



Varetypens unike identifikasjonskode: Ankermasse ESSVE ONE Ankermasse ESSVE ONE-ICE

Produsent:

ESSVE Produkter AB BOX 7091 164 07 Kista Sweden

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Europeisk teknisk bedømmelse (ETA)	Tilsiktet bruksområde	Artikkelnummer
ETA-18/0617 (2019-12-11)	Bonded anchor consisting of a cartridge with injection mortar ESSVE ONE, or ONE-ICE and a steel element for use in: cracked concrete strength classes C20/25 to C50/60. uncracked concrete strength classes C20/25 to C50/60.	302334 302336
ETA-18/0642 (2018-10-08)	 Bonded anchor consisting of a cartridge with injection mortar ESSVE ONE, ONE-ICE and a steel element for use in: Masonry bricks defined in the ETA 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 EOTA Technical Report TR 053 under consideration of the β-factor to ETA Annex C1, Table C1. 	302334 302336

Europeisk teknisk bedømmelse (ETA)	System for vurdering og verifikasjon av byggevarers ytelser (AVCP)	Europeisk bedømmelsesdokument	Teknisk bedømmelsesorgan (TAB)	Teknisk(e) kontrollorgan (NB)
ETA-18/0617 (2019-12-11)	1	EAD 330499-01-0601, (2018-08 draft)	DEUTSCHES INSTITUT FÜR BAUTECHNIK (DIBt)	1343 (FPC)
ETA-18/0642 (2018-10-08)	1	EAD 330076-00-0604, (2014-07)	DEUTSCHES INSTITUT FÜR BAUTECHNIK (DIBt)	1343 (FPC)



YTELSESERKLÆRING Nr: 18-ONE [NO]



Europeisk teknisk bedømmelse (ETA)	Dimensjon & Materiale	Egenskap	Ytelse
		Characteristic resistance to tension load (static and quasi-static loading)	Annex C1, C2, C4, C6
	Threaded rod M8 to M30	Characteristic resistance to shear load (static and quasi-static loading)	Annex C1, C3, C5, C7
	Internal threaded rod IG-M6 to IG-M20	Displacements under short term and long- term loading	Annex C8 – C10
ETA-18/0617 (2019-12-11)		Durability	Annex B1
	Threaded rod M8 to M30 (except hot-dipped) Rebar Ø8 to Ø32	Characteristic resistance and displacements for seismic performance category C1	Annex C2, C3, C6, C7
	-	Characteristic resistance and displacements for seismic performance category C2	NPD
	-	Content, emission and/or release of dangerous substances	NPD
		Characteristic values for resistance	Annex C6 – C45
		Reduction β -factors for job-site testing	Annex C1
ETA-18/0642 (2018-10-08)	Threaded rod M8 to M16 IG-M6 to IG-M10	Displacements	Annex C5 – C45
		Durability	Annex B1
		Reaction to fire	Class A1
	-	Content, emission and/or release of dangerous substances	NPD

Ytelser for denne byggevaren som er anført ovenfor, er i overensstemmelse med de angitte ytelsene. Denne ytelseserklæringen er utarbeidet i overensstemmelse med forordning (EU) nr. 305/2011 under produsentens eneansvar, som anført ovenfor.

Underskrevet for produsenten og på dennes vegne:

Kista 2020-01-20

Viktor Bukowski Product Developer/Technical expert – Fasteners

[ETA's attached as appendixes]





Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



European Technical Assessment

ETA-18/0617 of 11 December 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the Deutsches Institut für Bautechnik **European Technical Assessment:** Trade name of the construction product Injection system ESSVE ONE or ESSVE ONE-ICE for concrete Product family Bonded fastener for use in concrete to which the construction product belongs **ESSVE** Produkter AB Manufacturer Esbogatan 14 164 74 KISTA SCHWEDEN ESSVE Plant No. 671 Manufacturing plant This European Technical Assessment 31 pages including 3 annexes which form an integral part contains of this assessment This European Technical Assessment is EAD 330499-01-0601 issued in accordance with Regulation (EU) No 305/2011, on the basis of This version replaces ETA-18/0617 issued on 15 February 2019



European Technical Assessment ETA-18/0617 English translation prepared by DIBt

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Specific Part

1 Technical description of the product

The "Injection System ESSVE ONE, ESSVE ONE-ICE for concrete" is a bonded anchor consisting of a cartridge with injection ESSVE ONE or ESSVE ONE-ICE and a steel element. The steel element consists of a commercial threaded rod with washer and hexagon nut in the range of M8 to M30 or reinforcing bar in the range of \emptyset 8 to \emptyset 32 mm or an internal threaded anchor rod IG-M6 to IG-M20.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The product description is given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex C 1 to C 3, C 5, C 7
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1, C 4, C 6, C 8
Displacements (static and quasi-static loading)	See Anne C 9 to C 11
Characteristic resistance and displacements for seismic performance categories C1	See Anne C 12 to C 16
Characteristic resistance and displacements for seismic performance categories C2	No performance assessed
Durability	See Annex B 1

3.2 Hygiene, health and the environment (BWR 3)

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



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

In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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

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

Issued in Berlin on 11 December 2019 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt p.p. Head of Department *beglaubigt:* Baderschneider











Threaded rod M8, M10, M12, M16, M	120, M24, M27, M30 with washer and hexag	on nut
	es Commercia rod with: - Mater mecha Table - Inspect to EN - Markin depth	al standard threaded ials, dimensions and anical properties acc. A1 ction certificate 3.1 acc. 10204:2004 ng of embedment
Internal threaded anchor rod IG-M6	, IG-M8, IG-M10, IG-M12, IG-M16, IG-M20	
Threaded rod or screw	Mark of the producer	4)
		σ
	Marking: e.g. M8	
	Marking Internal thread	
	Mark	
	A4 additional mark for stainless steel HCR additional mark for high-corrosion resi	istance steel
Filling washer and mixer reduction fixture	nozzle for filling the annular gap between	anchor rod and
() () () () () () () () () () () () () (
Injection System ESSVE ONE, ESSVE ONE Product description	-ICE for concrete	Annex A 3



Tab	le A1: Materials						
Part	Designation	Material					
Stee	I, zinc plated (Steel acc. to EN the plated $\geq 5 \mu m$ act dis calculated $\geq 40 \mu m$	N 10087:1998 or EN 10263 cc. to EN ISO 4042:1999 or	:200	1)	AC:2000 or		
- nu	erardized \geq 40 µm ac	c. to EN ISO 17668:2016		130 10004.2004+	AC.2009 01		
		Property class		Characteristic tensile strength	Characteri yield stren	stic gth	Elongation at fracture
			4.6	$f_{uk} = 400 \text{ N/mm}^2$	f _{yk} = 240 N	 I/mm²	A ₅ > 8%
1	Threaded rod		4.8	f _{uk} = 400 N/mm ²	f _{yk} = 320 N	l/mm²	A ₅ > 8%
·			5.6	f _{uk} = 500 N/mm ²	f _{yk} = 300 N	l/mm²	A ₅ > 8%
		LIN 130 090-1.2013	5.8	f _{uk} = 500 N/mm ²	f _{yk} = 400 N	l/mm²	A ₅ > 8%
			8.8	f _{uk} = 800 N/mm ²	f _{yk} = 640 N	l/mm²	A ₅ ≥ 8%
		and to	4	for threaded rod c	lass 4.6 or 4	4.8	
2	Hexagon nut	EN ISO 898-2:2012	5	for threaded rod c	lass 5.6 or 5	5.8	
			8	for threaded rod c	lass 8.8		
3a	Washer	Steel, zinc plated, not-dip g	gaiva N ISi	0 7089.2000 EN IS	ea SO 7093-20	00 or F	N ISO 7094·2000)
3b	Filling washer	Steel, zinc plated, hot-dip	galva	anised or sherardize	ed	00 01 L	1100 /00 1.2000/
	Internal threaded	Property class	0	Characteristic tensile strength	Characteri yield stren	stic gth	Elongation at fracture
4	anchor rod	acc. to	5.8	f _{uk} = 500 N/mm ²	f _{yk} = 400 N	u/mm²	A ₅ > 8%
		EN ISO 898-1:2013	8.8	f _{uk} = 800 N/mm²	f _{vk} = 640 N	l/mm²	A ₅ > 8%
Stair Stair High	Iless steel A2 (Material 1.430 Iless steel A4 (Material 1.440 corrosion resistance steel (1 / 1.4307 / 1.4311 / 1.4567 1 / 1.4404 / 1.4571 / 1.4362 Material 1.4529 or 1.4565,	' or 1 2 or 1 acc.	.4541, acc. to EN 1 .4578, acc. to EN 1 to EN 10088-1: 20	0088-1:201 0088-1:201 14)	14) 14)	
		Property class		Characteristic tensile strength	Characteri yield stren	stic gth	Elongation at fracture
1	Threaded rod ¹⁾³⁾	+-	50	$f_{uk} = 500 \text{ N/mm}^2$	f _{yk} = 210 N	I/mm²	A ₅ ≥ 8%
		EN ISO 3506-1:2009		f _{uk} = 700 N/mm ²	f _{yk} = 450 N	I/mm²	A ₅ ≥ 8%
				f _{uk} = 800 N/mm ²	f _{yk} = 600 N	I/mm²	A ₅ ≥ 8%
	1)2)	acc to	50	for threaded rod c	lass 50		
2	Hexagon nut 133	EN ISO 3506-1:2009	70	for threaded rod c	lass 70		
		Δ2· Material 1 4301 / 1 43(80 17 / 1	10r threaded rod c	1855 80	to EN	10088-1.2014
0-		A4: Material 1.4401 / 1.440)4 / 1	1.4571 / 1.4362 or 1	1.4578, acc.	to EN	10088-1:2014
38	Washer	HCR: Material 1.4529 or 1	.456	5, acc. to EN 10088	3-1: 2014		
26	Filling weeker	(e.g.: EN ISO 887:2006, E Stainlags steel A4, High or	NIS	0 7089:2000, EN IS	50 7093:20	00 or E	N ISO 7094:2000)
30			mos	Characteristic	Characteri	stic	Elongation at
		Property class		tensile strength	yield stren	gth	fracture
	Internal threaded	acc. to	50	f _{uk} = 500 N/mm ²	f _{yk} = 210 N	I/mm²	A ₅ > 8%
4	anchor rod ¹⁾²⁾	EN ISO 3506-1:2009	70	f _{uk} = 700 N/mm ²	f _{yk} = 450 N	I/mm²	A ₅ > 8%
¹⁾ ²⁾ f ³⁾	Property class 70 for threaded ro or IG-M20 only property class 5 Property class 80 only for stainle	ods up to M24 and Internal th 0 ess steel A4	iread	ed anchor rods up to	o IG-M16,		
Inje	ction System ESSVE ONE, ES	SVE ONE-ICE for concrete					
Pro	duct description						Annex A 4



Reir	nforcing bar Ø 8, Ø 10, Ø 12, Ø 14, Ø 10	6, Ø 20, Ø 25, Ø 28, Ø 32					
	h _{ef}	1					
	 Minimum value of related rip area f_{R,min} ac Bib beight of the bar shall be in the range 	cording to EN 1992-1-1:2004+AC:2010					
	(d: Nominal diameter of the bar; h: Rip hei	ight of the bar)					
Tabl	e A2: Materials						
	I	Т					
Part	Designation	Material					
Reinf	orcing bars						
1	Rebar EN 1992-1-1:2004+AC:2010, Annex C	Bars and de-coiled rods class B or C f_{yk} and k according to NDP or NCL of EN $f_{uk} = f_{tk} = k \cdot f_{yk}$	1992-1-1/NA				
Injec	tion System ESSVE ONE, ESSVE ONE-ICE for o	concrete	_				
Proc Mate	luct description erials reinforcing bar		Annex A 5				



Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Seismic action for Performance Category C1: M8 to M30, Rebar Ø8 to Ø32.

Base materials:

- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A1:2016.
- Non-cracked concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Cracked concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.

Temperature Range:

- I: 40 °C to +40 °C (max long term temperature +24 °C and max short term temperature +40 °C)
- II: 40 °C to +80 °C (max long term temperature +50 °C and max short term temperature +80 °C)
- III: 40 °C to +120 °C (max long term temperature +72 °C and max short term temperature +120 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance class:
 - Stainless steel Stahl A2 according to Annex A 4, Table A1: CRC II
 - Stainless steel Stahl A4 according to Annex A 4, Table A1: CRC III
 - High corrosion resistance steel HCR according to Annex A 4, Table A1: CRC V

Design:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The anchorages are designed in accordance to EN 1992-4:2018 and Technical Report TR055, Edition February 2018

Installation:

- Dry or wet concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Flooded holes (not sea water): M8 to M16, Rebar Ø8 to Ø16, IG-M6 to IG-M10.
- Hole drilling by hammer (HD), hollow (HDB) or compressed air drill mode (CD).
- · Overhead installation allowed.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- The injection mortar is assessed for installation at minimum concrete temperature of -10°C resp. -20°C, where subsequently the temperature in the concrete does not rise at a rapid rate, i.e. from the minimum installation temperature to 24°C within a 12-hour period.

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Intended Use Specifications Annex B 1

Deutsches Institut für Bautechnik

Table B1: Installation	Table B1: Installation parameters for threaded rod													
Anchor size				M8	М	10	М	12	M16	M20	M	24	M27	M30
Outer diameter of anchor		d _{nom} [mm]] =	8	1	0	1	12	16	20	2	4	27	30
Nominal drill hole diameter		d ₀ [mm]] =	10	1	2	1	14	18	24	2	8	32	35
Effective contractor	ł	n _{ef,min} [mm]] =	60	6	0	7	70	80	90	9	6	108	120
	h	n _{ef,max} [mm]] =	160	20	20	2	40	320	400	48	30	540	600
Diameter of clearance hole in the fixture		d _f [mm]≤	9	1	2	1	14	18	22	2	6	30	33
Diameter of steel brush		d _b [mm]≥	12	1	4	1	16	20	26	3	0	34	37
Maximum torque moment		T _{inst} [Nm]≤	10	2	20	4	40	80	120	16	60	180	200
Minimum thickness of memb	er	h _{min} [m	m] h	1 _{ef} + 3	0 mn	n ≥ 10	00 r	mm			h _{ef} +	- 2d ₀		
Minimum spacing		s _{min} [m	m]	40	5	0	6	50	80	100	12	20	135	150
Minimum edge distance		c _{min} [m	m]	40	5	0	6	50	80	100	12	20	135	150
Table B2: Installation	Table B2: Installation parameters for rebar													
Rebar size			Ø 8	Ø	10	Ø 1:	2	Ø1	4 Ø 16	Ø 20		ð 25	Ø 28	Ø 32
Outer diameter of anchor	d _{no}	_m [mm] =	8	1	0	12		14	16	20		25	28	32
Nominal drill hole diameter	C	d ₀ [mm] =	12	1	4	16		18	20	24		32	35	40
Effective embedment depth	h _{ef,m}	_{iin} [mm] =	60	6	50	70		75	80	90		100	112	128
•	h _{ef,ma}	_{ax} [mm] =	160	2	00	240)	280) 320	400	!	500	580	640
Diameter of steel brush	C	d _b [mm] ≥	14	1	6	18		20	22	26		34	37	41,5
Minimum thickness of member	ł	h _{min} [mm]	[mm] n _{ef} + 3 ≥ 100		0 mm) mm		h _{ef} + 2d ₀		d ₀					
Minimum spacing	8	s _{min} [mm]	40	5	50	60		70	80	100	·	125	140	160
Minimum edge distance	(c _{min} [mm]	40	5	50	60		70	80	100		125	140	160
Table B3: Installation	param	eters for	interr	hal th	read	ed an	1ch	ior ro			10		M16	IG-M20
Internal diameter of anchor		d _a [mml -	_	6		8	0	10	12	12	10-1	6	20
Outer diameter of anchor ¹⁾		d [=	10		12	2	16	20		2	4	30
Nominal drill hole diameter		d_0 [=	12		14	1	18	22		2	8	35
Effective embedment depth		h _{ef,min} [=	60		70)	80	90		9	6	120
		h _{ef,max} [mm] =	= 2	200		24	0	320	400)	48	30	600
Diameter of clearance hole in the fixture		d _f [mm] =	=	7		9		12	14		1	8	22
Maximum torque moment		T _{inst} [[Nm]	≤	10		10)	20	40		6	0	100
Thread engagement length I _{IG} [mm] =	= 8	/20		8/2	0	10/25	12/3	80	16/	/32	20/40	
Minimum thickness of memb	er	h _{mi}	n [mm]	h _{ef} + ≥ 1	- 30 m 00 m	nm m		h _{ef} -			+ 2d ₀		
Minimum spacing		S _{mi}	n [mm]	50		60)	80	100)	12	20	150
Minimum edge distance		C _{min}	<u>n [mm</u>]	50		60)	80	100)	12	20	150
With metric threads according to EN 1993-1-8:2005+AC:2009														

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Intended Use Installation parameters Annex B 2



Table B4:	Paran	neter cleanin	g and settin	ig tools	5					
			2							
Threaded Rod	Rebar	Internal threaded Anchor rod	d ₀ Drill bit - Ø HD, HDB, CA	d Brus	[⊾] h - Ø	d _{b,min} min. Brush - Ø	Piston plug	Installat	ion direction of piston plu	n and use Ig
[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		Ļ		
M8			10	RBT10	12	10,5		•	·	
M10	8	IG-M6	12	RBT12	14	12,5		No pistor		d
M12	10	IG-M8	14	RBT14	16	14,5		no pistor	i piug require	iu ii
	12		16	RBT16	18	16,5				
M16	14	IG-M10	18	RBT18	20	18,5	VS18			
	16		20	RBT20	22	20,5	VS20	4		
M20	20	IG-M12	24	RBT24	26	24,5	VS24	h >	h>	
M24		IG-M16	28	RBT28	30	28,5	VS28	250 mn	n 250 mm	all
M27	25		32	RBT32	34	32,5	VS32	200		
M30	28	IG-M20	35	RBT35	37	35,5	VS35	-		
MAC - Hand pump (volume 750 ml) Drill bit diameter (d_0): 10 mm to 20 mm Drill hole depth (h_0): < 10 d _{nom} Only in non-cracked concrete										
Fiston plug for overhead or horizontal installation VS Steel brush RBT Drill bit diameter (d₀): 18 mm to 40 mm Drill bit diameter (d₀): all diameters										
Injection Sy Intended U	vstem ESSV	E ONE, ESSVI	E ONE-ICE fo	or concre	ete				Annex	В 3



Installation instruct	ons							
Drilling of the bore hole								
	Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor (Table B1, B2, or B3), with hammer (HD), hollow (HDB) or compressed air (CD) drilling. The use of a hollow drill bit is only in combination with a sufficient vacuum permitted. In case of aborted drill hole: The drill hole shall be filled with mortar							
	Attention! Standing water in the bore hole must be removed before	ore cleaning.						
MAC: Cleaning for b	ore hole diameter $d_0 \le 20$ mm and bore hole depth $h_0 \le 10d_{nom}$ (und	cracked concrete only!)						
4x	 2a. Starting from the bottom or back of the bore hole, blow the hole cl (Annex B 3) a minimum of four times. 	ean by a hand pump ¹⁾						
<u>********</u> **	 Check brush diameter (Table B4). Brush the hole with an appropr d_{b,min} (Table B4) a minimum of four times in a twisting motion. If the bore hole ground is not reached with the brush, a brush ext 	iate sized wire brush ension must be used.						
	2c. Finally blow the hole clean again with a hand pump (Annex B 3) a minimum of four times.							
4x	 ¹⁾ It is permitted to blow bore holes with diameter between 14 mm and 20 mm and an embedment depth up to 10d_{nom} also in cracked concrete with hand-pump. 							
CAC: Cleaning for a	I bore hole diameter in uncracked and cracked concrete							
4x	2a. Starting from the bottom or back of the bore hole, blow the hole c compressed air (min. 6 bar) (Annex B 3) a minimum of four times stream is free of noticeable dust. If the bore hole ground is not rea extension must be used.	lean with until return air ached an						
******** **	 2b. Check brush diameter (Table B4). Brush the hole with an appropr > d_{b,min} (Table B4) a minimum of four times in a twisting motion. If the bore hole ground is not reached with the brush, a brush external 	iate sized wire brush ension must be used.						
4x	20. Finally blow the hole clean again with compressed air (min. 6 bar minimum of four times until return air stream is free of noticeable ground is not reached an extension must be used.) (Annex B 3) a dust. If the bore hole						
After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning has to be repeated directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.								
Injection System ESS	VE ONE, ESSVE ONE-ICE for concrete							
Intended Use Installation instruction	ns	Annex B 4						



Installation instructions (continuation)						
	3 Attach the supplied static-mixing nozzle to the cartridge and load th correct dispensing tool. Cut off the foil tube clip before use. For every working interruption longer than the recommended work well as for new cartridges, a new static-mixer shall be used.	ne cartridge into the ing time (Annex B 6) as				
i- her -i	Prior to inserting the anchor rod into the filled bore hole, the positio depth shall be marked on the anchor rods.	n of the embedment				
min. 3 full stroke	5 Prior to dispensing into the anchor hole, squeeze out separately a r strokes and discard non-uniformly mixed adhesive components unt consistent grey colour. For foil tube cartridges it must be discarded strokes.	ninimum of three full il the mortar shows a a minimum of six full				
	6. Starting from the bottom or back of the cleaned anchor hole, fill the approximately two-thirds with adhesive. Slowly withdraw the static r hole fills to avoid creating air pockets. If the bottom or back of the a reached, an appropriate extension nozzle must be used. Observe the given in Annex B 6.	hole up to nixing nozzle as the nchor hole is not he gel-/ working times				
	 Piston plugs and mixer nozzle extensions shall be used according t following applications: Horizontal assembly (horizontal direction) and ground erection direction): Drill bit-Ø d₀ ≥ 18 mm and embedment depth h_{ef} > 2 Overhead assembly (vertical upwards direction): Drill bit-Ø d₀ ≥ 	o Table B4 for the (vertical downwards 50mm ≥ 18 mm				
	8. Push the threaded rod or reinforcing bar into the anchor hole while ensure positive distribution of the adhesive until the embedment de	turning slightly to pth is reached.				
	The anchor shall be free of dirt, grease, oil or other foreign material					
	9. Be sure that the anchor is fully seated at the bottom of the hole and visible at the top of the hole. If these requirements are not maintain to be renewed. For overhead application the anchor rod shall be fixed applied application the anchor rod shall be fixed applied application the anchor rod shall be fixed applied applie	d that excess mortar is ned, the application has ked (e.g. wedges).				
+20°C	10. Allow the adhesive to cure to the specified time prior to applying ar not move or load the anchor until it is fully cured (attend Annex B 6	ny load or torque. Do i).				
Tinet	11. After full curing, the add-on part can be installed with up to the max (Table B1 or B3) by using a calibrated torque wrench. It can be opt gap between anchor and fixture with mortar. Therefor substitute the washer and connect the mixer reduction nozzle to the tip of the mix filled with mortar, when mortar oozes out of the washer.	x. torque tional filled the annular e washer by the filling ker. The annular gap is				
Injection System ES	SVE ONE, ESSVE ONE-ICE for concrete					
Intended Lise		Annex B 5				

Installation instructions (continuation)



Table B5:	Table B5: Maximum working time and minimum curing time ESSVE ONE									
Concre	te temp	perature	Gelling- / working time	Minimu in dr	Im curing time y concrete ¹⁾					
-10 °C	to	-6°C	90 min ²⁾		24 h ²⁾					
-5 °C	to	-1°C	90 min		14 h					
0 °C	to	+4°C	45 min		7 h					
+5 °C	to	+9°C	25 min		2 h					
+ 10 °C	to	+19°C	15 min		80 min					
+ 20 °C	to	+29°C	6 min		45 min					
+ 30 °C	to	+34°C	4 min	4 min 25 min						
+ 35 °C	to	+39°C	2 min		20 min					
	+ 40 °C)	1,5 min		15 min					
Cartride	ge temp	perature	+5°C to -	+40°C						
¹⁾ In wet co ²⁾ Cartridge	ncrete t tempe	he curing tim rature must b	e must be doubled. e at min. +15°C.							
Table B6:	. M	lavimum wo	rking time and minimum curing time							
	E	SSVE ONE-I	CE							
Concre	te temp	perature	Gelling- / working time	Minimu in dry	Im curing time y concrete ¹⁾					
-20 °C	to	-16°C	75 min		24 h					
-15 °C	to	-11°C	55 min		16 h					
-10 °C	to	-6°C	35 min		10 h					
-5 °C	to	-1°C	20 min		5 h					
0 °C	to	+4°C	10 min		2,5 h					
+5 °C	to	+9°C	6 min		80 Min					
+	10 °C		6 min		60 Min					
Cartrido	ge temp	perature	-20°C to -	+10°C						
¹⁾ In wet co	ncrete t	he curing tim	e must be doubled.							
				I						
Injection S	ystem E	SSVE ONE, E	SSVE ONE-ICE for concrete							
Intended	Use				Annex B 6					
Curing tim	е									



T	able C1:	Characteristic values for s rods	teel tens	sion re	esistanc	e and s	teel sh	ear res	sistanc	e of th	readed	l		
Siz	ze				M8	M10	M12	M16	M20	M24	M27	M30		
Cr	oss section are	ea	A _s	[mm ²]	36,6	58	84,3	157	245	353	459	561		
Cł	naracteristic te	ension resistance, Steel failure	e ¹⁾											
Ste	eel, Property c	lass 4.6 and 4.8	N _{Rk,s}	[kN]	15 (13)	23 (21)	34	63	98	141	184	224		
Ste	eel, Property c	lass 5.6 and 5.8	N _{Rk,s}	[kN]	18 (17)	29 (27)	42	78	122	176	230	280		
Ste	eel, Property c	lass 8.8	N _{Rk,s}	[kN]	29 (27)	46 (43)	67	125	196	282	368	449		
Sta	ainless steel A	2, A4 and HCR, class 50	N _{Rk,s}	[kN]	18	29	42	79	123	177	230	281		
Sta	ainless steel A	2, A4 and HCR, class 70	N _{Rk,s}	[kN]	26	41	59	110	171	247	-	-		
Sta	ainless steel A	4 and HCR, class 80	N _{Rk,s}	[kN]	29	46	67	126	196	282	-	-		
Cł	naracteristic te	ension resistance, Partial facto	on resistance, Partial factor ²⁾											
Ste	eel, Property c	lass 4.6 and 5.6	γMs,N	[-]				2,0)					
Ste	eel, Property c	lass 4.8, 5.8 and 8.8	Y _{Ms,N}	[-]				1,5	5					
Sta	ainless steel A	2, A4 and HCR, class 50	Y _{Ms,N}	[-]				2,8	6					
Sta	ainless steel A	2, A4 and HCR, class 70	Y _{Ms,N}	[-]				1,8	7	7				
Sta	ainless steel A	4 and HCR, class 80	YMs,N	[-]				1,6	5					
Cł	naracteristic s	hear resistance, Steel failure	') I o	1							-	-		
E	Steel, Proper	ty class 4.6 and 4.8	V ⁰ Rk,s	[kN]	9 (8)	14 (13)	20	38	59	85	110	135		
r ar	Steel, Proper	ty class 5.6 and 5.8	V ⁰ Rk,s	[kN]	11 (10)	17 (16)	25	47	74	106	138	168		
eve	Steel, Proper	ty class 8.8	V ⁰ Rk,s	[kN]	15 (13)	23 (21)	34	63	98	141	184	224		
out	Stainless stee	el A2, A4 and HCR, class 50	V ⁰ Rk,s	[kN]	9	15	21	39	61	88	115	140		
Vithe	Stainless stee	el A2, A4 and HCR, class 70	V ⁰ Rk,s	[kN]	13	20	30	55	86	124	-	-		
^	Stainless stee	el A4 and HCR, class 80	V ⁰ Rk,s	[kN]	15	23	34	63	98	141	-	-		
	Steel, Proper	ty class 4.6 and 4.8	M ⁰ Rk,s	[Nm]	15 (13)	30 (27)	52	133	260	449	666	900		
arm	Steel, Proper	ty class 5.6 and 5.8	M ⁰ Rk,s	[Nm]	19 (16)	37 (33)	65	166	324	560	833	1123		
ver	Steel, Proper	ty class 8.8	M ⁰ Rk,s	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797		
h le	Stainless stee	el A2, A4 and HCR, class 50	M ⁰ Rk,s	[Nm]	19	37	66	167	325	561	832	1125		
Wit	Stainless stee	el A2, A4 and HCR, class 70	M ⁰ Rk,s	[Nm]	26	52	92	232	454	784	-	-		
	Stainless stee	el A4 and HCR, class 80	M ⁰ Rk,s	[Nm]	30	59	105	266	519	896	-	-		
Cł	naracteristic s	hear resistance, Partial factor	2)	_										
Ste	eel, Property c	lass 4.6 and 5.6	γ _{Ms,V}	[-]				1,6	7					
Ste	eel, Property c	lass 4.8, 5.8 and 8.8	Y _{Ms,V}	[-]				1,25						
Sta	ainless steel A	2, A4 and HCR, class 50	Y _{Ms,V}	[-]	[-] 2,38									
Sta	ainless steel A	2, A4 and HCR, class 70	Y _{Ms,V}	[-]				1,5	6					
Sta	ainless steel A	4 and HCR, class 80	Y _{Ms,V}	[-]				1,3	3					

¹⁾ Values are only valid for the given stress area A_s. Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot-dip galvanised threaded rods according to EN ISO 10684:2004+AC:2009.
 ²⁾ in absence of national regulation

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Performances

Characteristic values for steel tension resistance and steel shear resistance of threaded rods

Annex C 1



$\begin{array}{ c c c } \hline \textbf{Concrete cone failure} \\ \hline \textbf{Non-cracked concrete} & k_{ucr,N} & [-] & 11,0 \\ \hline \textbf{Cracked concrete} & k_{cr,N} & [-] & 7,7 \\ \hline \textbf{Edge distance} & \textbf{C}_{cr,N} & [mm] & 1,5 h_{ef} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,N} & [mm] & 2 \textbf{C}_{cr,N} \\ \hline \textbf{Splitting} & & & \\ \hline \textbf{Edge distance} & \hline 1.0 h_{ef} \\ \hline \textbf{2},0 > h/h_{ef} > 1,3 & \textbf{C}_{cr,sp} & [mm] & \hline \textbf{2} \cdot h_{ef} \left(\textbf{2},5 - \frac{h}{h_{ef}} \right) \\ \hline \textbf{1}/h_{ef} \leq 1,3 & & \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & 2 \textbf{C}_{cr,sp} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{2} \cdot h_{ef} \left(\textbf{2},5 - \frac{h}{h_{ef}} \right) \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{2} \cdot c_{cr,sp} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{2} \cdot c_{cr,sp} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{2} \cdot c_{cr,sp} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{S} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{S} \\ \hline \textbf{Axial distance} & \textbf{S}_{cr,sp} & [mm] & \hline \textbf{S} \\ \hline \textbf{Axial distance} & \hline \textbf{S}_{cr,sp} & [mm] & \hline \textbf{S} \\ \hline \textbf{Axial distance} & \hline \textbf{S}_{cr,sp} & [mm] & \hline \textbf{S} \\ \hline \textbf{S} \\ \hline \textbf{S} \\ \hline \textbf{Axial distance} & \hline \textbf{S}_{cr,sp} & [mm] & \hline \textbf{S} \\ \hline $	Anchor size				All Anchor types and sizes
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Concrete cone fa	ailure	1		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Non-cracked conc	rete	k _{ucr,N}	[-]	11,0
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Cracked concrete		k _{cr,N}	[-]	7,7
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Edge distance		C _{cr,N}	[mm]	1,5 h _{ef}
SplittingEdge distance $h/h_{ef} \ge 2,0$ $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ $[mm]$ $1,0 h_{ef}$ $h/h_{ef} \le 1,3$ $c_{cr,sp}$ $[mm]$ $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$ Axial distance $s_{cr,sp}$ $[mm]$ $2 c_{cr,sp}$	Axial distance		s _{cr,N}	[mm]	2 c _{cr,N}
Edge distance $h/h_{ef} \ge 2,0$ $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ [mm] $1,0 h_{ef}$ $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}}\right)$ Axial distance $s_{cr,sp}$ [mm] $2 c_{cr,sp}$	Splitting				
Edge distance $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ [mm] $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$ Axial distance $s_{cr,sp}$ [mm] $2 \cdot c_{cr,sp}$		h/h _{ef} ≥ 2,0			1,0 h _{ef}
h/h _{ef} \leq 1,32,4 h _{ef} Axial distances _{cr,sp} [mm]2 c _{cr,sp}	Edge distance	2,0 > h/h _{ef} > 1,3	C _{cr,sp}	[mm]	$2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$
Axial distance s _{cr,sp} [mm] 2 c _{cr,sp}		h/h _{ef} ≤ 1,3			2,4 h _{ef}
	Axial distance	·	s _{cr,sp}	[mm]	2 c _{cr.sp}

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Performances Characteristic values for Concrete cone failure and Splitting with all kind of action Annex C 2



Table	Table C3: Characteristic values of tension loads under static and quasi-static action												
Ancho	or siz	e threaded ro	d			M8	M10	M12	M16	M20	M24	M27	M30
Steel f	allur	e tia tansian rasi	stanaa	No	[LN]			A • f.	u (or s	ee Tab			
Dortio	fact		Stance	NRK,S				∕rs 'l					
Comb	ined	pull-out and o	concrete failure	TMS,N	[-]				566 12				
Chara	cteris	tic bond resist	ance in non-crack	ked concrete C	20/25								
	I:	40°C/24°C				10	12	12	12	12	11	10	9
ange	II:	80°C/50°C	Dry, wet concrete			7,5	9	9	9	9	8,5	7,5	6,5
nre ra	III:	120°C/72°C		-	[] [] [] [] [] [] [] [] [] [] [] [] [] [5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
berat	I:	40°C/24°C		∫ 'Rk,ucr		7,5	8,5	8,5	8,5				
Temp	II:	80°C/50°C	flooded bore hole			5,5	6,5	6,5	6,5	N A	o Perfo ssesse	ormanc d (NPA	e \)
	III:	120°C/72°C				4,0	5,0	5,0	5,0			,	,
Chara	cteris	tic bond resist	ance in cracked c	oncrete C20/2	5								
I: 40°C/24°C 4,0 5,0 5,5 5,5									5,5	6,5	6,5		
ange	II:	80°C/50°C	Dry, wet concrete			2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5
iure r	III:	120°C/72°C			[NI/mm2]	2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5
perat	1:	40°C/24°C		•нк,cr		4,0	4,0	5,5	5,5				
Tem	E II: 80°C/50°C flooded bore hole					2,5	3,0	4,0	4,0	N A	e A)		
	III: 120°C/72°C					2,0	2,5	3,0	3,0				
Reduk	tion	factor ψ^0_{sus} in	cracked and non	-cracked concr	ete C20/25	I							
ure	l:	40°C/24°C	Drv wet						0,	73			
perat ange	II:	80°C/50°C	concrete and	ψ^0_{sus}	[-]				0,	65			
Tem	:	120°C/72°C	hole			0.57							
				C25/30					1.	02			
				C30/37					1,	04			
Increa	sing	factors for con	crete	C35/45					1,	07			
Ψc				C40/50					1,	08			
				C45/55					1,	09			
Concr	ete d	one failure		050/60					Ι,	10			
Releva	ant p	arameter							see Ta	ble C2			
Splitti	ng					1							
Releva	ant p	arameter							see Ta	ble C2			
Instal	atio	n factor		Ι	1								
for dry and wet concrete Yinst [-] 1,0 1,2													
for flooded bore hole							1	,4			N	PA	
Inject	ion S	System ESSVE	ONE, ESSVE ON	E-ICE for conc	rete								
Performances Ann Characteristic values of tension loads under static and quasi-static action Ann							Anne	x C 3					



Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Steel failure without lever arm		L		1	1	1	1	1	I	
Characteristic shear resistance Steel, strength class 4.6, 4.8, 5.6 and 5.8	V ⁰ Rk,s	[kN]			0,6 •	A _s ∙f _{uk}	(or see	Table C	1)	
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A2, A4 and HCR, all classes	V ⁰ _{Rk,s}	[kN]			0,5 ·	A _s ∙f _{uk}	(or see	Table C	1)	
Partial factor	γ _{Ms,V}	[-]				see	Table C	1		
Ductility factor	k ₇	[-]					1,0			
Steel failure with lever arm	•	1 1								
Characteristic bending moment	M ⁰ Rk,s	[Nm]			1,2 • \	W _{el} ∙ f _u ⊧	(or see	Table C	;1)	
Elastic section modulus	W _{el}	[mm³]	31	62	109	277	541	935	1387	1874
Partial factor	γ _{Ms,V}	[-]				see	Table C	1		
Concrete pry-out failure	•	•								
Factor	k ₈	[-]					2,0			
Installation factor	γinst	[-]					1,0			
Concrete edge failure										
Effective length of fastener	I _f	[mm]	[mm] min(h _{ef} ; 12 · d _{nom}) min(h _{ef} ; 300mr							
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γ _{inst}	[-]					1,0			

Injection Systen	I ESSVE	ONE,	ESSVE	ONE-ICE	for concrete
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Performances

Characteristic values of shear loads under static and quasi-static action

Annex C 4



Table C5: Characteristic values of tension loads under static and quasi-static action													
Anchor size internal threade	d anchor rods			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20				
Steel failure ¹⁾													
Characteristic tension resistand	ce, 5.8	N _{Rk,s}	[kN]	10	17	29	42	76	123				
Steel, strength class	8.8	N _{Rk.s}	[kN]	16	27	46	67	121	196				
Partial factor, strength class 5.	8 and 8.8	γMe N	[-]		1	1	.5						
Characteristic tension resistant	ce. Stainless	NI NI					,-		101				
Steel A4 and HCR, Strength cl	ass 70 ²⁾	^{IN} Rk,s	[KN]	14	26	41	59	110	124				
Partial factor		γ _{Ms,N}	[-]			1,87			2,86				
Combined pull-out and conc	rete cone failu	re											
Characteristic bond resistance	in non-cracked	concret	e C20/25										
<u>φ</u> <u>I: 40°C/24°C</u>	Drv wet			12	12	12	12	11	9				
II: 80°C/50°C	concrete			9	9	9	9	8,5	6,5				
111: 120°C//2°C		^τ Bk.ucr	[N/mm ²]	6,5	6,5	6,5	6,5	6,5	5,0				
	flooded bore			8,5	8,5	8,5	No Perf	ormance A	ssessed				
$H = \frac{11.80 \cdot C/50 \cdot C}{110 \cdot 120 \cdot C/22 \cdot C}$	hole			5,0 5,0	6,5 5.0	6,5 5.0		(NPA)					
Characteristic bond resistance in cracked concrete C20/25													
I. 40°C/24°C			.0/23	5.0	5.5	55	55	5.5	6.5				
<u>e</u> <u>II: 80°C/50°C</u>	Dry, wet			3.5	4.0	4.0	4.0	5,5 5,5 4.0 4,0					
E B Ⅲ: 120°C/72°C	concrete			2.5	3.0	3.0	3.0	3.5					
⊕ <u>i</u> <u>i</u> : 40°C/24°C	⁶ / ₆ III: 120°C/72°C ^τ _{Rk,cr} [N/mm ²] 2,5 3,0 3,0 3,0 3,0 3,0 3,0 3,0 3,0 3,0 3,0												
E II: 80°C/50°C flooded bore II: 80°C/50°C hole							ormance A	ssessed					
⊢ <u>III: 120°C/72°C</u>	noie			2,5 3,0 3,0 (NPA)									
Reduktion factor ψ^0_{SUS} in crac	ked and non-cr	acked c	oncrete C	20/25									
				0.70									
	Dry, wet					0,	73						
ຍັຊີ II: 80°C/50°C	concrete and	ψ ⁰ sus	[-]			0,	65						
E <u>₩</u>	hole					0	57						
			5/20				02						
		C3	0/37			1,	02						
Increasing factors for concrete		C3	5/45			1.	07						
Ψc		C4	0/50			1,	08						
-		C4	5/55			1,	09						
		C5	0/60			1,	10						
Concrete cone failure						_							
Relevant parameter						see la	able C2						
Bolovant parameter						500 Tr	blo C2						
Installation factor						366 12							
for dry and wet concrete						1	,2						
for flooded bore hole		^γ inst	[-]		1,4			NPA					
¹⁾ Fastenings (incl. nut and was	her) must compl	y with th	e appropr	iate materi	al and prop	perty class	of the inter	nal threade	d rod.				
The characteristic tension res	istance for steel	failure is	s valid for	the interna	I threaded	rod and the	e fastening	element.					
For IG-M20 strength class 50	is valid												
Injection System ESSVE ONE	, ESSVE ONE-I	CE for c	oncrete										
	-	_						Annov	` 5				
Performances									, ,				
Characteristic values of tension	loads under sta	tic and q	uasi-statio	c action									



Table C6: Characteristic values of shear loads under static and quasi-static action										
Anchor size for internal threade	ed ancho	or rods		IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20	
Steel failure without lever arm ¹⁾										
Characteristic shear resistance,	5.8	V ⁰ Rk,s	[kN]	5	9	15	21	38	61	
Steel, strength class	8.8	V ⁰ Rk,s	[kN]	8	14	23	34	60	98	
Partial factor, strength class 5.8 a	nd 8.8	γ _{Ms,V}	[-]				1,25			
Characteristic shear resistance, Stainless Steel A4 and HCR, Strength class 70 ²⁾		V ⁰ Rk,s	[kN]	7	13	20	30	55	40	
Partial factor		γ _{Ms,V}	[-]			1,56			2,38	
Ductility factor		k ₇	[-]				1,0			
Steel failure with lever arm ¹⁾										
Characteristic bending moment,	5.8	M ⁰ Rk,s	[Nm]	8	19	37	66	167	325	
Steel, strength class	8.8	M ⁰ Rk,s	[Nm]	12	30	60	105	267	519	
Partial factor, strength class 5.8 a	nd 8.8	γ _{Ms,V}	[-]				1,25			
Characteristic bending moment, Stainless Steel A4 and HCR, Strength class 70 ²⁾		M ⁰ Rk,s	[Nm]	11	26	52	92	233	456	
Partial factor		γ _{Ms,V}	[-]		1,56					
Concrete pry-out failure										
Factor		k ₈	[-]	2,0						
Installation factor		γ _{inst}	[-]	1,0						
Concrete edge failure										
Effective length of fastener		I _f	[mm]		min	(h _{ef} ; 12 • d	nom)		min (h _{ef} ; 300mm)	
Outside diameter of fastener		d _{nom}	[mm]	10	12	16	20	24	30	
Installation factor		γ _{inst}	[-]				1,0			
¹⁾ Fastenings (incl. nut and washer The characteristic tension resista ²⁾ For IG-M20 strength class 50 is v) must cc ance for s valid	omply with t	the appr is valid	opriate ma for the inte	terial and	property cl.	ass of the i d the faste	nternal thro	eaded rod. int.	

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Performances

Characteristic values of shear loads under static and quasi-static action

Annex C 6



Table C7: Characteristic values of tension loads under static and quasi-static action														
Anchor size reinforcing	bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32		
Characteristic tension resi	stance	Noka	[kN]					م• أسلاً	1)					
Cross section area	Stariee	A A		50	70	112	154	201	214	101	616	804		
Dortial factor		/`S	[[]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]	- 50	19	115	134	1 4 ²⁾	514	491	010	004		
Combined pull out and a	oporata failu	^Y Ms,N	[-]					1,4						
Combined pull-out and C		ne rackod conc	rata C20/2	5										
				10	12	12	12	12	12	11	10	8.5		
$\begin{array}{c} 0 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	Dry, wet			7.5	9	9	9	9	9	8.0	7.0	6.0		
te 8 III: 120°C/72°C	concrete	-	[N] / 21	5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5		
କୁ ଜୁ <u>ା: 40°C/24°C</u>	floodod	¹ Rk,ucr	[IN/mm²]	7,5	8,5	8,5	8,5	8,5		lo Porf	ormono			
୍ରା <u>II: 80°C/50°C</u>	bore hole			5,5	6,5	6,5	6,5	6,5			d (NP	.e 4)		
III: 120°C/72°C				4,0	5,0	5,0	5,0	5,0				9		
Characteristic bond resista	ance in cracke	ed concrete	C20/25	1.0	5.0						0.5	0.5		
$\Phi = \frac{1: 40°C/24°C}{1! + 80°C/50°C}$	Dry, wet			4,0	5,0	5,5	5,5	5,5	5,5	5,5	6,5	6,5		
	concrete			2,5	3,5 25	4,0	4,0	4,0	4,0	4,0	4,5	4,5		
1. 40°C/24°C		^τ Rk,cr	[N/mm ²]	4.0	4.0	5.5	5.5	5.5	0,0	0,0	0,0	0,0		
E E II: 80°C/50°C	flooded			2.5	3.0	4.0	4,0	4.0		lo Perfe	ormanc	e		
⊢ III: 120°C/72°C	bore noie			2,0	2,5	3,0	3,0	3,0		ssesse	a (NP/	4)		
Reduktion factor ψ^0_{SUS} in	cracked and	non-cracked	l concrete	C20/25	5				•					
l: 40°C/24°C	Dry, wet							0,73						
e e e e e e e e e e e e e e e e e e e	and	Ψ^0 sus	[-]	0,65										
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	bore hole							0,57						
		C25/	1,02											
		C30/					1,04							
Increasing factors for cond	crete	C35/					1,07							
Ψc		C40/	50					1,08						
		C50/	55 /60	1,09										
Concrete cone failure		000/	00					1,10						
Relevant parameter							see	Table	C2					
Splitting				I										
Relevant parameter							see	Table	C2					
Installation factor														
for dry and wet concrete			1 1	1,2				1	,2					
for flooded bore hole		^r inst	[-]			1,4				N	PA			
 f_{uk} shall be taken from th in absence of national re 	e specificatior gulation	is of reinforci	ng bars											
Injection System ESSVE	ONE, ESSVE	ONE-ICE fo	r concrete)						٨	v 0 7			
Performances Annex C 7 Characteristic values of tension loads under static and quasi-static action														



Table C8: Characteristic value	Cable C8: Characteristic values of shear loads under static and quasi-static action											
Anchor size reinforcing bar			Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	
Steel failure without lever arm												
Characteristic shear resistance	V ⁰ Rk,s	[kN]				0,5	0∙A _s •	f _{uk} 1)				
Cross section area	A _s	[mm²]	50	79	113	154	201	314	491	616	804	
Partial factor	γMs,V	[-]					1,5 ²⁾					
Ductility factor	k ₇	[-]					1,0					
Steel failure with lever arm												
Characteristic bending moment	M ⁰ _{Rk,s}	[Nm]				1.2	۰w _{el} ۰	f _{uk} 1)				
Elastic section modulus	W _{el}	[mm³]	50	98	170	269	402	785	1534	2155	3217	
Partial factor	γ _{Ms,V}	[-]					1,5 ²⁾					
Concrete pry-out failure												
Factor	k ₈	[-]					2,0					
Installation factor	γ _{inst}	[-]					1,0					
Concrete edge failure												
Effective length of fastener	۱ _f	[mm]		miı	n(h _{ef} ; 1	2 • d _{noi}	m)		min(h _{ef} ; 300	mm)	
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	25	28	32	
Installation factor	γinst	[-]					1,0					
¹⁾ f shall be taken from the apositiontic	a of roinfor	aina hara										

 $^{1)}$ f_{uk} shall be taken from the specifications of reinforcing bars $^{2)}$ in absence of national regulation

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Annex C 8

Performances Characteristic values of shear loads under static and quasi-static action



Table C9: Dis	splacement	s under tension load	¹⁾ (thread	ded rod)					
Anchor size thread	led rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concre	ete C20/25 u	nder static and quasi-	-static ac	tion						
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
II: 80°C/50°C	$\delta_{N\infty}\text{-factor}$	[mm/(N/mm ²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Cracked concrete C	20/25 under	r static and quasi-stati	ic action							
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,0)90			0,0)70		
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,-	05			0,1	05		
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,2	219			0,1	70		
II: 80°C/50°C	$\delta_{N\infty}\text{-factor}$	[mm/(N/mm²)]	0,2	255			0,2	245		
Temperature range	$\delta_{\text{N0}}\text{-}\text{factor}$	[mm/(N/mm ²)]	0,2	219			0,1	70		
III: 120°C/72°C	$\delta_{N\infty}\text{-}factor$	[mm/(N/mm ²)]	0,2	255			0,2	245		
¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor	e displacemer · τ;	nt τ: action bond stress fo	r tension							

 $\delta_{N\infty} = \delta_{N\infty} \text{-factor} \ \cdot \tau;$

Displacements under shear load¹⁾ (threaded rod) Table C10:

Anchor size threa	ded rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked conc	rete C20/25 u	Inder static and quasi-	static ad	ction						
All temperature	δ_{V0} -factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
Cracked concrete	C20/25 under	r static and quasi-stati	c action							
All temperature	δ_{V0} -factor	[mm/kN]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10
⁽⁾ Calculation of th $\delta_{V0} = \delta_{V0}$ -factor $\delta_{V\infty} = \delta_{V\infty}$ -factor	ne displacemen · V; · V;	nt V: action shear load								
Injection System E	SSVE ONE, E	SSVE ONE-ICE for cond	crete					A -		`
Performances Displacements (thre	aded rods)							Ar	mex C s	3



$ \begin{array}{c c c c c c c c c } \mbox{Anchor size Interval threaded anchor rod} & IG-M6 & IG-M8 & IG-M10 & IG-M12 & IG-M16 & IG-M20 \\ \hline Anchor size Interval concrete C20/25 under static and quasi-static action $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$	Table C11: Displacements under tension load ¹⁾ (Internal threaded anchor rod)											
Non-cracked concrete C20/25 under static and quasi-static action Temperature range 1: 40°C/24°C δ_{N0} -factor [mm/(N/mm^2)] 0,023 0,026 0,031 0,036 0,041 0,049 Temperature range 11: 80°C/50°C δ_{N0} -factor [mm/(N/mm2)] 0,033 0,037 0,045 0,052 0,060 0,071 Temperature range 11: 80°C/50°C δ_{N0} -factor [mm/(N/mm2)] 0,056 0,063 0,075 0,088 0,100 0,119 Temperature range 11: 120°C/72°C δ_{N0} -factor [mm/(N/mm2)] 0,056 0,063 0,075 0,088 0,100 0,119 Temperature range 11: 120°C/72°C δ_{N0} -factor [mm/(N/mm2)] 0,056 0,063 0,075 0,088 0,100 0,119 One factor [mm/(N/mm2)] 0,056 0,063 0,075 0,088 0,100 0,172 One factor [mm/(N/mm2)] 0,056 0,063 0,075 0,088 0,100 0,172 Cacked concrete C2/25 under static and quasi-static action <th co<="" th=""><th colspan="10">Anchor size Internal threaded anchor rodIG-M6IG-M8IG-M10IG-M12IG-M16</th></th>	<th colspan="10">Anchor size Internal threaded anchor rodIG-M6IG-M8IG-M10IG-M12IG-M16</th>	Anchor size Internal threaded anchor rodIG-M6IG-M8IG-M10IG-M12IG-M16										
$\begin{array}{c c c c c c c c c } \hline Temperature range & $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$	Non-cracked concrete C20/25 under static and quasi-static action											
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,023	0,026	0,031	0,036	0,041	0,049			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,033	0,037	0,045	0,052	0,060	0,071			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,056	0,063	0,075	0,088	0,100	0,119			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,081	0,090	0,108	0,127	0,145	0,172			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,056	0,063	0,075	0,088	0,100	0,119			
$ \begin{array}{ c c c c } \hline Cracked concrete C20/25 under static and quasi-static action \\ \hline Temperature range I: 40°C/24°C & $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$	III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,081	0,090	0,108	0,127	0,145	0,172			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Cracked concrete C	20/25 under sta	tic and quasi-st	atic action								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,090			0,070					
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,105			0,105					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,219			0,170					
Temperature range III: 120°C/72°C δ _{N0} -factor [mm/(N/mm²)] 0,219 0,170 0,255 0,245 0,245 0,245 0,245	II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,255			0,245					
III: 120°C/72°C $\delta_{N^{\infty}}$ factor [mm/(N/mm ²)] 0,255 0,245	Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,219			0,170					
	III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,255			0,245					

¹⁾ Calculation of the displacement

 $\delta_{\text{N0}} = \delta_{\text{N0}} \text{-factor} \cdot \tau; \qquad \tau: \text{ action bond stress for tension}$

 $\delta_{N\infty} = \delta_{N\infty} \text{-factor} \cdot \tau;$

Table C12: Displacements under shear load¹⁾ (Internal threaded anchor rod)

Anchor size Inte	chor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20					
Non-cracked and	Non-cracked and cracked concrete C20/25 under static and quasi-static action											
All temperature	δ_{V0} -factor	[mm/kN]	0,07	0,06	0,06	0,05	0,04	0,04				
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,10	0,09	0,08	0,08	0,06	0,06				
¹⁾ Calculation of $\delta_{V0} = \delta_{V0}$ -facto $\delta_{V\infty} = \delta_{V\infty}$ -facto	the displacement or · V; V: or · V;	action shear loa	ad									
Injection System	ESSVE ONE, ESS	VE ONE-ICE fo	r concrete									
Performances							Annex	C 10				

Displacements (Internal threaded anchor rod)



Table C13: Di	isplaceme	nts under tensi	ion load	¹⁾ (rebar	·)						
Anchor size reinfo	orcing bar		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Non-cracked conc	rete C20/25	5 under static ar	nd quasi	-static a	ction						
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
range I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,075
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
120°C/72°C	$\delta_{N\infty}\text{-factor}$	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Cracked concrete	C20/25 und	ler static and qu	uasi-stat	ic actior	ו					-	
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,0)90				0,070			
range I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,1	05				0,105			
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,2	219				0,170			
80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255				0,245			
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,2	<u>2</u> 19				0,170			
120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255				0,245			
Table C14:DiAnchor size reinfo	isplaceme orcing bar	nt under shear	load ¹⁾ (I Ø 8	rebar) Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Non-cracked conc	rete C20/25	5 under static ar	nd quasi	-static a	ction						
All temperature	δ_{V0} -factor	[mm/kN]	0,06	0,05	0,05	0,04	0,04	0,04	0,03	0,03	0,03
ranges	δ _{v∞} - factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,04	0,04
Cracked concrete	C20/25 und	ler static and qu	uasi-stat	ic actior	า						
All temperature	δ_{V0} -factor	[mm/kN]	0,12	0,12	0,11	0,11	0,10	0,09	0,08	0,07	0,06
ranges	∣δ _{v∞} - ∫actor	[mm/kN]	0,18	0,18	0,17	0,16	0,15	0,14	0,12	0,11	0,10
¹⁾ Calculation of the displacement $\delta_{V0} = \delta_{V0}$ -factor $\cdot V$; V: action shear load $\delta_{V\infty} = \delta_{V\infty}$ -factor $\cdot V$;											
Injection System E Performances Displacements (reba	SSVE ONE	, ESSVE ONE-ICI	E for con	crete					An	inex C 1	1



Ancho Steel fa Charac Partial Charac Charac eaunte auge L	r size threaded roo ailure teristic tension resis factor ned pull-out and c cteristic bond resista I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C II: 80°C/24°C III: 80°C/24°C III: 120°C/72°C	d oncrete failure unce in non-cracl Dry, wet concrete flooded bore hole	N _{Rk,s,eq} γ _{Ms,N} <ed and="" cracke<="" th=""><th>[kN] [-]</th><th>M8 C20/25 2,5 1,6</th><th>M10 3,1</th><th>M12</th><th>M16 1,0 ∙ see Ta 3,7</th><th>M20 N_{Rk,s} ble C1 3,7</th><th>M24</th><th>M27</th><th>M30</th></ed>	[kN] [-]	M8 C20/25 2,5 1,6	M10 3,1	M12	M16 1,0 ∙ see Ta 3,7	M20 N _{Rk,s} ble C1 3,7	M24	M27	M30
Charac Partial Charac Charac Charac	teristic tension resis factor ned pull-out and c teristic bond resista I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C II: 80°C/24°C II: 80°C/24°C III: 80°C/24°C III: 120°C/72°C	oncrete failure oncrete failure nce in non-crac Dry, wet concrete flooded bore hole	N _{Rk,s,eq} γ _{Ms,N} ved and cracke τ _{Rk,eq}	[KN] [-]	C20/25 2,5 1,6	3,1	3,7	1,0 • see Ta 3,7	N _{Rk,s} ble C1	3,8	4.5	
Partial Charac Charac Lemberatrice	factor ned pull-out and c eteristic bond resista I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C	oncrete failure ance in non-crac Dry, wet concrete flooded bore hole	γ _{Ms,N} ked and cracke	d concrete (C20/25 2,5 1,6	3,1	3,7	see Ta 3,7	ible C1	3,8	15	
Cemberature range	Image Participation Participation <td>oncrete failure ince in non-cracl Dry, wet concrete flooded bore hole</td> <td>ed and cracke تRk,eq</td> <td>d concrete (</td> <td>C20/25 2,5 1,6</td> <td>3,1</td> <td>3,7</td> <td>3,7</td> <td>3,7</td> <td>3,8</td> <td>15</td> <td></td>	oncrete failure ince in non-cracl Dry, wet concrete flooded bore hole	ed and cracke تRk,eq	d concrete (C20/25 2,5 1,6	3,1	3,7	3,7	3,7	3,8	15	
Charac Temperature range	cteristic bond resistation I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C I: 40°C/24°C II: 80°C/50°C III: 80°C/72°C II: 80°C/72°C II: 80°C/72°C	Ince in non-cracl Dry, wet concrete flooded bore hole	<ed and="" cracke<="" td=""><td>d concrete (</td><td>C20/25 2,5 1,6</td><td>3,1</td><td>3,7</td><td>3,7</td><td>3,7</td><td>3,8</td><td>15</td><td></td></ed>	d concrete (C20/25 2,5 1,6	3,1	3,7	3,7	3,7	3,8	15	
Temperature range	I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C	Dry, wet concrete flooded bore hole	^{-τ} Rk,eq		2,5 1,6	3,1	3,7	3,7	3,7	3,8	15	
Temperature rang	II: 80°C/50°C III: 120°C/72°C I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C	flooded bore hole	^{− τ} Rk,eq		1,6						4,5	4,5
Temperature	III: 120°C/72°C I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C	flooded bore hole	^{-τ} Rk,eq			2,2	2,7	2,7	2,7	2,8	3,1	3,1
Temper	I: 40°C/24°C II: 80°C/50°C III: 120°C/72°C	flooded bore hole		[N/mm ²]	1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
Ter	II: 80°C/50°C III: 120°C/72°C	hole			2,5	2,5	3,7	3,7	N	o Perfe	ormano	<u>م</u>
	III: 120°C/72°C				1,6 1,9 2,7 2,7					ssesse	ed (NPA	4)
		C/72°C 1,3 1,6 2,0 2,0										
Redukt	tion factor ψ^0_{sus} in	cracked and nor	n-cracked conc	rete C20/25								
ature e	l: 40°C/24°C	Dry, wet						0,	73			
npera	II: 80°C/50°C	flooded bore	Ψ^0 sus	[-]				0,	65			
Ter	III: 120°C/72°C	hole						0,	57			
Increas	sing factors for conc	rete ψ_{C}	C25/30 to C5	50/60				1	,0			
Concre	ete cone failure							To				
Splittir	ni parameter 10							see ra				
Releva	nt parameter							see Ta	ble C2			
Installa	ation factor			1								
for dry	and wet concrete		γ _{inst}	[-]	1,0	1	4		1,2	NI	Σ Δ	
Injecti Perfor Chara	on System ESSVE	ONE, ESSVE ON	IE-ICE for cond	performance	e catego	ory C1)				Anne	x C 12	



Table C16: Characteristic valu (performance cate)	es of shear gory C1)	loads u	Inder s	seismic	action	l					
Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure without lever arm											
Characteristic shear resistance (Seismic C1)	V _{Rk,s,eq}	[kN]				0,70)∙V ⁰ Rk	,S			
Partial factor	γ _{Ms,V}	[-]				see	Table C	;1			
Ductility factor	k ₇	[-]	[-] 1,0								
Steel failure with lever arm											
Characteristic bending moment	M ⁰ _{Rk,s,eq}	[Nm]			No Pe	forman	ce Asse	ssed (N	PA)		
Concrete pry-out failure											
Factor	k ₈	[-]					2,0				
Installation factor	γ _{inst}	[-]					1,0				
Concrete edge failure											
Effective length of fastener	۱ _f	[mm]		m	in(h _{ef} ; 1	2 • d _{nor}	m)		min(h _{ef} ;	300mm)	
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30	
Installation factor	γ _{inst}	[-]					1,0				
Factor for annular gap	α_{gap}	[-]				0,5	5 (1,0) ¹⁾				
Annex A 3 is required											
Injection System ESSVE ONE, ESSVE ONE-ICE for concrete						Annox C 12					
Performances Characteristic values of shear loads ur	nder seismic a	ction (pe	erforma	nce cate	gory C1))					



Table C17: Characteristic values (performance categor)	s of tension ory C1)	n loads ui	nder s	eismic	actio	n					
Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure	Ne					1.0	• 4 • 1	: 1)			
Cross section area	A		50	70	113	154	201	UK 314	101	616	804
Portial factor	/`s		50	79	113	154	1 4 ²⁾	514	491	010	004
Combined null-out and concrete fail		[⁻]					1,4				
Characteristic bond resistance in non-c	racked and	cracked co	ncrete	C20/25	5						
□ l: 40°C/24°C Dr/ wat			2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5
II: 80°C/50°C Dry, wet			1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1
	TRK PO	[N/mm ²]	1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4
E E I: 40°C/24°C flooded		[]	2,5	2,5	3,7	3,7	3,7	1	No Perf	ormanc	e
$\stackrel{\bullet}{\vdash}$ $\stackrel{\Pi:}{\amalg}$ $\frac{100}{100}$ $\frac{100}{100}$ $\frac{100}{100}$ bore hole			1,8	1,9	2,7	2,7	2,7	<i> </i>	Assesse	ed (NPA	4)
Reduktion factor ψ^0_{SUS} in cracked and	non-cracked	d concrete	C20/2	5	2,0	,0					
≝ I: 40°C/24°C Dry, wet							0,73				
concrete and II: 80°C/50°C and	Ψ^0 sus	[-]					0,65				
E → III: 120°C/72°C bore hole							0,57				
Increasing factors for concrete $\psi_{\textbf{C}}$	C25/30 to	C50/60					1,0				
Concrete cone failure											
Relevant parameter						see	e l able	C2			
							Tabla	<u></u>			
						see	e rabie	62			
for dry and wet concrete			12				1	2			
for flooded bore hole	γinst	[-]	1,4		1.4			, <u> </u>	N	PA	
⁽¹⁾ f _{uk} shall be taken from the specification ⁽²⁾ in absence of national regulation	is of reinforci	ng bars									
Injection System ESSVE ONE, ESSVE	ONE-ICE fo	or concrete)						_		
Performances Characteristic values of tension loads un	der seismic a	action (perf	ormand	e cateç	jory C1)			Anne	x C 14	



Table C18: Characteristic val (performance cat	lues of shear egory C1)	loads u	nder s	eismic	actio	n					
Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure without lever arm			•			•	•				•
Characteristic shear resistance	V _{Rk,s,eq}	[kN]	[kN] $0,35 \cdot A_s \cdot f_{uk}^{2}$								
Cross section area	A _s	[mm ²]	50	79	113	154	201	314	491	616	804
Partial factor	γ _{Ms} ,v	[-]				•	1,5 ²⁾	•			
Ductility factor	k ₇	[-]					1,0				
Steel failure with lever arm			•								
Characteristic bending moment $M^0_{Rk,s,eq}$ [Nm] No Performance Assessed (NPA)											
Concrete pry-out failure			•								
Factor	k ₈	[-]					2,0				
Installation factor	γinst	[-]					1,0				
Concrete edge failure			•								
Effective length of fastener	۱ _f	[mm]		mi	n(h _{ef} ; 1	2•d _{no}	m)		min(h _{ef} ; 300	(mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	25	28	32
Installation factor	γinst	[-]					1,0	·			
Factor for annular gap	α _{gap}	[-]	0,5 (1,0) ³⁾								
¹⁾ f_{uk} shall be taken from the specifica ²⁾ in absence of national regulation	ations of reinford	ing bars	w and a			- +h - fi	turo Li				20 4

³⁾ Value in brackets valid for filled annular gab between anchor and clearance hole in the fixture. Use of special filling washer Annex A 3 is required

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Performances

Characteristic values of shear loads under seismic action (performance category C1)

Annex C 15



Table C19: Dis	splacement	s under tensi	on load ¹	⁾ (threa	ded rod)						
Anchor size thread	led rod			M8	M10	M12	M16	M20	M24	M27	M30	
Cracked and non-c	racked cond	rete C20/25 ur	nder seis	mic C1	action			•				
Temperature range	δ_{N0} -factor	[mm/(N/mm ²])]	0,090)70			
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²))]	0,105 (0,105			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²])]	0,	219			0,	0,170			
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²))]	0,	255			0,2	0,245			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²]]	0,	219			0,	170			
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²))]	0,	255			0,2	245			
Table C20: Dis	splacement	s under tensi	on load ¹	⁾ (rebar)							
Anchor size reinfo	rcing bar		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	
Cracked and non-c	racked conc	rete C20/25 ur	nder seis	mic C1	action		•					
Temperature range	$\delta_{\text{N0}}\text{-}\text{factor}$	[mm/(N/mm ²)]	0,0	090				0,070				
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,1	05				0,105				
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,2	219				0,170				
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,2	255				0,245				
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,2	219				0,170				
III: 120°C/72°C	$\frac{1}{2} \frac{1}{2} \frac{1}$											
$\delta_{N_{\infty}} = \delta_{N_{\infty}} - factor$ Table C21: Dis	$\begin{array}{l} \delta_{N0} = \delta_{N0} \text{-factor} \cdot \tau; & \tau: \text{ action bond stress for tension} \\ \delta_{N\infty} = \delta_{N\infty} \text{-factor} \cdot \tau; & \end{array}$ Table C21: Displacements under shear load ² (threaded rod)											
Anchor size thread	led rod			M8	M10	M12	M16	M20	M24	M27	M30	
Cracked and non-c	racked conc	rete C20/25 ur	nder seis	mic C1	action							
All temperature	δ_{V0} -factor	[mm/kN]		0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07	
ranges	$\delta_{V\infty}$ -factor	[mm/kN]		0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10	
Table C22: Dis	splacement	under shear	load ¹⁾ (re	ebar)								
Anchor size reinfo	rcing bar		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	
Cracked and non-ci	racked conc	rete C20/25 ur	nder seis	mic C1	action							
All temperature	δ_{V0} -factor	[mm/kN]	0,12	0,12	0,11	0,11	0,10	0,09	0,08	0,07	0,06	
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,18	0,18	0,17	0,16	0,15	0,14	0,12	0,11	0,10	
¹⁾ Calculation of the $\delta_{V0} = \delta_{V0}$ -factor $\delta_{V\infty} = \delta_{V\infty}$ -factor	e displacemei V; · V;	nt V: action shea	r load									
Injection System ES	SSVE ONE, E	SSVE ONE-ICE	for cond	crete								
Performances Displacements under seismic C1 action (threaded rods and rebar)									Annex C 16			





Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



European Technical Assessment

ETA-18/0642 of 8 October 2018

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the Deutsches Institut für Bautechnik **European Technical Assessment:** Trade name of the construction product ESSVE Injection system ONE or ONE ICE for Masonry Product family Metal Injection anchors for use in masonry to which the construction product belongs **ESSVE** Produkter AB Manufacturer Esbogatan 14 164 74 KISTA SCHWEDEN ESSVE Plant No. 671 Manufacturing plant This European Technical Assessment 61 pages including 3 annexes which form an integral part contains of this assessment EAD 330076-00-0604 This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of



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Specific Part

1 Technical description of the product

The ESSVE Injection System ONE or ONE ICE for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar ESSVE ONE or ESSVE ONE ICE, 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 product description is given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic values for resistance	See Annexes C 1 to C 45
Displacements	See Annex C 5 to C 45

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.3 Hygiene, health and the environment (BWR 3)

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

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

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

The system to be applied is: 1


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

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

Issued in Berlin on 8 October 2018 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt p.p. Head of Department *beglaubigt:* Baderschneider









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Table A1: Materials		
Designation	Material	
Steel, zinc plated ≥ 5 μm acc. to EN ISO 4042: hot-dip galvanised ≥ 40 μm acc. to EN ISO 146	1999 or Steel, 51:2009 and EN ISO 10684:200	4+AC:2009
Anchor rod	Steel, EN 10087:1998 or EN Property class 4.6, 4.8, 5.6, 5 EN 1993-1-8:2005+AC:2009 A _s > 8% fracture elongation	10263:2001 5.8, 8.8 acc.
Hexagon nut, EN ISO 4032:2012	Steel acc. EN 10087:1998 or Property class 4 (for class 4.6 Property class 5 (for class 5.6 Property class 8 (for class 8.8	EN 10263:2001 6, 4.8 rod) EN ISO 898-2:2012 6, 5.8 rod) EN ISO 898-2:2012 3 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 g	alvanised
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 / 1.4 Property class 70 EN ISO 35 Property class 80 EN ISO 35	571, EN 10088-1:2014, 06-1:2009 06-1:2009
Hexagon nut, EN ISO 4032:2012	Material 1.4401 / 1.4404 / 1.4 Property class 70 (for class 7 Property class 80 (for class 8	IS71 EN 10088-1:2014, 10 rod) EN ISO 3506-2:2009 10 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 / 1.44 Property class 70 (for class 7	04 / 1.4571, EN 10088-1:2014 0 rod) EN ISO 3506-1:2009
High corrosion resistant steel (HCR)		
Anchor rod	Material 1.4529 / 1.4565, EN Property class 70 EN ISO 35 Property class 80 EN ISO 35	10088-1:2014, 06-1:2009 06-1:2009
Hexagon nut, EN ISO 4032:2012	Material 1.4529 / 1.4565, EN Property class 70 (for class 7 Property class 80 (for class 8	10088-1:2014, 0 rod) EN ISO 3506-2:2009 0 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 / 1.45 Property class 70 (for class 7	65, EN 10088-1:2014 '0 rod) EN ISO 3506-1:2009
Plastic sleeve		
Perforated sleeve	Material: Polypropylene	
ESSVE Injection system ONE, ONE ICE for m	asonry	
Product description Materials		Annex A 4

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Table A2: Sleeve (Plastic)									
SH 12x80 SH 16x85 SH 20x85 d _s			L _s =	= h _{ef} = h _{nor}	n T				
SH 16x130 SH 20x130 SH 20x200 d_s									
Table A3: Sizes sleeve									
		S	eeve	12x80	16x85	16x130	20x85	20x130	20x200
Diameter of sleeve	d _s =	([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 l	[mm]	80	85	130	85	130	200
Table A4: Steel							1		
Α	nchor	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	I _{IG}	[mm]	8/20	8/20	10/25	-	-	-	-
Total length of steel element	l _{ges}	[mm]	Wit V	h sleeve: he Vithout sleev	ef - 5mm /e: hef	hef + t _{fix} + 9,5	hef + t _{fix} + 11,5	hef + t _{fix} + 17,5	hef + t _{fix} + 20,0
Internal threaded rod with me	ric exte	ernal thr	ead						
ESSVE Injection system ONE, ONE ICE for masonry Annex A 5 Product description Sleeves									



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 Technical Report TR 053 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 Technical Report TR 054, 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 C2; $N_{Bk,pb}$ see Technical Report TR 054
- $V_{Rk,b}$ and $V_{Rk,c}$ see Annex C4 to C45; $V_{Rk,s}$ see Annex C2; $V_{Rk,pb}$ see Technical Report TR 054
- For application with sleeve with drill bit size ≤ 15 mm installed in joints not filled with mortar:

$$\circ$$
 N_{Bk p} = 0.18 * N_{Bk p} and N_{Bk b} = 0.18 * N_{Bk b} (N_{Bk p} = N_{Bk b} see Annex C4

$$V_{\text{Rk,p,j}} = 0,15 * V_{\text{Rk,p}} \text{ and } V_{\text{Rk,b,j}} = 0,15 * V_{\text{Rk,b}}$$
 ($V_{\text{Rk,p}} = V_{\text{Rk,b}}$ 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 .

ESSVE Injection system ONE, ONE ICE for masonry

Intended Use

Specifications

to (C45)



Tal	Table B1: Overview brick types and properties with corresponding fastening elements (Anchor and Sleeves)										
Brick-No.	Brick type	Picture	Brick size length width height	Compressive strength	Bulk density	Sle	eeve - Anchor type	Annex			
			[mm]	[N/mm ²]	[kg/dm ³]						
Auto	claved aerated	concrete units accor	ding EN 771	-4		1					
1	Autoclaved Aerated Concrete AAC6	Ī	499 240 249	6	0,6	M8/M10/M12	/M16/IG-M6/IG-M8/IG-M10	C4 – C5			
Calc	ium silicate mas	onry units according	g EN 771-2								
2	Calcium silicate solid brick KS-NF		240 115 71	10 20 27	2,0	M8/M10/M12 SH 12x80 - M SH 16x85 - M SH 16x130 - SH 20x85 - M SH 20x130 - SH 20x200 -	/M16/IG-M6/IG-M8/IG-M10 //8 //8/M10/IG-M6 //12/M16/IG-M6/IG-M10 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10	C6 – C8			
3	Calcium silicate hollow brick KSL-3DF		240 175 113	8 12 14	1,4	SH 12x80 – M SH 16x85 – M SH 16x130 – SH 20x85 – M SH 20x130 – SH 20x200 –	//8 //8/M10/IG-M6 //12/M16/IG-M6 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10	C9 - C11			
4	Calcium silicate hollow brick KSL-12DF	and a series	498 175 238	10 12 16	1,4	SH 12x80 - N SH 16x85 - N SH 16x130 - SH 20x85 - SH 20x130 -	//8 //8/M10/IG-M6 M8/M10/IG-M6 M12/M16/IG-M8/IG-M10 M12/M16/IG-M8/IG-M10	C12 - C14			
Clay	masonry units a	according EN 771-1									
5	Clay solid brick Mz – DF		240 115 55	10 20 28	1,6	M8/M10/M12 SH 12x80 - M SH 16x85 - M SH 16x130 - SH 20x85 - M SH 20x130 - SH 20x200 -	/M16/IG-M6/IG-M8/IG-M10 //8 //8/M10/IG-M6 //12/M16/IG-M6 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10	C15 - C17			
6	Clay hollow brick Hlz-16DF		497 240 238	6 8 12 14	0,8	SH 12x80 - N SH 16x85 - N SH 16x130 - SH 20x85 - N SH 20x130 - SH 20x200 -	//8 //8/M10/IG-M6 //12/M16/IG-M6 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10 //12/M16/IG-M8/IG-M10	C18 - C20			
7	Clay hollow brick Porotherm Homebric		500 200 299	4 6 10	0,7	SH 12x80 - M SH 16x85 - M SH 16x130 - SH 20x85 - SH 20x130 -	//8 //8/M10/IG-M6 M8/M10/IG-M6 M12/M16/IG-M8/IG-M10 M12/M16/IG-M8/IG-M10	C21 - C23			
E In B	SSVE Injection Itended Use rick types and p	n system ONE, ON	Annex B 2								



Tal	Table B1: Overview brick types and properties with corresponding fastening elements (Anchor and Sleeves) (continue)											
Brick-No.	Brick type	Picture	Brick size length width height	Compressive strength	Bulk density	5	Sleeve - Anchor type	Annex				
<u> </u>			[mm]	[N/mm ²]	[kg/dm ³]							
Clay	masonry unit	s according EN 771	-1									
8	Clay hollow brick BGV Thermo		500 200 314	4 6 10	0,6	SH 12x80 SH 16x85 SH 16x13 SH 20x85 SH 20x13	9 – M8 5 – M8/M10/IG-M6 80 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 80 – M12/M16/IG-M8/IG-M10	C24 - C26				
9	Clay hollow brick Calibric R+		500 200 314	6 9 12	0,6	SH 12x80 SH 16x85 SH 16x13 SH 20x85 SH 20x13	9 – M8 5 – M8/M10/IG-M6 80 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 80 – M12/M16/IG-M8/IG-M10	C27- C29				
10	Clay hollow brick Urbanbric		560 200 274	6 9 12	0,7	SH 12x80 SH 16x85 SH 16x13 SH 20x85 SH 20x13	9 – M8 5 – M8/M10/IG-M6 30 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 30 – M12/M16/IG-M8/IG-M10	C30 - C32				
11	Clay hollow brick Brique creuse C40	H	500 200 200	4 8 12	0,7	SH 12x80 SH 16x85 SH 16x13 SH 20x85 SH 20x13	9 – M8 5 – M8/M10/IG-M6 80 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 80 – 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 SH 16x85 SH 16x13 SH 20x85 SH 20x13 SH 20x20	0 – M8 5 – M8/M10/IG-M6 30 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 30 – M12/M16/IG-M8/IG-M10 30 – 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 SH 16x85 SH 16x13 SH 20x85 SH 20x13 SH 20x20	0 – M8 5 – M8/M10/IG-M6 30 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 30 – M12/M16/IG-M8/IG-M10 30 – M12/M16/IG-M8/IG-M10	C39 - C41				
Ligh	t weight cond	rete according EN 7	71-3			1.00						
14	Hollow light weight concrete Bloc creux B40		494 200 190	4	0,8	SH 12x80 SH 16x85 SH 16x13 SH 20x85 SH 20x13	0 – M8 5 – M8/M10/IG-M6 80 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 80 – M12/M16/IG-M8/IG-M10	C42 - C43				
15	Solid light weight concrete		300 123 248	2	0,6	M8/M10/N SH 12x80 SH 16x85 SH 16x13 SH 20x85 SH 20x13 SH 20x20	M12/M16/IG-M6/IG-M8/IG-M10 – M8 – M8/M10/IG-M6 0 – M8/M10/IG-M6 5 – M12/M16/IG-M8/IG-M10 0 – M12/M16/IG-M8/IG-M10 0 – M12/M16/IG-M8/IG-M10	C44 - C45				
E	SSVE Inject	ion system ONE, (Annex B 3									
	inch types all		espondinț	g astering elem	ente							



Installation: Steel Brush RBT d_{b} Table B2: Installation parameters in autoclaved aerated concrete AAC and solid masonry (without sleeve) IG-M10 Anchor size M8 M10 IG-M6 M12 IG-M8 M16 Nominal drill hole diameter d_0 [mm] 10 12 14 18 Drill hole depth 80 90 100 100 h_0 [mm] 100 Effective anchorage depth 80 90 100 h_{ef} [mm] Minimum wall thickness $h_{ef} + 30$ [mm] h_{min} Diameter of clearance d_f ≤ 9 12 7 14 9 18 12 [mm] hole in the fixture RBT18 RBT10 RBT12 RBT14 Diameter of steel brush 12 14 16 20 d_{b} [mm] Minimum diameter of steel brush 12,5 d_{b.min} 10,5 14,5 18,5 [mm] 2 (14 for Mz DF) Max installation torque moment [Nm] T_{inst,max}

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

Ancherciza		MO	M8 / M10 / IG-M6 M12 / M16 / IG-M							
Anchor size			1018		0 / IG-IN6					
	\$	Sleeve	12x80	16x85	16x130	20x85	20x130	20x200		
Nominal drill hole diameter	do	[mm]	12	16	16	20	20	20		
Drill hole depth	ho	[mm]	85	90	135	90	135	205		
Effective anchorage depth	h _{ef}	[mm]	80	85	130	85	130	200		
Minimum wall thickness	\mathbf{h}_{min}	[mm]	115	115	175	115	175	240		
Diameter of clearance hole in the fixture	d _f ≤	[mm]	9	7 (IG-M6) / 9 (M8) / 12 (M10)		9 (IG-M8) / 12 (IG-M10) / 14 (M12) / 18 (M16)		-M10) / /16)		
Diameter of steel bruch			RBT12	RB	T16		RBT20			
	d _b	[mm]	14	1	8		22			
Minimum diameter of steel brush	d _{b,min}	[mm]	12,5	16	6,5		20,5			
Max installation torque moment	T _{inst,max}	[Nm]			2	2				

ESSVE Injection system ONE, ONE ICE for masonry

Intended Use

Installation parameters and cleaning brush

Annex B 4



Table B4: Maximum working time and minimum curing time ESSVE ONE									
Temperature in the base material T	Temperature of cartridge	Gelling- / working time	Minimum curing time in dry base material 1)						
0°C to + 4 °C	•	45 min	7 h						
+ 5 °C to + 9 °C		25 min	2 h						
+ 10 °C to + 19 °C		15 min	80 min						
+ 20 °C to + 29 °C	+5°C to +40°C	6 min	45 min						
+ 30 °C to + 34 °C		4 min	25 min						
+ 35 °C to + 39 °C		2 min 20 min							
+ 40°C		1.5 min	15 min						
 ¹⁾ In wet base material the curing time <u>must</u> be doubled Table B5: Maximum working time and minimum curing time ESSVE ONE ICE 									
Temperature in the base material T	Temperature of cartridge	Gelling- / working time	Minimum curing time in dry base material ¹⁾						
0 °C to +4 °C		10 min	2,5 h						
+ 5 °C to + 9 °C	0°C to +10°C	6 min	80 min						
+ 10°C		6 min	60 min						
ESSVE Injection syst	em ONE, ONE ICE for ma	sonry	Annex B 5						
Gelling and Curing time	es								







Installation in solid and hollow masonry (with sleeve)

3. 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.



5. Insert the perforated sleeve flush with the surface of the masonry or plaster. Only use



6. 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 Annex B 5.





7. 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 Annex B 5).
- 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.

ESSVE Injection system ONE, ONE ICE for masonry

Intended Use

Installation instructions hollow brick

Annex B 7



Brick-No	Installation & Use			β-fa	ctor		
and	category	T _a : 40°0	C / 24°C	Т _ь : 80°(C / 50°C	T _c : 120°	C / 72°(
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					0,86	0,73	0,7
9 Calibric R+	For all sizes	0,86	0,86	0,86			
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	0,6
15	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
Solid light weight concrete	$d_0 \ge 16 \text{ mm}$	0.93	0.93	0.87	0.87	0.65	0.67

 β -factors for job site testing under tension load

Г



Table C2: Characteristic steel resis	tance								
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
	γMs	[-]		-			2,	0	
steel, property class 4.8	N _{Rk,s}	[kN]	-	-	-	15	23	34	63
	γMs	[-]		-			1,	5	
steel, property class 5.6	N _{Rk,s}	[kN]	10	18	29	18	29	42	79
	γMs		10	2,0			2,	0	
steel, property class 5.8	N _{Rk,s}		10	1/	29	18	29	42	/9
	γ _{Ms}	[-]	10	1,5	40		1,	5	100
steel, property class 8.8	N _{Rk,s}		16	27	46	29	46	6/	126
	γ _{Ms}		14	1,5	41	06	I,	5	110
Stainless steel A4 / HCR, property class 70	IN _{Rk,s}		14	1 97	41	20	41	29	
	γ _{Ms}		16	1,07	46	20	1,0	67	126
Stainless steel A4 / HCR, property class 80	IN _{Rk,s}		10	1.6	40	29	40	6	120
Characteristic chase registeres	γMs	[[-]		1,0			1,	0	
		FI N I	1	1					
steel, property class 4.6	V _{Rk,s}		-	-	-	7	12	17	31
	ΎMs	[-]		-	1		1,6	57	
steel, property class 4.8	V _{Rk,s}		-	-	-	/	12	1/	31
	γMs			-	15	0	1,2	25	00
steel, property class 5.6	V _{Rk,s}		5	1.67	15	9	_ 15 _ 1(21	39
	γ _{Ms}		5	1,67	15	0	15	21	30
steel, property class 5.8	V Rk,s		5	1 25	15	9	1 1	25	39
	YMs V_		8	1/	23	15	23	20	63
steel, property class 8.8	V Rk,s		0	1 25	25	10	1 20	25	00
	V Dia	[kN]	7	13	20	13	20	30	55
Stainless steel A4 / HCR, property class 70	V HK,S	[-]	,	1.56	20	10	1!	56	00
		[kN]	8	15	23	15	23	34	63
Stainless steel A4 / HCR, property class 80	VMc	[-]		1.33			1.3	33	
Characteristic bending moment	11115			.,			.,.		
	M _{Bk.s}	[Nm]	-	-	-	15	30	52	133
steel, property class 4.6	γ _{Ms}	[-]		-			1,6	57	
	M _{Bk.s}	[Nm]	-	-	-	15	30	52	133
steel, property class 4.8	γ _{Ms}	[-]		-			1,2	25	
	M _{Bk.s}	[Nm]	8	19	37	19	37	66	167
steel, property class 5.6	γMs	[-]		1,67			1,6	57	
eteol, property close E 9	M _{Rk.s}	[Nm]	8	19	37	19	37	66	167
steer, property class 5.8	γMs	[-]		1,25			1,2	25	
steel property class 8.8	M _{Rk,s}	[Nm]	12	30	60	30	60	105	266
	γ́Ms	[-]		1,25			1,2	25	
Stainless steel A4 / HCB, property class 70	M _{Rk,s}	[Nm]	11	26	52	26	52	92	233
otamess steel A4 / Hon, property class 70	γMs	[-]		1,56			1,	56	
Stainless steel A4 / HCB, property class 80	$M_{Rk,s}$	[Nm]	12	30	60	30	60	105	266
orallioss stor A+ / Hort, property class of	γ́Ms	[-]		1,33			1,:	33	

ESSVE Injection system ONE, ONE ICE for masonry

Performances

Characteristic resistance under tension and shear load - steel failure



Spacing and edge distances			
			min
$\begin{array}{llllllllllllllllllllllllllllllllllll$	stic edge distance Edge distance stic spacing spacing stic (minimum) spacing for stic (minimum) spacing for	anchors placed parallel to anchors placed perpendio	bed joint cular to bed joint
Load direction Anchor	Tension load	Shear load parallel to free edge	e Shear load perpendicular to free edge
Anchors places parallel to bed joint $s_{cr,II}$; ($s_{min,II}$)			
Anchors places perpendicular to bed joint $s_{cr, \perp;}(s_{min, \perp})$			
$\begin{array}{lll} \alpha_{g,N,\parallel} = & Group \mbox{ factor in } \\ \alpha_{g,V,\parallel} = & Group \mbox{ factor in } \\ \alpha_{g,N,\perp} = & Group \mbox{ factor in } \\ \alpha_{g,V,\perp} = & Group \mbox{ factor in } \\ Group \mbox{ of two anchors: } & N^g_{Rk} \\ Group \mbox{ of four anchors: } & N^g_{Rk} \\ & (N_{Rk}) \\ & (W_{Rk}) \\ & (W_{Rk}) \end{array}$	case of tension load for an case of shear load for and case of tension load for an case of shear load for and case of shear load for and $\alpha = \alpha_{g,N} * N_{RK}$ $\alpha = \alpha_{g,N,II} * \alpha_{g,N,\perp} * N_{RK}$	hchors placed parallel to the shors placed parallel to the hchors placed perpendicular and $V^g_{Rk} = \alpha_{g,V} * V_{Rl}$ and $V^g_{Rk} = \alpha_{g,V,II} * \alpha$ for c _{cr})	the bed joint bed joint ar to the bed joint to the bed joint $c_{g,V,\perp} * V_{Rk}$
ESSVE Injection system ONE, Performances Edge distance and anchor spacin	ONE ICE for masonry		Annex C 3



Brick type: Autoclaved Aerat	ed C	Concrete – AAC6						
Table C3: Description of the br	ick							
Brick type		Autoclaved Aerate	d Concr	ete				
Bulk density ρ [kg/di	n ³]	0,6						
Compressive strength $f_b \ge [N/m]$	n²]	6					Der	-
Code		EN 771-4						
Producer (country code)		e.g. Porit (DE)						
Brick dimensions	ml	499 x 240 x 249						_
Drilling method]	Botary						
2 milling motion		riotary						
Table C4: Installation parameter	r							
Anchor size			[-]	M8	M10/IG-M6	M12/IG	i-M8	M16/IG-M10
Effective anchorage depth			[mm]	80	90	100)	100
Edge distance	Ccr	(([mm]			1,5*h _{ef}		101100-010
	Cm	in,N	[mm]			75		
Minimum edge distance	Cm	in,∨,II (C _{min,v} ,⊥) ¹⁾	[mm]			75 (1,5*h _{ef})	
Spacing	Scr		[mm]			3*h _{ef}		
Minimum spacing	Sm	in	[mm]			100		
¹⁾ C _{min,V,II} for shear loading parallel	o the	free edge; $C_{min,v, \perp}$ for	shear loa	ding pe	rpendicular the	free edge		
Table C5: Group factor for anch	or g	roup in case of tens	sion loa	ding				
Configuration		•			with a >	1		
		125 (M9:120)		V	100			10
parallel to horizontal		123 (108.120)			100	ααΝΙΙ		1,0
joint		1,5*het			3*hef	31.11.	[-]	2,0
⊥: anchors placed		75			100			1,4
horizontal joint		1,5*hef			3*hef	α _{g,N,⊥}		2,0
, , , , , , , , , , , , , , , , , , , ,								
Table C6: Group factor for anch	or g	roup in case of she	ar loadi	ng par	allel to free e	dge		
Configuration		with c ≥		<u>v</u>	vith s ≥			
II: anchors placed	14.5	75			100			1,2
parallel to horizontal		1.5*hef			3*hef	α _{g,V,II}		20
joint		1,0 1101					[-]	2,0
L: anchors placed perpendicular to horizontal joint		1,5*hef			3*hef	$\alpha_{g,V,\perp}$		2,0
ESSVE Injection system ONE, Performances Autoclaved Aer Description of the brick	ONE ated	E ICE for masonry Concrete - AAC6				An	nex C	4
Installation parameters								



Brick type: Table C7: G	Autoclave	d Aera for and	ated (chor c	Concret proup in	e – case	AAC6 e of shear	· lo	ading p	erpe	ndicu	ar to	free ed	qe		
(Configuration			•	wit	hc≥		51	with	s ≥					
II: anchors pl parallel to hori joint	laced izontal	V-••	•	1,5*hef 3,0*hef							α _{g,V,II}	II [-]		2,0	
⊥: anchors p perpendicula horizontal j	laced ar to oint		•		1,5	5*hef			3,0'	'hef		$lpha_{g,V,\perp}$	[-]		2,0
Table C8: Characteristic values of resistance under tension and shear loads															
						Cł	nara	acteristi	c resi	stance)				
								Use ca	tegor	у					al / al
	Effective		d/d						w. W	/w /d				d/d w/d w/w	
Anchor size	anchorage depth	40°C/	24°C	C 80°C/50°C 120°C/72°C 40°C/24°C 80°C/				/50°C	120°C/	/72°C	ter	For all nperature range			
	h _{ef}			$N_{Rk,b} = N$	Rk,p ¹)				N _{Rk,b} =	N _{Rk,p} ¹)			$V_{Rk,b}^{2)3)}$
	[mm]							[k]	۱]						
				Compre	essiv	ve strengt	h f	_b ≥ 6 N/	mm²						
M8	80	2,5 (2,0)	2,5 (1,	5)	2,0 (1,2))	2,5 (1	,5)	2,0	(1,5)	1,5 (1,2)		6,0
M10/IG-M6	90	4,0 (2,5)	3,0 (2,	0)	2,5 (1,5)	3,5 (2	2,5)	3,0	(2,0)	2,5 (1,5)		10,0
M12/IG-M8	100	5,0 (3,5)	4,0 (3,	0)	3,0 (2,5)	4,5 (3	,0)	3,5	(2,5)	3,0 (2	2,5)		10,0
M16/IG-M10	100	6,5 (4,5)	5,5 (3,	5)	4,0 (3,0))	5,5 (4	,0)	5,0	(3,5)	4,0 (3,0)		10,0
²⁾ For calcul ³⁾ The value Table C9: D	ation of V _{Rk,c} s s are valid for Displacemen	see ETA steel 5.	.G029, 6 or gr	Annex C eater. For	stee	el 4.6 and 4.	.8 m	nultiply V	Rk,b by	y 0,8					
• · ·	h _{ef}	Ν	δ	N / N		δΝΟ	i	δN∞		V		δνο			δ∨∞
Anchor size	[mm]	[kN]	[m	m/kN]		[mm]	[mm]	[]	<n]< td=""><td></td><td>[mm]</td><td></td><td>\top</td><td>[mm]</td></n]<>		[mm]		\top	[mm]
M8	80	0.9				0,16	(),32	1	.3		0.8		+	1.20
M10/IG-M6	90	1.4		0,18		0.26	().51		.8		1.2		+	1.80
M12/IG-M8	100	1.8				0.14	- ().29		2.1		1 4		+	2.10
M16/IG-M10	100	2.3	0	0,08		0.19	() 37		-, ' > 3		1.5		-	2 25
ESSVE Injection system ONE ONE ICE for masonry															
ESSVE Injection system ONE, ONE ICE for masonry Performances Autoclaved Aerated Concrete – AAC6 Installation parameters (continue) Characteristic values of resistance under tension and shear load / Displacements								Annex C 5							



Brick type: Calcium silicate solid brick KS-NF										
Table C10: Description of the brick										
Brick type	Calcium silicate solid brick KS-NF									
Bulk density ρ [kg/dm ³] 2,0										
Compressive strength $f_b \ge [N/mm^2]$										
Code	EN 771-2									
Producer (country code)	e.g. Wemding (DE)									
Brick dimensions [mm]	240 x 115 x 71									
Drilling method	Hammer									
Table C11. Installation personator										
Anchor size	All sizes									

Anchor Size		[-]	All Sizes
Edge distance	C _{cr}	[mm]	1,5*h _{ef}
Minimum edge distance	C _{min}	[mm]	60
Spacing	Scr	[mm]	3*h _{ef}
Minimum spacing	S _{min}	[mm]	120

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

Configura	ation	with c ≥	with s ≥			
II: anchors placed		60	120			1,0
parallel to horizontal	••	140	120	$\alpha_{g,N,II}$		1,5
joint		1,5*hef	3*h _{ef}		r ı	2,0
⊥: anchors placed		60	120		[-]	0,5
perpendicular to		1,5*hef	120	$\alpha_{g,N,\perp}$		1,0
horizontal joint		1,5*hef	3*h _{ef}			2,0

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

Configura	ation	with c ≥	with s ≥			
II: anchors placed		60	120			1,0
parallel to horizontal		115	120	α _{g,V,II}		1,7
joint		1,5*hef	3*h _{ef}		r 1	2,0
⊥: anchors placed		60	120		[-]	1,0
perpendicular to	I V 🚦	1,5*hef	120	$\alpha_{g,V,\perp}$		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

Configura	ation	with c ≥	with s ≥			
II: anchors placed		60	120			1,0
parallel to horizontal joint		1,5*hef	3*h _{ef}	α _{g,V,II}	1 1	2,0
⊥: anchors placed		60	120		[-]	1,0
perpendicular to horizontal joint		1,5*hef	3*h _{ef}	$lpha_{g,V,\perp}$		2,0

ESSVE Injection system ONE, ONE ICE for masonry

Performances calcium solid brick KS-NF

Installation parameters

Deutsches Institut $\left| \right|$ für Bautechnik

Brick	type: Cal	cium silicat	e solid bri	ick KS-NF					
Table (C15: Cł	naracteristic	values of re	esistance ι	under tensio	on and she	ar loads		
					Cha	racteristic r	esistance		
						Use categ	jory		
Anchor	Cleave	Effective anchorage depth		d/d			w/d w/w		d/d w/d w/w
size	Sieeve	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}		$N_{Rk,b} = N_{Rk,p}$	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)
	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-M87 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)
			Con	npressive s	strength f _b ≥	20 N/mm ²			
M8	-	80	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)
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)
	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-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)

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 Technical Report TR 054; 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)

ESSVE Injection system ONE, ONE ICE for masonry

Performances calcium solid brick KS-NF

Characteristic values of resistance under tension and shear load



Brick t	ype: Cal	cium silicate	e solid bri	ck KS-NF					
Table C	:16: Ch	aracteristic v	alues of re	esistance u	Inder tensio	n and shea	ar loads (c	ontinue)	
					Cha	racteristic r	esistance		
						Use categ	jory		
Anchor	Sloovo	Effective anchorage depth		d/d			w/d w/w		d/d w/d w/w
size	Sieeve	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]			
			Com	pressive s	trength 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}

²⁾ For c_{cr} calculation of $V_{Rk,c}$ see Technical Report TR 054; values in brackets $V_{Rk,b} = V_{Rk,c}$ for single anchors with c_{min}

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 C17: 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					1,7	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	1,7	0.15	0,26	0,51			
M8	12x80	80		0,10					
M8 / M10/	16x85	85	1.4		0.01	0.42	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							

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Performances calcium solid brick KS-NF

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



Brick type: Calcium si Table C18: Descriptio	licate hollo	w brick KS L-3DF ĸ					
Brick type		Calcium silicate ho	llow brick	K			
Dulla daga itu	FL	KSL-3DF					
Bulk density	$\rho [kg/dm^2]$	1,4					
Compressive strength f	_b ≥ [N/mm]	8, 12 Or 14					
Code		EN 771-2				$\mathbf{\nabla}$	
Producer (country code)		e.g. Wemding (DE))				
Brick dimensions	լՠՠֈ	240 x 175 x 113					
Drilling method		Rotary					
	175		95 95 38 14	14 44 14 32 14 44 14 44 14 44 14			
Table C19: Installation	n parameters						
Anchor size			[-]		All sizes	1)	
Edge distance	C _{cr}		[mm]		100 (120)	,	
Minimum edge distance	Cmin				240		
Spacing	Scr,II		[mm]		120		
Minimum spacing	Scr,⊥ Smin		[mm]		120		
¹⁾ Value in brackets for SH	120x85; SH20x	130 and SH20x200	[]				
Table C20: Group fact	tor for ancho	r group in case of t	ension l	oading			
Configuration		with c ≥		with s ≥			
II: anchors placed		60		120			1,5
parallel to horizontal	••	C		240	α _{a.N.II}		20
joint 🗦		160		120		[_]	20
⊥: anchors placed		60		120		[[[*]]	1.0
perpendicular to horizontal joint		C _{cr}		120	α _{g,N,⊥}		2,0
ESSVE Injection system Performances calcium Description of the brick	em ONE, ONE	EICE for masonry			An	nex C 9	



Brick typ	be: Calci	um silicate ł	nollow bri	ck KS L-3	DF					
Table C2 ⁻	l: Grou	p factor for a	nchor grou	up in case o	of shear loa	ading paral	lel to free	edge		
	Configur	ation		with c ≥		with s	2			
II: anchor	s placed		Γ	60		120				1,0
parallel to	horizontal	V ••		160		120		α _{g,V,II}		1,6
joi	nt			Ccr		240			r-1	2,0
⊥: ancho	s placed			60		120				1,0
perpend	icular to	V		Cor		120		$\alpha_{g,V,\perp}$		20
101201		← <u> </u>	L	UCI		120				2,0
Table C2	2: Grou	p factor for a	nchor grou	up in case (of shear loa	ading perpe	endicular	to free	edge	
	Configur	ation		with c ≥		with s a	2			
II: anchoi parallel to	s placed			60		120		0-11		1,0
joi	nt			C _{cr}		240		αg,v,li	[]	2,0
⊥: anchor	s placed			60		120				1,0
horizon	tal joint			C _{cr}		120		α _{g,V,⊥}		2,0
							laada			I
Table C2.	s: Char	acteristic val	ues of res	istance und	der tension	and snear	loads			
					Char	acteristic re	sistance			
		Effective				Use calego	лу			d/d·w/d·
Amelaan		anchorage		d/d			w/d; w/v	N		w/w
Anchor size	Sleeve	depth								For all
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°(C 120°	C/72°C	temperature
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		$N_{Rk,b} = N_R$	1) k.p		V _{Rk,b} ⁴⁾
		[mm]				[kN]				
			Comp	pressive str	rength f _b ≥ 8	B N/mm ²				
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		1,2	$4,0^{2}$ (1,5) ³
/ IG-M6	16x130	130	1,5	1,5	1,2	1,5	1,5		1,2	$4,0^{2}(1,5)^{3}$
M12 /	20x85	85	4,5	4,0	3,0	4,5	4,0	3	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 ≥ 1	2 N/mm ²				
M8	12x80	80	2,0	2,0	1,5	2,0	1,5	-	1,2	$3,0^{2}(1,2)^{3}$
M8 / M10	16x85	85	2,0	2,0	1,5	2,0	2,0		1,5	$4,5^{2}$ $(1,5)^{3}$
/ IG-M6	16x130	130	2,5	2,5	1,5	2,5	2,5		1,5	$4,5^{2}$ $(1,5)^{3}$
M12 /	20x85	85	6,0	5,5	4,0	6,0	5,5	4	4,0	4,5 ²⁾ (1,5) ³⁾
M16 /	20x130	130	6,0	5,5	4,0	6,0	5,5	4	4,0	4,5 ²⁾ (1,5) ³⁾
IG-M10	20x200	200	6,0	5,5	4,0	6,0	5,5	4	4,0	4,5 ²⁾ (1,5) ³⁾
¹⁾ Values	are valid f	or c_{cr} and c_{min}								
²⁾ V _{Rk,c,II} ³⁾ V	$= V_{Rk,b}$ valic	for shear load	parallel to fr	ee edge oor lood in di	raction to from	odao				
⁴⁾ The va	lues are va	lid for steel 5.6	or greater. F	For steel 4.6	and 4.8 multip	oly V _{Rk,b} by 0,	8			
FGGVE	Injection			for macon	v					
LOOVE	injection	system ONE,			у		_	A		0
Perform	ances ca	Icium hollow	brick KS I	3DF				Ani	nex C 1	U
Installatio	on paramete	ers (continue)	undor topolo	n and choor !	ood					
Unaracte	insue values	s or resistance t	inder tensio	n and shear I	oau					



Brick typ	e: Calci	um silio	cate h	ollow bri	ck K	S L-3I	DF				
Table C2	4: Cha	racterist	tic val	ues of res	istan	ce und	ler tensio	n and shear	loads (con	tinue)	
							Cha	racteristic re	sistance		
								Use categ	ory		
Anabar		Effec ancho	tive rage		c	d/d			w/d w/w		d/d; w/d; w/w
size	Sleeve	dep	th	40°C/24°C	80°C	c/50°C	120°C/72°(40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{et}	f		N _{Rk,b} =	= N _{Rk,p}	1)		$N_{Rk,b} = N_{Rk,p}$	1) D	V _{Rk,b} ⁴⁾
		[mn	n]					[kN]			
				Comp	ressi	ve stre	ength f _b ≥	14 N/mm ²			
M8	12x80	80)	2,5	2	2,5	1,5	2,0	2,0	1,5	$3,5^{2}(1,5)^{3}$
M8 / M10	16x85	85	;	2,5	2	2,5	1,5	2,5	2,5	1,5	$6,0^{2}(2,0)^{3}$
/ IG-M6	16x130	130	0	2,5	2	2,5	2,0	2,5	2,5	2,0	$6,0^{2}$ (2,0) ³⁾
M12 /	20x85	85	5	6,5	6	5,0	4,5	6,5	6,0	4,5	$6,0^{2}$ (2,0) ³⁾
IG-M8 /	20x130	130	0	6,5	6	5,0	4,5	6,5	6,0	4,5	$6,0^{2}$ (2,0) ³⁾
IG-M10	20x200	200	0	6,5	6	5,0	4,5	6,5	6,0	4,5	6,0 ²⁾ (2,0) ³⁾
1) Values 2) V _{Rk,c,I} 3) V _{Rk,c,⊥} 4) The values Table C2	s are valid f = $V_{Rk,b}$ valid = $V_{Rk,b}$ (valid alues are va 5: Disp	for c _{cr} and d for shea ues in bra alid for ste blaceme	l c _{min} ar load ackets) eel 5.6 nts	parallel to fr valid for sh or greater.	ree edg ear loa For ste	ge ad in dir eel 4.6 a	ection to fre and 4.8 mult	e edge iply V _{Rk,b} by 0	,8		
Anchor siz	ze Sle	eeve	Effe anch dep	ective horage oth h _{ef}	N	δ _N /	Ν δ _Ν	₀ δ _N 。	. V	δ_{V0}	δ _{V∞}
			1]	mm]	[kN]	[mm/l	kN] [mi	n] [mn	n] [kN]	[mm]	[mm]
M8	12	2x80		80					1,0	1,0	1,50
M8 / M10	/ 16	6x85		85	0,71		0,6	4 1,2	9		
IG-M6	16	x130	1	130		0.0	<u> </u>				
M12 / M16	a / 20)x85		85		0,9			1,7	1,9	2,85
IG-M8 /	20	x130	-	130	1.86		1.6	7 3.3	4	-	

ESSVE Injection system ONE, ONE ICE for masonry

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

200

Annex C 11

IG-M10

20x200



		Calaium ailiaata ha	llow briek				
Brick type		KSL-12DF	NOW DRICK				
Bulk density p	[kg/dm ³]	1,4					
Compressive strength $f_b \ge 1$	[N/mm ²]	10, 12 or 16			66	- 0	
Code		EN 771-2					1
Producer (country code)		e.g. Wemding (DE)					
Brick dimensions	[mm]	498 x 175 x 238					
Drilling method		Rotary					
						59 23 59 17	
35 59	64	59 64	59	64	59 ₇ 35	5	
35 59 Table C27: Installation particular particu	64 arameters	59 <u>64</u>	[-] [mm]	64	59 35 All sizes 100 (120) ¹		
35 59 Table C27: Installation particular Anchor size Edge distance Edge distance Minimum edge distance	64 arameters	59 <u>64</u>	[-] [mm] [mm]	64	59 35 All sizes 100 (120) ¹ 100 (120) ¹		
35 59 Table C27: Installation particular Anchor size Edge distance Edge distance Minimum edge distance Spacing Spacing	64 arameters	59 64	[-] [mm] [mm] [mm]	64	59 35 All sizes 100 (120) ¹ 100 (120) ¹ 498 238		
35 59 Table C27: Installation particular Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing 1) Value is breakets for OLION	64 arameters	59 64	[-] [mm] [mm] [mm] [mm] [mm]	64 /	59 35 All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120		
35 59 Table C27: Installation parallel to horizontal Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH202 ²⁾ For V _{Rk,c} : cmin according to Table C28: Group factor Configuration II: anchors placed parallel to horizontal	64 arameters	59 64 59 64 50 50 50 50 50 50 50 50 50 50	[-] [mm] [mm] [mm] [mm] [mm] ension loa	64 / nding with s ≥ 120	59 35 All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120		1,0
35 59 Table C27: Installation parallel to horizontal joint Anchor size Edge distance Minimum edge distance Spacing ¹¹ Value in brackets for SH200 ²² For V _{Rk,c} : cmin according to Table C28: Group factor	64	59 64 59 64 5 5 5 5 5 5 5 5 5 5 5 5 5	[-] [mm] [mm] [mm] [mm] [mm]	64 / Inding with s ≥ 120 498	59 35 All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120		1,0
35 59 Table C27: Installation parallelition parallelition Anchor size Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SH202 2) For V _{Rk,c} : cmin according to Table C28: Group factor II: anchors placed parallel to horizontal joint L: anchors placed	64	59 64 59 64 5 6 6 6 6 6 6 6 6 6 6 6 6 6	[-] [mm] [mm] [mm] [mm] [mm] ension loa	64 ding with s ≥ 120 498 120	59 35 All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120 α _{g,N,II}		1,0
35 59 Table C27: Installation parallel to horizontal joint Anchor size Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SH202 2) For V _{Rk,c} : cmin according to a state of the sta	64	59 64 59 64 5 6 6 6 6 6 6 6 6 6 6 6 6 6	[-] [mm] [mm] [mm] [mm] [mm] ension loa	64 iding with s ≥ 120 498 120 238	59 35 All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120		1,0 2,0 1,0 2,0



Brick type	: Calcium si	licate hollo	w brick	KS L-120)F					
Table C29:	Group fact	or for anch	or group i	in case of	shear load	ling paralle	el to free	edge		
	Configuration			with c ≥		with s ≥				
II: anchors parallel to ho joint	placed prizontal	V •		Ccr		498		αg,γ,II		2,0
⊥: anchors perpendicu horizontal	placed Ilar to joint	V		C _{cr}		238		$lpha_{g,V,\perp}$	[-]	2,0
Table C30:	Group fact	or for anch	or group i	in case of	shear load	ling perpe	ndicular	to free	edge	
	Configuration			with c ≥		with s ≥				
II: anchors parallel to ho joint	placed prizontal	V		C _{cr}		498		α _{g,V,II}		2,0
⊥: anchors perpendicu horizontal	placed Ilar to joint			c _{cr} 238 α _{g,v,⊥}			2,0			
Table C31: Characteristic values of resistance under tension and shear loads										
					Chai	racteristic r	esistance			
						Use categ	gory			
Apphor oizo	or size Sleeve 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	40°C/24°C	80°C/50°C	C 120°C	/72°C	For all temperature range
		h _{ef}	1	$N_{Rk,b} = N_{Rk,b}$	1) p	١	$J_{Rk,b} = N_{Rl}$	1) k,p		V _{Rk,b} ²⁾³⁾
		[mm]				[kN]				
			Compres	sive stren	gth f _b ≥ 10	N/mm ²		_		
M8	12x80	80	0,6	0,6	0,4	0,5	0,5	0,	4	2,5
M8 / M10 /	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-M87 IG-M10	20x130	130	2,5	2,5	2,0	2,5	2,5	2,	0	5,5
			Compres	sive stren	gth f _b ≥ 12	N/mm ²				
M8	12x80	80	0,75	0,6	0,5	0,6	0,6	0,	4	3,0
M8 / M10 /	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 a Calculati The valu 	re valid for c_{cr} a on of $V_{Rk,c}$ see es are valid for	and c _{min} Technical Rep steel 5.6 or gi	oort TR 054 reater. For s	, except for steel 4.6 and	shear load p d 4.8 multiply	parallel to fre y V _{Rk,b} by 0,8	e edge wit 3	th c ≥ 12	20 mm:	$V_{Rk,c,II} = V_{Rk,b}$
ESSVE In	jection syste	m ONE, ON	E ICE for	masonry						
Performation	nces calcium parameters (co tic values of res	hollow bric ntinue) sistance unde	k KS L-1	2 DF nd shear loa	d			Anı	nex C	13



Brick type: Calcium silicate hollow brick KS L-12DF											
Table C32:	Character	istic values	of resista	ance unde	r tension a	nd shear I	loads (cor	ntinue)			
			Characteristic resistance								
						Use cateo	gory				
Apphoriza	Sleeve	Effective anchorage depth	d/d				d/d w/d w/w				
Anchor size			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}	$N_{\text{Bk,b}} = N_{\text{Bk,p}}^{1}$			1	1) p	V _{Rk.b} ²⁾³⁾			
		[mm]				[kN]					
			Compres	sive stren	gth f _⊳ ≥ 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 Technical Report TR 054, 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		0.02	0.46	1,0	1,3	1,95
M8 / M10 /	16x85	85	0,20		0,23	0,40			
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			

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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									
Table C34: Description of the brick	Table C34: Description of the brick								
Brick type	Clay solid brick Mz-DF								
Bulk density ρ [kg/dm ³]	1,6								
Compressive strength $f_b \ge [N/mm^2]$	10, 20 or 28								
Code	EN 771-1								
Producer (country code)	e.g. Unipor (DE)								
Brick dimensions [mm]	240 x 115 x 55								
Drilling method	Hammer								
	· · · ·								
Table C35: Installation parameter									

	[-]	All sizes
C _{cr}	[mm]	1,5*h _{ef}
C _{min}	[mm]	60
Scr	[mm]	3*h _{ef}
S _{min}	[mm]	120
	C _{cr} C _{min} S _{cr} S _{min}	[-] C _{cr} [mm] C _{min} [mm] S _{cr} [mm] S _{min} [mm]

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

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

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

Configura	ation	with c ≥	with s ≥			
II: anchors placed parallel to horizontal		60	120			0,5
		90	120	$\alpha_{g,V,II}$		1,1
joint		1,5*hef	3*h _{ef}		[-]	2,0
⊥: anchors placed perpendicular to		60	120			0,5
		1,5*hef	120	$\alpha_{g,V,\perp}$		1,0
horizontal joint		1,5*hef	3*h _{ef}			2,0

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

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

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Performances clay solid brick Mz-DF

Description of the brick

Installation parameters



Brick type: Clay solid brick Mz-DF												
Table C39: 0	Characteristic values	s of resistance u	nder tension a	and shear loa	ds							
			Characteristic resistance									
		Effective		d/d		d/d						
		anchorage		w/d								
Anchor size	Sleeve	depth		W/W		W/W						
			40°C/24°C	80°C/50°C	12000/7200	For all						
			40 0/24 0	00 0/00 0	120 0/12 0	range						
		h _{ef}		$N_{Pk, b} = N_{Pk, b}^{1}$)	$V_{\text{Pk}}^{2)3)}$						
		[mm]			[kN]	- nk,0						
	Compressive strength f _b ≥ 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)						
		Compressive s	trength f _b ≥ 20	N/mm ²								
M8	-	80	4,5 (2,5)	4,5 (2,5)	4,0 (2,0)	5,0 (1,5)						
M10 / IG-M6	-	90	5,5 (2,5)	5,5 (2,5)	4,5 (2,0)	5,0 (1,5)						
M12 / IG-M8	-	100	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,0 (1,5)						
M16 / IG-M10	-	100	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	8,0 (2,5)						
M8	12x80	80	4,5 (2,5)	4,5 (2,5)	4,0 (2,0)	5,0 (1,5)						
M8 / M10 /	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)						
		Compressive s	trength f _b ≥ 28	N/mm²								
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)						

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 Technical Report TR 054; 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 $V_{Rk,b}$ by 0.8

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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				
M10 / IG-M6	-	90	1,6	6	0,24	0,47	1,9	-	1.50	
M12 / IG-M8	-	100	17		0,26	0.51				
M16 / IG-M10	-	100	1,7			0,51	2,9			
M8	12x80	80		0.15				1.00		
M8 / M10 /	16x85	85		0,15				1,00	1,50	
IG-M6	16x130	130	10		0.10	0.20	1.0			
M12 / M16 /	20x85	85	1,3		0,19	0,39	1,9			
IG-M8 /	20x130	130								
IG-M10	20x200	200								

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Performances clay solid brick Mz-DF Displacements



Brick type: Clay hollow	brick HLz	-16-DF						
Table C41: Description	of the bric	k						
Brick type		Clay hollow brick						
Bulk density	[kg/dm ³]	0,8				and the second		
Compressive strength $f_b \ge$	[N/mm ²]	6, 8, 12, 14					100	
Code		EN 771-1					Ĭ	
Producer (country code)		e.g. Unipor DE)						
Brick dimensions	[mm]	497 x 240 x 238						
Drilling method		Rotary						
Table C42: Installation					+ 13 + 13 + 0			
Anchor size	arameters		[_]		All sizes			
Edge distance	Cor		[mm]		100 (120) ¹	1)		
Minimum edge distance	C _{min} ²⁾		[mm]		100 (120)	1)		
Casaiaa	S _{cr,II}		[mm]		497			
Spacing	S _{cr,⊥}		[mm]		238			
Minimum spacing	S _{min}		[mm]		100			
 Value in brackets for SH20 ²⁾ For V_{Rk,c}: c_{min} according to Table C43: Group factor 	0x85; SH20x [:] Technical R • for ancho	130 and SH20x200 eport TR 054 r group in case of t	tension	loading		1	1	
		WITH C 2		with s ≥				
parallel to horizontal	••	Ccr		100	α _{0.N.II}		1,3	
joint		C _{cr}		497		[-]	2,0	
⊥: anchors placed	•	Ccr		100			1,1	
horizontal joint	•	Ccr		238	$\alpha_{g,N,\perp}$		2,0	
ESSVE Injection system	ONE, ONE	ICE for masonry			Anı	nex C 18		
Description of the brick Installation parameters								



Brick type: Cl	ay hollow brick HL	z-16-DF								
Table C44: G	iroup factor for anch	or group in case	of shear load	ding parallel t	o free edge					
Cor	figuration	with c ≥	:	with s ≥						
II: anchors place parallel to horizon joint	ed Intal	Ccr		497	α _{g,V,II}		2,0			
⊥: anchors place perpendicular t horizontal join	ed o t	C _{cr}		238	$\alpha_{g,V,\perp}$	[-]	2,0			
Table C45: G	roup factor for anch	or group in case	of shear load	ding perpend	icular to free e	dge				
Con	figuration	with c ≥	:	with s ≥						
II: anchors place parallel to horizor joint	ed Intal	C _{cr}		497	α _{g,V,II}	[_]	2,0			
⊥: anchors place perpendicular t horizontal join	ed o t	Ccr	238		$\alpha_{g,V,\perp}$	[-]	2,0			
Table C46: Characteristic values of resistance under tension and shear loads										
				Characte	ristic resistance)				
				Use	e category					
		Effective		d/d		d/d				
Anchor size		anchorage		w/d			w/d			
	Sleeve	depth		w/w			W/W			
			40°C/24°C	80°C/50°C	120°C/72°C	tem	or all perature ange			
		h _{ef}		$N_{Bkb} = N_{Bkp}$)	V	2)3) Bk b			
		[mm]		[kN]			111,0			
		Compressive s	trength $f_b \ge 6$	N/mm ²						
M8	12x80	80	2,5	2,5	2,0		2,5			
M8 / M10/	16x85	85	2,5	2,5	2,0		4,5			
IG-M6	16x130	130	3,5	3,5	3,0		4,5			
M12/M16/	20x85	85	2,5	2,5	2,0		5,0			
IG-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	trength $f_b \ge 8$	N/mm ²						
M8	12x80	80	3,0	3,0	2,5		3,0			
M8 / M10/	16x85	85	3,0	3,0	2,5	-	5,5			
IG-M6	16x130	130	4,5	4,5	3,5		5,5			
M12/M16/	20x85	85	3,0	3,0	2,5		6,0			
IG-M8 / IG-M10	20x130	130	4,5	4,5	3,5		7,0			
1)	20x200	200	4,5	4,5	3,5		7,0			
¹⁾ Values ar ²⁾ Calculatio V _{Rk,b} ³⁾ The value	e valid for c _{cr} and c _{min} on of V _{Rk,c} see Technical es are valid for steel 5.6 c	Report TR 054, exc or greater. For steel	cept for shear lo 4.6 and 4.8 mu	bad parallel to free litiply $V_{Rk,b}$ by 0,	ee edge with c ≥ 8	125 mm	V _{Rk,c,II} =			
ESSVE Inject	ion system ONE, ON	E ICE for mason	iry							
Performance: Installation para Characteristic v	s clay hollow brick H Imeters (continue) alues of resistance unde	Lz-16DF r tension and shear	load		Anne	ex C 19				



Brick type: Cl	ay hollow brick HL	_z-16-DF							
Table C47: 0	Characteristic values	s of resistance un	der tension a	and shear loa	ds (continue)				
				Characte	ristic resistance				
		Effective	Use category						
				d/d					
		anchorage		w/d		w/d			
Anchor size Sleeve	Sleeve	depth		w/w		W/W			
			4000/0400	0000/5000		For all			
			40°C/24°C	80°C/50°C	120°C/72°C	temperature			
		n _{ef}		$N_{Rk,b} = N_{Rk,p}$,	V _{Rk,b}			
		[mm]		[kN]					
		Compressive st	rength f _b ≥ 12	N/mm²					
M8	12x80	80	3,5	3,5	3,0	4,0			
M8 / M10/	16x85	85	3,5	3,5	3,0	6,5			
IG-M6	16x130	130	5,0	5,0	4,5	6,5			
	20x85	85	3,5	3,5	3,0	7,0			
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 st	rength f _b ≥ 14	N/mm ²					
M8	12x80	80	4,0	4,0	3,0	4,0			
M8 / M10/	16x85	85	4,0	4,0	3,0	6,5			
IG-M6	16x130	130	5,5	5,5	4,5	6,5			
MID/MIC/	20x85	85	4,0	4,0	3,0	7,0			
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 Technical Report TR 054, 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 1 1		0.11	0.00	1,10	1,20	1,80
M8 / M10/	16x85	85	1,14		0,11	0,23	1.96	1 50	2.25
IG-M6	16x130	130	1,57	0.10	0,16	0,31	1,00	1,50	2,25
M12 / M16 /	20x85	85	1,14	0,10	0,11	0,23	1,86	1,50	2,25
IG-M8 /	20x130	130	1 57		0.16	0.21	2.57	2.10	0.15
IG-M10 20x20	20x200	200	1,57		0,16	0,31	2,37	2,10	3,15

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Performances clay hollow brick HLz-16DF

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



Brick type: Clay hollow brick F	Porotherm Homebrid	c					
Table C49: Description of the b	orick						
Brick type	Clay hollow hollow	v brick					
Bulk density o [kg/dm	Porotnerm Homer	Porotherm Homebric					
Compressive strength $f_{\rm b} \ge [N/mm]$	$\frac{1}{2}$ 4.6 or 10	4.6 or 10			HHH	HH	
Code	EN 771-1						
Producer (country code)	e.g. Wienerberger	r (FR)					
Brick dimensions [mn] 500 x 200 x 299	. ,			aleo fræder dæteler		
Drilling method	Rotary						
		494 -					
Table C50: Installation paramet	ers			All -1			
Anchor size		[-]		All sizes	1)		
$\begin{array}{c} \text{Minimum edge distance} & \text{C}_{\text{min}}^{2)} \end{array}$		[mm]		100 (120)	1)		
Spacing S _{cr,II}		[mm]		500			
Spacing S _{cr,⊥}		[mm]		299			
Minimum spacing Smin 1) Value in brackets for SH20x85 and 2) For V _{Rk,c} : cmin according to Technic	SH20x130 al Report TR 054	[mm]		100			
Table C51: Group factor for and	hor group in case of	tension le	oading	I		1	
Configuration	with c ≥		with s ≥				
parallel to horizontal	200		100	α _{α.N.II}		2,0	
joint	Ccr		500		[-]	2,0	
⊥: anchors placed	200		100	(i		1,2	
horizontal joint	Ccr		299	Gg,N,⊥		2,0	
ESSVE Injection system ONE, C Performances clay hollow brick	ONE ICE for masonry Porotherm Homebric	1		An	nex C 21		
Installation parameters							



Brick type: Clay sili	icate hollow	brick Porothe	rm Homeb	ric					
Table C52: Group f	actor for ancl	nor group in cas	se of shear l	oading para	llel to free	e edge			
Configuratio	on	with c	2 ≥	with s	≥				
II: anchors placed parallel to horizontal joint		C _{cr}		500		αg,v,II	[-]	2,0	
⊥: anchors placed perpendicular to horizontal joint		Ccr	C _{or}		299			2,0	
Table C53: Group f	actor for ancl	hor group in cas	se of shear l	oading perp	endiculaı	to free	edge		
Configuratio	on	with c	2 ≥	with s	≥				
II: anchors placed parallel to horizontal joint		C _{cr}	Ccr		500		[]	2,0	
⊥: anchors placed perpendicular to horizontal joint		Ccr		299		$\alpha_{g,V,\perp}$	[-]	2,0	
Table C54: Charac	teristic value	s of resistance	under tensio	on and shear	loads				
				Chara	cteristic re	esistanc	e		
				1	jory				
		Effective		d/d			d/d		
		anchorage	w/d					ı/d	
Anchor size	Sleeve depth	depth	w/w						
			40°C/24°C 80°C/50°C	120°C/72	2°C ⊢	For all temperature			
		b	$N_{\text{DLL}} = N_{\text{DL}}^{(1)}$)	V2		e ()3)	
				$N_{Rk,b} = N_{Rk,p}$		KN]		200-20	
		Compressive	strength f.	$> 4 \text{ N/mm}^2$					
M8	12x80	80	0.9	0.9	0.75		20		
	16x85	85	0.9	0.9	0.75		2.0		
M8 / M10/ IG-M6	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		
		Compressive	strength f _b	≥ 6 N/mm ²			(6)		
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		
IG-M8 / IG-M10	20x130	130	1,2	1,2	1,2		3,0		
 ¹⁷ Values are valid f ²⁾ Calculation of V_R V_{Rk,b} ³⁾ The values are values 	for c _{cr} and c _{min} _{k,c} see Technica alid for steel 5.6	Il Report TR 054, e or greater. For ste	except for sheated and 4.8	ar load parallel ¹ multiply V _{Rk,b} l	to free edg by 0,8	e with c	≥ 200 mm:	V _{Rk,c,II} =	
ESSVE Injection sy Performances clay	stem ONE, O	NE ICE for masc Porotherm Hom	onry ebric		_	An	nex C 22		
Installation parameters Characteristic values o	(continue) f resistance und	er tension and she	ar load						



						Chara	cteristic resis	tance		
							Use category			
			Effective			d/d				
Anabaraina	Cleave	anchorage				W/d				
Anchor Size	e c	sleeve	deptil			VV/ VV		Eor all tem	v nerature	
				40°C/2	24°C	80°C/50°C	120°C/72°C	rang	je	
			h _{ef}		N _{Rk,b}		$R_{k,b} = N_{Rk,p}^{(1)}$		V _{Rk,b} ²⁾³⁾	
			[mm]				[kN]			
			Compress	ive strengtl	h f _b ≥ ′	<u>10 N/mm²</u>	4.0			
<u>M8 1</u>		12x80	80	1,2	2	1,2 1,2		3,0	3,0	
M8 / M10/ IG-	M6 1	6×120	120	1,2	:	1,2	1,2	3,0) :	
M12 / M16		20x85	85	1,0	,	1.2	1.0	3,0)	
IG-M8 / IG-M	10 2	0x130	130	1.5		1.5	1.5	4.0)	
Table C56: D	Sleeve	ents Effect anchor	ive age N	r steel 4.6 an δ_N / N	ια 4.8 n δ _N	nuitipiy v _{Rk,b}	∞ V	δνο	δ _{V∞}	
	0,0010	depth	n _{ef}	[mm/kN]	ſmr	n] [mr	n] [kN]	[mm]	[mm]	
M8	12v80	80			[111	n [nn		[,,,,,]	[]	
	16x85	85	0,34		0,2	7 0,5	5 0,0	-		
IG-M6	16x130	130	0.43	0.00	0.3	4 06	9 1.0	1.00	1 00	
M12 / M16 /	20x85	85 0.34		0,80	0.2	7 0.5	5	1,20	1,80	
IG-M8 / IG-M10	20x130	130	0,43		0,3	4 0,6	9 1,14			
M8 M8 / M10/ IG-M6 M12 / M16 / IG-M8 / IG-M10	12x80 16x85 16x130 20x85 20x130	80 85 130 85 130	0,34 0,34 0,34 0,34 0,34 0,0,43	0,80	0,2 0,3 0,2 0,3	7 0,5 4 0,6 7 0,5 4 0,6 4 0,6	$ \begin{array}{c} 0,9\\ 0,9\\ 9\\ 1,0\\ 5\\ 9\\ 1,14\\ \end{array} $	1,20		

ESSVE Injection system ONE, ONE ICE for masonry

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


Brick type: Clay hollow brick	k BG\	/ Thermo						
Table C57: Description of th	e bricl	k						
Brick type		Clay hollow brick						
Bulk density o [kg/c	lm ³]	0,6						
Compressive strength $f_b \ge [N/m]$	im ²]	4, 6 or 10						
Code		EN 771-1						
Producer (country code)		e.g. Leroux (FR)						
Brick dimensions [r	nm]	500 x 200 x 314			and the second			
Drilling method		Rotary						
200							5	
Table C58: Installation parameters								
Anchor size			[-]					
Edge distance C _{cr}	2)		[mm]		$\frac{100 (120)^{1}}{100 (120)^{1}}$			
Sor Sor	<u>n</u> II		[mm]		500			
Spacing Scr.	<u></u>		[mm]		314			
Minimum spacing S _{mi}	n		[mm]		100			
 Value in brackets for SH20x85 a For V_{Rk,c}: c_{min} according to Tech Table C59: Group factor for a 	nd SH2 nical Re ancho r	20x130 eport TR 054 r group in case of te	ensior	n loading				
Configuration		with c ≥		with s ≥				
II: anchors placed	Ī	200		100				1,7
parallel to horizontal		Cor		500		$\alpha_{g,N,II}$		2.0
		200		100			[-]	1 1
perpendicular to horizontal joint	200			314		$\alpha_{g,N,\perp}$		2,0
ESSVE Injection system ONE	, ONE	ICE for masonry						
Performances clay hollow brick BGV Thermo Description of the brick Installation parameters					Annex C 24			



Brick type: Clay hollow brick BGV Thermo								
Table C60: Group factor for anchor group in case of shear loading parallel to free edge								
Configuration	with c ≥	with s ≥						
II: anchors placed parallel to horizontal joint	C _{cr}	500	α _g ,∨,II	F 1	2,0			
⊥: anchors placed perpendicular to horizontal joint	C _{cr}	314	$\alpha_{g,v,\perp}$	[-]	2,0			
Table C61: Group factor for ancho	or group in case of shear	loading perpend	icular to free	edge				
Configuration	with c ≥	with s ≥						
II: anchors placed parallel to horizontal joint	C _{cr}	500	α _{g,V,II}	ſ_1	2,0			
⊥: anchors placed perpendicular to horizontal joint	C _{cr}	314	$\alpha_{g,V,\perp}$	[-]	2,0			
ESSVE Injection system ONE_ONE	FICE for masonry							
Performances clay hollow brick BC		Anı	1ex C 25					



Brick type:	Clay hollo	w brick BGV	Therm	0						
Table C62:	Character	istic values of	i resista	nce under t	ension and	shear load	ls			
					Cha	aracteristic	resistance)		
						Use cate	gory			
		Effectiv	e		d/d			d/d		
		anchora	ge	w/d				w/d		
Anchor size	Sleeve	depth			w/w			w/w		
				40°C/24°C	80°C/50°C	C 120°C	/72°C	For all temp range	erature e	
		h _{ef}			$N_{Rk,b} = N_{Rk}$	r,p		V _{Rk,b} ²	(3)	
		[mm]		[kN]						
		C	ompres	sive streng	th f _b ≥4 N/n	nm²				
M8	12x80	80		0,6	0,6	0,	,6	2,0	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						
Compressive strength f _b ≥ 6 N/mm 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		
	Compressive strength 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 /	20x85	85		0,9	0,9	0,	,9	4,0		
IG-M10	20x130	130		2,0	2,0	1,	5	4,0		
 Values ²⁾ Calcula V_{Rk,b} ³⁾ The val 	are valid for d ation of V _{Rk,c} s lues are valid	c _{cr} and c _{min} ee Technical Re for steel 5.6 or g	eport TR (greater. F)54, except fo or steel 4.6 ai	or shear load p nd 4.8 multiply	parallel to fre y V _{Rk,b} by 0,8	e edge with 3	n c ≥ 250 mm:	V _{Rk,c,II} =	
Table C63:	Displacem	nents								
Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	v	δ _{vo}	δγ∞	
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]	
M8	12x80	80	0.00		0.01	0.44	07			
M8 / M10/	16x85	85	0,26		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	0,00	0,21	0,41	0,86	1,00	1,50	
IG-M8 / IG-M10	20x130	130	0,43		0,34	0,69				

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Performances clay hollow brick BGV Thermo Characteristic values of resistance under tension and shear load Displacements Annex C 26



Brick type: Clay hollow b	orick Cali	bric R+						
Table C64: Description of	of the bric	k						
Brick type		Clay hollow brick Calibric R+						
Bulk density p	[kg/dm ³]	0,6				Sec.		
Compressive strength $f_b \ge 1$	[N/mm ²]	6, 9 or 12					2	
Code		EN 771-1					<	
Producer (country code)		e.g. Terreal (FR)						
Brick dimensions	[mm]	500 x 200 x 314						
Drilling method		Rotary						
						5 *		
Table C65: Installation pa	arameters				All -'			
Anchor size	0		[-] [mm]		All sizes	1)		
Minimum edge distance	C _{Cr} ²⁾		[mm]		100 (120) ¹⁾			
	S _{cr,II}		[mm]		500			
Spacing	S _{cr,⊥}		[mm]		314			
Minimum spacing	S _{min}	Think Waltable	[mm]		100			
¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to T Table C66: Group factor	85 and SH Fechnical R for ancho	20x130 eport TR 054 r group in case of 1	tension	loading				
Configuration		with c ≥		with s ≥				
II: anchors placed		175		100			1,7	
joint		C _{cr}		500	α _{g,N,II}		2,0	
⊥: anchors placed		175		100		[-]	1,0	
perpendicular to	:	Corr		314	α _{g,N,⊥}		20	
ESSVE Injection system ONE, ONE ICE for masonry Performances clay hollow brick Calibric R+ Annex C 27								
Description of the brick Installation parameters								



Brick type: Clay hollow brick Calibric R+									
Table C67:	Group factor f	or anchor group in	case of shear	loading parallel	to free edge				
(Configuration	W	ith c ≥	with s ≥					
II: anchors p parallel to hor joint	laced izontal		C _{cr}	500	α _{g,V,II}		2,0		
⊥: anchors p perpendicul horizontal j	laced ar to oint		C _{cr}	314	$\alpha_{g,V,\perp}$	[-]	2,0		
Table C68: Group factor for anchor group in case of shear loading perpendicular to free edge									
(Configuration	w	ith c ≥	with s ≥					
II: anchors p parallel to hor joint	hors placed I to horizontal joint		C _{cr}	500	α _{g,V,II}	[-]	2,0		
⊥: anchors p perpendicul horizontal j	laced ar to oint		C _{cr}	314	$\alpha_{g,v,\perp}$		2,0		
Table C69: Characteristic values of resistance under tension and shear loads									
				Character	istic resistance				
			Use category						
		Effective		d/d			d/d		
		anchorage		W/a			W/C		
Anchor size	Sleeve	depth				_	For all		
			40°C/24°C	80°C/50°C	120°C/72°C	ter	nperature		
	h_{ef} $N_{Rk,p} = N_{Rk,p}^{1}$ $V_{Rk,b}^{2)3}$								
		[mm]			[kN]				
		Compress	sive strength f _t	, ≥ 6 N/mm²					
M8	12x80	80	0,9	0,9	0,75		3,0		
M8 / M10/	16x85	85	0,9	0,9	0,75		4,0		
	16x130	130	1,2	1,2	0,9		4,0		
IG-M8 /	20x85	65	0,9	0,9	0,75		6,0		
IG-M10	20x130	130	1,2	1,2	0,9		6,0		
		Compress	ive strength f _t	2 2 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-M87 IG-M10	20x130	130	1,5	1,5	1,2		7,5		
¹⁾ Values	s are valid for c _{cr} ar	nd c _{min}	A sussest for she						
	lation of V _{Rk,c} see I	ecnnical Report 1R 05	4, except for sne	ar load parallel to f	ree edge with $c \ge 2$	250 mm	$V_{Rk,c,II} =$		
³⁾ The va	alues are valid for s	steel 5.6 or greater. For	steel 4.6 and 4.8	3 multiply V _{Rk,b} by 0),8				
ESSVE Inj	ection system C	ONE, ONE ICE for m	asonry						
Deví	Destauran alar hallan belah Osthela D					Annex C 28			
	Performances clay hollow brick Calibric R+								
Characterist	ic values of resista	ue) nce under tension and	shear load						
Unaracterist	ic values of resista	nee under tension and	Silear Iuau						



Brick type: Clay hollow brick Calibric R+									
Table C70:	Characteris	tic values of resista	ance under te	ension and	l shear loa	ds (contin	ue)		
					Characteris	stic resistar	nce		
					Use d	category			
		Effective			d/d			d/d	
		anchorage			w/d			w/d	
Anchor size	Sleeve	depth			W/W			W/W	
			40°C/249		C/50°C	12000/70		For all	
			40 0/24		0/00 0	12010/72		range	
		h _{ef}		N _P	$h = N_{\text{Bk} p}^{(1)}$			$V_{\text{Bk}b}^{2)3)}$	
		[mm]		[kN]					
Compressive strength f _b ≥ 12 N/mm ²									
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 $V_{Rk,c}$ see Technical Report TR 054, except for shear load parallel to free edge with $c \ge 250$ 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 $V_{Rk,b}$ by 0,8									
Table C71: Displacements									
		Effective							

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	0.24		0.07	0 55	1,0	1,10	1,65	
M8 / M10/	16x85	85	0,34		0,27	0,55	0,55	1 4 2		
IG-M6	16x130	130	0,43	0.80	0,34		1,43	2,00	3,00	
M12 / M16 /	20x85	85	0,34	ŕ	0,27	0,55				
IG-M8 / IG-M10	20x130	130	0,43		0,34	0,69	2,14			

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Performances clay hollow brick Calibric R+	Annex C 29
Characteristic values of resistance under tension and shear load (continue)	
Displacements	



Brick type: Clay hollow	brick Urb	oanbric							
Table C72: Description	of the brid	:k							
Brick type		Clay hollow brick							
Dulle develte	[] /	Urbanbric				EFFE	10		
Bulk density p		0,7			TEF				
Compressive strength $f_b = \frac{1}{2}$: [N/mm ⁻]	6, 9 or 12			596				
Code		EN 771-1			E				
Producer (country code)		e.g. Imerys (FR)							
Brick dimensions	[mm]	560 x 200 x 274							
Drilling method		Rotary							
<u> </u>		560			99.5	;			
				5					
	ø40		C†	b,0	20	00			
]			
	 6 ;								
				- 40					
Table C73: Installation p Anchor size Installation p	parameters	3	[-]		All sizes				
Edge distance	Ccr		[mm]		$100(120)^{1}$)			
Minimum edge distance	C _{min} ²⁾		[mm]		100 (120) ¹⁾				
Speciag	S _{cr,II}		[mm]		560				
Spacing	$\mathbf{S}_{cr,\perp}$		[mm]		274				
Minimum spacing	Smin		[mm]		100				
 Value in brackets for SH20 For V_{Rk,c}: c_{min} according to Table C74: Group factor)x85 and SH Technical F r for ancho	l20x130 Report TR 054 or group in case of t	tension lo	bading					
Configuration		with c ≥		with s ≥					
II: anchors placed		185		100			1,9		
parallel to horizontal	••	Car		560	α _{g,N,II}		20		
		105		100		[-]	-,0		
perpendicular to	•	185		100	α _{α.Ν}		1,1		
horizontal joint		C _{cr}		274	g, , ,⊥		2,0		
ESSVE Injection system	ONE, ONI	E ICE for masonry							
Performances clay hollo Description of the brick Installation parameters	w brick Uı	banbric			Anr	nex C 30			



Brick type: Cl	ay hollow brick Ur	banbric								
Table C75: G	iroup factor for anch	or group in case	of shear load	ding parallel to	o free edge					
Con	figuration	with c ≥	:	with s ≥						
II: anchors place parallel to horizor joint	ed ntal	C _{cr}		560	α _{g,V,II}	[-]	2,0			
⊥: anchors place perpendicular t horizontal joint	ed o t	C _{cr}		274	$\alpha_{g,V,\perp}$	[-]	2,0			
Table C76: Group factor for anchor group in case of shear loading perpendicular to free edge										
Con	figuration	with c ≥	:	with s ≥						
II: anchors place parallel to horizor joint	ed htal	C _{cr}		560	α _{g,V,II}	[]	2,0			
⊥: anchors place perpendicular t horizontal joint	ed o t	C _{cr}		274	$\alpha_{g,V,\perp}$	[-]	2,0			
Table C77: 0	Characteristic values	s of resistance un	der tension a	and shear load	ds					
				Character	istic resistanc	е				
				Use	category					
		Effective		d/d			d/d			
		anchorage		w/d			w/d			
Anchor size	Sleeve	depth		vv/ vv		F	or all			
			40°C/24°C	80°C/50°C	120°C/72°C	tem	perature			
						r	ange			
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$)	V	2)3) Rk,b			
		[mm]		2	[kN]					
	10.00	Compressive st	trength $f_b \ge 6$	N/mm²						
M8	12x80	80	0,9	0,9	0,75	_	3,0			
M8 / M10/	16x85	85	0,9	0,9	0,75		3,0			
	16X130	130	2,0	2,0	1,5		3,0			
M12/M16/	20x85	120	0,9	0,9	0,75		3,5			
	201130	Compressive st	2,0	2,0	1,5		3,5			
M8	12x80	80		0.9	0.9		4.0			
M8 / M10/	16x85	85	0,0	0,0	0,9		4.0			
IG-M6	16x130	130	2.5	2.5	2.0		4.0			
M12 / M16 /	20x85	85	0.9	0.9	0.9		4.5			
IG-M8 / IG-M10	20x130	130	2,5	2,5	2,0		4,5			
 Values ar Calculatic V_{Rk,b} The value 	e valid for c_{cr} and c_{min} on of $V_{Rk,c}$ see Technical as are valid for steel 5.6	l Report TR 054, exc or greater. For steel	cept for shear lo 4.6 and 4.8 mu	ad parallel to fre Itiply V _{Rk,b} by 0,8	e edge with c ≥ 3	190 mm:	V _{Rk,c,II} =			
ESSVE Inject	ion system ONE, ON	IE ICE for mason	ry							
Performance Installation para Characteristic v	s clay hollow brick L ameters (continue) alues of resistance unde	Jrbanbric er tension and shear	load		Ann	ex C 31				



Brick type:	Clay hollow	brick Urban	bric								
Table C78:	Table C78: Characteristic values of resistance under tension and shear loads (continue)										
					Characteristic resistance						
						Use	e category				
			Effectiv	0		d/d			d/d		
		a	nchora	ae		w/d			w/d		
Anchor size	Slee	ve	depth			w/w			w/w		
								F	or all		
				40	°C/24°C	80°C/50°C	120°C/72	2°C tem	perature		
									2)3)		
			n _{ef}		$N_{Rk,b} = N_{Rk,p}''$				Rk.b		
[mm] [kN]											
$\frac{1}{10000}$											
N8	12x8	30	80		1,2	1,2	0,9		4,5		
M8 / M10/	16x8	35	85		1,2	1,2	0,9		4,5		
IG-M6	16x1	30	130		3,0	3,0	2,5		4,5		
M12 / M16 /	20x8	35	85		1,2	1,2	0,9		5,0		
IG-M8 / IG-M1	0 20x1	30	130		3,0	3,0	2,5		5,0		
¹⁾ Values ²⁾ Calcula V _{Rk,b} ³⁾ The va	are valid for c _{cr} ation of V _{Rk,c} sea lues are valid fo	and c _{min} e Technical Repo or steel 5.6 or gre	ort TR 05 eater. Fo	54, except fo or steel 4.6 a	or shear lo	ad parallel to fre Itiply V _{Rk,b} by 0,	ee edge with 8	n c ≥ 190 mm:	V _{Rk,c,II} =		
Table C79:	Displaceme	nts	_		_						
		Effective									
Anchor size	Sleeve	anchorage	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ_{V0}	δ _{V∞}		
7410101 0120	0,00000	depth h _{ef}									
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]		
M8	12x80	80	0.34		0.27	0.55					
M8 / M10/	16x85	85	0,04		0,27	0,00	1,30				

0,69

0,27

0,69

1,37

0,55

1,37

1,43

1,00

1,50

0,86

0,34

0,86

0,80

130

85

130

ESSVE Injection system ONE, ONE ICE for masonry	
Performances clay hollow brick Urbanbric	Annex C 32
Characteristic values of resistance under tension and shear load (continue)	
Displacements	

IG-M6

M12 / M16 /

IG-M8 /

IG-M10

16x130

20x85

20x130



Brick type: Clay hollow brid	ck Brig	ue creuse C40						
Table C80: Description of t	he bric	k						
		Clay hollow brick						
Brick type		Brique creuse C40						
Bulk density p [kg/	/dm ³]	0,7						
Compressive strength $f_b \ge [N/n]$	mm²]	4, 8 or 12						
Code		EN 771-1						
Producer (country code)		e.g. Terreal (FR)						
Brick dimensions	[mm]	500 x 200 x 200						
Drilling method		Rotary						
	8 1	200		6 1				
	-	1	8 11	6 **				
Table C81: Installation para Anchor size Edge distance	meters		[-] [mm]	200)	All sizes	1)	
Minimum edge distance cr	2) min		[mm]		-	00 (120)1	1)	
Spacing	or,II		[mm]			500		
Spacing	or,⊥		[mm]			200		
Minimum spacing s _r	min		[mm]			200		
Value in brackets for SH20x85 ²⁾ For $V_{Rk,c}$: c _{min} according to Tecl Table C82: Group factor for	and SH2 hnical R ancho i	20x130 eport TR 054 r group in case of t e	ension	loading				
Configuration		with c ≥		with s ≥				
II: anchors placed parallel to horizontal joint		Ccr		200		α _{g,N,II}	[_]	2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr}		200		$\alpha_{g,N,\perp}$	[[]	2,0
ESSVE Injection system ON Performances clay hollow be	E, ONE rick Bri	ICE for masonry que creuse C40				Anr	nex C 33	
Installation parameters								



Brick type: C	lay hollow brick Bri	que creuse C4	0				
Table C83: G	aroup factor for anche	or group in case	of shear loa	ding parallel t	o free edge		
Cor	figuration	with c ≥	:	with s ≥			
II: anchors place parallel to horizon joint	ed ntal	C _{cr}		500	α _{g,V,II}		2,0
⊥: anchors place perpendicular t horizontal join	ed o t	C _{cr}		200	$\alpha_{g,V,\perp}$	[-]	2,0
Table C84: G	aroup factor for anch	or group in case	of shear loa	ding perpendi	cular to free e	edge	
Cor	figuration	with c ≥	:	with s ≥			
II: anchors place parallel to horizon joint	ed ntal	Ccr		500	α _{g,V,II}	F 1	2,0
⊥: anchors plac perpendicular t horizontal join	ed o t	Ccr		200	$\alpha_{g,V,\perp}$	[-]	2,0
Table C85: 0	Characteristic values	of resistance ur	der tension	and shear loa	ds		
				Characte	ristic resistance	Э	
				Use	e category		
		Effective		d/d			d/d
		anchorage		w/d			w/d
Anchor size	Sleeve	depth		w/w			w/w
			4000/0400	0000/5000	10000/7000	F	or all
			40°C/24°C	80°C/50°C	120°C/72°C	tem	perature
	-	h.)		2)3)
	-	[mm]		Rk,b — NRk,p	[kN]	V	Rk,b
		Compressive st	trength $f_{\rm h} \ge 4$	N/mm ²			
M8	12x80	80	0.6	0.6	0.6		0.9
M8 / M10/	16x85	85	0.6	0.6	0.6		0.9
IG-M6	16x130	130	0,6	0,6	0.6		0.9
M12 / M16 /	20x85	85	0,6	0,6	0,6		0,9
IG-M8 / IG-M10	20x130	130	0,6	0,6	0,6		0,9
		Compressive st	trength $f_b \ge 8$	N/mm ²			
M8	12x80	80	0,9	0,9	0,75		1,2
M8 / M10/	16x85	85	0,9	0,9	0,75		1,2
IG-M6	16x130	130	0,9	0,9	0,75		1,2
M12 / M16 /	20x85	85	0,9	0,9	0,75		1,2
IG-M8 / IG-M10	20x130	130	0,9	0,9	0,75		1,2
 Values ar Calculation The value 	re valid for c _{cr} and c _{min} on of V _{Rk,c} see Technical es are valid for steel 5.6 c	Report TR 054 or greater. For steel	4.6 and 4.8 mi	ultiply V _{Rk,b} by 0,	8		
ESSVE Inject Performances Installation para Characteristic v	tion system ONE, ON s clay hollow brick B umeters (continue) alues of resistance under	E ICE for mason rique creuse C4(r tension and shear	ry) load		Anne	ex C 34	
l							



						Character	ristic resist	ance	
						Use	category		
			Effectiv	e		d/d			d/d
		a	nchora	ge		w/d			w/d
Anchor size	Slee	ve	depth			w/w			
				40°	C/24°C	80°C/50°C	120°C/72	°C .	temperature
				40	0/24 0	00 0/00 0	120 0/12		range
			h _{ef}			$N_{Bk,p} = N_{Bk,p}^{1}$)		V _{Rk.b} ²⁾³⁾
			[mm]				[kN]		
		Cor	npressi	ve strengt	h f _b ≥ 12	N/mm ²			
M8	12x8	30	80		1,2	1,2	0,9		1,5
M8 / M10/	16x8	35	85		1,2	1,2	0,9		1,5
IG-M6	16x1	30	130		1,2	1,2	0,9		1,5
M12 / M16 /	20x8	35	85		1,2	1,2	0,9		1,5
<u>G-M8 / IG-M1</u>	0 20x1	30	130		1,2	1,2	0,9		1,5
Table C87:	Displaceme	nts Effective							
Anchor size	Sleeve	anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{vo}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]] [mm]
M8	12x80	80	0,17		0,14	0,27			
M8 / M10/	16x85	85					-		
	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-M10	20x130	130	0,14		0,11	0,23			
ESSVE Inie	ection system		E for m	asonry					



Brick type: Clay hollow brick	k Blo	cchi Leggeri					
Table C88: Description of the	e bric	:k					
Brick type		Clay hollow brick					
Bulk density o [kg/c	1m ³ 1						
Compressive strength $f_{\rm b} \ge [N/m]$	m^2	4, 6, 8 or 12			A.		
		EN 771-1				10	
Producer (country code)		e.g. Wienerberger	(IT)				
Brick dimensions [r	nm]	250 x 120 x 250	<u> </u>				
Drilling method		Rotary					
				6-11	= 1		
}					1		
					1		
120 }				32 - 43			
					5		
		250) (
Table C89: Installation param	neters	3					
Anchor size			[-]		All sizes		
Edge distance c _{cr}			[mm]		100 (120)	1)	
Minimum edge distance c _{mi}	n		[mm]		60		
Spacing Scr.	,11		[mm]		250		
Scr.	,⊥		[mm]		120		
Minimum spacing S _{mi}		100 and 01 100,000	լՠՠֈ		100		
Value in brackets for SH20x85; S	SH20x	130 and SH20x200					
Table COOL Crown factor for a	maha	r aroun in cocc of t	onolon	looding			
	ancho	in group in case of t	ension	loading			1
	T	with c ≥		with s ≥			
II: anchors placed		60		100	(A N II		1,0
joint		C _{cr}		250	Ctg,N,II		2,0
⊥: anchors placed	Ŧ	- Schröcken				- [-]	
perpendicular to		60		100	$\alpha_{g,N,\perp}$		2,0
horizontal joint	1						
				I			
ESSVE Injection system ONE	, ONE	EICE for masonry					
Performances clay bollow bri	ck Bl	occhi Leggeri			An	nex C 36	
Description of the brick		coon Leggen					
Installation parameters							



Brick type: C	lay hollow brick Blo	cchi Leggeri					
Table C91: C	Group factor for ancho	or group in case o	of shear loadi	ng parallel to	free edge		_
Cor	figuration	with c ≥		with s ≥			
II: anchors plac	ed	60 ¹⁾		100 ¹⁾	(Co VIII		1,0
joint		C _{cr}		250	αg,v,li		2,0
⊥: anchors plac	ed	60 ¹⁾		100 ¹⁾		[-]	1,6
horizontal join	t	C _{cr}		250	α _{g,V,⊥}		2,0
¹⁾ Only valid for V_{f}	Rk,b according to Table C93	3 and C94 values in	brackets				
Table C92: 0	Group factor for ancho	r group in case o	of shear loadi	ng perpendic	cular to free	edge	
Cor	figuration	with c ≥		with s ≥			
II: anchors plac	ed	60 ¹⁾		100 ¹⁾			1,0
joint	ntal	C _{cr}		250	α _{g,V,II}		2,0
⊥: anchors plac	ed	60 ¹⁾		100 ¹⁾		[-]	1.6
perpendicular horizontal join	to	Ccr		250	α _{g,V,⊥}		2,0
			bracketa	200			2,0
Table C93:	Characteristic values of	of resistance und	er tension ar	id shear load	l s ristic resistan	ice	
				Use	category		
		Effective		d/d;	w/d; w/w		
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°	°C ter	For all nperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		V _{Bk,b} ⁴⁾
		[mm]			[kN]		
		Compressive stre	ength f _b ≥ 4 N	l/mm ²			
M8	12x80	80					
M8 / M10/	16x85	85					
IG-M6	16x130	130	0.4	0.4	0.0		o^{2} (o^{3})
	20x85	85	0,4	0,4	0,3	2,	0 (0,9)
M12/M16/	20x130	130					
IG-M8 / IG-MITU	20x200	200	1				
		Compressive stre	ength f _b ≥ 6 N	l/mm ²			
M8	12x80	80					
M8 / M10/	16x85	85					
IG-M6	16x130	130	1				-2)
	20x85	85	0,5	0,5	0,4	2,	5 ⁻⁷ (1,2) ³⁷
M12 / M16 /	20x130	130	1				
IG-M8 / IG-M10	20x200	200	1				
 Values are va Calculation of Values in brac The values ar 	lid for c_{cr} and c_{min} V _{Rk,c} see Technical Report ckets V _{Rk,c} = V _{Rk,b} for anch e valid for steel 5.6 or grea	rt TR 054, except for ors with c _{min} ater. For steel 4.6 ar	r shear load par nd 4.8 multiply V	⊔ allel to free edo / _{Rk,b} by 0,8	ge with c ≥ 125	5 mm: V _{Rk}	$_{,c,II} = V_{Rk,b}$
ESSVE Injec Performance	tion system ONE, ONE s clay hollow brick Blo	E ICE for masonry occhi Leggeri	y		Anr	nex C 37	
Installation para Characteristic v	ameters (continue) values of resistance under	tension and shear lo	bad				



Brick type:	Clay hollo	ow brick Blo	cchi Lo	eggeri						
Table C94:	Characte	ristic values o	of resis	tance unde	er tension an	d shear load	ls (contir	nue)		
						Characte	ristic resis	stance		
						Use	e category	/		
			Eff	ective			d/d			
			anc	horage			w/d			
Anchor size	S	Sleeve	d	epth						or all
					40°C/24°C	80°C/50°C	120°C	/72°C	tem r	perature ange
				h _{ef}		$N_{Bk,b} = N_{Bk,i}$	1)		\	$I_{\text{Bk,b}}^{4)}$
			[mm]			[kN]			
						. 2				
N/0		1000	Compr	essive stre	$ngth f_b \ge 8 N$	/mm ⁻				
		12x80		80						
M8 / M10/		16X85		120						
10-100		00,000		95	0,6	0,6	0,	5	3,0 ²	²⁾ (1,2) ³⁾
M12/M16/	2	20803		120						
IG-M8 / IG-M1	0 2	0x200		200						
	_	(Compre	essive strer	nath $f_{\downarrow} \ge 12$ N	J/mm ²				
M8	-	12x80	50mpre	80	·g					
M8 / M10/		16x85		85						
IG-M6	1	6x130		130					0.5	$(\mathbf{z}, \mathbf{z}, \mathbf{z})$
	2	20x85		85	0,6	0,6	0,	6	3,5	⁻ / (1,5) [°] /
M12/M16/	0 2	0x130		130						
	2	0x200		200						
²⁾ Calcul V _{Rk,b} ³⁾ Values ⁴⁾ The va	ation of V _{Rk,c} in brackets alues are vali	see Technical F $V_{Rk,c} = V_{Rk,b}$ for a d for steel 5.6 or ments	Report Th anchors greater	R 054, excep with c _{min} . For steel 4.6	t for shear load 6 and 4.8 multi	d parallel to fre ply V _{Rk,b} by 0,8	e edge wit	h c ≥ 125	mm: '	V _{Rk,c,II} =
Anchor	Sloovo	Effective anchorage	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{vo}		δ _{V∞}
size	Sleeve	depth h _{ef}								
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
All sizes	All sizes	All sizes	0,17	1,20	0,21	0,41	0,9	1,20)	1,80
ESSVE Inje Performan Characteristi Displacemen	ection syst ces clay ho c values of re	em ONE, ONE bllow brick Blo esistance under	E ICE fo	e r masonry eggeri and shear loa	ad (continue)			Annex (C 38	



Brick type: Clay hollo	w brick Do	opio Uni				
Table C96: Descriptio	on of the brid	spie em				
Defektive		Clay hollow brick				
Brick type		Doppio Uni			-	
Bulk density	ρ [kg/dm³]	0,9		all links	-	
Compressive strength ft	$_{\rm D} \ge [{\rm N/mm}^2]$	10, 16, 20 or 28				
Code		EN 771-1				
Producer (country code)		e.g. Wienerberger (IT)				
Brick dimensions	[mm]	250 x 120 x 120				
Drilling method		Rotary				
	11	9 9 9 9 9 9 9 9 9 9 9 9 9 9		120		
Table C97: Installation	n parameters	3				
Anchor size		[-]		All sizes		
Edge distance	Ccr	[mm]	100 (120) ¹	1)	
Minimum edge distance	C _{min} ²⁾	[mm]	60		
Spacing	S _{cr,II}	[mm]	250		
	S _{cr,⊥}	[mm]	120		
Minimum spacing	Smin,II	[mm]	100		
¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according Table C98: Group fact	I20x85; SH20x to Technical F or for ancho	130 and SH20x200 Report TR 054 or group in case of tensio	n loading			
Configuration		with c ≥	with s ≥			
II: anchors placed		60	100			1,0
parallel to horizontal joint		C _{cr}	250	α _{g,N,II}		2,0
⊥: anchors placed perpendicular to horizontal joint		60	120	$\alpha_{g,N,\perp}$		2,0
ESSVE Injection syste Performances clay hol	m ONE, ONE low brick Do	E ICE for masonry oppio Uni		Anı	nex C 39	
Installation parameters						



Brick type: C	lay hollow brick Dop	pio Uni					
Table C99: 0	Group factor for ancho	r group in case o	of shear loadi	ng parallel t	o free edge		
Cor	nfiguration	with c ≥		with s ≥			
II: anchors plac parallel to horizo joint	ed ntal	Ccr		250	α _g ,v,II		2,0
⊥: anchors plac perpendicular t horizontal join	ed to	Ccr		120	$\alpha_{g,V,\perp}$	[-]	2,0
Table C100: 0	aroup factor for ancho	r group in case o	of shear loadi	ng perpendi	cular to free	edge	
Cor	nfiguration	with c ≥		with s ≥			
II: anchors plac parallel to horizo joint	ed ntal	C _{cr}		250	α _{g,V,II}		2,0
⊥: anchors plac perpendicular t horizontal join	ed to t	C _{cr}		120	$\alpha_{g,V,\perp}$	[-]	2,0
Table C101:	Characteristic values of	of resistance und	ler tension ar	nd shear load	ds		
				Characte	eristic resistan	се	
				Us	e category		
		Effective			d/d		
		anchorage			w/d		
Anchor size	Sleeve	depth			w/w		F A II
			40°C/24°C	80°C/50°C	120°C/72°0	C ter	For All nperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,b}$	1) p		$V_{Rk,b}^{(2)3)}$
		[mm]			[kN]		
	(Compressive stre	ngth f _b ≥ 10 I	N/mm²			
M8	12x80	80					
M8 / M10/	16x85	85					
IG-M6	16x130	130	0.6	0.6	0.5		15
M12/M16/	20x85	85	0,0	0,0	0,0		1,0
IG-M8 / IG-M10	20x130	130					
	20x200	200					
	(Compressive stre	ength f _b ≥ 16 I	N/mm²			
M8	12x80	80	-				
M8 / M10/	16x85	85	_				
IG-M6	16x130	130	0.75	0.75	0.6		2.0
M12/M16/	20x85	85	- 0,70	0,70	0,0		2,0
IG-M8 / IG-M10	20x130	130	-				
1)	20x200	200					
 Values at ²⁾ Calculation ³⁾ The value 	re valid for c_{cr} and c_{min} on of $V_{Rk,c}$ see Technical F es are valid for steel 5.6 or	Report TR 054 greater. For steel 4	.6 and 4.8 multi	iply V _{Rk,b} by 0,8	3		
ESSVE Inject	tion system ONE, ONE	EICE for masonry	/				
Performance Installation para Characteristic v	s clay hollow brick Do ameters (continue) ralues of resistance under	ppio Uni tension and shear lo	bad		Ann	ex C 40	



Brick type: C	lay hollo	w brick Dop	pio Un	ni						
Table C102:	Characte	ristic values o	of resis	tance unde	er tension an	d shear load	ds (contin	ue)		
				_		Characte	ristic resis	stance		
				-		Use	e category			
			Eff	ective			d/d			
			anc	horage			W/d			
Anchor size	S	Sleeve	d	epth					Fo	r All
					40°C/24°C	80°C/50°C	120°C/	72°C	tempe	erature
				1-			1)		rai	2)3)
				n _{ef}		$N_{Rk,b} = N_{Rk,b}$			VR	(,b
			`ompre	ninj ecivo etror	ath $f_{\rm c} > 20$ N	l/mm ²	נאואן			
MQ		2280	Jompre		$ g_{\rm III} _{\rm b} \ge 20$ F	N/11111				
		2X00		85						
	1	6×130		120						
		02130		95	0,9	0,9	0,7	5	2	,0
M12 / M16 /	2	0x130		120						
IG-M8 / IG-M10	2	0×200		200						
	2	0,200	Compre	esive strer	ath f. > 28 N	J/mm ²				
M8	1	2×80	Jompre	80						
		6x85		85						
IG-M6	1	6x130		130						
		20x85		85	1,2	1,2	0,9	9	2	,5
M12 / M16 /	2	0x130		130						
IG-M8 / IG-M10	$\frac{2}{2}$	0x200		200						
²⁾ Calcula ³⁾ The valu Table C103:	tion of V _{Rk,c} ues are valid Displace	see Technical R d for steel 5.6 or ments	leport TF greater.	R 054 For steel 4.6	5 and 4.8 multi	ply V _{Rk,b} by 0,8	3			
Anchor	Sleeve	Effective anchorage depth hef	N	δ_{N} / N	δ _{N0}	δ _{N∞}	v	δ_{V0}		δ∨∞
3126		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mn	າ]	[mm]
All sizes	All sizes	All sizes	0.26	1.20	0.31	0.62	0.6	0.3	3	0.45
ESSVE Inje	es clay ho	em ONE, ONE	ICE fo	r masonry ni				Annex	C 41	
Displacement	values of re	esistance under	tension	and shear loa	au (continue)					



Brick type: Hollow Ligh	nt weight o	concrete Bloc creu	ux B40				
Brick type		Hollow light weight	concrete				
Dulla densita	FI	Bloc creux B40					
Bulk density	$\rho [kg/dm^{\circ}]$	0,8					
Compressive strength T _b	≥ [N/mm ⁻]	4				and the second	uame
Code		EN 771-3					C.F.
Producer (country code)		e.g. Sepa (FR)			STORE STREET, STORE ST	Change & Mangard	and the second second
Brick dimensions	[mm]	494 x 200 x 190					
Drilling method		Rotary					
]	494					
200					17		
			17	,			
Table C105: Installation	parameters	;					
Anchor size			[-]		All sizes		
Edge distance	Ccr		[mm]		100 (120) ¹)	
Minimum edge distance	C _{min} ²⁾		[mm]		100 (120) ¹)	
Spacing	S _{cr,II}		[mm]		494		
Misissur seresies	S _{cr,⊥}		[mm]		190		
¹⁾ Value in brackets for SH2 ²⁾ For V _{Bk c} : c _{min} according t	o Technical R	20x130 Report TR 054	[mm]		100		
Table C106: Group factor	or for ancho	or group in case of t	ension lo	ading			
Configuration		with c ≥		with s ≥			
II: anchors placed		100		100			1,5
parallel to horizontal	••	C _{cr}		494	α _{g,N,II}		2,0
⊥: anchors placed		100		100		[-]	1.0
perpendicular to horizontal joint	•	C _{cr}		190	α _{g,N,⊥}		2,0
ESSVE Injection system Performances hollow lin Description of the brick	n ONE, ONE ght weight o	E ICE for masonry concrete Bloc creux	к B40		Anr	nex C 42	



Brick type	e: Hollow	Light weigh	t concret	e Bloc cre	eux B40					
Table C107	: Group	factor for anc	hor group	in case of	shear load	ling paralle	el to free	e edg	е	
	Configurati	on		with c ≥		with s ≥				
II: anchors	placed			50		100				1,1
parallel to he joint	orizontal			Ccr		494		α _{g,V,II}		2,0
⊥: anchors	placed			100		100			[-]	1,1
horizonta	l joint			Ccr		190		α _{g,V,⊥}		2,0
Table C108	3: Group f	actor for anc	hor group	in case of	shear load	ling perper	ndiculaı	r to fr	ee edge	
	Configurati	on		with c ≥		with s ≥				
II: anchors parallel to he joint	placed prizontal			C _{cr}		494		α _{g,V,II}	[-]	2,0
⊥: anchors perpendic horizonta	placed ular to I joint			C _{cr}		190		$\alpha_{g,V,\bot}$		2,0
Table C109): Characte	eristic values	of resista	nce under	tension an	d shear loa	ads			
					Char	acteristic re	sistance	Э		
						Use catego	ory			d/d
		Effective		d/d			w/d			w/d
Anchor size	Sleeve	depth					W/W			w/w
		•	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50)°C 12	20°C/72°C	For all temperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,t}$	1)	1	$V_{Rk,b} = N$	Rk.p ¹⁾		V _{Rk,b} ²⁾³⁾
		[mm]				[kN]				
		I	Compre	essive stre	ngth f _b ≥ 4	N/mm ²				
M8	12x80	80	1,2	0,9	0,75	0,9	0,9		0,75	3,0
M8 / M10/	16x85	85	1,2	0,9	0,75	1,2	0,9		0,75	3,0
	16x130	130	1,2	0,9	0,75	1,2	0,9		0,75	3,0
IG-M8 /	20x85	85	1,2	0,9	0,75	1,2	0,9		0,75	3,0
IG-M10	20x130	130	1,2	0,9	0,75	1,2	0,9		0,75	3,0
¹⁾ Valu ²⁾ Calc V _{Rk,t} ³⁾ The Table C11	es are valid ulation of V _F values are v 0: Displace	for c _{cr} and c _{min} _{lk,c} see Technica alid for steel 5.6 ements	al Report TF 6 or greater.	R 054, excep For steel 4.6	t for shear lo 6 and 4.8 mu	ad parallel to Itiply V _{Rk,b} by	free edg	ge with	n c ≥ 250 m	ım: V _{Rk,c,ll} =
Anchor	Sleeve	Effective anchorag	e N	δ _N / N	δ _{N0}	δ _{N∞}	V	/	δ_{V0}	δ _{∨∞}
size	0 CIECVE	depth h _e	F FLNI	[mm/kN]]	[mm]	[mm]			[mm]	[mm]
All sizes	All sizes	All sizes	0,34	0,90	0,31	0,62	0,8	36	0,9	1,35
ESSVE In Performa Installation Characteri	njection sy nces hollo parameters stic values o	stem ONE, O bw light weigh (continue) f resistance und	NE ICE for	r masonry e brick Blo and shear loa	oc creux B4	0 ments			Annex C	43



Brick type		Solid light weight o	concrete b	rick			
Bulk density	ρ [kg/dm ³]	0,6				and all	
Compressive strength f	$h \ge [N/mm^2]$	2					
Code		EN 771-3				16103-3	
Producer (country code)		e.g. Bisotherm (DE	Ξ)				
Brick dimensions	[mm]	300 x 123 x 248	_/			S. The sea	
Drilling method	[]	Rotary			一口的自己的意义	No.	
Table C112: Installatio	n parameter						
Anchor size	•		[-]		All sizes		
Edge distance	Ccr		[mm]		1,5*h _{ef}		
linimum edge distance	Cmin		[mm]		60		
Spacing	Scr		[mm]		3*h _{ef}		
/linimum spacing	Smin		[mm]		120		
Configuration II: anchors placed		with c ≥ 90		with s ≥ 120			1,1
parallel to horizontal		1,5*hef		3*h _{ef}	α _{g,N,II}		2,0
⊥: anchors placed		124		120		[-]	1,1
perpendicular to horizontal joint		1,5*hef		3*h _{ef}	$\alpha_{g,N,\perp}$		2,0
Table C114: Group fact	tor for ancho	or group in case of s	shear load	ding parallel to	free edge		
		5					
Configuration		with c ≥		with s ≥			
Configuration		with c ≥ 60		with s ≥ 120			0,6
Configuration II: anchors placed parallel to horizontal joint	V•	with c ≥ 60 90		with s ≥ 120 120	α _{g,V,II}	. [.]	0,6 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed		with c ≥ 60 90 60		with s ≥ 120 120 120	α _{g,V,II}	· [-]	0,6 2,0 0,6
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint		with c ≥ 60 90 60 124		with s ≥ 120 120 120 120 120	α _{g,V,I}	· [-]	0,6 2,0 0,6 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact	v •••	with c ≥ 60 90 60 124 or group in case of s	shear load	with s ≥ 120 120 120 120 120 ding perpendic	$\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$ ular to free	edge	0,6 2,0 0,6 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration	V • • • • • • • • • • • • • • • • • • •	with c ≥ 60 90 60 124 er group in case of s with c ≥	shear load	with s ≥ 120 120 120 120 120 ding perpendic with s ≥	$ \alpha_{g,V,II} $ $ \alpha_{g,V,\perp} $ ular to free	edge	0,6 2,0 0,6 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed	V •• tor for ancho	with c ≥ 60 90 60 124 or group in case of s with c ≥ 60	shear load	with s ≥ 120 120 120 120 120 ding perpendic with s ≥ 120	α _{g,V,II} α _{g,V,⊥} ular to free	edge	0,6 2,0 0,6 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint	tor for ancho	with c ≥ 60 90 60 124 or group in case of s with c ≥ 60 90	shear load	with s ≥ 120 120 120 120 ding perpendic with s ≥ 120 120 120	α _{g,V,II} α _{g,V,⊥} ular to free	edge	0,6 2,0 0,6 2,0 0,6 2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint L: anchors placed	V ••• tor for ancho	with c ≥ 60 90 60 124 or group in case of s with c ≥ 60 90 60 90 60	shear load	with s ≥ 120 120 120 120 120 120 120 120	$\begin{array}{c c} & \alpha_{g,V,II} \\ \hline & \alpha_{g,V,\perp} \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	edge	0,6 2,0 0,6 2,0 0,6 2,0 0,6
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint II: anchors placed parallel to horizontal joint L: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	tor for ancho	with c ≥ 60 90 60 124 or group in case of s with c ≥ 60 90 60 124	shear load	with s ≥ 120	$\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$ $\alpha_{g,V,\perp}$	edge	0,6 2,0 0,6 2,0 0,6 2,0 0,6 1,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint II: anchors placed parallel to horizontal joint II: anchors placed perpendicular to horizontal joint L: anchors placed perpendicular to horizontal joint	tor for ancho	with c ≥ 60 90 60 124 or group in case of s with c ≥ 60 90 60 124 or group in case of s 00 60 90 60 1,5*hef 1,5*hef	shear load	with s ≥ 120 120 120 120 120 ding perpendic with s ≥ 120 120 120 120 120 120 120 3*h _{ef}	$ \begin{array}{c c} & \alpha_{g,V,II} \\ \hline & \alpha_{g,V,\bot} \\ \hline \\ ular to free \\ \hline & \alpha_{g,V,II} \\ \hline & \alpha_{g,V,II} \\ \hline & \alpha_{g,V,\bot} \\ \end{array} $	edge	0,6 2,0 0,6 2,0 0,6 2,0 0,6 1,0 2,0

Deutsches Institut für Bautechnik

Brick type: Solid light weight concrete brick - LAC												
Table C116: Characteristic values of resistance under tension and shear loads												
	Sleeve		Characteristic resistance									
Anchor size			Use category									
		Effective anchorage depth	d/d					d/d w/d w/w				
			40°C/24°C	80°C/50°	C 120°C/72	°C 40°	°C/24°C	80°C/50°C	120°C/72°C	For all temperature range		
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{(1)}$				$N_{Bk,p} = N_{Bk,p}^{(1)}$				
		[mm]		[kN]								
Compressive strength f _b ≥ 2 N/mm ²												
M8	-	80	3,0	2,5	2,0		2,5	2,0	1,5	3,0		
M8 / M10/ IG-M6	-	90	3,0	3,0	2,0		2,5	2,5	2,0	3,0		
M10 / IG-M8	-	100	3,5	3,0	2,5		3,0	2,5	2,0	3,0		
M16 / IG-M10	-	100	3,0	3,0	2,0		3,0	3,0	2,0	3,0		
M8	12x80	80	2,5	2,5	2,0		2,5	2,0	1,5	3,0		
M8 / M10/	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	20x85	85	2,5	2,5	2,0		2,5	2,5	2,0	3,0		
/ IG-M8 /	20x130	130	2,5	2,5	2,0		2,5	2,5	2,0	3,0		
IG-M10	20x200	200	2,5	2,5	2,0		2,5	2,5	2,0	3,0		
 Values are valid for c_{cr}, values in brackets are valid for single anchors with c_{min} For calculation of V_{Rk,c} see ETAG029, Annex C 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 C117: Displacements 												
			Effective									
Anchor	size	e Sleeve	anchorage depth h _{ef}	Νδ	_N / N	δ_{N0}	δ _{N∝}	. V	δ_{V0}	δ _{V∞}		
			[mm]	[kN] [m	m/kN] [I	nm]	[mm	1] [kN] [mm]	[mm]		
M8		-	80									
M8 / M10/ IG-M6		-	90	0,86	0,50 (),43	0,8	6				
M10 / IG-M8		-	100	1,00) 25 (),35	0,7	0				
M16 / IG-M10		-	100	0,86	,35 (,30	0,6	0				

			-,		-,	-,			
M8	12x80	80	0,71	0,50	0,36	0,71	0,9	0,25	0,38
M8 / M10/ IG-M6	16x85	85		0,35	0,25	0,50			
	16x130	130							
	20x85	85							
M12/M16/	20x130	130							
	20x200	200							

ESSVE Injection system ONE, ONE ICE for masonry

Performances solid light weight concrete brick - LAC Characteristic values of resistance under tension and shear load Displacements Annex C 45