Table C98: Group factor Configuration	C _{cr} C _{min} ²⁾ S _{cr,11} S _{cr,⊥} S _{min,11} S _{min,⊥} x85; SH20x ETAG 029,	s 130 and SH20x200 Annex C or group in case of ter with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹ 60 250 120 100)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to E Table C98: Group factor	C _{cr} C _{min} ²⁾ S _{cr,11} S _{cr,⊥} S _{min,11} S _{min,⊥} x85; SH20x ETAG 029,	s (130 and SH20x200 Annex C or group in case of ter	[-] [mm] [mm] [mm] [mm] [mm]	Y 1070	100 (120) ¹ 60 250 120 100		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to E Table C98: Group factor Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,II} S _{min,II} S _{min,⊥} x85; SH20x ETAG 029, for ancho	s 130 and SH20x200 Annex C or group in case of ten with c ≥ 60	[-] [mm] [mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹ 60 250 120 100 120		1,0 2,0 2,0



Config	uration	with c ≥		with s ≥			
II: anchors placed parallel to horizonta joint		C _{cr}		250	α _{g,V,II}	ri	2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr}		120	$\alpha_{g,V,\perp}$	[-]	2,0
Table C100: Gro	up factor for anch	or group in case	of shear loadi	ng perpendic	ular to free ed	ge	
Config	uration	with c ≥		with s ≥			1
II: anchors placed parallel to horizonta joint		C _{cr}		250	α _{g,V,II}		2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr}		120	$\alpha_{g,v,\perp}$	[-]	2,0
Table C101: Ch		Effective anchorage depth	der tension and shear loads Characteristic resistance Use category d/d w/d				
Anchor size	Sleeve		40°C/24°C	80°C/50°C	w/w 120°C/72°C	ten	For All nperature range
		h _{ef}	h _{ef} N _{Rk,b} =		1) Rk,p		V _{Rk,b} ²⁾³⁾
		[mm]			[kN]		
		Compressive str	ength f _b ≥ 10 M	1/mm ²	di 2-		
M8	12x80	80	_				
M8 / M10/	16x85	85	_	0,6			
IG-M6	16x130	130	0,6		0,5		1,5
M12/M16/	20x85	85	0,0		1217		1.65
G-M8 / IG-M10	20x130	130	-		1		
	20x200	200		1/2			
M8	12x80	Compressive stre 80	$engin_b \ge 10 r$			1	
M8 / M10/	16x85	85	-				
IG-M6	16x130	130	I Contra a				
	20x85	85	0,75	0,75	0,6		2,0
M12/M16/	20x130	130			1.000		
G-M8 / IG-M10	20x200	200			4		
²⁾ Calculation	valid for c_{cr} and c_{min} of $V_{Rk,c}$ see ETAG 029 are valid for steel 5.6 o), Annex C	4.6 and 4.8 multi	ply $V_{\text{Rk,b}}$ by 0,8			
		UP Vinylester for	masonru				



Anchor size			Characteristic resistance								
Apobor sizo					Use category						
Apphor size			Fff	ective	d/d						
				horage	w/d						
Anchorsize	S	leeve		epth –		1	w/w				
					40°C/24°C	80°C/50°C	120°C/	72°C	For A tempera range	ture	
		-		h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		V _{Rk,b} ²	3)	
		-		mm]			[kN]		1.1.1.1		
· · · · ·		Ċ	Compre	ssive stren	gth f _b ≥ 20 N	l/mm²					
M8	1	2x80		80							
M8 / M10/	1	6x85		85							
IG-M6	1	6x130		130	0.0	0,9	0.7	5	20		
M12/M16/	2	20x85		85	0,9	0,9	0,75		2,0		
G-M8 / IG-M10	2	0x130		130							
	2	0x200		200							
				essive stren	gth f _b ≥ 28 N	l/mm²					
M8		2x80		80							
M8 / M10/		6x85		85							
IG-M6	16x130 20x85			130	1,2	1,2	0,9		2,5		
M12/M16/			85		1,2		0,5		_,-		
G-M8 / IG-M10		0x130 0x200		130 200							
		d for steel 5.6 or	0			,,,,,,,, .					
Table C103:	Displacer										
Anchor size S	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	v	δνα	3 0	V∞	
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mn	n] [n	າm]	
All sizes Al	ll sizes	All sizes				0,62		_		,45	
All sizes Al	ll sizes		0,26	1,20	0,31	0,62	0,6	0,3		-	



Brick type Bulk density Compressive strength f _b Code Producer (country code) Brick dimensions Drilling method	ρ [kg/dm³] ₀≥ [N/mm²] [mm]	e.g. Sepa (FR)					
Compressive strength f _b Code Producer (country code) Brick dimensions	, ≥ [N/mm ²] ·	4 EN 771-3 e.g. Sepa (FR)		10 M 10			
Code Producer (country code) Brick dimensions	[mm]	EN 771-3 e.g. Sepa (FR)					1
Producer (country code) Brick dimensions	[mm]	e.g. Sepa (FR)	EN 771-3				
Brick dimensions	[mm]						
		494 x 200 x 190		35	and along the little		and a
		Rotary					
200		494			17		
			17	-			
Anchor size			[-]		All sizes) –	
Anchor size Edge distance	C _{cr}				All sizes 100 (120) ¹ 100 (120) ¹		
Anchor size Edge distance Minimum edge distance	Cor		[-] [mm]		100 (120) ¹		
Anchor size Edge distance Minimum edge distance Spacing	C _{cr} C _{min} ²⁾		[-] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{cr,⊥} S _{min}	1v120	[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according t Table C106: Group facte	Ccr [.] C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} I20x85 and SH20 to ETAG 029, Ar	nnex C group in case of t	[-] [mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C106: Group facto Configuration	Ccr [.] C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} I20x85 and SH20 to ETAG 029, Ar	nnex C group in case of f with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹ 100 (120) ¹ 494 190		15
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according to Table C106: Group facto	Ccr [.] C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} I20x85 and SH20 to ETAG 029, Ar	nnex C group in case of t	[-] [mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494 190		
²⁾ For V _{Rk,c} : c _{min} according Table C106: Group factor Configuration II: anchors placed parallel to horizontal	Ccr [.] C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} I20x85 and SH20 to ETAG 029, Ar	nnex C group in case of t with c ≥ 100	[-] [mm] [mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹ 100 (120) ¹ 494 190 100		1,5 2,0 1,0



	0 "	1	1	200	1				1
II: anchors	Configuratio	on Tell		with c ≥		with s ≥			
parallel to ho		V	-	50		100	α	V.II	1,1
joint				Ccr		494		[-]	2,0
⊥: anchors		1.		100		100			1,1
perpendici horizonta		× •		Ccr		190	αg	V,⊥	2,0
Table C108	: Group f	actor for anc	hor group	in case of	shear load	ling perper	ndicular to	free edge	
	Configuratio	on		with c ≥		with s ≥			T
II: anchors parallel to ho joint	orizontal			Ccr		494	άg		2,0
⊥: anchors perpendici horizonta	ular to	V		Ccr		190	αg	V [-]	2,0
					Char	acteristic re Use catego			d/d
Anchor size	Sleeve	Effective anchorage depth	d/d			w/d w/w			w/d w/w
Anchor Size	Gleeve		40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperatur range
		h _{et}	1	$N_{Rk,b} = N_{Rk,t}$	1)	1	$N_{Rk,b} = N_{Rk,p}$	1)	V _{Rk,b} ²⁾³⁾
		[mm]				[kN]	and threader t		
110	10.00				ngth $f_b \ge 4$			0.75	
M8	12x80 16x85	80 85	1,2	0,9	0,75	0,9	0,9	0,75	3,0
M8 / M10/ IG-M6			1,2	0,9	0,75	1,2	0,9	0,75	3,0
/12 / M16 /	16x130 20x85	130 85	1,2 1,2	0,9 0,9	0,75 0,75	1,2 1,2	0,9 0,9	0,75 0,75	3,0 3,0
IG-M8 /	The second second							· · · · · · · · · · · · · · · · · · ·	
IG-M10	20x130	130	1,2	0,9	0,75	1,2	0,9	0,75	3,0
²⁾ Calc	ulation of V _{RI} values are va	for c _{cr} and c _{min} _{k,c} see ETAG 02 alid for steel 5.6 ements						≥ 250 mm: \	$V_{Rk,c,II} = V_{Rk,b}$
Anchor size	Sleeve	Effective anchorag depth h _{et}	e N	δ_N / N	δ _{ΝΟ}	δ _{N∞}	v	δ _{vo}	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
All sizes	All sizes	All sizes	0,34	0,90	0,31	0,62	0,86	0,9	1,35
Friulside	r Injection	System KEM	-UP Vinyl	ester for m	asonry				
Dorformo	nces hollo	w light weigh	at concret	e brick Blo	c creux B4	0	1	Annex C	43



Brick type		Solid light weight	ick		-			
Bulk density	ρ [kg/dm ³]	0,6		10	10-161 (150)			
Compressive strength ft	$\geq [N/mm^2]$	2		Contra la	24			
Code	1.01.70	EN 771-3			S Sec. 1			
Producer (country code)		e.g. Bisotherm (D	E)					
Brick dimensions	[mm]	300 x 123 x 248		and the second	有利用			
Drilling method		Rotary			ALL			
Table C112: Installatio	n parameter							
Anchor size			[-]		All sizes	-		
Edge distance	Ccr		[mm]		1,5*h _{ef}			
Minimum edge distance	Cmin		[mm]		60			
Spacing	Scr		[mm]		3*h _{ef}			
Minimum spacing	Smin		[mm]		120			
II: anchors placed parallel to horizontal		90		120	-		1,1	
Configuration		with c ≥ 90		with s ≥ 120			1,1	
joint		1,5*hef		3*h _{ef}	α _{g,N,I}	[-]	2,0	
⊥: anchors placed perpendicular to		124		120	$\alpha_{g,N,\perp}$		1,1	
horizontal joint	-	1,5*hef		3*hef			2,0	
Table C114: Group fact Configuration	or for ancho	or group in case of with c ≥	shear load	ling parallel to with s ≥	free edge	-		
II: anchors placed		60		120			0,6	
parallel to horizontal joint	V ••	90		120	α _{g,V,II}		2,0	
⊥: anchors placed	H	60		120		[-]	0,6	
	V 💲	124		120	α _{g,V,1} .		2,0	
perpendicular to horizontal joint							-	
perpendicular to	or for ancho	or group in case of	shear load	ing perpendic	ular to free	edge		
perpendicular to horizontal joint	or for ancho	or group in case of with c ≥	shear load	ling perpendic with s ≥	ular to free	edge		
perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed	or for ancho		shear load		ular to free	edge	0,6	
perpendicular to horizontal joint Table C115: Group fact Configuration	or for ancho	with c ≥	shear load	with s ≥	ular to free			
perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint	or for ancho	with c ≥ 60	shear load	with s ≥ 120		edge	0,6 2,0 0,6	
perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to	or for ancho	with c ≥ 60 90	shear load	with s ≥ 120 120			2,0	
perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	or for ancho	with c ≥ 60 90 60	shear load	with s ≥ 120 120 120	α _{g,v,ii}		2,0 0,6	

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		•	ght concre values of re				n and shear	r loads					
							acteristic res						
				Use category									
Apphor	Anchor Oleane d			d/d				d/d w/d w/w					
size	depth	40°C/24°C	80°C/50)°C 120°	°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range				
		h _{ef}		$N_{Rk,b} = N$				$N_{Rk,b} = N_{Rk,b}$	1)	V _{Rk,b} ²⁾³⁾			
		[mm]					[kN]		0	110,0			
		· • •	Con	npressiv	ve stren	gth 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/	16x85	85	3,0	2,5		2,0	3,0	2,5	2,0	3,0			
IG-M6	16x130	130	3,0	2,5		2,0	3,0	2,5	2,0	3,0			
M12 / M16		85	2,5	2,5		2,0	2,5	2,5	2,0	3,0			
/ IG-M8 / IG-M10	20x130 20x200	-	2,5 2,5	2,5 2,5		2,0 2,0	2,5 2,5	2,5 2,5	2,0	3,0			
¹⁾ Values ²⁾ For ca	s are valid Iculation c alues are v	for c_{cr} , value of $V_{Rk,c}$ see E	s in brackets a TAG029, Ann 5.6 or greater	are valid fo ex C	-	anchors	with c _{min}		2,0	3,0			
Anchor	size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{ΝΟ}	₎ δ _Ν	• V	δ _{vo}	δ _{V∞}			
			[mm]	[kN] [mm/kN]	[mn	n] [mn	n] [kN] [mm]	[mm]			
M8		-	80										
M8 / M IG-M		-	90	0,86	0,50	0,4	3 0,8	6					
M10 / IG	à-M8	-	100	1,00	0.25	0,3	5 0,7	0					
M16 / IG	-M10	-	100	0,86	0,35	0,3	0 0,6	0					
M8		12x80	80		0,50	0,3	6 0,7	1 0,9	0,25	0,38			
M8 / M	10/	16x85	85							-,			
IG-M		16x130	130	0.71									
		20x85	85	0,71	0,35	0,2	5 0,5	0					
		20x130	130										

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Performances solid light weight concrete brick - LAC Characteristic values of resistance under tension and shear load Displacements

20x200

Annex C 45

IG-M8 / IG-M10