



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

Produsent:

ESSVE Produkter AB BOX 7091 164 07 Kista Sweden

info@essve.se

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 Rebar Ø8 to Ø32	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
ETA-10/0042 (2018-10-08)		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 European Technical Assessment:

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

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

This version replaces

Deutsches Institut für Bautechnik

Injection system ESSVE ONE or ESSVE ONE-ICE for concrete

Bonded fastener for use in concrete

ESSVE Produkter AB Esbogatan 14 164 74 KISTA SCHWEDEN

ESSVE Plant No. 671

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

EAD 330499-01-0601

ETA-18/0617 issued on 15 February 2019



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

Page 2 of 31 | 11 December 2019

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.



Page 3 of 31 | 11 December 2019

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



Page 4 of 31 | 11 December 2019

European Technical Assessment ETA-18/0617

English translation prepared by DIBt

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

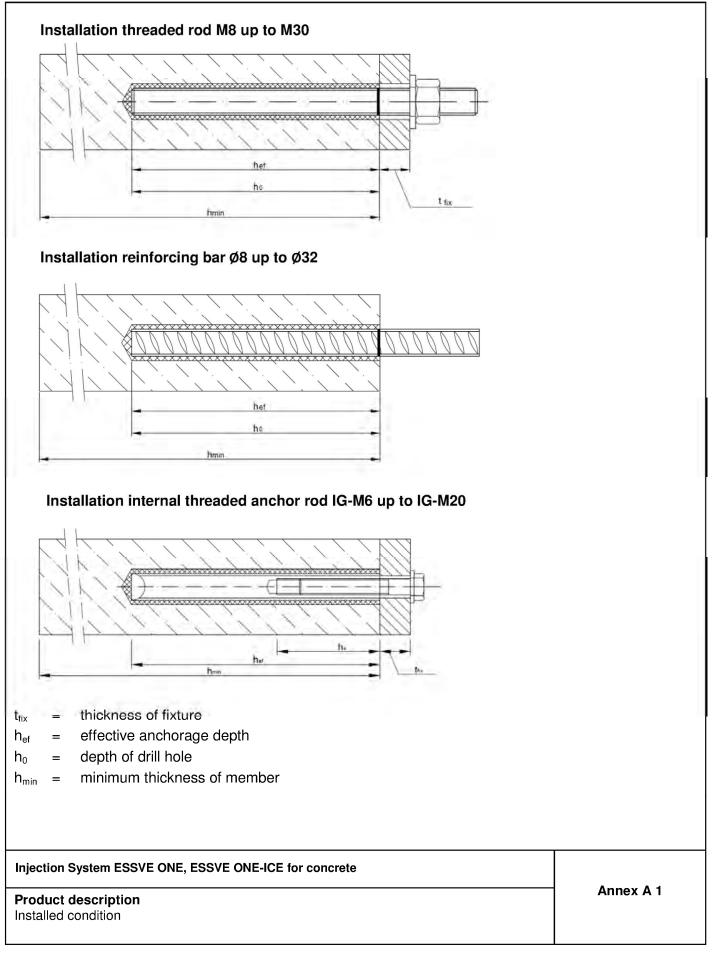
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

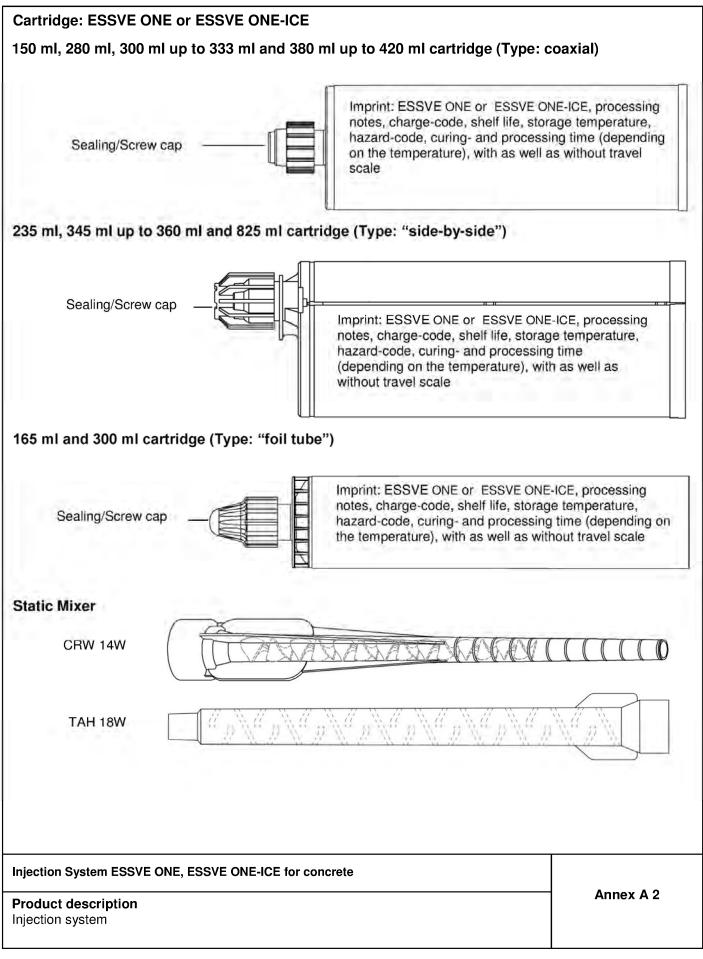
Issued in Berlin on 11 December 2019 by Deutsches Institut für Bautechnik

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











Threaded rod M8, M10, M12, M16, M20, M24, M27, M30 with washer and hexage	on nut
d h _{ef} d d h _{ef} d h _{ef} to EN	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)
Image: Back state Image: Back Image: Back Image	
I Marking Internal thread Mark M8 Thread size (Internal thread) A4 additional mark for stainless steel HCR additional mark for high-corrosion resi Filling washer and mixer reduction nozzle for filling the annular gap between a	
fixture 3b	
Injection System ESSVE ONE, ESSVE ONE-ICE for concrete	
Product description Threaded rod, internal threaded rod and filling washer	Annex A 3



Part	Designation	Material					
	I, zinc plated (Steel acc. to I		63:200	1)			
zir ho	ic plated $\ge 5 \mu m$ t-dip galvanised $\ge 40 \mu m$	acc. to EN ISO 4042:1999 acc. to EN ISO 1461:2009 acc. to EN ISO 17668:2016	or and El		AC:2009 or		
		Property class		Characteristic tensile strength	Characteri yield stren		Elongation at fracture
			4.6	f _{uk} = 400 N/mm ²	f _{yk} = 240 N	I/mm²	A ₅ > 8%
1	Threaded rod		4.8	f _{uk} = 400 N/mm ²	f _{vk} = 320 N	I/mm²	A ₅ > 8%
'		acc. to		f _{uk} = 500 N/mm ²	f _{vk} = 300 N	l/mm²	A ₅ > 8%
		EN ISO 898-1:2013		f _{uk} = 500 N/mm ²	f _{vk} = 400 N		A ₅ > 8%
				$f_{uk} = 800 \text{ N/mm}^2$	f _{vk} = 640 N		A ₅ ≥ 8%
			4	for threaded rod c			
2	Hexagon nut	acc. to EN ISO 898-2:2012	5	for threaded rod c			
	-	EN 130 090-2.2012	8	for threaded rod c	lass 8.8		
3a	Washer	Steel, zinc plated, hot-di (e.g.: EN ISO 887:2006,				100 or E	N ISO 7094-200
3b	Filling washer	Steel, zinc plated, hot-di					100 7004.200
-		Property class		Characteristic	Characteri	stic	Elongation at
	Internal threaded			tensile strength	yield stren		fracture
4	anchor rod	acc. to	5.8	f _{uk} = 500 N/mm ²	f _{yk} = 400 N	I/mm²	A ₅ > 8%
		EN ISO 898-1:2013	8.8	f _{uk} = 800 N/mm²	f _{yk} = 640 N	I/mm²	A ₅ > 8%
	nless steel A4 (Material 1.44 corrosion resistance stee					stic	Elongation at fracture
	1)3)		50	$f_{uk} = 500 \text{ N/mm}^2$	f _{vk} = 210 N	-	A ₅ ≥ 8%
1	Threaded rod ¹⁾³⁾	acc. to		$f_{uk} = 700 \text{ N/mm}^2$	f _{vk} = 450 N		A ₅ ≥ 8%
		EN ISO 3506-1:2009	80		$f_{vk} = 600 \text{ N}$		$A_5 \ge 8\%$
			50		1.1		1.5 6.6
2	Hexagon nut ¹⁾³⁾	acc. to	70				
	Ŭ	EN ISO 3506-1:2009	80	for threaded rod c			
3а	Washer	A2: Material 1.4301 / 1.4 A4: Material 1.4401 / 1.4 HCR: Material 1.4529 or (e.g.: EN ISO 887:2006,	404 / 1.456 EN IS	l.4571 / 1.4362 or 1 5, acc. to EN 10088 O 7089:2000, EN IS	l.4578, acc 3-1: 2014 SO 7093:20	. to EN	10088-1:2014
3b	Filling washer	Stainless steel A4, High	corros				I
		Property class		Characteristic tensile strength	Characteri yield stren		Elongation at fracture
	Internal threaded	acc. to	50	$f_{uk} = 500 \text{ N/mm}^2$	f _{vk} = 210 N	-	A ₅ > 8%
4	anchor rod ¹⁾²⁾	EN ISO 3506-1:2009	70	$f_{\rm uk} = 700 \rm N/mm^2$	f _{vk} = 450 N	l/mm²	A ₅ > 8%
²⁾ f ³⁾ f		EN ISO 3506-1:2009 rods up to M24 and Internal 50 nless steel A4	70 thread	$f_{uk} = 700 \text{ N/mm}^2$	f _{yk} = 450 N		Ŭ.
Pro	ction System ESSVE ONE, E duct description erials threaded rod and inte		te				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 Rib height of the bar shall be in the range 							
	(d: Nominal diameter of the bar; h: Rip hei							
Tabl	e A2: Materials							
Part	Designation	Material						
Reinf	orcing bars	1						
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	luct description		Annex A 5					
	erials reinforcing bar							



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



Table B1: Installation	parameters fo											
Anchor size			M8	M	10	M12	M16	;	M20	M24	M27	M30
Outer diameter of anchor	d _{nom} [mi	n] =	8	1	0	12	16		20	24	27	30
Nominal drill hole diameter	d ₀ [mi	n] =	10	1	2	14	18		24	28	32	35
Effective embedment depth	h _{ef,min} [mi		60 160	6		70	80		90	96	108	120
·	h _{ef,max} [mi	_{ax} [mm] =		20	00	240	320	_	400	480	540	600
Diameter of clearance hole in the fixture	d _f [mi	n] ≤	9	1	2	14	18		22	26	30	33
Diameter of steel brush	d _b [mi	n] ≥	12	1	4	16	20		26	30	34	37
Maximum torque moment	T _{inst} [Ni	n] ≤	10	2	0	40	80		120	160	180	200
Minimum thickness of member	er h _{min} [I	nm]	h _{ef} + 3	30 mm	າ ≥ 100) mm			ł	n _{ef} + 2d	0	
Minimum spacing	S _{min} [I	nm]	40	5	0	60	80		100	120	135	150
Minimum edge distance	C _{min} [I	nm]	40	5	0	60	80		100	120	135	150
Table B2: Installation	parameters fo	r reb	ar						1			
Rebar size		Ø	8 0	ð 10	Ø 12	Ø 1	4 Ø	16	Ø 20	Ø 25	5 Ø 28	3 Ø 32
Outer diameter of anchor	d _{nom} [mm] =	: {	3	10	12	14		6	20	25	28	32
Nominal drill hole diameter	d ₀ [mm] =	: 1	2	14	16	18	3 2	20	24	32	35	40
Effective embedment depth	h _{ef,min} [mm] =	6	0	60	70	75	5 8	30	90	100	112	128
	h _{ef,max} [mm] =	: 16	60 2	200	240	28	0 3	20	400	500	580	640
Diameter of steel brush	d _b [mm] ≥			16	18	20) 2	22	26	34	37	41,5
Minimum thickness of member	h _{min} [mm]		h _{ef} + 30 mn ≥ 100 mm					$h_{ef} + 2d_0$				
Minimum spacing	s _{min} [mm]	4	0	50	60	70) 8	30	100	125	140	160
Minimum edge distance	c _{min} [mm]	4	0	50	60	70) [8	30	100	125	140	160
Table B3:InstallationSize internal threaded anchor	parameters fo	r inte		nreado G-M6		hor ro -M8	od IG-M	10	IG-M1	2 10	i-M16	IG-M20
Internal diameter of anchor		[mm		6		8	10		12		16	20
Outer diameter of anchor ¹⁾		[mm		10		12	16		20		24	30
Nominal drill hole diameter		[mm		12		14	18		22		28	35
Effective embedment depth	h _{ef,mir}	[mm] =	60	-	70	80		90		96	120
•	h _{ef,ma}	[mm] =	200	2	40	320)	400		480	600
Diameter of clearance hole in the fixture	d	[mm] =	7		9	12		14		18	22
		t [Nm]≤	10		10	20		40		60	100
		[mm	1_ 9	8/20	8	/20	10/2	25	12/30) 1	6/32	20/40
Thread engagement length min/max	IIG	[1= 4	0/20								
000		_{nin} [m	-	h _{ef} +	 30 mr 00 mm				ŕ	n _{ef} + 2d	0	
min/max	er h	-	- m]	h _{ef} +	00 mm		80		r 100) 120	150

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Intended Use Installation parameters Annex B 2



	and a second		8		*****			C	PO	
Threaded Rod	Rebar	Internal threaded Anchor rod	d ₀ Drill bit - Ø HD, HDB, CA	d Brusl		d _{b,min} min. Brush - Ø	Piston plug		on direction piston plu	
[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		Ļ	\rightarrow	1
M8			10	RBT10	12	10,5			11	
M10	8	IG-M6	12	RBT12	14	12,5	1	N In the later of		-1
M12	10	IG-M8	14	RBT14	16	14,5	1	No piston p	oug require	a
	12		16	RBT16	18	16,5				
M16	14	IG-M10	18	RBT18	20	18,5	VS18			
	16		20	RBT20	22	20,5	VS20			
M20	20	IG-M12	24	RBT24	26	24,5	VS24	h _{ef} >	h _{ef} >	
M24		IG-M16	28	RBT28	30	28,5	VS28	250 mm	250 mm	all
M27	25		32	RBT32	34	32,5	VS32	250 mm	250 mm	
	~~~	IG-M20	35	RBT35	37	35,5	VS35	-		
M30	28									
M30	32		40	RBT40	41,5	40,5	VS40	1		
MAC - Ha	32	<b>o (volume 7</b> 10 mm to 20 < 10 d _{nom}	<b>5</b> 0 ml)	RBT40	41,5	40,5 - <b>Rec. com</b> bit diameter (4	VS40	ameters	(min 6 bar	)
MAC - Ha Drill bit dia Drill hole d Only in nor Piston pl installati	32 and pump meter (d ₀ ): epth (h ₀ ): h-cracked	<b>o (volume 7</b> 10 mm to 20 < 10 d _{nom}	50 ml) mm	RBT40	41,5 CAC Drill t	40,5 - <b>Rec. com</b> bit diameter (4	vS40	ameters	(min 6 bar	•) 3 1 d
MAC - Ha Drill bit dia Drill hole d	32	<b>o (volume 7</b> 10 mm to 20 < 10 d _{nom}	<b>5</b> 0 ml)	RBT40	41,5	40,5 - <b>Rec. com</b> bit diameter (4	VS40 <b>presse</b> d ₀ ): all dia	ameters	(min 6 bar	)



Drilling of the bo	bre hole	
	Drill with hammer drill a hole into the base material to the size and required by the selected anchor (Table B1, B2, or B3), with hamm or compressed air (CD) drilling. The use of a hollow drill bit is only sufficient vacuum permitted. In case of aborted drill hole: The drill hole shall be filled with mortal.	er (HD), hollow (HDB) in combination with a
_	Attention! Standing water in the bore hole must be removed before	re cleaning.
AC: Cleaning f	or bore hole diameter $d_0 \le 20$ mm and bore hole depth $h_0 \le 10d_{nom}$ (unc	racked concrete only!
	Starting from the bottom or back of the bore hole, blow the hole cle (Annex B 3) a minimum of four times.	ean by a hand pump ¹⁾
	<ul> <li>Check brush diameter (Table B4). Brush the hole with an appropri &gt; 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 structure of the bore hole ground is not reached with the brush, a brush external structure of the bore hole ground is not reached with the brush, a brush external structure of the bore hole ground is not reached with the brush, a brush external structure of the bore hole ground is not reached with the brush.</li> </ul>	
2-201	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 aup to 10d _{nom} also in cracked concrete with hand-pump.	and an embedment depth
AC: Cleaning fo	or all bore hole diameter in uncracked and cracked concrete	
1000 a.e)	Starting from the bottom or back of the bore hole, blow the hole clo 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.	until return air
	Check brush diameter (Table B4). Brush the hole with an appropri > 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	
	Finally blow the hole clean again with compressed air (min. 6 bar) minimum of four times until return air stream is free of noticeable of ground is not reached an extension must be used.	
	After cleaning, the bore hole has to be protected against re-co an appropriate way, until dispensing the mortar in the bore ho the cleaning has to be repeated directly before dispensing the In-flowing water must not contaminate the bore hole again.	le. If necessary,
	· · · · · · · · · · · · · · · · · · ·	
njection System I	ESSVE ONE, ESSVE ONE-ICE for concrete	



Installation instruc	ctions (continuation)	
	Attach the supplied static-mixing nozzle to the cartridge and load the correct dispensing tool. Cut off the foil tube clip before use. For every working interruption longer than the recommended working well as for new cartridges, a new static-mixer shall be used.	
	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 half stroke	Frior to dispensing into the anchor hole, squeeze out separately a n strokes and discard non-uniformly mixed adhesive components unt consistent grey colour. For foil tube cartridges it must be discarded strokes.	I the mortar shows a
-0	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 th given in Annex B 6.	nixing nozzle as the nchor hole is not
	<ul> <li>Piston plugs and mixer nozzle extensions shall be used according to following applications:         <ul> <li>Horizontal assembly (horizontal direction) and ground erection direction): Drill bit-Ø d₀ ≥ 18 mm and embedment depth h_{ef} &gt; 2</li> <li>Overhead assembly (vertical upwards direction): Drill bit-Ø d₀ ≥</li> </ul> </li> </ul>	(vertical downwards 50mm
	Push the threaded rod or reinforcing bar into the anchor hole while the ensure positive distribution of the adhesive until the embedment dependence of the adhesive	oth is reached.
	The anchor shall be free of dirt, grease, oil or other foreign material	
	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 fix	ed, the application has
+20"	10. Allow the adhesive to cure to the specified time prior to applying an not move or load the anchor until it is fully cured (attend Annex B 6	
	III. 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.	ional filled the annular e washer by the filling
Injection System ES	SVE ONE, ESSVE ONE-ICE for concrete	11
Intended Use		Annex B 5

Installation instructions (continuation)



Concre	te temp	perature	Gelling- / working time	Minimum curing time in dry 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	25 min
+ 35 °C	to	+39°C	2 min	20 min
	+ 40 °C		1,5 min	15 min
		perature	+5°C to	+40°C
	e tempe	rature must be a	nust be doubled. It min. +15°C. <b>ng time and minimum curing time</b>	
		SSVE ONE-ICE		
Concre	te temp	perature	Gelling- / working time	Minimum curing time in dry concrete ¹⁾
	to	-16°C	75 min	24 h
-20 °C			55 min	16 h
-20 °C -15 °C	to	-11°C	55 11111	1011
		-11°C -6°C	35 min	10 h
-15 °C	to			
-15 °C -10 °C	to to	-6°C	35 min	10 h
-15 °C -10 °C -5 °C	to to to	-6°C -1°C	35 min 20 min	10 h 5 h
-15 °C -10 °C -5 °C 0 °C +5 °C	to to to to	-6°C -1°C +4°C	35 min 20 min 10 min	10 h 5 h 2,5 h
-15 °C -10 °C -5 °C 0 °C +5 °C + Cartride	to to to to 10 °C ge temp	-6°C -1°C +4°C +9°C 	35 min 20 min 10 min 6 min	10 h 5 h 2,5 h 80 Min 60 Min
-15 °C -10 °C -5 °C 0 °C +5 °C +5 °C +	to to to to 10 °C ge temp	-6°C -1°C +4°C +9°C 	35 min 20 min 10 min 6 min 6 min -20°C to	10 h 5 h 2,5 h 80 Min 60 Min



Т	Table C1:       Characteristic values for s rods	teel tens	sion re	esistanc	e and s	teel sh	ear res	sistanc	e of th	readed	I
Si	ze			M8	M10	M12	M16	M20	M24	M27	M30
Cr	ross section area	A _s	[mm ² ]	36,6	58	84,3	157	245	353	459	561
С	haracteristic tension resistance, Steel failure	e ¹⁾									
St	teel, Property class 4.6 and 4.8	N _{Rk,s}	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
St	eel, Property class 5.6 and 5.8	N _{Rk,s}	[kN]	18 (17)	29 (27)	42	78	122	176	230	280
St	eel, Property class 8.8	N _{Rk,s}	[kN]	29 (27)	46 (43)	67	125	196	282	368	449
St	ainless steel A2, A4 and HCR, class 50	N _{Rk,s}	[kN]	18	29	42	79	123	177	230	281
St	ainless steel A2, A4 and HCR, class 70	N _{Rk,s}	[kN]	26	41	59	110	171	247	-	-
	ainless steel A4 and HCR, class 80	N _{Rk,s}	[kN]	29	46	67	126	196	282	-	-
С	haracteristic tension resistance, Partial facto	or ²⁾									
St	eel, Property class 4.6 and 5.6	γMs,N	[-]				2,0	)			
St	eel, Property class 4.8, 5.8 and 8.8	Y _{Ms,N}	[-]				1,5	5			
St	ainless steel A2, A4 and HCR, class 50	Y _{Ms,N}	[-]				2,8	6			
St	ainless steel A2, A4 and HCR, class 70	Y _{Ms,N}	[-]				1,8	7			
St	ainless steel A4 and HCR, class 80	Y _{Ms,N}	[-]				1,6	5			
С	haracteristic shear resistance, Steel failure	1)	1				[]	1	I	1	
٦	Steel, Property class 4.6 and 4.8	V ⁰ _{Rk,s}	[kN]	9 (8)	14 (13)	20	38	59	85	110	135
arm		V ^U Rk.s	[kN]	11 (10)	17 (16)	25	47	74	106	138	168
evel	Steel, Property class 8.8	V ⁰ Rk.s	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
ut le	Stainless steel A2, A4 and HCR, class 50	V ⁰ Rk.s	[kN]	9	15	21	39	61	88	115	140
Without lever	Stainless steel A2, A4 and HCR, class 70	V ⁰ Rk.s	[kN]	13	20	30	55	86	124	-	-
>	Stainless steel A4 and HCR, class 80	V ⁰ _{Rk,s}	[kN]	15	23	34	63	98	141	-	-
	Steel, Property class 4.6 and 4.8	M ⁰ Rk.s	[Nm]	15 (13)	30 (27)	52	133	260	449	666	900
arm	Steel, Property class 5.6 and 5.8	M ⁰ _{Rk,s}	[Nm]	19 (16)	37 (33)	65	166	324	560	833	1123
		M ⁰ Rk,s	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797
With lever	Stainless steel A2, A4 and HCR, class 50	M ⁰ Rk.s	[Nm]	19	37	66	167	325	561	832	1125
Vit	Stainless steel A2, A4 and HCR, class 70	M ⁰ Rk,s	[Nm]	26	52	92	232	454	784	-	-
	Stainless steel A4 and HCR, class 80	M ⁰ Rk,s	[Nm]	30	59	105	266	519	896	-	-
С	haracteristic shear resistance, Partial factor										
St	eel, Property class 4.6 and 5.6	γ _{Ms,V}	[-]				1,6	7			
St	eel, Property class 4.8, 5.8 and 8.8	Y _{Ms,V}	[-]				1,2	5			
St	ainless steel A2, A4 and HCR, class 50	Y _{Ms,V}	[-]				2,3	8			
St	ainless steel A2, A4 and HCR, class 70	Y _{Ms,V}	[-]				1,5	6			
St	ainless steel A4 and HCR, class 80	Y _{Ms,V}	[-]				1,3	3			
1											

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



Anchor size       All Anchor types and sizes         Concrete cone failure       Non-cracked concrete       kucr,N       [-]       11.0         Cracked concrete       kcr,N       [-]       7.7         Edge distance $c_{cr,N}$ [mm]       1.5 h_{ef}         Axial distance       scr,N       [mm]       2 c_{cr,N}         Splitting       1.0 h_{ef}        1.0 h_{ef}         Edge distance $2.0 > h/h_{ef} > 1.3$ ccr.sp       [mm] $2 \cdot h_{ef} \left( 2.5 - \frac{h}{h_{ef}} \right)$ Axial distance $s_{cr.sp}$ [mm] $2 \cdot h_{ef} \left( 2.5 - \frac{h}{h_{ef}} \right)$ $2.4 h_{ef}$ Axial distance $s_{cr.sp}$ [mm] $2 c_{cr.sp}$ $c_{cr.sp}$		k _{cr,N}		All Anchor types and sizes 11,0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	rete	k _{cr,N}		11,0
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			r1	
Axial distance $s_{cr,N}$ [mm] $2 c_{cr,N}$ SplittingEdge distance $h/h_{ef} \ge 2,0$ $1,0 h_{ef}$ $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ $[mm]$ $2 \cdot h_{ef} \left( 2,5 - \frac{h}{h_{ef}} \right)$ $h/h_{ef} \le 1,3$ $2,4 h_{ef}$			L-]	
Splitting           Edge distance $h/h_{ef} \ge 2,0$ $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ $h/h_{ef} \le 1,3$ $[mm]$ $2 \cdot h_{ef} \left( 2,5 - \frac{h}{h_{ef}} \right)$ $2,4 h_{ef}$		c _{cr,N}	[mm]	
Edge distance $h/h_{ef} \ge 2,0$ 1,0 $h_{ef}$ $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ [mm] $2 \cdot h_{ef} \left( 2,5 - \frac{h}{h_{ef}} \right)$ $h/h_{ef} \le 1,3$ $2,4 h_{ef}$ $2,4 h_{ef}$		s _{cr,N}	[mm]	2 c _{cr,N}
Edge distance $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ [mm] $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}}\right)$ $h/h_{ef} \le 1,3$ $2,4 h_{ef}$				
$\frac{1}{h/h_{ef} \le 1,3}$	h/h _{ef} ≥ 2,0			1,0 h _{ef}
h/h _{ef} ≤ 1,3         2,4 h _{ef} Axial distance         \$ _{cr,sp} [mm]         2 c _{cr,sp}	2,0 > h/h _{ef} > 1,3	C _{cr,sp}	[mm]	$\frac{2}{h_{ef}}$
Axial distance     \$cr,sp     [mm]     2 ccr,sp	h/h _{ef} ≤ 1,3			2,4 h _{ef}
		S _{cr.sp}	[mm]	2 c _{cr.sp}
			h/h _{ef} ≤ 1,3	h/h _{ef} ≤ 1,3

#### 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



	or size threaded ro	od			M8	M10	M12	M16	M20	M24	M27	M30	
Steel f		• .	N	<b>FL N 17</b>			۸.f	(or o					
	cteristic tension res	Istance	N _{Rk,s}	[kN]					ee Tab				
	factor ined pull-out and	concrete failure	γMs,N	[-]				see 1a	able C1				
	cteristic bond resist			C20/25									
	l: 40°C/24°C				10	12	12	12	12	11	10	9	
Temperature range	II: 80°C/50°C	Dry, wet concrete			7,5	9	9	9	9	8,5	7,5	6,5	
ure n	III: 120°C/72°C				5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0	
erati	I: 40°C/24°C		^T Rk,ucr	[N/mm²]	7,5	8,5	8,5	8,5					
Lemp	II: 80°C/50°C	flooded bore hole			5,5	6,5	6,5	6,5	No Performance Assessed (NPA)				
	III: 120°C/72°C				4,0	5,0	5,0	5,0				Ŋ	
Charao	cteristic bond resist	ance in cracked	concrete C20	/25									
	l: 40°C/24°C				4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5	
Temperature range	II: 80°C/50°C	Dry, wet concrete			2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5	
rre ra	III: 120°C/72°C			<b>IN</b> 1 (manual 21	2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5	
berati	I: 40°C/24°C		^T Rk,cr	[N/mm²]	4,0	4,0	5,5	5,5					
Temp	II: 80°C/50°C	flooded bore hole			2,5	3,0	4,0	4,0		lo Perfo ssesse			
•	III: 120°C/72°C				2,0	2,5	3,0	3,0				•)	
Reduk	tion factor $\psi^0_{sus}$ ir	r cracked and no	n-cracked cor	ncrete C20/25									
Ire	I: 40°C/24°C	Dry, wet						0,	73				
Temperature range	II: 80°C/50°C	concrete and	$\psi^0$ sus	[-]	0,65								
ra ra	III: 120°C/72°C	flooded bore hole	505		0,57								
•			C25/30						02				
			C30/37						04				
Increa	sing factors for con	crete	C35/45					1,	07				
$\Psi_{c}$			C40/50						08				
			C45/55						09				
Concr	ete cone failure		C50/60					Ι,	10				
Releva	ant parameter							see Ta	able C2				
Splitti Releva	<b>ng</b> ant parameter							see Ta	able C2				
	ation factor												
	and wet concrete		γ _{inst}	[-]	1,0				1,2				
tor floc	oded bore hole					1	,4			NF	PA		
Inject	ion System ESSVE	ONE, ESSVE ON	NE-ICE for co	ncrete									
Perfo	rmances								-	Anne	x C 3		
	icteristic values of te	naion loodo undor	statio and au	ani atatia antin	2				1				



Table C4: Characteristic values	s of shea	ar loads	s under	static	and qu	asi-stat	ic actio	n		
Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Steel failure without lever arm				•						
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	γMs,V	[-]				see	Table C	1		
Ductility factor	k ₇	[-]					1,0			
Steel failure with lever arm										
Characteristic bending moment	M ⁰ Rk,s	[Nm]			1,2 • '	W _{el} ∙ f _{uk}	(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	lf	[mm]		r	nin(h _{ef} ; 1	2 • d _{nor}	n)		min(h _{ef} ;	300mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γinst	[-]					1,0			

Performances

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

Annex C 4



Anchor size internal threaded a	nchor rods			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Steel failure ¹⁾		1							
Characteristic tension resistance,	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 a	nd 8.8	γMs,N	[-]		1	1	,5		
Characteristic tension resistance,									
Steel A4 and HCR, Strength class		N _{Rk,s}	[kN]	14	26	41	59	110	124
Partial factor		γ _{Ms,N}	[-]			1,87			2,86
Combined pull-out and concrete									
Characteristic bond resistance in r	non-cracked	concret	te C20/25						
φ <u>I: 40°C/24°C</u> Dr	y, wet			12	12	12	12	11	9
	ncrete			9	9	9	9	8,5	6,5
m         co           00         III:         120°C/72°C         co           11:         40°C/24°C         fill         fill         fill			[N/mm ² ]	6,5	6,5	6,5	6,5	6,5	5,0
	oded bore			8,5	8,5	8,5	No Perf	ormance A	ssesse
□ <u>II: 80°C/50°C</u> hc	le			6,5	6,5	6,5		(NPA)	
III: 120°C/72°C				5,0	5,0	5,0		. ,	
Characteristic bond resistance in o	sracked con		20/25	5,0	5,5	5,5	5,5	5,5	6,5
$e_{\rm II} = \frac{1.40^{\circ} {\rm C}/24^{\circ} {\rm C}}{{\rm II}: 80^{\circ} {\rm C}/50^{\circ} {\rm C}}$ Dr	y, wet			<u> </u>	<u> </u>	5,5 4,0	5,5 4,0	5,5 4,0	4,5
$\begin{array}{c} 1. & 40 & 0/24 & 0 \\ \hline 11. & 80^{\circ}C/50^{\circ}C & co \\ \hline 11. & 120^{\circ}C/72^{\circ}C & co \\ \hline 11. & 40^{\circ}C/24^{\circ}C & flo \\ \hline 11. & 80^{\circ}C/50^{\circ}C & flo \\ \hline 1$	ncrete			2,5	3,0	4,0 3,0	4,0 3,0	4,0 3,0	4,5
En		^τ Rk,cr	[N/mm ² ]		5,5	5,5	3,0	3,0	3,5
E II: 80°C/50°C	oded bore			<u>4,0</u> 3,0	4,0	4,0	No Perf	ormance A	ssessed
H <u>H: 80°C/30°C</u> hc	le			2,5	4,0 3,0	4,0 3,0		(NPA)	
Reduktion factor $\psi^0_{sus}$ in cracked	and non-ci	racked c	oncrete (		0,0	0,0			
				20/25					
□ I: 40°C/24°C Dr	y, wet					0,	73		
	oncrete and oded bore	$\psi^0_{sus}$	[-]			0,	65		
E III: 120°C/72°C hc	le					0,	57		
			5/30				02		
			0/37				04		
Increasing factors for concrete			5/45				07		
$\Psi_{c}$									
Concrete cone failure		05	0/00			Ι,	10		
						see Ta	able C2		
						see Ta	able C2		
		Yinet	[ [-]			1	,2		
					,				
Ψc Concrete cone failure Relevant parameter Splitting failure Relevant parameter Installation factor for dry and wet concrete for flooded bore hole ¹⁾ Fastenings (incl. nut and washer) The characteristic tension resista ²⁾ For IG-M20 strength class 50 is v	nce for steel	C4 C5 γinst	0/50 5/55 0/60 [-] e appropris valid for	iate materi the interna	1,4 al and prop I threaded	1, 1, see Ta see Ta 1 perty class	,2   of the inter	NPA nal threade element.	d roo
	SSVE ONE-								



chor size for internal thread	ded anch	or rods		IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
el failure without lever arm	1)					1	1		•
aracteristic shear resistance,	5.8	V ⁰ _{Rk,s}	[kN]	5	9	15	21	38	61
el, strength class	8.8	V ⁰ Rk,s	[kN]	8	14	23	34	60	98
rtial factor, strength class 5.8	and 8.8	γ _{Ms,V}	[-]				1,25		
aracteristic shear resistance, inless Steel A4 and HCR, ength class 70 ²⁾		V ⁰ Rk,s	[kN]	7	13	20	30	55	40
rtial factor		γ _{Ms,V}	[-]			1,56	•		2,38
ctility factor		k ₇	[-]				1,0		•
el failure with lever arm ¹⁾		•							
aracteristic bending moment,	5.8	M ⁰ Rk,s	[Nm]	8	19	37	66	167	325
el, strength class	8.8	M ⁰ _{Rk,s}	[Nm]	12	30	60	105	267	519
rtial factor, strength class 5.8	and 8.8	γMs,V	[-]		•	•	1,25	·	•
aracteristic bending moment, inless Steel A4 and HCR, ength class 70 ²⁾		M ⁰ Rk,s	[Nm]	11	26	52	92	233	456
rtial factor		γMs,V	[-]			1,56			2,38
ncrete pry-out failure									
ctor		k ₈	[-]				2,0		
tallation factor		γinst	[-]				1,0		
ncrete edge failure									
ective length of fastener		۱ _f	[mm]		min	(h _{ef} ; 12 • d	nom)		min (h _{ef} ; 300mr
tside diameter of fastener		d _{nom}	[mm]	10	12	16	20	24	30
tallation factor		γ _{inst}	[-]				1,0		
Fastenings (incl. nut and wash The characteristic tension resis For IG-M20 strength class 50 is	tance for s	steel failure	is valid	opriate ma	aerial and ernal threa	property cla ded rod and	ass of the f	ning eleme	eaded rod. ent.

Performances

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

Annex C 6



Table C7:         Characteristic value	s of tensior	n loads ui	nder s	tatic a	nd qua	asi-sta	tic act	ion			
Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure		1						0			
Characteristic tension resistance	N _{Rk,s}	[kN]					א _s ∙f _{uk}				1
Cross section area	A _s	[mm ² ]	50	79	113	154	201	314	491	616	804
Partial factor	γ _{Ms,N}	[-]					1,4 ²⁾				
Combined pull-out and concrete fail											
Characteristic bond resistance in non-o	racked conc	rete C20/2									
<u>●</u> <u>I: 40°C/24°C</u> Dry, wet <u>II: 80°C/50°C</u> Dry, wet			10	12 9	12 9	12 9	12 9	12	11	10	8,5
			7,5 5,5	9 6,5	9 6,5	9 6,5	9 6,5	9 6,5	8,0 6,0	7,0 5,0	6,0 4,5
III:   120°C/72°C   concrete     III:   10°C/24°C   flooded	^τ Rk,ucr	[N/mm ² ]	7,5	8,5	8,5	8,5	8,5			· · · · ·	•
E 0 1: 40 0/24 0 flooded			5,5	6,5	6,5	6,5	6,5		lo Perfe		
H: 120°C/72°C bore hole			4,0	5,0	5,0	5,0	5,0	A A	ssesse	ed (NPA	4)
Characteristic bond resistance in crack	ed concrete	C20/25									
$\underline{\Theta}$ <u>I: 40°C/24°C</u> Dry, wet			4,0	5,0	5,5	5,5	5,5	5,5	5,5	6,5	6,5
II: 80°C/50°C concrete			2,5	3,5	4,0	4,0	4,0	4,0	4,0	4,5	4,5
ter en li 120°C/72°C concrete	τ _{Rk,cr}	[N/mm ² ]	2,0	2,5	3,0	3,0	3,0	3,0	3,0	3,5	3,5
$\begin{array}{c} 1. & 40 \text{ C}/24 \text{ C} \\ \hline 11. & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ \hline 111: & 120^{\circ}\text{C}/72^{\circ}\text{C} \\ \hline 111: & 120^{\circ}\text{C}/72^{\circ}\text{C} \\ \hline 111: & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ $	1 11,01		4,0 2,5	4,0 3,0	5,5 4,0	5,5 4,0	5,5 4,0		lo Perfe	ormanc	e
⊢ <u>III: 120°C/72°C</u> bore hole			2,0	2,5	4,0	3,0	3,0	A	ssesse	ed (NP/	4)
Reduktion factor $\psi^0_{sus}$ in cracked and	non-cracked	l d concrete			0,0	0,0	0,0				
en li 40°C/24°C Dry, wet concrete and li 80°C/50°C and li li addid	0						0,73				
	$\Psi^0$ sus	[-]					0,65				
[¯] ■ III: 120°C/72°C bore hole	0.05						0,57				
	C25/						1,02				
Increasing factors for concrete	C30/ C35/						1,04 1,07				
$\Psi_{c}$	C40/						1,07				
T C	C45/						1,09				
	C50/						1,10				
Concrete cone failure	1										
Relevant parameter						see	e Table	C2			
Splitting											
Relevant parameter						see	e Table	C2			
Installation factor	1	1									
for dry and wet concrete	γ _{inst}	[-]	1,2				1	,2		~ ^	
for flooded bore hole					1,4				NI	PA	
<ol> <li>f_{uk} shall be taken from the specificatio</li> <li>in absence of national regulation</li> </ol>		ng bars									
Injection System ESSVE ONE, ESSVE	ONE-ICE fo	or concrete	)								
Performances Characteristic values of tension loads up	nder static an	d quasi-sta	tic actio	on				1	Anne	ex C 7	



Table C8: Characteristic value	es of shea	r loads u	Inder s	static a	nd qua	asi-sta	tic act	ion			
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 ⁰ Rk,s	[kN]				0,5	0∙A _s ∙	f _{uk} 1)			
Cross section area	As	[mm ² ]	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}	[mm ³ ]	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				
$\int_{\infty}^{1)} f_{uk}$ shall be taken from the specification	ons of reinfo	rcing 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	l 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	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
I: 40°C/24°C	$\delta_{N\infty}\text{-}factor$	[mm/(N/mm ² )]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range	$\delta_{\text{N0}}\text{-factor}$	[mm/(N/mm ² )]	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
		[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/mm ² )]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Cracked concrete C	Cracked concrete C20/25 under static and quasi-s									
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,0	)90			0,0	)70		
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]	0,1	05			0,1	05		
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,2	219			0,1	70		
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,255 0,245							
Temperature range	Temperature range $\delta_{N0}$ -factor [mm/(N/mm ² )]		0,2	219	0,170					
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]	0,2	255			0,2	245		
¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor		nt τ: action bond stress fo	or tension							

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

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

Anchor size thre	aded rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked con	crete C20/25 u	Inder static and quasi	-static ac	tion						
All temperature	$\delta_{V0}$ -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	e C20/25 under	r static and quasi-stat	ic action							
All temperature	$\delta_{V0}$ -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
$\delta_{V\infty} = \delta_{V\infty}$ -facto	or ∙V;						I			
Injection System	ESSVE ONE, E	SSVE ONE-ICE for cor	ncrete							



Table C11:       Displacements under tension load ¹⁾ (Internal threaded anchor rod)										
Anchor size Intern	al threaded ar	ichor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20		
Non-cracked concrete C20/25 under static and quasi-static action										
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,023	0,026	0,031	0,036	0,041	0,049		
l: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]	0,033	0,037	0,045	0,052	0,060	0,071		
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,056	0,063	0,075	0,088	0,100	0,119		
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		
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,056	0,063	0,075	0,088	0,100	0,119		
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		
Cracked concrete C	20/25 under st	atic and quasi-st	atic action							
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,090			0,070				
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]	0,105			0,105				
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,219			0,170				
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]	0,255			0,245				
Temperature range	$\delta_{N0}$ -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

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

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

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

Anchor size Inte	ernal threaded	anchor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked and cracked concrete C20/25 und			er static and	quasi-stati				
All temperature	$\delta_{V0}$ -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
δ _{V∞} = δ _{V∞} -fac	tor · V;							
Injection System	n ESSVE ONE, E	SSVE ONE-ICE fo	or concrete					
Performances							Annex	C 10

Displacements (Internal threaded anchor rod)



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	i under static ar	nd quasi	-static a	ction						•
Temperature	$\delta_{N0}$ -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	0,07
Temperature	$\delta_{N0}$ -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,12
range II: 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	0,18
Temperature	$\delta_{\text{N0}}\text{-}\text{factor}$	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,12
range III: 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	0,18
Cracked concrete	C20/25 und	ler static and qu	uasi-stat	ic action	1						
Temperature	$\delta_{N0}$ -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	$\delta_{N0}$ -factor	[mm/(N/mm²)]	0,2	219				0,170			
range II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255				0,245			
Temperature	$\delta_{N0}$ -factor	[mm/(N/mm²)]	0,2	219				0,170			
range III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]	0,2	255				0,245			
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C14:</b> Di	·τ; ·τ;	nent τ: action bond <b>nt under shear</b>					Γ		Γ	Γ	
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: Di	τ; τ; splaceme	τ: action bond			Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: Di	τ; τ; splaceme orcing bar	τ: action bond	load ¹⁾ (r Ø 8	rebar) Ø 10		Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\begin{array}{lll} \delta_{N0} = \delta_{N0} \text{-factor} \\ \delta_{N\infty} = \delta_{N\infty} \text{-factor} \end{array}$	τ; τ; splaceme orcing bar rete C20/25 δ _{vo} -factor	τ: action bond nt under shear o under static ar	load ¹⁾ (r Ø 8	rebar) Ø 10		Ø 14 0,04	Ø 16 0,04	Ø <b>20</b> 0,04	Ø <b>25</b> 0,03	Ø <b>28</b> 0,03	Ø 32 0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-} factor \\ \delta_{N\infty} &= \delta_{N\infty} \text{-} factor \end{split}$ Table C14: Di Anchor size reinfor Non-cracked concordance All temperature	τ; τ; splaceme prcing bar rete C20/25 $δ_{V0}$ -factor $δ_{V\infty}$ -	τ: action bond nt under shear o under static ar	load ¹⁾ (r Ø 8 nd quasi	rebar) Ø 10 -static a	ction						
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-} factor \\ \delta_{N\infty} &= \delta_{N\infty} \text{-} factor \end{split}$	τ; τ; splaceme prcing bar rete C20/25 $δ_{Vo}$ -factor $δ_{V\infty}$ - factor	τ: action bond nt under shear o under static ar [mm/kN] [mm/kN]	load ¹⁾ (n Ø 8 nd quasi- 0,06 0,09	rebar) Ø 10 -static ar 0,05 0,08	ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-} \text{factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-} \text{factor} \end{split}$ Table C14: Di Anchor size reinformation in the second secon	τ; τ; splaceme prcing bar rete C20/25 $δ_{Vo}$ -factor $δ_{V\infty}$ - factor	r: action bond nt under shear under static ar [mm/kN] [mm/kN] ler static and qu	load ¹⁾ (n Ø 8 nd quasi- 0,06 0,09	rebar) Ø 10 -static ar 0,05 0,08	ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-} \text{factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-} \text{factor} \end{split}$ Table C14: Di Anchor size reinformation of the second secon	τ; τ; splaceme prcing bar rete C20/25 $δ_{V0}$ -factor $δ_{V\infty}$ - factor C20/25 und $δ_{V0}$ -factor $δ_{V\infty}$ - factor $δ_{V\infty}$ - factor	r: action bond nt under shear i under static ar [mm/kN] [mm/kN] ler static and qu [mm/kN] [mm/kN]	load ¹⁾ (r Ø 8 nd quasi 0,06 0,09 uasi-stat	rebar) Ø 10 -static a 0,05 0,08 ic action	ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-} factor \\ \delta_{N\infty} &= \delta_{N\infty} \text{-} factor \end{split}$	τ; τ; τ; τ; σ σ σ σ σ σ σ σ	r: action bond nt under shear under static ar [mm/kN] [mm/kN] [mm/kN] [mm/kN] [mm/kN] hent V: action shea	load ¹⁾ (r Ø 8 nd quasi- 0,06 0,09 uasi-stati 0,12 0,18	rebar) Ø 10 -static a 0,05 0,08 ic action 0,12 0,18	0,05           0,08           0,011	0,04 0,06 0,11	0,04 0,06 0,10	0,04 0,05 0,09	0,03 0,05 0,08	0,03 0,04 0,07	0,03



	or size threaded ro	d			M8	M10	M12	M16	M20	M24	M27	M30
<u>Steel fa</u> Charac	allure steristic tension resi	stance	N _{Rk,s,eq}	[kN]				1,0 •	Neka			
Partial			γ _{Ms,N}	[-]				see Ta				
	ined pull-out and o	concrete failure	1015,11					000 14				
	cteristic bond resist		ked and crack	(ed concrete	C20/25							
	I: 40°C/24°C				2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5
Temperature range	II: 80°C/50°C	C/50°C Dry, wet concrete			1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1
ture	III: 120°C/72°C		^τ Rk,eq	[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
pera	I: 40°C/24°C		nk,ey	[]	2,5	2,5	3,7	3,7				
Tem	II: 80°C/50°C	flooded bore hole			1,6	1,9	2,7	2,7		lo Perfo ssesse		-
	III: 120°C/72°C				1,3	1,6	2,0	2,0				
Reduk	tion factor $\psi^0_{sus}$ in	cracked and nor	n-cracked con	crete C20/25								
ture	I: 40°C/24°C	Dry, wet						0,7	73			
Temperature range	II: 80°C/50°C	concrete and flooded bore	$\Psi^0$ sus	[-]				0,6	65			
Tem	III: 120°C/72°C	hole						0,5	57			
	sing factors for cond	crete $\psi_{C}$	C25/30 to C	50/60				1,	0			
	ete cone failure ant parameter							see Ta				
Splitti								300 10				
	ant parameter							see Ta	ble C2			
	ation factor and wet concrete		Ι		1,0				1,2			
	ded bore hole		γinst	[-]	1,0	1	,4		1,2	NF	ΡΑ	
Inject	ion System ESSVE	ONE, ESSVE ON	IE-ICE for cor	ncrete							C 12	



Table C16:         Characteristic valu           (performance cate)		loads ι	under s	seismic	action					
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				see	Table C	;1				
							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	γinst	[-]					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	$\gamma_{inst}$	[-]					1,0			
Factor for annular gap	$\alpha_{gap}$	[-]				0,5	5 (1,0) ¹⁾			
Annex A 3 is required										
Injection System ESSVE ONE, ESSV	/E ONE-ICE fo	or conci	rete						Annex (	2 13
Characteristic values of shear loads ur	nder seismic a	ction (pe	erforma	nce cate	gory C1)	)		1		



Table C17:         Characteristic values (performance categor)		n loads ui	nder s	eismic	actio	า					
Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure Characteristic tension resistance	N	[LN]				1.0	• A _s • 1	: 1)			
Cross section area	N _{Rk,s,eq}	[kN]	50	79	113	154	201	uk 314	491	616	804
Partial factor	-	[mm ² ]	50	79	113	104	1,4 ²⁾	514	491	010	004
Combined pull-out and concrete failu	γ _{Ms,N}	[-]					1,4				
Characteristic bond resistance in non-c		cracked co	ncrete	C20/2	5						
			2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5
II: 80°C/50°C concrete			1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1
	^τ Rk, eq	[N/mm ² ]	1,3 2,5	1,6 2,5	2,0 3,7	2,0 3,7	2,0 3,7	2,0	2,1	2,4	2,4
□ 0 1. 40 0/24 0 flooded			1,6	1,9	2,7	2,7	2,7			ormanc	
111: 120°C/72°C			1,3	1,6	2,0	2,0	2,0		ssesse	ed (NPA	A)
Reduktion factor $\psi^0_{sus}$ in cracked and	non-cracked	d concrete	C20/2	5							
₽ I: 40°C/24°C Dry, wet							0,73				
L: 40°C/24°C Dry, wet concrete and flooded bore hole	$\Psi^0$ sus	[-]					0,65				
							0,57				
Increasing factors for concrete $\psi_{C}$	C25/30 to	C50/60					1,0				
Concrete cone failure							e Table	<u></u>			
Relevant parameter Splitting						566		02			
Relevant parameter						see	e Table	C2			
Installation factor											
for dry and wet concrete	γ _{inst}	[-]	1,2				1	,2			
for flooded bore hole					1,4				N	PA	
<ul> <li>¹⁾ f_{uk} shall be taken from the specificatior</li> <li>²⁾ in absence of national regulation</li> </ul>											
Injection System ESSVE ONE, ESSVE	ONE-ICE fo	or concrete	)						A		
<b>Performances</b> Characteristic values of tension loads un	ider seismic a	action (perf	ormano	ce cateç	jory C1)	)			Anne	x C 14	



Table C18:Characteristic value(performance cate		loads u	nder s	eismic	actio	า					
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]				0,3	5 • A _s	• 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 Po	erforma	ance As	sessec	d (NPA)	ł	
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]		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	γ _{inst}	[-]					1,0				
Factor for annular gap	$\alpha_{gap}$	[-]					0,5 (1,0	) ³⁾			
¹⁾ f _{uk} shall be taken from the specificat ²⁾ in absence of national regulation	tions of reinford	ing bars									

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					1	1	1			1	
Anchor size thread	ded rod			M8	M10	M12	M16	M20	M24	M27	M30
Cracked and non-c	racked conc	rete C20/25 ur	nder seis	smic C1	action						
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )	]	0,	090			0,0	070		
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )	]	0,	105			0,	105		
Temperature range $\delta_{N0}$ -factor [mm/(N/mm ² )		]	0,2					170			
	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )	]	0,	255			0,3	245		
Temperature range	$\delta_{N0}$ -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 tensio	on load	¹⁾ (rebar	)	1					
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 un	der seis	smic C1	action						
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm ² )]	0,0	090				0,070			
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]		105				0,105			
Temperature range	$\delta_{N0}$ -factor	[mm/(N/mm²)]	0,	219				0,170			
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ² )]		255				0,245			
Temperature range	δ _{N0} -factor	[mm/(N/mm ² )]		219				0,170			
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor	$\delta_{N\infty}$ -factor e displacement $\tau$ ;	[mm/(N/mm²)] nt τ: action bond	0,:	255				0,245			
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis	δ _{N∞} -factor e displacemen · τ; · τ; splacement	nt	0,:	255 r tension ( <b>thread</b>	-			0,245			
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor	δ _{N∞} -factor e displacemen · τ; · τ; splacement	nt τ: action bond	0,:	255 r tension	ed rod) M10	M12	M16		M24	M27	M30
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis	δ _{N∞} -factor e displacemen · τ; · τ; splacement ded rod	nt τ: action bond s under shear	0,; stress for	255 r tension (thread M8	M10	M12	M16	0,245	M24	M27	M30
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Dis Anchor size thread Cracked and non-c All temperature	δ _{N∞} -factor e displacemen · τ; · τ; splacement ded rod	nt τ: action bond s under shear	0,; stress for	255 r tension (thread M8	M10	<b>M12</b>	<b>M16</b>	0,245	<b>M24</b>	<b>M27</b>	<b>M30</b>
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Dis Anchor size thread Cracked and non-c	δ _{N∞} -factor e displacemen · τ; · τ; splacement ded rod racked conc	nt τ: action bond s under shear crete C20/25 ur	0,; stress for	255 r tension (threado M8 smic C1	M10 action			0,245	I		
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges	$\begin{array}{c} \delta_{N\infty} \mbox{-factor} \\ e \ displacement \\ \cdot \ \tau; \\ \cdot \ \tau; \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	nt τ: action bond s under shear crete C20/25 ur [mm/kN]	load ²⁾ (	255 r tension (threade M8 smic C1 0,12 0,18	M10 action 0,12	0,11	0,10	0,245 M20 0,09	0,08	0,08	0,07
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges	$\begin{array}{c} \delta_{N\infty}\text{-factor}\\ \text{e displacement}\\ \cdot \ \tau;\\ \cdot \ \tau;\\ \textbf{splacement}\\ \textbf{ded rod}\\ \textbf{racked conc}\\ \hline \delta_{V0}\text{-factor}\\ \hline \delta_{V\infty}\text{-factor}\\ \textbf{splacement}\\ \end{array}$	nt τ: action bond s under shear crete C20/25 ur [mm/kN] [mm/kN]	load ²⁾ (	255 r tension (threade M8 smic C1 0,12 0,18	M10 action 0,12	0,11	0,10	0,245 M20 0,09	0,08	0,08	0,07
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges <b>Table C22:</b> Dis	$\frac{\delta_{N\infty}\text{-factor}}{\epsilon \text{ displacement}}$ $\frac{\sigma_{V}}{\tau_{\tau}}$ $\frac{\sigma_{V}}{\epsilon}$	nt τ: action bond s under shear crete C20/25 ur [mm/kN] [mm/kN] under shear l	o,; stress for r load ²⁾ ( nder seis	255 r tension (threade M8 smic C1 0,12 0,12 0,18 ebar) Ø 10	M10 action 0,12 0,18 Ø 12	0,11	0,10	0,245 M20 0,09 0,14	0,08	0,08	0,07
III: $120 \circ C/72 \circ C$ ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges <b>Table C22:</b> Dis <b>Anchor size reinfo</b> <b>Cracked and non-c</b>	$\frac{\delta_{N\infty}\text{-factor}}{\epsilon \text{ displacement}}$ $\frac{\sigma_{V}}{\tau_{\tau}}$ $\frac{\sigma_{V}}{\epsilon}$	nt τ: action bond s under shear crete C20/25 ur [mm/kN] [mm/kN] under shear l	o,; stress for r load ²⁾ ( nder seis	255 r tension (threade M8 smic C1 0,12 0,12 0,18 ebar) Ø 10	M10 action 0,12 0,18 Ø 12	0,11	0,10	0,245 M20 0,09 0,14	0,08	0,08	0,07
III: $120 \circ C/72 \circ C$ ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges <b>Table C22:</b> Dis <b>Anchor size reinfo</b> <b>Cracked and non-c</b> All temperature All temperature	$δ_{N∞}$ -factor e displacement · τ; · τ; splacement ded rod racked conc $δ_{V0}$ -factor splacement rcing bar racked conc $δ_{V0}$ -factor	nt τ: action bond s under shear crete C20/25 ur [mm/kN] [mm/kN] under shear l crete C20/25 un	o,; stress for r load ²⁾ ( nder seis load ¹⁾ (r Ø 8	255 r tension (threado mic C1 0,12 0,18 ebar) Ø 10 smic C1 0,12	M10 action 0,12 0,18 Ø 12 action	0,11 0,17 Ø 14 0,11	0,10 0,15 Ø 16 0,10	0,245 0,245 <b>M20</b> 0,09 0,14 Ø 20	0,08 0,13 Ø 25 0,08	0,08 0,12 Ø <b>28</b>	0,07 0,10 Ø <b>32</b> 0,06
III: $120 \circ C/72 \circ C$ ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges <b>Table C22:</b> Dis <b>Anchor size reinfo</b>	$δ_{N\infty}$ -factor e displacement · τ; · τ; splacement ded rod racked conc $\delta_{V0}$ -factor splacement rcing bar racked conc $\delta_{V\infty}$ -factor $\delta_{V\infty}$ -factor $\delta_{V\infty}$ -factor e displacement · V;	nt t: action bond s under shear rete C20/25 ur [mm/kN] under shear l rete C20/25 un [mm/kN] [mm/kN]	0,3 stress for r load ²⁾ ( nder seis load ¹⁾ (r Ø 8 0,12 0,18	255 r tension (thread M8 smic C1 0,12 0,12 0,18 ebar) Ø 10 smic C1	M10 action 0,12 0,18 Ø 12 action 0,11	0,11 0,17 Ø 14	0,10 0,15 Ø 16	0,245 0,245 <b>M20</b> 0,09 0,14 Ø 20 0,09	0,08 0,13 Ø 25	0,08 0,12 Ø 28 0,07	0,07 0,10 Ø <b>32</b>
III: 120°C/72°C ¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor <b>Table C21:</b> Dis <b>Anchor size thread</b> <b>Cracked and non-c</b> All temperature ranges <b>Table C22:</b> Dis <b>Anchor size reinfo</b> <b>Cracked and non-c</b> Anchor size reinfo <b>Cracked and non-c</b> All temperature ranges ¹⁾ Calculation of the $\delta_{V0} = \delta_{V0}$ -factor	$δ_{N\infty}$ -factor e displacement · τ; · τ; splacement ded rod racked conc $\delta_{V0}$ -factor splacement rcing bar racked conc $\delta_{V0}$ -factor $\delta_{V0}$ -factor $\delta_{V0}$ -factor e displacement · V; · V;	nt τ: action bond s under shear rete C20/25 ur [mm/kN] [mm/kN] under shear l rete C20/25 un [mm/kN] [mm/kN] [mm/kN] [mm/kN] [mm/kN]	0,3 stress for r load ²⁾ ( nder seis load ¹⁾ (r Ø 8 0,12 0,18 r load	255 r tension (threade m8 smic C1 0,12 0,18 ebar) Ø 10 smic C1 0,12 0,18	M10 action 0,12 0,18 Ø 12 action 0,11	0,11 0,17 Ø 14 0,11	0,10 0,15 Ø 16 0,10	0,245 0,245 <b>M20</b> 0,09 0,14 Ø 20 0,09	0,08 0,13 Ø <b>25</b> 0,08 0,12	0,08 0,12 Ø 28 0,07	0,07 0,10 Ø <b>32</b> 0,06 0,10





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



### **European Technical Assessment** ETA-18/0642

Page 2 of 61 | 8 October 2018

English translation prepared by DIBt

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.



Page 3 of 61 | 8 October 2018

#### 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



### European Technical Assessment ETA-18/0642 English translation prepared by DIBt

Page 4 of 61 | 8 October 2018

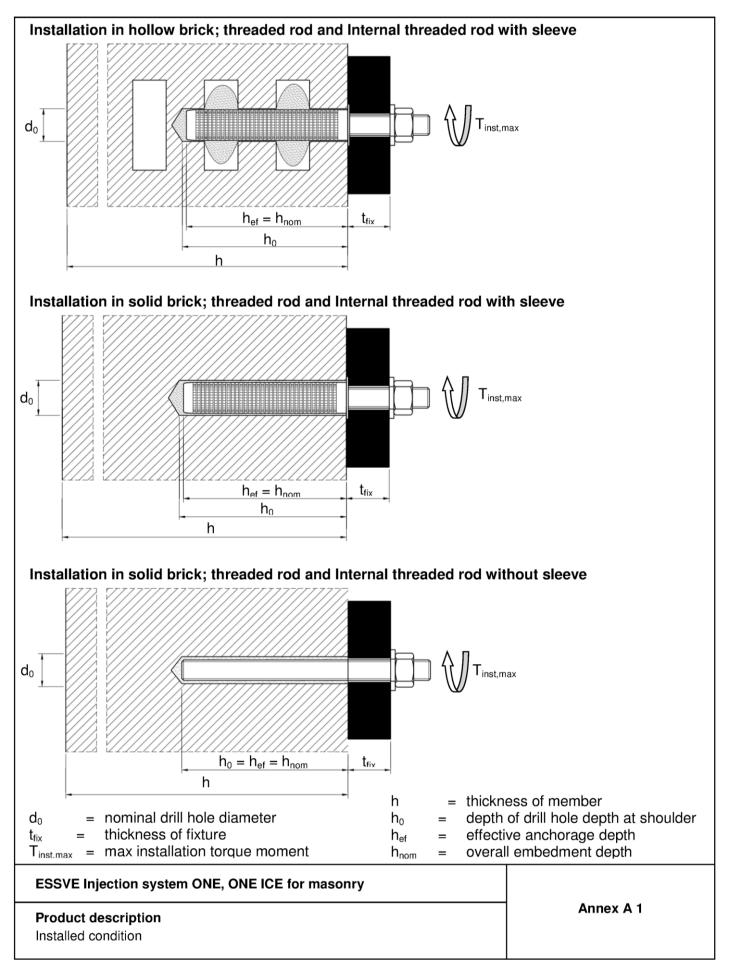
# 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

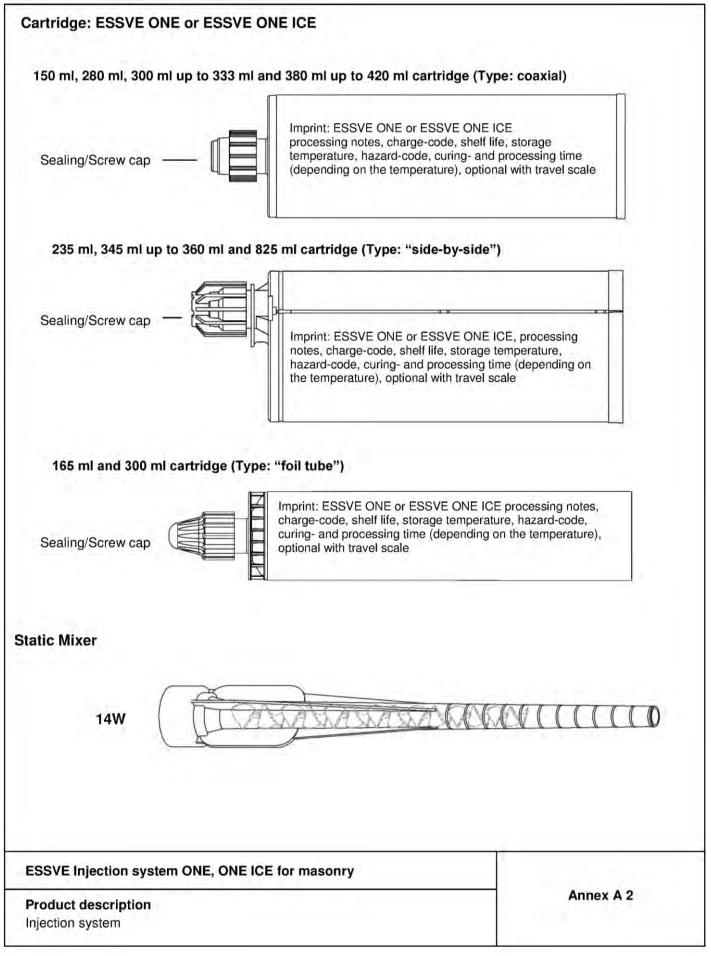
Dr.-Ing. Lars Eckfeldt p.p. Head of Department *beglaubigt:* Baderschneider





# Page 6 of European Technical Assessment ETA-18/0642 of 8 October 2018





### Page 7 of European Technical Assessment ETA-18/0642 of 8 October 2018



Threaded rod M8, M10, M12, M16	
Mark of the	
embedment depth	
l ges	-
	<b>i</b>
$h_{ef} = h_{nom}$	E
nut washer	ġ
	_
mmercial standard rod with:	
nternal threaded rod IG-M6, IG-M8, IG-M10	
Mark the producer	
	= drom
	d = d
her	
)	•
urking: e.g. 🗘 M8	
SSVE Injection system ONE, ONE ICE for masonry	
	Annex A 3
roduct description nchor rods	
A CARL AND A	



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

### Page 9 of European Technical Assessment ETA-18/0642 of 8 October 2018



Table A2:         Sleeve (Plastic)									
SH 12x80 SH 16x85 SH 20x85 d	s		L _s =	h _{ef} = h _{nor}					
SH 16x130 SH 20x130 SH 20x200 d _s			L _s = h _{ef} :	= h _{nom}					
Table A3: Sizes sleeve									
		S	leeve	12x80	16x85	16x130	20x85	20x130	20x200
Diameter of sleeve	d _s : d _{no}		[mm]	12	16	16	20	20	20
Length of sleeve	Ls		[mm]	80	85	130	85	130	200
Effective anchorage depth	h _e	f [	[mm]	80	85	130	85	130	200
Overall anchor embedment	h _{no}	m [	[mm]	80	85	130	85	130	200
Table A4: Steel									
	Anchor	rod	IG-M6	IG-M8	IG-M10	M8	M10	M12	M16
Outside diameter of anchor	$d_1 = d_{nom}$	[mm]	10 ¹⁾	12 ¹⁾	16 ¹⁾	8	10	12	16
Diameter of internal thread	d ₂	[mm]	6	8	10	-	-	-	-
Thread engagement length Min/max	l _{IG}	[mm]	8/20	8/20	10/25	-	-	-	-
Total length of steel element	I _{ges}	[mm]		sleeve: het		hef + t _{fix} + 9,5	- hef + t _{fix} + 11,5	hef + t _{fix} + 17,5	hef + t _f + 20,0
¹⁾ Internal threaded rod with m	etric exte	ernal thr						, .	, .
ESSVE Injection system C	DNE, OI		for mase	onry					
Product description Sleeves							Ar	nnex A 5	



### Specifications of intended use

### Anchorages subject to:

Static and quasi-static loads

#### **Base materials:**

- Autoclaved Aerated Concrete (Use category d) according to Annex B2
- Solid brick masonry (Use category b), according to Annex B2.
- Hollow brick masonry (use category c), according to Annex B2 and B3
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010.
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by job site tests according to 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_{Bk,b} and V_{Bk,c} see Annex C4 to C45; V_{Bk,s} see Annex C2; V_{Bk,pb} see Technical Report TR 054
- For application with sleeve with drill bit size  $\leq 15$  mm installed in joints not filled with mortar:

• 
$$N_{Bk,p,i} = 0,18 * N_{Bk,p}$$
 and  $N_{Bk,b,i} = 0,18 * N_{Bk,b}$  ( $N_{Bk,p} = N_{Bk,b}$  see Annex C4 to C45)

$$V_{\mathsf{Bk},\mathsf{c}} = 0.15 * V_{\mathsf{Bk},\mathsf{c}} \text{ and } V_{\mathsf{Bk},\mathsf{b}} = 0.15 * V_{\mathsf{Bk},\mathsf{b}}$$
 (V_{Bk,b} and V_{Bk,c} 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



Brick-No.	Brick type	Picture	Brick size length width height	Compressive strength	Bulk density	Sleeve - Anchor type	Annex
			[mm]	[N/mm ² ]	[kg/dm ³ ]		
Auto	claved aerated co	ncrete units acco	ording EN 771	-4			-
1	Autoclaved Aerated Concrete AAC6	17.	499 240 249	6	0,6	M8/M10/M12/M16/IG-M6/IG-M8/IG-M10	C4 - C5
Calc	ium silicate masor	nry units accordi	ng EN 771-2				
2	Calcium silicate solid brick KS-NF		240 115 71	10 20 27	2,0	M8/M10/M12/M16/IG-M6/IG-M8/IG-M10 SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C6 – C8
3	Calcium silicate hollow brick KSL-3DF		240 175 113	8 12 14	1,4	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C9 - C11
4	Calcium silicate hollow brick KSL-12DF	· tite	498 175 238	10 12 16	1,4	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C12- C14
Clay	masonry units ac	cording EN 771-1	1				
5	Clay solid brick Mz – DF		240 115 55	10 20 28	1,6	M8/M10/M12/M16/IG-M6/IG-M8/IG-M10 SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C15 C17
6	Clay hollow brick Hlz-16DF		497 240 238	6 8 12 14	0,8	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10 SH 20x200 – M12/M16/IG-M8/IG-M10	C18 - C20
7	Clay hollow brick Porotherm Homebric		500 200 299	4 6 10	0,7	SH 12x80 – M8 SH 16x85 – M8/M10/IG-M6 SH 16x130 – M8/M10/IG-M6 SH 20x85 – M12/M16/IG-M8/IG-M10 SH 20x130 – M12/M16/IG-M8/IG-M10	C21 - C23
lr	SSVE Injection s ntended Use rick types and pro				ements	Annex B 2	



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



Installation: Steel Brush RBT  $d_{b}$ Table B2: Installation parameters in autoclaved aerated concrete AAC and solid masonry (without sleeve) **IG-M10** Anchor size **M**8 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 90 100 h_{ef} [mm] 80 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)

Anchor size			M8	M8 / M1	0 / IG-M6	M12 / M	16 / IG-M8	/ <b>IG-M10</b>
	\$	Sleeve	12x80	16x85	16x130	20x85	20x130	20x200
Nominal drill hole diameter	d ₀	[mm]	12	16	16	20	20	20
Drill hole depth	h ₀	[mm]	85	90	135	90	135	205
Effective anchorage depth	h _{ef}	[mm]	80	85	130	85	130	200
Minimum wall thickness	h _{min}	[mm]	115	115	175	115	175	240
Diameter of clearance hole in the fixture	d _f ≤	[mm]	9		-M6) / 12 (M10)		/8) / 12 (IG /12) / 18 (I	
Diameter of steel bruch			RBT12	RB	T16		RBT20	
Diameter of steel brush	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**

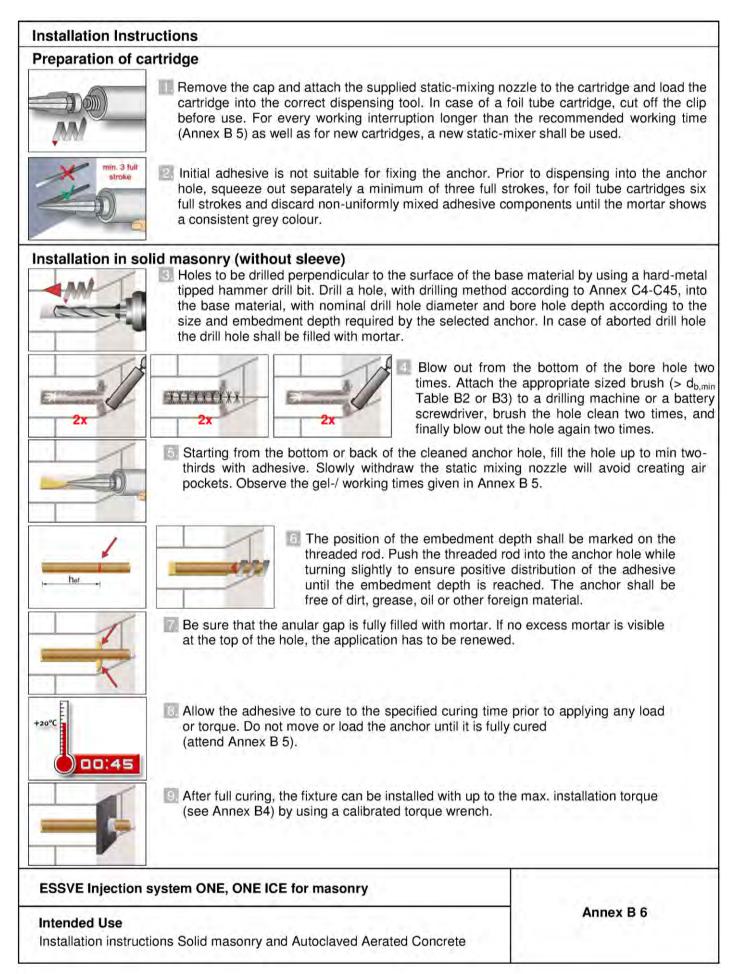
Installation parameters and cleaning brush

Annex B 4



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
Table B5: Maximum wor ESSVE ONE I Temperature in the base material T		n curing time 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
	he curing time <u>must</u> be dou		
	he curing time <u>must</u> be dou		

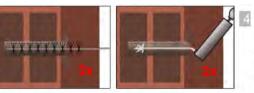






### Installation in solid and hollow masonry (with sleeve)

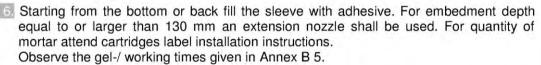
Holes to be drilled perpendicular to the surface of the base material by using a hardmetal tipped hammer drill bit. Drill a hole, with drill method according to Annex C4 – C45, into the base material, with nominal drill hole diameter and bore hole depth according to the size and embedment depth required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



sleeves that have the right length. Never cut the sleeve.

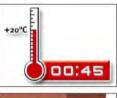
Blow out from the bottom of the bore hole two times. Attach the appropriate sized brush (>  $d_{b,min}$  Table B3) to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.

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





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).



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°C
abbreviation		d/d	w/d w/w	d/d	w/d w/w	d/d	w/d w/w
1 AAC6	For all sizes	0,95	0,86	0,81	0,73	0,81	0,73
2	d₀ ≤ 14 mm	0,93	0,80	0,87	0,74	0,65	0,56
KS-NF	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
3	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
KSL-3DF	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
4	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
KSL-12DF	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
5 MZ-DF							
6 Hlz-16DF							
7 Porotherm Homebric							
8 BGV-Thermo							
9 Calibric R+	For all sizes	0,86	0,86	0,86	0,86	0,73	0,73
10 Urbanbric							
11 Brique creuse C40							
12 Blocchi Leggeri							
13 Doppio Uni							
14	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
Bloc creux B40	d₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
15	d₀ ≤ 12 mm	0,93	0,80	0,87	0,74	0,65	0,56
Solid light weight concrete	d ₀ ≥ 16 mm	0,93	0,93	0,87	0,87	0,65	0,65
ESSVE Injection system	ONE, ONE ICE for m	asonry				Annex C 1	

 $\beta$ -factors for job site testing under tension load

ſ



Sizo					IG-M10	MO	M40	M10	MAC
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
	γ́Ms	[-]		-			2		
steel, property class 4.8	N _{Rk,s}	[kN]	-	-	-	15	23	34	63
	γMs	[-]		-			1	-	
steel, property class 5.6	N _{Rk,s}	[kN]	10	18	29	18	29	42	79
	γMs	[-]	10	2,0		10	2		70
steel, property class 5.8	N _{Rk,s}	[kN]	10	17	29	18	29	42	79
	γ _{Ms}	[-] [kN]	16	1,5 27	46	29	46	,5 67	126
steel, property class 8.8	N _{Rk,s}	[-]	10	1,5	40	29	40		120
	$\frac{\gamma_{Ms}}{N_{Rk,s}}$	[kN]	14	26	41	26	41	59	110
Stainless steel A4 / HCR, property class 70	YMs	[-]		1,87		20	1,		110
	N _{Rk,s}	[kN]	16	29	46	29	46	67	126
Stainless steel A4 / HCR, property class 80	γ _{Ms}	[-]		1,6				6	
Characteristic shear resistance	/1015			.,-				-	
	$V_{Rk,s}$	[kN]	-	-	-	7	12	17	31
steel, property class 4.6	ΥRk.s γMs	[-]		-		,	1,		
	V _{Rk,s}	[kN]	-	-	-	7	12	17	31
steel, property class 4.8	YMs	[-]		-				25	
	V _{Rk,s}	[kN]	5	9	15	9	15	21	39
steel, property class 5.6	γMs	[-]		1,67			1,	67	
staal property close E 9	V _{Rk,s}	[kN]	5	9	15	9	15	21	39
steel, property class 5.8	γ́Ms	[-]		1,25			1,	25	
steel, property class 8.8	$V_{Rk,s}$	[kN]	8	14	23	15	23	34	63
steel, property class 0.0	γMs	[-]		1,25			1,	25	
Stainless steel A4 / HCR, property class 70	$V_{Rk,s}$	[kN]	7	13	20	13	20	30	55
	γMs	[-]		1,56			1	56	
Stainless steel A4 / HCR, property class 80	$V_{Rk,s}$	[kN]	8	15	23	15	23	34	63
	γMs	[-]		1,33			1,	33	
Characteristic bending moment									
steel, property class 4.6	M _{Rk,s}	[Nm]	-	-	-	15	30	52	133
	γMs	[-]		-			1	67	
steel, property class 4.8	M _{Rk,s}	[Nm]	-	-	-	15	30	52	133
	γMs	[-]		-				25	107
steel, property class 5.6	M _{Rk,s}	[Nm]	8	19	37	19	37	66 67	167
	Υ _{Ms}	[-]	0	1,67	27	10	1		167
steel, property class 5.8	M _{Rk,s}	[Nm]	8	19 1,25	37	19	37	66 25	167
	γ _{Ms}	[-] [Nm]	12	30	60	30	60	105	266
steel, property class 8.8	M _{Rk,s}	[-]	12	1,25	00	30		25	200
	$\frac{\gamma_{Ms}}{M_{Rk,s}}$	[Nm]	11	26	52	26	52	92	233
Stainless steel A4 / HCR, property class 70		[-]		1,56	52	20		56	200
	$\frac{\gamma_{Ms}}{M_{Rk,s}}$	[Nm]	12	30	60	30	60	105	266
Stainless steel A4 / HCR, property class 80	IN INK,S	[-]		1,33				33	

### ESSVE Injection system ONE, ONE ICE for masonry

### Performances

Characteristic resistance under tension and shear load - steel failure



Spacing and edge distances			
Cc	r	Cmi	n
		Smin I	
		Smin I	
	Smin II Smin II		
	E Fis	U S	
	Scr II		
		af ff	
		d v	
	ि मु	Our	
	Contraction of the second seco	Scr II	
		Scr II	
C _{cr} = Characte	ristic edge distance		
	Edge distance		
s _{cr} = Characte	ristic spacing		
s _{min} = Minimum	spacing		
		for anchors placed parallel to I for anchors placed perpendicu	
Load direction	Tension load	Shear load parallel to free	Shear load perpendicula
Anchor		edge	to free edge
Anchors places parallel to bed			
joint s _{cr,ll} ; (s _{min,ll} )		V •	V+
Anchors places perpendicular to bed joint $s_{cr,\perp}$ ; ( $s_{min,\perp}$ )			
α _{g,N,ll} = Group factor i	a case of tension load for	r anchors placed parallel to the	bed joint
Dirit		anchors placed parallel to the b	
		anchors placed perpendicular	
		anchors placed perpendicular t	
	$\alpha_{Rk} = \alpha_{g,N} * N_{RK}$ $\alpha_{Rk} = \alpha_{g,N,II} * \alpha_{g,N,\perp} * N_{RK}$	and $V_{Rk}^{g} = \alpha_{g,V} * V_{Rk}$ and $V_{Rk}^{g} = \alpha_{g,V,II} * \alpha_{g,V}$	* V
	$R_{k} = \Omega_{g,N,II}  \Omega_{g,N,\perp} = \Omega_{Rk}$ Rk: $N_{Rk,b}$ or $N_{Rk,b,j}$ for $C_{cr}$ )	and $V R_k = \alpha_{g,V,II} \alpha_{g,V}$	V,⊥ VHK
	$R_{k:} V_{Rk,c}; V_{Rk,c,j}; V_{Rk,b} \text{ or } V_{Rk,c}$	_{k,b,j} for c _{cr} )	
(wi	th the relevant $\alpha_{g}$ )		
ESSVE Injection system ONE	, ONE ICE for masonry	1	
Desfermen			Annex C 3
Performances Edge distance and anchor space	ing		
LUGE UISTAILLE ATU ATUTUT SDAC	ing		



		Autoclaved Aera AAC6	ted Concr	ete				
	[kg/dm ³ ]	0,6				In.		
oomprossive strength in -	[N/mm ² ]	6					in the second	
Code	[isumi ]	EN 771-4					10.0	
Producer (country code)		e.g. Porit (DE)						
Brick dimensions	[mm]	499 x 240 x 249	_			_		
Drilling method	fund	Rotary					-	-
Table C4: Installation para	ameter							
Anchor size			[-]	M8	M10/IG-M6	M12/IC	G-M8	M16/IG-M10
Effective anchorage depth			[mm]	80	90	100		100
Edge distance	Cor		[mm]			1,5*hef		
Minimum edge distance	Cmi	in,N	[mm]			75		
Minimum edge distance	Cm	in,∨,II (Cmin,v,⊥) ¹⁾	[mm]		1.10	75 (1,5*h _e	f)	
Spacing	Scr		[mm]			3*h _{ef}	-	
Minimum spacing ¹⁾ C _{min,V,II} for shear loading pa	Smi		[mm]			100		
Configuration	anchor g	with c ≥ 125 (M8:120		- T.	with s ≥ 100	ααΝΙΙ		1,8
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	anchor g	with c ≥ 125 (M8:120 1,5*hef 75		- T.	100 3*hef 100	$\alpha_{g,N,II}$	[-]	2,0 1,4
II: anchors placed parallel to horizontal joint L: anchors placed		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef	))		100 3*hef 100 3*hef	αg,N,⊥	[-]	2,0
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef	))	ng pai	100 3*hef 100 3*hef	αg,N,⊥	[-]	2,0 1,4
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C6: Group factor for		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef roup in case of sł	))	ng pai	100 3*hef 100 3*hef callel to free e	αg,N,⊥	[-]	2,0 1,4
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C6: Group factor for Configuration		with c ≥ 125 (M8:120 1,5*hef 75 1,5*hef roup in case of sł with c ≥	))	ng pai	100 3*hef 100 3*hef rallel to free e	αg,N,⊥	[-]	2,0 1,4 2,0



Effective unchorage	v v v v v v v	s of I		1,5*hef 1,5*hef e under tens	T 6 7 8	3,0'		$\alpha_{g,V,ii}$	E	2,0
to nt aracteristi Effective	c value	sof	resistance	e under tens	T 6 7 8			$\alpha_{g,V,\perp}$		2,0
Effective	c value	s of I	resistance		T 6 7 8	d shear	oads			
	-			Ch			110.010			
					aracter	ristic res	stance			
					Use	categor	у			
nchorage			d/d				w/w w/d			d/d w/d w/w
depth	40°C/2	24°C	80°C/50°	C 120°C/72	°C 40°	C/24°C	80°C/50°C	120°0	C/72°C	For all temperatur range
he			Nous = No	1)			Nous = Nou	1)		V _{Rk,b} ²⁾³⁾
			I THK,D - I TH	<u>(,p</u>			HK,D - THK,	2		* HK,D
			Compres	sive strengt	h f _b ≥ 6					
80	2,5 (2	2,0)					2,0 (1,5)	1,5	(1,2)	6,0
90	4,0 (2	2,5)	3,0 (2,0)	2,5 (1,5	3,	5 (2,5)	3,0 (2,0)	2,5	(1,5)	10,0
100	5,0 (3	3,5)	4,0 (3,0)	3,0 (2,5	4,	5 (3,0)	3,5 (2,5)	3,0	(2,5)	10,0
				the second se			5,0 (3,5)	4,0	(3,0)	10,0
		or gr	Salor, 1 01 3	1001 4.0 and 4.	omuup	A HK D D	. 9,0			
hef	N	δ	N/N	δΝΟ	δN∞		V	δγα	)	δ∨∞
h _{ef} [mm]	N [kN]		N / N m/kN]	δ _{N0} [mm]	δ _{N∞} [mm]		V [N]	δγc [mm		δ∨∞ [mm]
		[m	m/kN]			[]			ן [ו	
[mm]	[kN]	[m		[mm]	[mm]	1	(N]	[mn	ו] ו	[mm]
[mm] 80	[kN] 0,9	[mi	m/kN]	[mm] 0,16	[mm] 0,32	[] 1 1	(N] ,3	[mm 0,8	n] I 2	[mm] 1,20
i	90 100 100 valid for c _{cr} , ' on of V _{Rk,c} s are valid for	[mm] 80 2,5 (2 90 4,0 (2 100 5,0 (3 100 6,5 (4 valid for c _{cr} , values in on of V _{Rk,c} see ETAC	[mm]           80         2,5 (2,0)           90         4,0 (2,5)           100         5,0 (3,5)           100         6,5 (4,5)           ralid for c _{cr} , values in brack on of V _{Rk,c} see ETAG029, are valid for steel 5.6 or gr	[mm]         Compres           80         2,5 (2,0)         2,5 (1,5)           90         4,0 (2,5)         3,0 (2,0)           100         5,0 (3,5)         4,0 (3,0)           100         6,5 (4,5)         5,5 (3,5)           ralid for c _{cr} , values in brackets are valio on of V _{Rk,c} see ETAG029, Annex C; are valid for steel 5.6 or greater. For states valid for steel 5.6 or greater.	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Compressive strength $f_b \ge 6$ 80         2,5 (2,0)         2,5 (1,5)         2,0 (1,2)         2,3           90         4,0 (2,5)         3,0 (2,0)         2,5 (1,5)         3,3           100         5,0 (3,5)         4,0 (3,0)         3,0 (2,5)         4,3           100         6,5 (4,5)         5,5 (3,5)         4,0 (3,0)         5,4           are valid for c _{cr} , values in brackets are valid for single anchors work on of V _{Rk,c} see ETAG029, Annex C;         are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiple	$\begin{tabular}{ c c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	$\begin{tabular}{ c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	$\begin{tabular}{ c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	$\begin{tabular}{ c c c c c c } \hline & & & & & & & & & & & & & & & & & & $



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

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

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

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

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

Configura	tion	with c ≥	with s ≥			
II: anchors placed	H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-H-	60	120			1,0
parallel to horizontal	V	115	120	α _{g,V,II}		1,7
joint		1,5*hef	3*h _{ef}		<b>C</b> 1	2,0
⊥: anchors placed		60	120		[-]	1,0
perpendicular to	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

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

## ESSVE Injection system ONE, ONE ICE for masonry

### Performances calcium solid brick KS-NF

Installation parameters

#### Deutsches Institut $\mathbf{D}$ für Bautechnik

Brick	type: Cal	cium silicat	e solid br	ick KS-NF									
Table (	C15: Cł	naracteristic	alues of r	esistance u	under tensio	on and she	ar loads						
					Cha	racteristic r							
						Use categ	gory						
Anchor	Sleeve	Effective anchorage depth		d/d			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)		$N_{Rk,b} = N_{Rk,c}$	1)	V _{Rk,b} ²⁾³⁾				
	-					[kN]		)	- חגט				
1	[mm] [kN] [kN] [kN]												
M8	-	80	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	2,5 (1,5)				
M10 / IG-M6	-	90	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,0 (2,0)				
M12 / IG-M8	-	100	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	2,5 (1,5)				
M16 / IG-M10	-	100	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,0 (1,5)	3,5 (1,5)	2,0 (0,9)	2,5 (1,5)				
M8	12x80	80	3,5 (1,5)	3,5 (1,5)	2,5 (1,2)	3,5 (1,5)	3,0 (1,5)	2,5 (1,2)	2,5 (1,5)				
M8 /	16x85	85	3,5 (1,5)	3,0 (1,5)	2,0 (0,9)	3,5 (1,5)	3,0 (1,5)	2,5 (1,2)	2,5 (1,5)				
M10/ IG-M6	16x130	130	3,5 (1,5)	3,0 (1,5)	2,0 (0,9)	3,5 (1,5)	3,0 (1,5)	2,5 (1,2)	2,5 (1,5)				
M12/	20x85	85	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	2,5 (1,5)				
M16 /	20x130	130	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	2,5 (1,5)				
IG-M8 / IG-M10	20x200	200	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	3,0 (1,5)	2,5 (1,2)	2,0 (0,9)	2,5 (1,5)				
					strength f _b ≥								
M8	-	80	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)				
M10 / IG-M6	-	90	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,5 (2,5)				
M12/ IG-M8	-	100	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)				
M16/ IG-M10	-	100	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)				
M8	12x80	80	5,5 (2,5)	5,0 (2,5)	3,5 (1,5)	4,5 (2,0)	4,5 (2,0)	3,0 (1,5)	4,0 (2,5)				
M8 /	16x85	85	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,0 (2,5)				
M10/ IG-M6	16x130	130	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,0 (2,5)				
M12 /	20x85	85	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,5)				
M16 /	20x130	130	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,5)				
IG-M8 / IG-M10	20x200	200 d for c _{cr} , values	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,0)	4,0 (2,0)	3,0 (1,5)	4,0 (2,5)				

1)

Values are valid for  $c_{cr}$ , values in brackets are valid for single anchors with  $c_{min}$ For  $c_{cr}$  calculation of  $V_{Rk,c}$  see 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



					Cha	racteristic r	esistance		
						Use categ	jory		
Anchor	thor a depth			d/d				d/d w/d w/w	
size	Sleeve	h _{ef} [mm]	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For All temperature range
		h _{ef}	$N_{Rk,b} = N_{Rk,p}^{(1)}$				$V_{Rk,b} = N_{Rk,p}$	1)	V _{Rk,b} ²⁾³⁾
		[mm]				[kN]			
			Com	pressive s	strength f _b ≥	27 N/mm ²			
M8	-	80	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M10 / IG-M6	-	90	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,5 (3,0)
M12 / IG-M8	-	100	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M16 / G-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)
G-M8 / G-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)

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

2) For c_{cr} calculation of V_{Bk,c} see Technical Report TR 054; values in brackets V_{Bk,b} = V_{Bk,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  $V_{\text{Rk},b}$  by 0,8

#### Table C17: Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	$\delta_{N0}$	δ _{N∞}	V	$\delta_{V0}$	δ _{V∞}
		[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							

ESSVE Injection system	ONE, ON	NE ICE for	masonry
------------------------	---------	------------	---------

### Performances calcium solid brick KS-NF

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



Brick type		Calcium silicate ho	llow brick				
Bulk density	ρ [kg/dm ³ ]	KSL-3DF 1,4			1.10	S	
	$p [N/mm^2]$	8, 12 or 14			10.1	100	1
Code	P = [is/inin ]	EN 771-2	_		100		ſ
Producer (country code)		e.g. Wemding (DE)			-	÷ .	J
Brick dimensions	[mm]	240 x 175 x 113					
Drilling method	fund	Rotary					
	175		95	14 44 14 32 14 44			
	10	5, 44 14, 38 17,	38 14	14 44 16			
	n parameters						
Anchor size	n parameters		[-]		All sizes	)	
Anchor size Edge distance	n parameters		[-] [mm]		All sizes 100 (120) ¹ 60	)	
Anchor size Edge distance Minimum edge distance	n parameters		[-]		100 (120) ¹	)	
Table C19:InstallationAnchor sizeEdge distanceMinimum edge distanceSpacing	n parameters		[-] [mm] [mm]		100 (120) ¹ 60	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min}	5	[-] [mm] [mm] [mm]		100 (120) ¹ 60 240	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH Table C20: Group fact	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s (130 and SH20x200 or group in case of to	[-] [mm] [mm] [mm] [mm] [mm]	44 16	100 (120) ¹ 60 240 120	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SF	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s 130 and SH20x200 or group in case of to with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ading with s ≥	100 (120) ¹ 60 240 120		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH Table C20: Group fact Configuration II: anchors placed	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s (130 and SH20x200 or group in case of to	[-] [mm] [mm] [mm] [mm] [mm]	44 16	100 (120) ¹ 60 240 120	}	1,5
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SF Table C20: Group fact Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s 130 and SH20x200 or group in case of to with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ading with s ≥	100 (120) ¹ 60 240 120		1,5
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SF Table C20: Group fact Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s 130 and SH20x200 or group in case of to with c ≥ 60	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ading with s ≥ 120	100 (120) ¹ 60 240 120 120	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SF Table C20: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s 130 and SH20x200 or group in case of to with c ≥ 60 c _{cr}	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ading with s ≥ 120 240	100 (120) ¹ 60 240 120 120		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SF Table C20: Group fact Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} H20x85; SH20x	s (130 and SH20x200 or group in case of to with c ≥ 60 c _{cr} 160	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ading with s ≥ 120 240 120	100 (120) ¹ 60 240 120 120		2,0 2,0



	Configur	ation	_	with c ≥		with s	2			
II: ancho	rs placed			60		120			1	,0
parallel to	horizontal	V .		160		120	α	g,V,II	1	,6
jo	int		1	Ccr		240		[	1 2	2,0
	rs placed			60		120			1	,0
	licular to ital joint	V		Ccr		120	α.	g,V,⊥	2	2,0
Table C2	2: Grou	p factor for a	nchor grou	up in case o	of shear loa	ading perpe	endicular to	o free edge	e	
	Configur	ation	110	with c ≥		with s	2			
II: ancho				60		120		1.11	1	,0
	horizontal int	V		Ccr		240	α	g,V,II	2	2,0
	rs placed		T	60		120		- I	-1	,0
perpend	licular to	V		0.5			α	g,V,⊥		
horizon	tal joint	<u>l</u>		Ccr		120	L		2	2,0
Table C2	3: Char	acteristic va	lues of res	istance und	der tension	and shear	loads			_
					Char	acteristic re				
						Use catego	ory		1	
Anchor	dar a	Effective anchorage		d/d w/d; w/w			d/d; v w/v	w		
size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°	C temper ran	ratur
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		$N_{Rk,b} = N_{Rk,j}$	1) P	V _{Rk}	4) ,b
		[mm]				[kN]				
					ength $f_b \ge 8$			1	1 2) -	
M8	12x80	80	1,5	1,5	1,2	1,5	1,2	0,9	$2,5^{2}$ (	
M8 / M10 / IG-M6	16x85 16x130	85 130	1,5 1,5	1,5 1,5	1,2 1,2	1,5 1,5	1,5 1,5	1,2 1,2	4,0 ²⁾ ( 4,0 ²⁾ (	(1,5) $(1,5)^3$
M12 /	20x85	85	4,5	4,0	3,0	4,5	4,0	3,0	4,0 ²⁾ (	$\frac{1,0}{1,5}$
M16 /								-		
IG-M8 /	20x130	130	4,5	4,0	3,0	4,5	4,0	3,0	$4,0^{2}$ (	
IG-M10	20x200	200	4,5	4,0	3,0	4,5	4,0	3,0	4,0 ²⁾ (	1,5)°
	10.00				ength $f_b \ge 1$				0.021 (	4 013
	12x80	80	2,0	2,0	1,5	2,0	1,5	1,2	3,0 ²⁾ ( 4,5 ²⁾ (	$\frac{1,2}{1,5}$
M8	16x85 16x130	85 130	2,0 2,5	2,0 2,5	1,5 1,5	2,0 2,5	2,0 2,5	1,5 1,5	4,5 ² (	$\frac{1,5}{1,5}^{3}$
M8 / M10	10/100	85	6,0	5,5	4,0	6,0	5,5	4,0	4,5 ⁽¹⁾	
M8 / M10 / IG-M6	20185		6,0		4,0	a Province			4,5 ⁽¹⁾	
M8 / M10	20x85	120	0.0	5,5		6,0	5,5	4,0		
M8 / M10 / IG-M6 M12 / M16 / IG-M8 /	20x130	130		E E		6,0	5,5	4,0	4,5 ²⁾ (	1,5)°
M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10	20x130 20x200	200	6,0	5,5	4,0	0,0				
M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 ¹⁾ Value: ²⁾ V _{Rk,c,II} ³⁾ V _{Rk,c,I}	20x130 $20x200$ s are valid for a state of the second s		6,0 parallel to fr ) valid for she	ee edge ear load in dii	rection to free	edge	8			



						Char	acteristic re	sistance		
							Use catego			
Anchor		Effective anchorage		d/d				w/d w/w		d/d; w/d; w/w
Anchor size	Sleeve	depth	40°C/24°C			°C/72°C		80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{(1)} \qquad \qquad N_{Rk,b} = N_{Rk,p}^{(1)}$						V _{Rk,b} ⁴⁾
		[mm]		$I_{HK,D} = I_{HK,D}$ [kN]         Compressive strength $f_b \ge 14 \text{ N/mm}^2$						
			Comp	ressive	strengt	th f _b ≥ 1	<u>4 N/mm²</u>			
M8	12x80	80	2,5	2,5		1,5	2,0	2,0	1,5	$3,5^{2}(1,5)^{3}$
M8 / M10	16x85	85	2,5	2,5		1,5	2,5	2,5	1,5	$6,0^{2}$ $(2,0)^{3}$
/ IG-M6	16x130	130	2,5	2,5		2,0	2,5	2,5	2,0	$6,0^{2}$ $(2,0)^{3}$
M12 /	20x85	85	6,5	6,0		4,5	6,5	6,0	4,5	6,0 ²⁾ (2,0) ³⁾
M16 / IG-M8 /	20x130	130	6,5	6,0		4,5	6,5	6,0	4,5	$6,0^{2}(2,0)^{3}$
IG-M10	20x200	200	6,5	6,0		4,5	6,5	6,0	4,5	$6,0^{2}$ $(2,0)^{3}$
<ol> <li>²⁾ V_{Rk,c,II}</li> <li>³⁾ V_{Rk,c,⊥}</li> </ol>	= V _{Rk,b} valic = V _{Rk,b} (val alues are va	or c _{cr} and c _{min} d for shear load ues in brackets alid for steel 5. <b>lacements</b>	) valid for sh	ear load ir				8		
Anchor si	ze Sle	an	fective chorage epth h _{ef}	Νδ	_N / N	δ _{N0}	δ _{N∞}	v	$\delta_{V0}$	δ _{V∞}
			[mm]	[kN] [m	m/kN]	[mm	i] [mm	] [kN]	[mm]	[mm]
M8	12	x80	80					1,0	1,0	1,50
M8 / M10	)/ 16	x85	85	0,71		0,64	1,29	)		
IG-M6	16>	(130	130		0 90					

0,90

1,67

1,86

### ESSVE Injection system ONE, ONE ICE for masonry

20x85

20x130

20x200

M12 / M16 / IG-M8 /

IG-M10

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

85

130

200

Annex C 11

1,7

3,34

1,9

2,85



Brick type		Calcium silicate ho KSL-12DF	llow brick		100		
Bulk density	ρ [kg/dm ³ ]	1,4			12.		
	$b \ge [N/mm^2]$	10, 12 or 16			44		
Code	0 = []	EN 771-2					24
Producer (country code)		e.g. Wemding (DE	)			-1	r
Brick dimensions	[mm]	498 x 175 x 238	/	-		1	
Drilling method	[	Rotary				C.	
$\int C$	) _ (	$\bigcirc$	$\bigcirc$	$) \frown ($		17	
35 59	64	59 64	59	64	59 / 35	1	
Table C27: Installation	64 /	1 .	<b>59</b>	f 64 f	All sizes	1	
Table C27:       Installation         Anchor size       Edge distance	n parameters	1 .	[-] [mm]	f 64 f	All sizes 100 (120) ¹	۹ )	
Table C27: Installation	Cor Cor	1 .	[-] [mm] [mm]	, 64 , ,	All sizes 100 (120) ¹ 100 (120) ¹	۹ )	
Table C27:       Installation         Anchor size       Edge distance	C _{cr} C _{min} ²⁾ S _{cr,II}	1 .	[-] [mm] [mm] [mm]	f 64 f	All sizes 100 (120) ¹ 100 (120) ¹ 498	۹ )	
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing	Cor Crinin ²⁾ Scr,II Scr,⊥ Smin	8	[-] [mm] [mm]	¢ 64 /	All sizes 100 (120) ¹ 100 (120) ¹	۹ )	
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : cmin according	C _{cr} C _{min} S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	s 120×130	[-] [mm] [mm] [mm] [mm] [mm]		All sizes 100 (120) ¹ 100 (120) ¹ 498 238	۹ )	
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ¹⁾ Value in brackets for SF ²⁾ For V _{Rk,c} : cmin according         Table C28:       Group fact         Configuration       II: anchors placed	Cor Cmin ²⁾ Scr,II Scr,⊥ Smin H20x85 and SH to Technical F to Technical F	20x130 Report TR 054 or group in case of t	[-] [mm] [mm] [mm] [mm] [mm]	Iding	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120	۹ )	1,0
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ¹⁾ Value in brackets for SF ²⁾ For V _{Rk,c} : cmin according         Table C28:       Group fact         Configuration       II: anchors placed         parallel to horizontal       Image: Content of the second secon	C _{cr} C _{min} S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	s l20x130 Report TR 054 or group in case of t with c ≥ 100	[-] [mm] [mm] [mm] [mm] [mm]	nding with s ≥ 120	All sizes 100 (120) ¹ 100 (120) ¹ 498 238	۹ )	
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : cmin according         Table C28:       Group fact         Configuration       II: anchors placed parallel to horizontal joint	Cor Cmin ²⁾ Scr,II Scr,⊥ Smin H20x85 and SH to Technical F	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr}	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥ 120 498	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120	۹ )	2,0
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : cmin according         Table C28:       Group fact         Configuration       II: anchors placed parallel to horizontal joint         ⊥: anchors placed perpendicular to       For vertice	Cor Cmin ²⁾ Scr,II Scr,⊥ Smin H20x85 and SH to Technical F	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥ 120 498 120	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120		2,0 1,0
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ⁽¹⁾ Value in brackets for SH ⁽²⁾ For V _{Rk,c} : cmin according         Table C28:       Group fact         Configuration       II: anchors placed parallel to horizontal joint         L: anchors placed perpendicular to       For Value in bracket in the spaced perpendicular to	Cor Cmin ²⁾ Scr,II Scr,⊥ Smin H20x85 and SH to Technical F	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr}	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥ 120 498	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120 α _{g,N,II}		2,0
Table C27:       Installation         Anchor size       Edge distance         Edge distance       Minimum edge distance         Spacing       Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : cmin according         Table C28:       Group fact         Configuration       II: anchors placed parallel to horizontal joint         ⊥: anchors placed       Image: Configuration	Cor Cmin ²⁾ Scr,II Scr,⊥ Smin H20x85 and SH to Technical F	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥ 120 498 120	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120 α _{g,N,II}		2,0 1,0



	Configuration		1	with c ≥	1	with s ≥			
II: anchors p			-	with C 2		with 5 2		-	-
parallel to hor joint		V		Ccr	_	498	α	lg,∨,II [-]	2,0
⊥: anchors p perpendicul horizontal j	ar to			Cor		238	α	'g,V,⊥	2,0
Table C30:	Group fac	ctor for anch	or group	in case of	shear load	ling perpe	ndicular t	o free edge	
	Configuration	(		with c ≥		with s ≥	1		
II: anchors p parallel to hor joint		V		Ccr		498	α	'g,V,II	2,0
⊥: anchors p perpendicul horizontal j	ar to	V		Cer		238	α	[-]	2,0
Table C31:	Characte	eristic values	of resist	ance unde	1.1.1.1.1.1.1.1.1.1.1.1		20.00		
					Char	acteristic r Use categ			
		Effective anchorage		d/d		Use cale	w/d w/w		d/d w/d w/w
Anchor size	Sleeve	depth	40°C/24°(	C 80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		N _{Rk,b} = N _{Rk}	1)	1	N _{Rk,b} = N _{Rk,}	1)	V _{Rk,b} ²⁾³⁾
		[mm]				[kN]			
		1	Compre	ssive stren	gth $f_b \ge 10$	N/mm ²			
M8	12x80	80	0,6	0,6	0,4	0,5	0,5	0,4	2,5
M8 / M10 /	16x85	85	0,6	0,6	0,4	0,6	0,6	0,4	5,5
IG-M6	16x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
M12/M16/	20x85	85	1,5	1,5	0,9	1,5	1,5	0,9	5,5
IG-M8 / IG-M10	20x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
			Compre	ssive stren	ath f. > 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	0,4	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
<ol> <li>Values ar</li> <li>Calculatic</li> <li>The value</li> </ol>	s are valid fo	and c _{min} e Technical Rep or steel 5.6 or g	reater. For	steel 4.6 and				n c ≥ 120 mm	: V _{Rk,c,ll} = V _{Rk,t}
Performan		n hollow brid		21			1	Annex C	13



Brick type:	Calcium si	licate hollo	ow brick	KS L-120	)F				
Table C32:	Character	istic values	of resista	nce unde	r tension a	nd shear I	loads (cor	ntinue)	
					Char	acteristic r			
Ancheraine	Clasura	Effective anchorage depth		d/d		Use categ	w/d w/w		d/d w/d w/w
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}	1	$N_{Rk,b} = N_{Rk,b}$	1) p	1	$V_{Rk,b} = N_{Rk,b}$	1) p	V _{Rk,b} ²⁾³⁾
		[mm]				[kN]			
			Compres	sive stren	gth f _b ≥ 16	N/mm ²			
M8	12x80	80	0,9	0,9	0,6	0,75	0,75	0,5	3,5
M8 / M10 /	16x85	85	0,9	0,9	0,6	0,9	0,9	0,6	8,0
IG-M6	16x130	130	4,0	3,5	2,5	4,0	3,5	2,5	8,0
M12 / M16 /	20x85	85	2,0	2,0	1,5	2,0	2,0	1,5	8,0
IG-M8 / IG-M10	20x130	130	4,0	3,5	2,5	4,0	3,5	2,5	8,0

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

²⁾ Calculation of V_{Rk,c} see 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}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	$\delta_{V0}$	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,26		0,23	0.46	1,0	1,3	1,95
M8 / M10 /	16x85	85	0,20		0,23	0,46			
IG-M6	16x130	130	1,14	0,90	1,03	2,06			
M12 / M16	20x85	85	0,57		0,51	1,03	2,3	2,5	3,75
/ IG-M8 / IG-M10	20x130	130	1,14		1,03	2,06			

### ESSVE Injection system ONE, ONE ICE for masonry

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



Brick type	Clay solid brick Mz-DF	
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	

Edge distance	Cor	[mm]	1,5*h _{ef}	
Minimum edge distance	Cmin	[mm]	60	
Spacing	Scr	[mm]	3*h _{ef}	
Minimum spacing	Smin	[mm]	120	

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

Configuration	with c ≥	with s ≥	I I I I I I I I I I I I I I I I I I I	A	i and and
II: anchors placed	60	120	1.000		0,7
parallel to horizontal joint	1,5*hef	3*h _{ef}	α _{g,N,II}		2,0
L: anchors placed	60	120		[-]	0,5
perpendicular to	1,5*hef	120	α _{g,N,⊥}		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

Configurat	ion	with c ≥	with s ≥			
II: anchors placed		60	120		1	0,5
parallel to horizontal	V	90	120	α _{g,V,II}		1,1
joint		1,5*hef	3*hel	11 6. 3.	194	2,0
⊥: anchors placed		60	120		1-1	0,5
perpendicular to	V 1	1,5*hef	120	ag,V,L		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

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

### ESSVE Injection system ONE, ONE ICE for masonry

### Performances clay solid brick Mz-DF

Description of the brick

Installation parameters



				Character	ristic resistance	
					e category	
Anabaraiza	Cleave	Effective anchorage depth		d/d w/d w/w	calegory	d/d w/d w/w
Anchor size	Sleeve	Сертт	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$	)	$V_{Rk,b}^{(2)3)}$
		[mm]			[kN]	
		Compressive s	trength 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				
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)
	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				
M8	-	80	5,5 (2,5)	5,5 (2,5)	4,5 (2,5)	5,5 (2,0)
M10 / IG-M6	-	90	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
M12 / IG-M8	-	100	7,0 (3,5)	7,0 (3,5)	6,0 (3,0)	5,5 (2,0)
M16 / IG-M10		100	7,0 (3,5)	7,0 (3,5)	6,0 (3,0)	9,0 (3,0)
M8	12x80	80	5,5 (2,5)	5,5 (2,5)	4,5 (2,5)	5,5 (2,0)
M8 / M10 / IG-M6	16x85	85	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
	16x130	130	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 / IG-M10	20x130 20x200	130 200	6,0 (3,0) 6,0 (3,0)	6,0 (3,0) 6,0 (3,0)	5,0 (2,5) 5,0 (2,5)	5,5 (2,0) 5,5 (2,0)

2) 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  $V_{\text{Rk},\text{b}}$  by 0,8

### ESSVE Injection system ONE, ONE ICE for masonry

### Performances clay solid brick Mz-DF

Characteristic values of resistance under tension and shear load



Brick type: Cla	y solid br	rick Mz-DF							
Table C40: Di	splaceme	nts							
Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	$\delta_{V0}$	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80	1,3		0,19	0,39			
M10 / IG-M6	-	90	1,6		0,24	0,47	1,9		
M12 / IG-M8	-	100	17		0.06	0.51			
M16 / IG-M10	-	100	1,7		0,26	0,51	2,9		
M8	12x80	80		0.15				1 00	1 50
M8 / M10 /	16x85	85		0,15				1,00	1,50
IG-M6	16x130	130	1.0		0.10	0.00	10		
M12 / M16 /	20x85	85	1,3		0,19	0,39	1,9		
IG-M8 /	20x130	130	1						
IG-M10	20x200	200	1						

## ESSVE Injection system ONE, ONE ICE for masonry

Performances clay solid brick Mz-DF Displacements



Brick type Bulk density Compressive strength f _b Code	ρ [kg/dm ³ ] , ≥ [N/mm ² ]	HLz-16-DF 0,8			Contraction of	-	
Compressive strength fb		0,0			A COLORADOR	100 million (1997)	
		6, 8, 12, 14					-
Joue		EN 771-1				100	
Producer (country code)		e.g. Unipor DE)					
Brick dimensions	[mm]	497 x 240 x 238		-			
Drilling method	[	Rotary				-	
		UL_UjU ⁺⁵⁶ D-0-0-0-0-0 D-0-0-0-0-0 5			++13 #-6		
Table C42: Installation					+13		
Table C42:       Installation         Anchor size					All sizes	)	
Table C42:       Installation         Anchor size       Edge distance					All sizes		
Table C42:       Installation         Anchor size       Edge distance         Andread Stance       Minimum edge distance	parameters		[-] [mm] [mm]		All sizes 100 (120) ¹ 100 (120) ¹ 497		
Table C42:       Installation         Anchor size	parameters		[-] [mm] [mm] [mm]		All sizes 100 (120) ¹ 100 (120) ¹ 497 238		
Table C42:       Installation         Anchor size	Ccr Cmin ²⁾ Scr.11 Scr.1 Smin 20x85; SH20> to Technical F	s <130 and SH20x200 Report TR 054 or group in case of	[-] [mm] [mm] [mm] [mm] [mm]	5-# ading	All sizes 100 (120) ¹ 100 (120) ¹ 497		
Table C42:       Installation         Anchor size         Edge distance         Minimum edge distance         Spacing         Minimum spacing         1)       Value in brackets for SHI         2)       For V _{Bk,c} : cmin according for SHI         Table C43:       Group factor         Configuration	Ccr Cmin ²⁾ Scr.11 Scr.1 Smin 20x85; SH20> to Technical F	s <130 and SH20x200 Report TR 054 or group in case of with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥	All sizes 100 (120) ¹ 100 (120) ¹ 497 238		
Table C42:       Installation         Anchor size	Ccr Cmin ²⁾ Scr.11 Scr.1 Smin 20x85; SH20> to Technical F	s <130 and SH20x200 Report TR 054 or group in case of	[-] [mm] [mm] [mm] [mm] [mm]	5-# ading	All sizes 100 (120) ¹ 100 (120) ¹ 497 238 100		1,3
Table C42:       Installation         Anchor size	Ccr Cmin ²⁾ Scr.11 Scr.1 Smin 20x85; SH20> to Technical F	s <130 and SH20x200 Report TR 054 or group in case of with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥	All sizes 100 (120) ¹ 100 (120) ¹ 497 238		1,3
Table C42:       Installation         Anchor size         Edge distance         Minimum edge distance         Spacing ¹⁾ Value in brackets for SHI ²⁾ For V _{Rk,c} : cmin according for the configuration         II: anchors placed parallel to horizontal       Initian	Ccr Cmin ²⁾ Scr.11 Scr.1 Smin 20x85; SH20> to Technical F	s <130 and SH20x200 Report TR 054 or group in case of with c ≥ 	[-] [mm] [mm] [mm] [mm] [mm]	ading with s ≥ 100	All sizes 100 (120) ¹ 100 (120) ¹ 497 238 100		

Installation parameters



jointImage: constraint of the second perpendicular to horizontal jointImage: constraint of the second perpendicular to horizontal jointImage: constraint of the second perpendicular to free edgeTable C45: Group factor for anchor group in case of shear loading perpendicular to free edgeConfigurationwith $c \ge$ with $s \ge$ Image: constraint of the second perpendicular to free edgeII: anchors placed parallel to horizontal jointImage: constraint of the second perpendicular to free edgeImage: constraint of the second perpendicular to free edgeL: anchors placedImage: constraint of the second perpendicular to free edgeImage: constraint of the second perpendicular to free edgeL: anchors placedImage: constraint of the second perpendicular to free edgeImage: constraint of the second perpendicular to free edgeL: anchors placedImage: constraint of the second perpendicular to free edgeImage: constraint of the second perpendicular	Confi	guration	with c	2	with s ≥				
L: anchors placed perpendicular to proper dicular to tree edge         238         α _{a,V,L} 2           Table C45: Group factor for anchor group in case of shear loading perpendicular to tree edge           Configuration         with c ≥         with s ≥         (1)           Bit anchors placed parallel to horizontal joint         V → •         cor         497         α _{a,V,l} [-]         2           Table C46:         Characteristic values of resistance under tension and shear loads         (-)         2         (-)         2           Table C46:         Characteristic values of resistance under tension and shear loads         Use category         (-)         2           Anchor size         Sleeve         Effective anchorage depth         (-)         (-)         (-)         (-)           M8         12×80         85         2,5         2,0         2,5         2,0         4,5           M8         12×80         85         2,5         2,0         5,5         3,0         4,5           M12 / M16 / (G-M6)         12×80         80         3,0         3,0         3,0         6,0           G-M8         12×80         80         3,0         3,0         3,5         3,5         3,0         6,0           M8	parallel to horizont		C _{cr}		497	α _{g,V,II}	r.i	2,0	
Configuration         with c ≥         with s ≥         with s ≥         orgeneration         continue         continue <thcontinue< th="">         continue         contin</thcontinue<>	perpendicular to	V	C _{cr}	-	238	$\alpha_{g,v,\perp}$	E1	2,0	
II: anchors placed parallel to horizontal joint       V       cor       497 $\alpha_{g,V I}$ [-]       2         1: anchors placed perpendicular to horizontal joint       V       cor       238 $\alpha_{g,V,I}$ [-]       2         Table C46: Characteristic values of resistance under tension and shear loads         Characteristic resistance under tension and shear loads         Characteristic resistance         Use category         Anchor size       Sleeve       Characteristic resistance         Liftective anchorage depth       Characteristic resistance         M8       12x80       80 c/50°C       120°C/72°C	Table C45: Gr	oup factor for anc	hor group in case	e of shear load	ding perpend	cular to free e	dge		
parallel to horizontal joint         V ····         c _{cr} 497         α ₀ .vit α ₀ .vit         1           L: anchors placed perpendicular to horizontal joint         V ····         c _{cr} 238         α ₀ .vit         [-]         2           Table C46:         Characteristic values of resistance under tension and shear loads         Use category         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/0         0/	Confi	guration	with c	2	with s ≥			1	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	parallel to horizont		C _{cr}		497	α _g ,v,li	r.	2,0	
$ \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline Characteristic resistance & Use category & Use category & d/d & d/d$	perpendicular to		C _{cr}		238	$\alpha_{g,v,\perp}$	EI.	2,0	
Use category           Use category           d/d         d/d <td>Table C46: Cl</td> <td>naracteristic value</td> <td>s of resistance u</td> <td>nder tension a</td> <td>and shear loa</td> <td>ds</td> <td></td> <td></td>	Table C46: Cl	naracteristic value	s of resistance u	nder tension a	and shear loa	ds			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					Characte	ristic resistance			
Anchor size         Sleeve $Iachorage depth$ w/d         w/d         w/d         w/d           Anchor size         Sleeve $Iachorage depth$ $Iachorage depth$ $w/w$ <					Use	category			
Anchor size         Sleeve         anchorage depth         w/d         w/d         w/d         w/d           Anchor size         Sleeve $anchoragedepth         w/d         W/d$			Effective				1		
Anchor size         Sleeve         depth         w/w         w/w         w/w         w/w           Anchor size         Sleeve         depth         40°C/24°C         80°C/50°C         120°C/72°C         For al temperative arrange           het         N _{Bk,b} = N _{Bk,b} ^{1/2} V _{Bk,b} ^{2/k} V _{Bk,b} ^{2/k} V _{Bk,b} ^{2/k} 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 / IG-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M8         12x80         80         3,0         3,5         3,5         3,0         6,0           G-M8 / IG-M10         20x85         85         2,5         2,5         3,0         6,0           M8         12x80         80         3,0         3,0         2,5         3,0           M8         12x80         80         3,0         3,0         2,5         5,5           IG-M6         16x130         130							1.02		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Anchor size	Sleeve			w/w			202.2.2	
h _{ef} N _{Bk,b} N _{Bk,b} N _{Bk,b} V _{Bk,b} <t< td=""><td></td><td></td><td></td><td>40°C/24°C</td><td>80°C/50°C</td><td>120°C/72°C</td><td>tem</td><td>perature</td></t<>				40°C/24°C	80°C/50°C	120°C/72°C	tem	perature	
[mm]         [kN]           Compressive strength $f_b \ge 6$ N/mm²           M8         12x80         80         2,5         2,5         2,0         2,5           M8 / M10/ IG-M6         16x85         85         2,5         2,5         2,0         4,5           M12 / M16 / IG-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M12 / M16 / IG-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M12 / M16 / IG-M8 / IG-M10         20x85         85         2,5         3,5         3,0         6,0           W12 / M16 / IG-M8 / IG-M10         20x200         200         3,5         3,5         3,0         6,0           W12 / M16 / IG-M6         16x130         130         4,5         4,5         3,5         5,5           M8 / M10/ IG-M6         16x130         130         4,5         4,5         3,5         5,5           M12 / M16 / IG-M6         20x85         85         3,0         3,0         2,5         5,5           M12 / M16 / IG-M6         20x85         85         3,0         3,0         2,5         6,0           M12 / M16 / IG-M6         20x85			h _{ef}		$N_{Bk,b} = N_{Bk,b}$	)	V _{Bk,b} ²⁾³⁾		
M8         12x80         80         2,5         2,5         2,0         2,5           M8 / M10/ IG-M6         16x85         85         2,5         2,5         2,0         4,5           M12 / M16 / IG-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M12 / M16 / IG-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M12 / M16 / IG-M8 / IG-M10         20x130         130         3,5         3,5         3,0         6,0           Compressive strength $f_b \ge 8$ N/mm ² M8         12x80         80         3,0         3,0         2,5         5,5           IG-M6         16x130         130         4,5         4,5         3,5         5,5           M12 / M16 / IG-M6         16x130         130         4,5         4,5         3,5         5,5           M12 / M16 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           M12 / M16 / IG-M8 / IG-M10         20x200         200         4,5         4,5         3,5         7,0           10         Values are valid for $c_{xr}$ and $c_{min}$ 20x200         200				( the second sec	[kN]				
M8         12x80         80         2,5         2,5         2,0         2,5           M8 / M10/ IG-M6         16x85         85         2,5         2,5         2,0         4,5           M12 / M16 / G-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M12 / M16 / G-M8 / IG-M10         20x85         85         2,5         2,5         2,0         5,0           M12 / M16 / G-M8 / IG-M10         20x130         130         3,5         3,5         3,0         6,0           20x200         200         3,5         3,5         3,0         6,0           Compressive strength $f_b \ge 8$ N/mm ² M8         12x80         80         3,0         3,0         2,5         5,5           IG-M6         16x130         130         4,5         4,5         3,5         5,5           M12 / M16 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           M12 / M16 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           20x200         200         4,5         4,5         3,5         7,0           Qox200 </td <td></td> <td></td> <td>Compressive s</td> <td>strength $f_b \ge 6$</td> <td>N/mm²</td> <td></td> <td></td> <td></td>			Compressive s	strength $f_b \ge 6$	N/mm ²				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	M8	12x80				2,0		2,5	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		16x85	85	2,5	2,5	2,0	100.0	4,5	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	IG-M6	16x130	130	3,5	3,5	3,0		4,5	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	M12/M16/		85	2,5	A			5,0	
20x200         200         3,5         3,5         3,0         6,0           Compressive strength $f_b ≥ 8 \text{ N/mm}^2$ 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 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           M12 / M16 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           M12 / M16 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           W12 / M16 / IG-M8 / IG-M10         20x85         85         3,0         3,0         2,5         6,0           Values are valid for $c_{or}$ and $c_{min}$ 20x200         200         4,5         4,5         3,5         7,0           ''         Values are valid for $c_{or}$ and $c_{min}$ 20         200         200         4,5         4,5         3,5         7,0           ''         Values are valid for $c_{or}$ and $c_{$		20x130				3,0		6,0	
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		20x200				3,0		6,0	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$									
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						1. Contract 1. Con			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	IG-M6								
IG-M8 / IG-M1020x1301304,54,53,57,0 $20x200$ 2004,54,53,57,0 $1)$ Values are valid for $c_{cr}$ and $c_{min}$ Calculation of $V_{Rk,c}$ see Technical Report TR 054, except for shear load parallel to free edge with $c \ge 125$ mm: $V_{Rk,c}$	M12/M16/							11.00	
<ul> <li>¹⁾ Values are valid for c_{cr} and c_{min}</li> <li>²⁾ Calculation of V_{Rk,c} see Technical Report TR 054, except for shear load parallel to free edge with c ≥ 125 mm: V_{Rk,c}</li> <li>V_{Rk,b}</li> </ul>									
<ul> <li>²⁾ Calculation of V_{Rk,c} see Technical Report TR 054, except for shear load parallel to free edge with c ≥ 125 mm: V_{Rk,c}</li> <li>V_{Rk,b}</li> </ul>	11		200	4,5	4,5	3,5		7,0	
	²⁾ Calculation V _{Rk,b}	of $V_{Rk,c}$ see Technica					125 mm	: V _{Rk,c,li} =	
ESSVE Injection system ONE, ONE ICE for masonry	ESSVE Injectio	on system ONE, O	NE ICE for maso	nry					



Brick type: Cla	ay hollow brick HI	Lz-16-DF				
Table C47: C	haracteristic value:	s of resistance u	nder tension a	and shear loa	ds (continue)	
				Characte	ristic resistance	
				Use	e category	
		Effective		d/d		d/d
		anchorage		w/d		w/d
Anchor size	Sleeve	depth		w/w		w/w
Anchor Size	Oleeve	doptil				For all
			40°C/24°C	80°C/50°C	120°C/72°C	temperature
						range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$	)	V _{Rk,b} ²⁾³⁾
		[mm]		[kN]		
		Compressive s	trength f _b ≥ 12	N/mm ²		
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
M12 / M16 / IG-M8 / IG-M10	20x130	130	5,0	5,0	4,5	9,0
IG-1010 / IG-10110	20x200	200	5,0	5,0	4,5	9,0
		Compressive s	trength f _b ≥ 14	N/mm ²		
M8	12x80	80	4,0	4,0	3,0	4,0
M8 / M10/	16x85	85	4,0	4,0	3,0	6,5
IG-M6	16x130	130	5,5	5,5	4,5	6,5
	20x85	85	4,0	4,0	3,0	7,0
M12 / M16 / IG-M8 / IG-M10	20x130	130	5,5	5,5	4,5	9,0
	20x200	200	5,5	5,5	4,5	9,0

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

²⁾ Calculation of V_{Rk,c} see 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	$\delta_{V0}$	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	1 1 4		0.11	0.00	1,10	1,20	1,80
M8 / M10/	16x85	85	1,14		0,11	0,23	1.00	1 50	0.05
IG-M6	16x130	130	1,57	0.10	0,16	0,31	1,86	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	20x200	200	1,57		0,16	0,31	2,37	2,10	3,15

### ESSVE Injection system ONE, ONE ICE for masonry

### Performances clay hollow brick HLz-16DF

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



Porotherm Homebric           [kg/dm³]         0,7           [N/mm²]         4, 6 or 10           EN 771-1         e.g. Wienerberger (FR)           [mm]         500 x 200 x 299           Rotary         494           + 4,5         494           + 4,5         494	
[N/mm ² ] 4, 6 or 10 EN 771-1 e.g. Wienerberger (FR) [mm] 500 x 200 x 299 Rotary 494 494	
EN 771-1 e.g. Wienerberger (FR) [mm] 500 x 200 x 299 Rotary 494 + 4,5 31 25	
e.g. Wienerberger (FR) [mm] 500 x 200 x 299 Rotary 494 + 4,5 31 25 0 0 0 0 0 0 0 0 0 0 0 0 0	
[mm] 500 x 200 x 299 Rotary 494 4,5 31 25	
Rotary 494 494 31 25 000000000000000000000000000000000000	
494	
arameters	
	All sizes
	100 (120) ¹⁾
	100 (120) ¹⁾ 500
	299
S _{min} [mm]	100
(85 and SH20v130	ading
k85 and SH20x130 Technical Report TR 054 for anchor group in case of tension load with c ≥ 200	with s ≥
Technical Report TR 054 for anchor group in case of tension load with c ≥	with s ≥     2       100     2,       500     2,
Technical Report TR 054 for anchor group in case of tension load with c ≥ 200	with s ≥
	1.6



Configurat	ion	with	C≥	with s	2			
II: anchors placed parallel to horizontal joint	V	c	cr	500	α _{g,v,}		2,0	
⊥: anchors placed perpendicular to horizontal joint	V	c	cr	299	α _g ,v,	[-]	2,0	
able C53: Group	factor for and	hor group in ca	ase of shear l	oading perp	endicular to f	ree edge		
Configurat	ion	with	IC≥	with s	2			
II: anchors placed parallel to horizontal joint		c	er	500	α _g ,v,		2,0	
⊥: anchors placed perpendicular to horizontal joint		c	cr	299	α _{g,v}	I.	2,0	
able C54: Charae	cteristic value	es of resistance	under tensio	12 POINT AC 10 P 40	loads	ance		
					Jse category	ance		
		Effective	· · · · · · · · · · · · · · · · · · ·	d/d	Jae calegory	d/c	h	
		anchorage		w/d		w/c		
Anchor size	Sleeve	depth		w/w		w/v	w/w	
			40°C/24°C	80°C/50°C	120°C/72°C	For all tem		
	-	h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$	)	rang V _{Rk,b}	2)3)	
		[mm]		TARKD - TARKD	[kN]	V Rk,b		
	-		e strength f _b	$\geq 4 \text{ N/mm}^2$				
M8	12x80	80	0,9	0,9	0,75	2,0	)	
	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	ic	
		Compressiv	e strength fb	≥ 6 N/mm ²				
M8	12x80	80	0,9	0,9	0,9	2,5	j.	
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,9	2,5	i	
	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		
<ul> <li>Calculation of V₁</li> <li>Calculation of V₁</li> <li>V_{Rk,b}</li> <li>The values are v</li> </ul>	_{R,c} see Technic valid for steel 5.0	al Report TR 054, 5 or greater. For s	teel 4.6 and 4.8			h c ≥ 200 mm:	V _{Rk,c,II} =	
ESSVE Injection sy	stem ONE, C	INE ICE for mas	sonry					
		Porotherm Ho			Annex C 22			



							teristic resist	ance	
							lse category		
Anchor s	size	Sleeve	Effective anchorage depth	,	Ň	d/d v/d v/w		d/c w/c w/v	k
				40°C/2			120°C/72°C	For all tem rang	je
			h _{ef}		N _{Rk,b}	= N _{Rk,p} ¹⁾		V _{Rk,b}	2)3)
			[mm]				[kN]		
			Compress	ive strength	n f _b ≥ 10 N	/mm²			
M8		12x80	80	1,2		,2	1,2	3,0	
M8 / M10/ I	G-M6	16x85	85	1,2		,2	1,2	3,0	
		16x130	130	1,5	1	,5	1,5	3,5	5
							,		
M12 / M1	16 /	20x85	85	1,2	1	,2	1,2	4,0	
IG-M8 / IG ¹⁾ Values ²⁾ Calcula V _{Rk,b}	16 / -M10 are valid for ation of V _{Rk,c} s	20x85 20x130 c _{cr} and c _{min} see Technical	85 130 Report TR 0	1,2 1,5 54, except for	1 shear load	,5 parallel to	1,2 1,5 o free edge wit	4,0	)
IG-M8 / IG ¹⁾ Values ²⁾ Calcula V _{Rk,b} ³⁾ The va	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6	85 130	1,2 1,5 54, except for	1 shear load	,5 parallel to	1,2 1,5 o free edge wit	4,0	)
IG-M8 / IG ¹⁾ Values ²⁾ Calcula V _{Rk,b}	16 / -M10 are valid for ation of V _{Rk,c} s	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6 <b>ments</b>	85 130 Report TR 09 or greater. Fo	1,2 1,5 54, except for	1 shear load	,5 parallel to	1,2 1,5 o free edge wit	4,0	)
IG-M8 / IG ¹⁾ Values ²⁾ Calcula V _{Rk,b} ³⁾ The va	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6	85 130 Report TR 05 or greater. Fo ve age N	1,2 1,5 54, except for	1 shear load	,5 parallel to	1,2 1,5 o free edge wit y 0,8	4,0	)
IG-M8 / IG ¹⁾ Values ²⁾ Calcula V _{Rk,b} ³⁾ The va Table C56:	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid <b>Displacen</b>	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6 <b>nents</b> Effecti anchora	85 130 Report TR 05 or greater. Fo ve age N h _{ef} N	1,2 1,5 54, except for or steel 4.6 and	1 shear load d 4.8 multip	,5 parallel tα ly V _{Rk,b} by	1,2 1,5 o free edge wit y 0,8	4,0 h c ≥ 200 mm:	) V _{Rk,c,II} =
IG-M8 / IG ¹⁾ Values ²⁾ Calcula V _{Rk,b} ³⁾ The va Table C56:	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid <b>Displacen</b>	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6 <b>nents</b> Effecti anchora depth	85 130 Report TR 05 or greater. Fo ve age N h _{ef} N	1,2           1,5           54, except for           or steel 4.6 and           δ _N / N	1 shear load d 4.8 multip δ _{N0} [mm]	,5 parallel tα ly V _{Rk,b} by δ _{N∞}	1,2 1,5 o free edge wit y 0,8 V ] [kN] 0,9	4,0 h c ≥ 200 mm: δ _{V0}	V _{Rk,c,II} = δ _{V∞}
IG-M8 / IG ¹⁾ Values ²⁾ Calcula VRk,b ³⁾ The va Table C56: Anchor size	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid <b>Displacen</b> Sleeve	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6 nents Effecti anchora depth [mm	85 130 Report TR 09 or greater. Fo ve age N h _{ef} N	1,2           1,5           54, except for           or steel 4.6 and           δ _N / N	1 shear load d 4.8 multip δ _{N0}	,5 parallel tα ly V _{Rk,b} by δ _{N∞}	1,2 1,5 o free edge wit y 0,8 V ] [kN] 0,9	4,0 h c ≥ 200 mm: δ _{V0}	V _{Rk,c,II} = δ _{V∞}
IG-M8 / IG ¹⁾ Values ²⁾ Calcula ³⁾ The va Table C56: Anchor size M8	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid <b>Displacen</b> Sleeve 12x80	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6 ments Effecti anchora depth [mm 80	85 130 Report TR 05 or greater. Fo ve age N h _{ef} N ] [kN] 	1,2           1,5           54, except for           or steel 4.6 and           δ _N / N           [mm/kN]	1 shear load d 4.8 multip δ _{N0} [mm]	,5 parallel tα ly V _{Rk,b} by δ _{N∞}	1,2 1,5 o free edge wit y 0,8 V ] [kN] 0,9 0,9	4,0 h c ≥ 200 mm: δ _{V0} [mm]	δ _{V∞}
IG-M8 / IG ¹⁾ Values ²⁾ Calcula ³⁾ The va <b>Table C56:</b> Anchor size M8 M8 / M10/	16 / -M10 are valid for ation of V _{Rk,c} s lues are valid <b>Displacen</b> Sleeve 12x80 16x85	20x85 20x130 c _{cr} and c _{min} see Technical for steel 5.6 ments Effecti anchora depth [mm 80 85	85 130 Report TR 05 or greater. Fo ve age N h _{ef} N ] [kN] 	1,2           1,5           54, except for           or steel 4.6 and           δ _N / N	1 shear load d 4.8 multip δ _{N0} [mm] 0,27	,5 parallel tα ly V _{Rk,b} by δ _{N∞} [mm 0,55	1,2 1,5 o free edge wit y 0,8 V ] [kN] 0,9 0,9 0,9 0,9	4,0 h c ≥ 200 mm: δ _{V0}	V _{Rk,c,II} = δ _{V∞}

### 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	Ş.				
Bulk density	ρ [kg/dm ³ ]	BGV Thermo 0,6					
	$\geq [N/mm^2]$	4, 6 or 10					
Code	= [raymon ]	EN 771-1					
Producer (country code)		e.g. Leroux (FR)					
Brick dimensions	[mm]	500 x 200 x 314					
Drilling method	[]	Rotary					
			500	n			
200		2	2	61		\$5	
	parameters	s		5	All sizes		
Anchor size		s	[-]	5	All sizes		
Anchor size Edge distance	parameters	S	[-] [mm] [mm]	5	All sizes 100 (120) ¹ 100 (120) ¹		
Anchor size Edge distance Minimum edge distance	Ccr	S	[mm] [mm] [mm]	5	100 (120) ¹ 100 (120) ¹ 500		
Anchor size Edge distance Minimum edge distance Spacing	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥}	S	[mm] [mm] [mm] [mm]	5	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according to Table C59: Group facto	Ccr Cmin ²⁾ Scr,II Scr,⊥ Smin 20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of	[mm] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH: ²⁾ For V _{Rk,c} : c _{min} according f <b>Table C59:</b> Group factor Configuration	Ccr Cmin ²⁾ Scr,II Scr,⊥ Smin 20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of with c ≥	[mm] [mm] [mm] [mm] [mm]	ading with s ≥	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH: ²⁾ For V _{Rk,c} : c _{min} according for <b>Table C59:</b> Group factor Configuration II: anchors placed	Ccr Cmin ²⁾ Scr,II Scr,⊥ Smin 20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of	[mm] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500 314 100		1,7
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH: ²⁾ For V _{Rk,c} : c _{min} according f <b>Table C59:</b> Group factor Configuration	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{min} 20x85 and SH to Technical F or for ancho	H20x130 Report TR 054 or group in case of with c ≥	[mm] [mm] [mm] [mm] [mm]	ading with s ≥	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ² ²⁾ For V _{Rk,c} : c _{min} according to <b>Table C59:</b> Group factor Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{min} 20x85 and SH to Technical F or for ancho	H20x130 Report TR 054 or group in case of with c ≥ 200	[mm] [mm] [mm] [mm] [mm]	ading with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314 100		1,7 2,0 1,1
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according to <b>Table C59:</b> Group factor Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{min} 20x85 and SH to Technical F or for ancho	H20x130 Report TR 054 <b>or group in case of</b> with c ≥ 200 c _{cr}	[mm] [mm] [mm] [mm] [mm]	ading with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100		2,0



Configuratio	n	with c ≥	with s ≥			
II: anchors placed parallel to horizontal joint		C _{cr}	500	αg,∨,∥	11	2,0
⊥: anchors placed perpendicular to horizontal joint	V	Cor	314	α _{g,V,⊥}	[-]	2,0
		group in case of shear		ular to free	edge	
Configuratio	'n	with c ≥	with s ≥	11		
II: anchors placed parallel to horizontal joint	V	C _{cr}	500	$\alpha_{g,V,II}$	L1	2,0
⊥: anchors placed perpendicular to horizontal joint	V	Ccr	314	$\alpha_{g,V,\perp}$	[-]	2,0



Table C62:		ic values of resis	1			
					cteristic resistan	се
		Effective			Jse category	-17-1
		Effective anchorage		d/d w/d	d/d w/d	
Anchor size	Sleeve	depth		w/w		
		·	40°C/24°C	w/w 80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1)}$		V _{Rk,b} ²⁾³⁾
		[mm]			[kN]	
		Compi	essive streng	th f _b ≥ 4 N/mm ²	2	
M8	12x80	80	0,6	0,6	0,6	2,0
M8 / M10/	16x85	85	0,6	0,6	0,6	2,0
IG-M6	16x130	130	1,2	1,2	0,9	2,5
M12 / M16 / IG-M8 /	20x85	85	0,6	0,6	0,6	2,5
IG-M10	20x130	130	1,2	1,2	0,9	2,5
				th f _b ≥ 6 N/mm ²	1	
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 /	20x85	85	0,9	0,9	0,75	3,0
IG-M8 / IG-M10	20x130	130	1,5	1,5	1,2	3,0
		Compre	essive strengt	h 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

#### Table C63: Displacements

Sleeve	Effective anchorage depth h _{ef}	Ν	δ _N / N	δ _{N0}	δ _{N∞}	V	$\delta_{V0}$	δγ∞
	[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
12x80	80	0.26		0.21	0.41	0.7		
16x85	85	0,20		0,21	0,41	0,7		
16x130	130	0,43	0,80	0,34	0,69		1,00	1,50
20x85	85	0,26		0,21	0,41	0,86	,	,
20x130	130	0,43		0,34	0,69	,		
	12x80 16x85 16x130 20x85	anchorage depth h _{ef} [mm]           12x80         80           16x85         85           16x130         130           20x85         85	anchorage depth h _{ef} N           Imm]         [kN]           12x80         80           16x85         85           16x130         130         0,43           20x85         85         0,26	$\begin{array}{c c} Sleeve \\ \hline Sleeve \\ \hline leeve \\ \hline leeve$	$\begin{array}{c c} Sleeve \\ \hline \\ Sleeve \\ \hline \\ \hline \\ \\ \hline \\ \\ \hline \\ \\ 12x80 \\ 16x85 \\ 85 \\ \hline \\ 16x130 \\ 130 \\ 20x85 \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $

## ESSVE Injection system ONE, ONE ICE for masonry

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



Brick type		Clay hollow brick	k		~		
Bulk density	ρ [kg/dm ³ ]	Calibric R+ 0,6			Suller.	and the second	
	p [kg/dff] $b \ge [N/mm^2]$	6, 9 or 12					-
Compressive strength	P ≂ [iv/iiiii ]	EN 771-1		1		2	
Producer (country code)		222/02/02/02/02/02/02/02/02/02/02/02/02/	e.g. Terreal (FR)				
Brick dimensions	[mm]	500 x 200 x 314				< 11	
Drilling method	fund	Rotary				~	
Driming motilou		riolary		4			
1-			500		5 <del>11</del>		
			www.w	กลาม-มามามามามาก	5		
	1		_ 86 2	20			
					]()]		
200							
200							
					IJ		
0	10		1	Ĩ	1		
	n parameters	1					
Anchor size	- 1	1	[-]		All sizes	)	
Anchor size Edge distance	Cor	5	[mm]		100 (120) ¹⁾		
Anchor size Edge distance Minimum edge distance	- 1	3					
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾	s 	[mm] [mm]		100 (120) ¹⁾ 100 (120) ¹⁾		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min}		[mm] [mm] [mm]		100 (120) ¹⁾ 100 (120) ¹⁾ 500		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according Table C66: Group fact	C _{or} C _{min} ²⁾ S _{or,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	I20x130 Report TR 054 or group in case o	[mm] [mm] [mm] [mm] [mm]		100 (120) ¹⁾ 100 (120) ¹⁾ 500 314		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according <b>Table C66: Group fact</b>	C _{or} C _{min} ²⁾ S _{or,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	20x130 Report TR 054 <b>or group in case o</b> with c ≥	[mm] [mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹⁾ 100 (120) ¹⁾ 500 314		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according <b>Table C66: Group fact</b> Configuration II: anchors placed parallel to horizontal	C _{or} C _{min} ²⁾ S _{or,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	l20x130 Report TR 054 <b>or group in case o</b> with c ≥ 175	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹⁾ 100 (120) ¹⁾ 500 314		1,7
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according <b>Table C66:</b> Group fact Configuration II: anchors placed parallel to horizontal joint	C _{or} C _{min} ²⁾ S _{or,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	I20x130 Report TR 054 or group in case o with c ≥ 175 c _{cr}	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SH 2) For V _{Rk,c} : c _{min} according Table C66: Group fact Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	C _{or} C _{min} ²⁾ S _{or,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	20x130 Report TR 054 or group in case o with c ≥ 175 c _{or} 175	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100 500 100	100 (120) ¹ 100 (120) ¹ 500 314 100		2,0 1,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according <b>Table C66: Group fact</b> <u>Configuration</u> II: anchors placed parallel to horizontal joint	C _{or} C _{min} ²⁾ S _{or,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	I20x130 Report TR 054 or group in case o with c ≥ 175 c _{cr}	[mm] [mm] [mm] [mm] [mm]	with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100 α _{g,N,II}		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according <b>Table C66:</b> Group fact Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,I} S _{or,⊥} S _{min} H20x85 and SH to Technical F tor for ancho	20x130 Report TR 054 or group in case o with c ≥ 175 C _{cr} 175 C _{cr}	[mm] [mm] [mm] [mm] of tension loa	with s ≥ 100 500 100	100 (120) ¹ 100 (120) ¹ 500 314 100 α _{g,N,II}		2,0 1,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according <b>Table C66:</b> Group fact Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	C _{cr} C _{min} ²⁾ S _{cr,I} S _{or,⊥} S _{min} H20x85 and SH to Technical F tor for ancho	20x130 Report TR 054 or group in case o with c ≥ 175 C _{cr} 175 C _{cr}	[mm] [mm] [mm] [mm] of tension loa	with s ≥ 100 500 100	100 (120) ¹ 100 (120) ¹ 500 314 100 α _{g,N,II}		2



C	Configuration		with c ≥	with s ≥	and the second sec		
II: anchors pl parallel to hori joint	aced		C _{cr}	500	α _{g,∨,II}	T.1	2,0
⊥: anchors pl perpendicula horizontal jo	ar to V		Ccr	314	$\alpha_{g,v,\perp}$	[-]	2,0
Table C68:	Group factor fo	or anchor group in	case of shear l	loading perpend	dicular to free e	dge	
C	Configuration	A	with c ≥				
	I: anchors placed arallel to horizontal joint		Ccr	500	α _g ,v,ii	11	2,0
⊥: anchors pl perpendicula horizontal je	arto V—		C _{cr}	314	$\alpha_{g,v,\perp}$	[-]	2,0
Table C69:	Characteristic	values of resistar	nce under tensio	on and shear lo	ads		
			-		istic resistance		
				Use d/d	category		
	Effecti anchora hor size Sleeve depth					d/d w/d w/w	
Anchor Size			40°C/24°C	80°C/50°C	120°C/72°C	te	For all mperature range
		h _{et}		$N_{Rk,b} = N_{Rk,p}^{(1)}$			V _{Rk,b} ²⁾³⁾
		[mm]		Ting Ting	[kN]		
		Compres	sive strength f _b	≥ 6 N/mm ²			
M8	12x80	80	0,9	0,9	0,75		3,0
M8 / M10/	16x85	85	0,9	0,9	0,75		4,0
IG-M6	16x130	130	1,2	1,2	0,9		4,0
M12/M16/	20x85	85	0,9	0,9	0,75		6,0
IG-M8 /	20x130	130	1,2	1,2	0,9		6,0
IG-M10			sive strength f _b	1 A			1247
M8	12x80	80	1,2	1,2	0,9	1	3,5
M8 / M10/	16x85	85	1,2	1,2	0,9		5,0
IG-M6	16x130	130	1,2	1,2	1,2		5,0
M12/M16/	20x85	85	1,3	1,5	0,9		7,5
IG-M8 / IG-M10	20x130	130	1,5	1,5	1,2		7,5
²⁾ Calcul V _{Rk,b}		d c _{min} echnical Report TR 0 teel 5.6 or greater. Fo				250 mm	: V _{Rk,c,li} =
ECOVE Int	ection system O	NE, ONE ICE for n	nasonrv				



	-	rick Calibric R+								
Table C70:	Characteristic	values of resistan	ce under tensio	on and shear loa	ads (continue)					
			Characteristic resistance							
				Use	category					
		Effective		d/d		d/d				
		anchorage		w/d		w/d				
Anchor size	Sleave	depth		w/w		w/w				
Sieeve	or size Sleeve depth		40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range				
		h _{ef}		V _{Rk,b} ²⁾³⁾						
		[mm]								
		Compress	ive strength f _b	≥ 12 N/mm²						
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				
²⁾ Calcula V _{Rk,b}		nd c _{min} Technical Report TR 05		·	-	50 mm: V _{Rk,c,ll} =				

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

Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	$\delta_{V0}$	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,34		0,27	0,55	1,0	1,10	1,65
M8 / M10/	16x85	85	0,34		0,27	0,55	1 40		
IG-M6	16x130	130	0,43	0,80	0,34	0,69	1,43		
M12 / M16 /	20x85	85	0,34		0,27	0,55		2,00	3,00
IG-M8 / IG-M10	20x130	130	0,43		0,34	0,69	2,14		

ESSVE Injection system ONE, ONE ICE for masonry	
Performances clay hollow brick Calibric R+	Annex C 29
Characteristic values of resistance under tension and shear load (continue)	
Displacements	



ρ [kg/dm ³ ] ≥ [N/mm ² ]	Lirbanbric				-	
	Urbanbric					-
≥ [N/mm ⁻ ]	0,7			- CE	255	1
Compressive strength $f_b \ge [N/mm^2]$ Code			6, 9 or 12			
	EN 771-1			Ear		
	e.g. Imerys (FR)					
[mm]	Construction of the second	560 x 200 x 274				
	Rotary					
~ ~	560			99,5	5	
	20					
Tada		H5,8	5	- 20	00	
1040					12-1-	
- 63						
			40			
Ccr		[-] [mm]		All sizes 100 (120) ¹	)	
C _{min} ²⁾		[mm]		100 (120) ¹	)	
Scr.II		[mm]				
S _{cr,⊥}						
S _{min}	100.400	[mm]		100		
to Technical F	Report TR 054	tension loa	ading			
	with c ≥		with s ≥		/	1
Value 1	185		100			1,9
	Ccr		560	α _{g,N,II}		2,0
			100		[-]	1,1
	185		100			
	185 _{Cor}		274	α _{g,N,⊥}		2,0
			274	α _{g,N,⊥}		2,0
	Ccr         Cmin ² Scr,II         Scr,L         Smin         20x85 and SH         co Technical F	560 040 040 040 040 040 040 040 0	560         040         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         63         640         63         63         640         63         640         63         640         63         640         640         63         640	560         20       6,5         63       5,5         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         63       40         640       40         63       100         5       100         5       100         5       100         5       100         5       100         5       100         5       100         5       100         5       100	560       9         20       6,5         63       40         63       40         63       40         63       100 (120) ¹ Cor       [mm]       100 (120) ¹ Sor,I       [mm]       560         Sor,I       [mm]       100 (120) ¹ Sor,I       [mm]       560         Sor,I       [mm]       100         20x85 and SH20x130       100         to Technical Report TR 054       100         Sor for anchor group in case of tension loading	560       9         20       6,5         040       5,5         040       5,5         040       63         63       40         63       40         63       40         63       100 (120) ¹¹ Cor       [mm]         100 (120) ¹¹ Scr.L       [mm]         560         Scr.L       [mm]         204         560         Scr.L       [mm]         560         Scr.L       [mm]         100       20/10         co Technical Report TR 054         or for anchor group in case of tension loading



Confid	guration	with c	>	with s ≥			
II: anchors placed parallel to horizonta joint		Ccr	_	560	$\alpha_{g,v,li}$		2,0
⊥: anchors placed perpendicular to horizontal joint	V	Ccr		274	$lpha_{g,V,\perp}$	[-]	2,0
Table C76: Gro	oup factor for and	hor group in case	e of shear load	ding perpendi	cular to free e	dge	
Config	guration	with c	2	with s ≥			
II: anchors placed parallel to horizonta joint		Cer		560	$\alpha_{g,v,u}$	[-]	2,0
L: anchors placed perpendicular to horizontal joint		C _{cr}		274	α _{g,V,⊥}	(°I	2,0
Table C77: Ch	aracteristic value	es of resistance u	nder tension a	and shear loa	ds		
				Character	ristic resistance	n	
			1		category	à.	
Anchor size	Sleeve	Effective anchorage depth	d/d w/d w/w			d/d w/d w/w	
Anchor size	Sieeve	depin	40°C/24°C	80°C/50°C	120°C/72°C	tem	For all perature range
		h _{ef}	N _{Rk,b} = I		)	V _{Rk,b} ²⁾³⁾	
		[mm]			[kN]		
	24 22	Compressive s				-	
M8	12x80	80	0,9	0,9	0,75		3,0
M8 / M10/	16x85	85	0,9	0,9	0,75	-	3,0
IG-M6	16x130	130	2,0	2,0	1,5		3,0
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,75		3,5
	20x130	130 Compressive s	2,0	2,0 N/mm ²	1,5		3,5
M8	12x80	80	0,9	0,9	0,9	1	4,0
M8 / M10/	16x85	85	0,9	0,9	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
1) Values are	valid for c _{cr} and c _{min} of V _{Rk,c} see Technic	al Report TR 054, ex	cept for shear lo	1.0	e edge with c ≥ 1	190 mm	
3) V _{Rk,b} The values	are valid for steel 5.6	of greater. For siee	i no ana no ma				



			Characteristic resistance					
		Effective anchorage depth		Use	e category			
				d/d		d/d		
				w/d		w/d		
Anchor size	Sleeve			w/w		w/w		
Anchor Size			40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range V _{Rk.b} ²⁾³⁾		
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1)}$				
		[mm]		[kN]				
		Compressive st	trength f _b ≥ 12	N/mm ²				
M8	12x80	80	1,2	1,2	0,9	4,5		
M8 / M10/	16x85	85	1,2	1,2	0,9	4,5		
IG-M6	16x130	130	3,0	3,0	2,5	4,5		
M12 / M16 /	20x85	85	1,2	1,2	0,9	5,0		
G-M8 / IG-M10 🗌	20x130	130	3,0	3,0	2,5	5,0		

# Table C79: Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	$\delta_{N0}$	δ _{N∞}	V	$\delta_{V0}$	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,34		0.27	0,55			
M8 / M10/	16x85	85	0,34		0,27	0,55	1,30		
IG-M6	16x130	130	0,86	0,80	0,69	1,37		1,00	1,50
M12 / M16 /	20x85	85	0,34		0,27	0,55		,	,
IG-M8 / IG-M10	20×130	130	0,86		0,69	1,37	1,43		

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	

Т



Brick type							
		Clay hollow brick Brique creuse C4					
Bulk density	ρ [kg/dm ³ ]	0,7	.0				
	$p [N/mm^2]$	4, 8 or 12			The		
Code	<u> </u>	EN 771-1					
Producer (country code)		e.g. Terreal (FR)				100	
Brick dimensions	[mm]	500 x 200 x 200	_				
Drilling method	[]	Rotary	_				
	8	200	8 11 6	t.			
		56	40-/	\$7			
Anchor size	n parameters	<pre> }</pre>	[-]	200	All sizes	)	
Anchor size Edge distance	n parameters	s	[-] [mm]	200	All sizes 100 (120) ¹ 100 (120) ¹		
Anchor size Edge distance Minimum edge distance	Cor	s	[mm] [mm] [mm]	200	100 (120) ¹		
Anchor size Edge distance Minimum edge distance Spacing	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥}	3	[mm] [mm] [mm] [mm]	200	100 (120) ¹ 100 (120) ¹ 500 200		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : C _{min} according <b>Table C82: Group fact</b>	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of	[mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	120x130 Report TR 054	[mm] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500 200		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according Table C82: Group fact	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of	[mm] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500 200		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according Table C82: Group fact	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of	[mm] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500 200		



endicular to free $\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$	edge	2,0 2,0
endicular to free ≥		2,0
2	edge	
αg,v,ii		
		2,0
$\alpha_{g,v_{i,L}}$		2,0
	ce	
	1	12
l /	w	/d //d /w
°C 120°C/72°C	tempe	r all erature nge
	V _{Bk}	2)3)
[kN]		
		2
0,6	0	,9
0,6	0	,9
0,6	0	,9
0,6	0	,9
0,6	0	,9
1	1	_
	1	,2
0,75		
0,75		,2
0,75 0,75	1	,2
0,75	1	/
	r loads acteristic resistand Use category °C 120°C/72°C N _{Rk,p} ¹⁾ [kN] 0,6 0,6 0,6 0,6	r loads         acteristic resistance         Use category         0         0         °C         120°C/72°C         rai         N _{Rk,p} ¹⁾ V _{Rk} [kN]         0,6         0,6         0,6         0,6         0,6         0,6         0,6



							ristic resist	ance		
							e category			
			Effective	e		d/d				d/d
			nchorag			w/d				w/d
Anchor size	Slee	ve	depth			w/w				w/w For all
				4	0°C/24°C	80°C/50°C	120°C/72	2°C	tem	perature ange
			h _{ef}			$N_{Rk,b} = N_{Rk,p}^{1}$	)		V	2)3) Rk,b
			[mm]				[kN]			
		Con	npressi	ve stren	gth f _⊳ ≥ 12	N/mm ²				
M8	12x8	80	80		1,2	1,2	0,9			1,5
M8 / M10/	16x8		85		1,2	1,2	0,9			1,5
IG-M6	16x1		130		1,2	1,2	0,9			1,5
M12 / M16 /	20x8		85		1,2	1,2	0,9			1,5
G-M8 / IG-M1	0 20x1		130		1,2	1,2	0,9			1,5
Table C87:	Displaceme	Effective								
Anchor size	Sleeve	anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ	V0	δ _{V∞}
		[mm]	[kN]	[mm/kN	] [mm]	[mm]	[kN]	[m	ım]	[mm]
M8	12x80	80	0,17		0,14	0,27				
M8 / M10/	16x85	85	0,17		0,14	0,27				
IG-M6	16x130	130	0,14	0,80	0,11	0,23	0,3	0	,9	1,35
M12 / M16 /	20x85	85	0,17		0,14	0,27				
IG-M8 / IG-M10	20x130	130	0,14		0,11	0,23				



Bulk density Compressive strength Code Producer (country code) Brick dimensions Drilling method	ρ [kg/dm ³ ] f _b ≥ [N/mm ² ] [mm]	Blocchi Legge           0,6           4, 6, 8 or 12           EN 771-1           e.g. Wienerbe           250 x 120 x 25           Rotary			-			
Compressive strength Code Producer (country code) Brick dimensions	f _b ≥ [N/mm ² ]	4, 6, 8 or 12 EN 771-1 e.g. Wienerbe 250 x 120 x 25	rger (IT)				-	
Code Producer (country code) Brick dimensions		EN 771-1 e.g. Wienerbe 250 x 120 x 25	rger (IT)					
Producer (country code) Brick dimensions	[mm]	e.g. Wienerbe 250 x 120 x 25	rger (IT)		-	141	1	
Brick dimensions	[mm]	250 x 120 x 25	iger (II)		-			
	[mm]		50		-	54		
			50					
				6-7	1			
						]		
						16		
1	120			32	- 43 -			
						J.		
	on parameters	5		1				
Anchor size		S	[-]			All sizes	)	
Anchor size Edge distance	Cor	S	[mm]			100 (120) ¹	)	
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min}	5	[mm] [mm]			100 (120) ¹ 60	)	
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} S _{cr,II}	S	[mm]			100 (120) ¹	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	Ccr           Cmin           Scr,II           Scr,L           Smin		[mm] [mm] [mm] [mm] [mm]			100 (120) ¹ 60 250	)	
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SI Table C90: Group fac Configuration	Cor Cmin Scr,II Scr,I Smin H20x85; SH20>	<130 and SH20x20 or group in case with c a	[mm] [mm] [mm] [mm] [mm] 00	w	ith s ≥	100 (120) ¹ 60 250 120		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SI Table C90: Group fac Configuration II: anchors placed	Cor Cmin Scr,II Scr,I Smin H20x85; SH20>	(130 and SH20x20 or group in case	[mm] [mm] [mm] [mm] [mm] 00	w		100 (120) ¹ 60 250 120 100		1,0
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SI Table C90: Group fac Configuration	Cor Cmin Scr,II Scr,I Smin H20x85; SH20>	<130 and SH20x20 or group in case with c a	[mm] [mm] [mm] [mm] [mm] 00	W	ith s ≥	100 (120) ¹ 60 250 120	[-]	1,0



II: anchors placed parallel to horizontal joint       Image: second secon	Config	uration	with c ≥		with s ≥			
parallel to horizontal joint increases in the set of t		5-16-1	60 ¹⁾		1001)			1.0
1: anchors placed perpendicular to horizontal joint       00 ¹¹ 100 ¹⁰ $a_{0}$ v_L       [-1]       1.6         1: anchors placed perpendicular to horizontal joint       0.1       0.2 $a_{0}$ v_L       [-1]       1.6         1: anchors placed parallel to horizontal joint       0.1       0.0 ¹¹ 100 ¹¹ $a_{0}$ v_L       [-1]       1.6         1: anchors placed joint       0.1       0.0 ¹¹ 100 ¹¹ $a_{0}$ v_L       [-1]       1.0         1: anchors placed joint       0.1       0.0 ¹¹ 100 ¹¹ $a_{0}$ v_L       [-1]       1.0         1: anchors placed joint       0.1       0.0 ¹¹ 100 ¹¹ $a_{0}$ v_L       [-1]       1.6         1: anchors placed joint       0.1       0.0 ¹¹ 100 ¹¹ $a_{0}$ v_L       [-1]       1.6         1: anchors placed joint       0.1       0.0 ¹¹ 100 ¹¹ $a_{0}$ v_L       [-1]       1.6         1: anchor size       Is extracteristic values of resistance under tension and shear loads       Is extracteristic resistance       [-1]       1.6         1: Anchor size       Sieeve       Effective anchorage depth       [-1]       0.0 ² [-1]       [-1]       1.6         M8 / M10/       16x85		V				α _{g,V,II}		4.5
1: anchors placed perpendicular to horizontal joint $60^{\circ}$ $100^{\circ}$ $\alpha_{q,v,i}$ $1.6$ ''Only valid for V _{Re,b} according to Table C93 and C94 values in brackets          Table C92: Group factor for anchor group in case of shear loading perpendicular to free edge $1.0$ Configuration       with c 2       with s 2 $1.0$ II: anchors placed parallel to horizontal joint $00^{\circ}$ $00^{\circ}$ $1.0$ joint $0^{\circ}$ $00^{\circ}$ $00^{\circ}$ $1.0$ joint $00^{\circ}$ $00^{\circ}$ $00^{\circ}$ joint $0^{\circ}$ $00^{\circ}$ $00^{\circ}$ joint $00^{\circ}$ $00^{\circ}$ $1.0$ $2.0^{\circ}$ <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>[-]</td> <td></td>							[-]	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		V t	60''		100"	Clay .	e. 11	1,6
Table C92: Group factor for anchor group in case of shear loading perpendicular to free edge         Configuration       with $c \ge$ with $s \ge$ 1         11: anchors placed parallel to horizontal joint $v = 0$ $c_{cr}$ $250$ $a_{0},v_{it}$ $1.0$ 1: anchors placed parallel to horizontal joint $v = 0$ $c_{cr}$ $250$ $a_{0},v_{it}$ $1.0$ 1: anchors placed pergendicular to horizontal joint $v = 0$ $c_{cr}$ $250$ $a_{0},v_{it}$ $1.0$ 1 ¹ Only valid for V _{Ru,b} according to Table C93 and C94 values in brackets $a_{0},v_{it}$ $1.0$ $1.0$ Table C93: Characteristic values of resistance under tension and shear loads         Characteristic resistance $d_{0}$ c/24°C $80^{\circ}$ C/50°C $120^{\circ}$ C/72°C       For all temperatur range r			Ccr		250	cug, v, T	=:1	2,0
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	¹⁾ Only valid for $V_{Rk,b}$	according to Table C	93 and C94 values in	brackets				
II: anchors placed parallel to horizontal joint       II: anchors placed perpendicular to horizontal joint       II: anchors placed for View difference in the prediction of the p	Table C92: Gro	up factor for anch	or group in case	of shear loadi	ng perpendic	ular to free ed	ge	
Image: Single of the second	Config	uration	with c ≥		with s ≥			1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			60 ¹⁾		100 ¹⁾	12		1,0
L: anchors placed perpendicular to horizontal joint       Image: constraint of the product of the pr		V	Cor		250	α _{g,V,II}	_	20
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							[-]	
$\begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	perpendicular to	V	60			α _{g,V,⊥}	6	
Table C93: Characteristic values of resistance under tension and shear loads         Anchor size       Characteristic resistance         Anchor size       Sleeve       Characteristic resistance         Bit       Use category       d/d'; w/d; w/w       For all temperature range         her       Nek,b = N _{Rk,b} = N _{Rk,b} ¹ V _{Rk,b} ⁴ M8       12x80       80       KI       KI         Compressive strength $f_b \ge 4$ N/mm ² M8       12x80       80       0,4       0,4       0,3       2,0 ² (0,9) ³ M12 / M16 / IG-M6       16x130       130       0,4       0,4       0,3       2,0 ² (0,9) ³ M8 / IG-M10       20x85       85       0,5       0,5       0,4       2,5 ² (1,2) ³ M12 / M16 / IG-M6       16x130       130       0,5       0,5       0,4       2,5 ² (1,2) ³ M12 / M16 / IG-M8 / IG-M10       20x85       85       0,5       0,5       0,4       2,5 ² (1,2) ³ M12 / M16 / IG-M6       16x130       130       0,5       0,5       0,4       2,5 ² (1,2) ³ M12 / M16 / IG-M6       10x30       130 </td <td>and a set of the set o</td> <td>L IC</td> <td></td> <td></td> <td>250</td> <td></td> <td>_</td> <td>2,0</td>	and a set of the set o	L IC			250		_	2,0
Anchor size       Sleeve       depth $40^{\circ}C/24^{\circ}C$ $80^{\circ}C/50^{\circ}C$ $120^{\circ}C/72^{\circ}C$ temperature range         h _{et} N _{Bk,b} = N _{Bk,b} N _{Bk,b} = N _{Bk,b} N _B			anchorage				T a	For all
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $								
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Anchor size	Sleeve		40°C/24°C	80°C/50°C	120°C/72°C	tem	perature
$\begin{tabular}{ c c c c c c } \hline $[mm]$ & $[kN]$ \\ \hline $Compressive strength $f_b $$ 4 $N/mm^2$ \\ \hline $M8$ & $12x80$ & $80$ \\ \hline $M8 / M10/$ & $16x85$ & $85$ \\ \hline $IG-M6$ & $16x130$ & $130$ \\ \hline $M12 / M16 /$ \\ \hline $IG-M6$ & $16x130$ & $130$ \\ \hline $20x85$ & $85$ \\ \hline $20x130$ & $130$ \\ \hline $20x200$ & $200$ \\ \hline $Compressive strength $f_b $$ 6 $N/mm^2$ \\ \hline $M8$ & $12x80$ & $80$ \\ \hline $M8 / M10/$ & $16x85$ & $85$ \\ \hline $IG-M6$ & $16x130$ & $130$ \\ \hline $M8$ & $12x80$ & $80$ \\ \hline $M8 / M10/$ & $16x85$ & $85$ \\ \hline $IG-M6$ & $16x130$ & $130$ \\ \hline $IG-M6$ & $16x130$ & $130$ \\ \hline $M12 / M16 /$ \\ \hline $IG-M6$ & $16x130$ & $130$ \\ \hline $M12 / M16 /$ \\ \hline $IG-M8 / IG-M10$ \\ \hline $20x200$ & $200$ \\ \hline \end{tabular}$			h _{ef}		$N_{Rk,b} = N_{Rk,p}$	)		
$ \begin{array}{ c c c c c c c c } \hline M8 & 12x80 & 80 \\ \hline M8 / M10 / & 16x85 & 85 \\ \hline IG-M6 & 16x130 & 130 \\ \hline M12 / M16 / & 20x85 & 85 \\ \hline 20x130 & 130 & 0.4 \\ \hline G-M8 / IG-M10 & 20x200 & 200 \\ \hline \hline & \hline &$			[mm]			[kN]		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	2.72	01.01.020.04		rength $f_b \ge 4 N$			-	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			80	rength f _b ≥ 4 N			1	_
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	M8 / M10/	16x85	80 85	rength f _b ≥ 4 N				
G-M8 / IG-M10       20x130       130         Compressive strength $f_b \ge 6$ N/mm²         M8       12x80       80         M8 / M10/       16x85       85         IG-M6       16x130       130       0,5       0,5       0,4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x85       85       0,5       0,5       0,4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x130       130       0,5       0,5       0,4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x200       200       0       0.5       0,5       0,4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x200       200       0,5       0,5       0,4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x200       200       0.5       0,5       0,4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x200       200       0.5       0.5       0.4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x200       200       130       0.5       0.5       0.4 $2,5^{2}$ (1,2) ³ M12 / M16 / G-M8 / IG-M10       20x200       200       0.5       0.5       0.4 $2.5^{$	M8 / M10/	16x85 16x130	80 85 130		/mm ²	0.3	2.0	) ²⁾ (0.9) ³⁾
Compressive strength $f_b \ge 6 \text{ N/mm}^2$ M812x8080M8 / M10/16x8585IG-M616x130130M12 / M16 / G-M8 / IG-M1020x858520x85850,50,5M12 / M16 / G-M8 / IG-M1020x2002001)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 $c \ge 125 \text{ mm: } V_{Rk,c,II} = V_{Rk,b}$ 3)Values in brackets $V_{Rk,c} = V_{Rk,b}$ for anchors with $c_{min}$ 4)The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8	M8 / M10/ IG-M6	16x85 16x130 20x85	80 85 130 85		/mm ²	0,3	2,0	) ²⁾ (0,9) ³⁾
$\begin{array}{ c c c c c c c c }\hline M8 & 12x80 & 80 \\\hline M8 / M10 / & 16x85 & 85 \\\hline IG-M6 & 16x130 & 130 \\\hline IG-M6 & 16x130 & 130 \\\hline M12 / M16 / & 20x85 & 85 \\\hline M12 / M16 / & 20x85 & 85 \\\hline G-M8 / IG-M10 & 20x200 & 200 \\\hline \end{array} 0,5 & 0,5 & 0,4 & 2,5^{2} (1,2)^3 \\\hline \hline & 2,5^{2} (1,2)^3 \\\hline & 2,5^{2} (1,2$	M8 / M10/ IG-M6 M12 / M16 /	16x85 16x130 20x85 20x130	80 85 130 85 130		/mm ²	0,3	2,0	) ²⁾ (0,9) ³⁾
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	M8 / M10/ IG-M6 M12 / M16 /	16x85 16x130 20x85 20x130	80 85 130 85 130 200	0,4	/ <b>mm²</b> 0,4	0,3	2,0	) ²⁾ (0,9) ³⁾
IG-M616x1301300,50,50,4 $2,5^{2^{2}}$ (1,2)3M12 / M16 / G-M8 / IG-M1020x85850,50,4 $2,5^{2^{2}}$ (1,2)31)20x2002002002002002001)Values are valid for c _{cr} and c _{min} 2Calculation of V _{Rk,c} see Technical Report TR 054, except for shear load parallel to free edge with c ≥ 125 mm: V _{Rk,c,II} = V _{Rk,b} V _{Rk,c,II} = V _{Rk,b} 3)Values in brackets V _{Rk,c} = V _{Rk,b} for anchors with c _{min} 4)The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V _{Rk,b} by 0,8	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10	16x85 16x130 20x85 20x130 20x200	80 85 130 85 130 200 Compressive str	0,4	/ <b>mm²</b> 0,4	0,3	2,0	) ²⁾ (0,9) ³⁾
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8	16x85 16x130 20x85 20x130 20x200 12x80	80 85 130 85 130 200 <b>Compressive str</b> 80	0,4	/ <b>mm²</b> 0,4	0,3	2,0	) ²⁾ (0,9) ³⁾
$\begin{array}{ c c c c c c c c }\hline M12 \ / \ M16 \ / \ D20x130 & 130 \\\hline G-M8 \ / \ IG-M10 & 20x200 & 200 \\\hline \hline & 20x200 & 200 \\\hline & 20x200 & 20x20 \\\hline & 20x200 & 20x20 \\\hline & 20x200 & 20x20 \\\hline & 20x20 & 20x20 \\\hline & $	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/	16x85 16x130 20x85 20x130 20x200 12x80 16x85	80 85 130 85 130 200 <b>Compressive str</b> 80 85	0,4	/ <b>mm²</b> 0,4	0,3	2,0	) ²⁾ (0,9) ³⁾
C-IM8 / IC-IM10       20x200       200         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)       Values in brackets $V_{Rk,c} = V_{Rk,b}$ for anchors with $c_{min}$ 4)       The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130	80 85 130 85 130 200 <b>Compressive str</b> 80 85 130	0,4 rength f _b ≥ 6 N	/mm ² 0,4 /mm ²			
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⁾ Values in brackets $V_{Rk,c} = V_{Rk,b}$ for anchors with $c_{min}$ ⁴⁾ The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0,8	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/ IG-M6	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130 20x85	80 85 130 85 130 200 <b>Compressive str</b> 80 85 130 85 130	0,4 rength f _b ≥ 6 N	/mm ² 0,4 /mm ²			
	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/ IG-M6 M12 / M16 /	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130 20x85 20x130	80 85 130 85 130 200 <b>Compressive str</b> 80 85 130 85 130	0,4 rength f _b ≥ 6 N	/mm ² 0,4 /mm ²			
	M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 M8 M8 / M10/ IG-M6 M12 / M16 / G-M8 / IG-M10 ¹⁾ Values are valid ²⁾ Calculation of V _F ³⁾ Values in bracket	16x85 16x130 20x85 20x130 20x200 12x80 16x85 16x130 20x85 20x130 20x200 for c _{cr} and c _{min} _{Rk,c} see Technical Rep ts V _{Rk,c} = V _{Rk,b} for and	80           85           130           85           130           200           Compressive str           80           85           130           200           Compressive str           80           85           130           85           130           200           port TR 054, except for chors with cmin	0,4 rength f _b ≥ 6 N 0,5 or shear load par	/mm ² 0,4 /mm ² 0,5 allel to free edg	0,4	2,5	5 ²⁾ (1,2) ³⁾



Anchor siz						Character	istic resistance	Э	
Anchorain						Use	category		
Anchorain			⊏ff	ective			d/d		
Anchorain				horage			w/d		
ALICHOF SIZ	e	Sleeve		epth		1	w/w		
					40°C/24°C	80°C/50°C	120°C/72°C	ter	For all nperature range
				h _{ef}		$N_{Rk,b} = N_{Rk,p}$	)		V _{Rk,b} ⁴⁾
				mm]			[kN]		- 10,0
			•				• •		
			Compre	essive stre	ngth f _b ≥ 8 N	/mm ²			
M8		12x80		80					
M8 / M10/	/	16x85		85					
IG-M6		16x130		130	0,6	0,6	0,5	3	$(1,2)^{(2)}$
M12 / M16		20x85		85	0,0	0,0	0,0	0,	0 (1,2)
G-M8 / IG-N		20x130		130					
		20x200		200		2			
					ngth f _b ≥ 12 N	N/mm²			
M8		12x80		80					
M8 / M10/	/	16x85		85					
IG-M6		16x130		130	0,6	0,6	0,6	3,	$5^{2)}(1,5)^{3)}$
M12 / M16	/	20x85		85	-				
G-M8 / IG-N	/10	20x130 20x200		130 200					
⁴⁾ The	es in bracket values are va	s $V_{Rk,c} = V_{Rk,b}$ for a lid for steel 5.6 or			6 and 4.8 multi	ply $V_{Rk,b}$ by 0,8			
Table C95:	Displac	ements							
	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{vo}	δ _{V∞}
Anchor size	1		[kN]	[mm/kN]	[mm]	[mm]	[kN] [r	nm]	[mm]
Anchor size		[mm]			i fuund				I furnint



Table C96: Description	n of the brid					
Brick type		Clay hollow brick Doppio Uni				
Bulk density	ρ [kg/dm ³ ]	0,9				-
	≥ [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	d			
				0		
		[-]		All sizes		
Anchor size Edge distance	Ccr	[-] [mm]		100 (120) ¹	)	
Anchor size Edge distance	C _{cr} C _{min} ²⁾	[-] [mm] [mm]		100 (120) ¹ 60	)	
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾ S _{cr} ,II	[-] [mm] [mm] [mm]		100 (120) ¹ 60 250	)	
Anchor size Edge distance Minimum edge distance Spacing	Ccr Cmin ²⁾ Scr,II Scr,⊥	[-] [mm] [mm] [mm] [mm]		100 (120) ¹ 60 250 120	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} ²⁾ S _{cr} ,II	[-] [mm] [mm] [mm]		100 (120) ¹ 60 250	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C98: Group facto	$\begin{array}{c} C_{cr} \\ C_{min}^{(2)} \\ \hline S_{cr,II} \\ \hline S_{cr,\bot} \\ \hline S_{min,II} \\ \hline S_{min,\bot} \\ \hline 20x85; SH20x \\ co Technical F \\ \end{array}$	[-] [mm] [mm] [mm] [mm] [mm] (130 and SH20x200	loading with s ≥	100 (120) ¹ 60 250 120 100	)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to <b>Table C98: Group facto</b> Configuration	$\begin{array}{c} C_{cr} \\ C_{min}^{(2)} \\ \hline S_{cr,II} \\ \hline S_{cr,\bot} \\ \hline S_{min,II} \\ \hline S_{min,\bot} \\ \hline 20x85; SH20x \\ co Technical F \\ \end{array}$	[-] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension with c ≥	with s ≥	100 (120) ¹ 60 250 120 100	)	1.0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Bk,c} : C _{min} according to Table C98: Group facto	$\begin{array}{c} C_{cr} \\ C_{min}^{(2)} \\ \hline S_{cr,II} \\ \hline S_{cr,\bot} \\ \hline S_{min,II} \\ \hline S_{min,\bot} \\ \hline 20x85; SH20x \\ co Technical F \\ \end{array}$	[-] [mm] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension		100 (120) ¹ 60 250 120 100		1,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to <b>Table C98:</b> Group factor Configuration II: anchors placed parallel to horizontal	Ccr Cmin ²⁾ Scr,II Scr,⊥ Smin,II Smin,⊥ 20x85; SH20x to Technical F or for ancho	[-] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension with c ≥ 60	with s ≥ 100	100 (120) ¹ 60 250 120 100 120	)	



Config	uration	with c ≥		with s ≥	1. I''		
II: anchors placed parallel to horizonta joint		Ccr		250	α _{g,V,II}	ri.	2,0
⊥: anchors placed perpendicular to horizontal joint	V	C _{cr}		120	α _{g,V,⊥}	[-]	2,0
Table C100: Gro	up factor for anch	or group in case	of shear loadi	ng perpendic	ular to free ed	ge	
Confic	uration	with c ≥		with s ≥			
II: anchors placed parallel to horizonta joint		C _{cr}		250	α _{g,V,I}		2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr}		120	$\alpha_{g,V,\perp}$	[-]	2,0
Table C101: Ch	aracteristic values	of resistance un	der tension an	Characteri	s stic resistance category		
Apphorisize	Slaava	Effective anchorage depth	t		d/d w/d w/w		
Anchor size	Sleeve	depin	40°C/24°C	80°C/50°C	120°C/72°C	terr	For All operature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$	)	1	2)3)
		[mm]			[kN]		
	1 100 100	Compressive str	ength f _b ≥ 10 M	/mm²		-	
M8	12x80	80	_				
M8 / M10/	16x85	85	_				
IG-M6	16x130	130	0,6	0,6	0,5	1.1	1,5
M12/M16/	20x85	85	-		12.4 %		199
G-M8 / IG-M10	20x130	130	-				
	20x200	200	amouth f > 4C h	1/mama ²	-		
M8	12x80	Compressive stre 80	$engin_b \ge 16 r$			1	
M8 / M10/	16x85	85					
IG-M6	16x130	130	I Contra a	1.15			
	20x85	85	0,75	0,75	0,6		2,0
M12/M16/	20x130	130					
G-M8 / IG-M10	20x200	200					
²⁾ Calculation	valid for $c_{cr}$ and $c_{min}$ of $V_{Rk,c}$ see Technical are valid for steel 5.6 (	Report TR 054	4.6 and 4.8 multi	ply V _{Rk,b} by 0,8			
	n system ONE, ON	F ICE for mason	v				



S	Sleeve	anc	ective horage						
s	Sleeve	anc			Use	e category	/		
s	Sleeve	anc				d/d			
s	Sleeve					w/d			
			epth –			w/w			
				40°C/24°C	80°C/50°C	120°C/	/72°C	For A tempera rang	ture
			h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		V _{Rk,b} ²	)3)
			mm]			[kN]			
	Ċ		ssive stren	gth f _b ≥ 20 N	l/mm²				
-	2x80		80						
-	l 6x85		85						
1	6x130		130	0.0	0.0				
2	20x85		85	0,9	0,9	0,7	5	2,0	
2	0x130		130						
2									
	C	Compre	ssive stren	gth f _b ≥ 28 №	l/mm²				
-	12x80		80						
-	6x85		85						
1	6x130		130	1.2	1.2		0	25	
2	20x85		85	1,2	1,2	0,.	5	2,5	
2	0x130		130						
2	0x200	:	200						
	d for steel 5.6 or			and 4.8 multi	ply V _{Rk,b} by 0,8				
Displace				and 4.8 multi	ply V _{Rk,b} by 0,8				
Displace	ments			and 4.8 multi	ply V _{Rk,b} by 0,8				
<b>Displace</b> Sleeve				and 4.8 multi	oly V _{Rk,b} by 0,8 δ _{N∞}	V	δνα	ο δ	V∞
-	ments Effective anchorage	greater.	For steel 4.6				δ _{να} [mn		יע∞ חm]
	2 2 2 1 1 1 1 2 2 2 2	20x85 20x130 20x200 ( 12x80 16x85 16x130 20x85 20x130 20x200 re valid for c _{cr} and c _{min}	20x85       20x130       20x200       Compre       12x80       16x85       16x130       20x85       20x130       20x200	20x85         85           20x130         130           20x200         200           Compressive strend           12x80         80           16x85         85           16x130         130           20x85         85           20x130         130           20x200         200	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{tabular}{ c c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $



	Bloc creux B40         o [kg/dm³]       0,8         ≥ [N/mm²]       4         EN 771-3       e.g. Sepa (FR)         [mm]       494 x 200 x 190         Rotary			-		
Compressive strength f _b : Code Producer (country code) Brick dimensions	≥ [N/mm ² ] 4 EN 771-3 e.g. Sepa (FR) [mm] 494 x 200 x 190			Transfer of the local division in which the local division in the	The second se	-
Code Producer (country code) Brick dimensions	EN 771-3 e.g. Sepa (FR) [mm] 494 x 200 x 190					N.
Producer (country code) Brick dimensions	e.g. Sepa (FR) [mm] 494 x 200 x 190				-	
Brick dimensions	[mm] 494 x 200 x 190					
and the second				and a local section		Street B
t						
200	494			17		
		17				
	oarameters					
Anchor size		(-)		All sizes	)	
Anchor size Edge distance	Cor	[-] [mm]		100 (120) ¹		
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾	[-] [mm] [mm]		100 (120) ¹ 100 (120) ¹		
Anchor size Edge distance Minimum edge distance	Cor	[-] [mm]		100 (120) ¹		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min}	[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C106: Group facto Configuration II: anchors placed	Cor           Cmin ²⁾ Scr,II           Scr,⊥           Smin           0x85 and SH20x130           o Technical Report TR 054           r for anchor group in case of t           with c ≥           100	[-] [mm] [mm] [mm] [mm] [mm]	ding with s ≥ 100	100 (120) ¹ 100 (120) ¹ 494 190 100		1,5
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to <b>Table C106: Group facto</b> Configuration	Cor         Cmin ²⁾ Scr,II         Scr,⊥         Smin         0x85 and SH20x130         0 Technical Report TR 054         r for anchor group in case of t         with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹ 100 (120) ¹ 494 190		
²⁾ For V _{Rk,c} : c _{min} according to <b>Table C106:</b> Group facto Configuration II: anchors placed parallel to horizontal	Cor           Cmin ² Scr,II           Scr,⊥           Smin           0x85 and SH20x130           o Technical Report TR 054           r for anchor group in case of t           with c ≥           100	[-] [mm] [mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹ 100 (120) ¹ 494 190 100		1,5 2,0 1,0



	Configuratio	n	11	with c ≥		with s ≥			- C 1	
II: anchors placed		50			100			1,1		
parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint		V	Cor			494	α _g	7,0	2,0	
		- ng		100		100		[-]	1,1	
		V	Ccr					,V,L	2,0	
	-74 - 12	- den com State ou Bell								
Table C108	Configuratio	actor for anc	nor group	with c ≥	snear load	with s ≥		free edge	T	
II: anchors placed			WILLI C Z				-			
parallel to horizontal joint		V	Cer			494		v.n [-]	2,0	
⊥: anchors placed perpendicular to horizontal joint		V	C _{cr}			190 α.		(V.L.	2,0	
Table C109	9: Characte Sleeve	ristic values	of resistance under tension and shear loads Characteristic resistance Use category							
Anchor size		Effective anchorage depth		d/d		w/d w/w			d/d w/d w/w	
		depui	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperatur range	
		her				$N_{Rk,b} = N_{Rk,p}$	$k,b = N_{Rk,p}^{(1)}$			
		[mm]				[kN]				
1.10	10.00				ngth $f_b \ge 4$			0.75		
M8	12x80	80	1,2	0,9	0,75	0,9	0,9	0,75	3,0	
M8 / M10/ IG-M6	16x85 16x130	85 130	1,2	0,9 0,9	0,75 0,75	1,2 1,2	0,9 0,9	0,75 0,75	3,0 3,0	
A12/M16/	20x85	85	1,2	0,9	0,75	1,2	0,9	0,75	3,0	
IG-M8 /	20x130	130	1,2	0,9	0,75	1,2	0,9	0,75	3,0	
<ol> <li>Calc</li> <li>V_{Rk,t}</li> <li>³⁾ The</li> </ol>	es are valid I ulation of V _{RI}	for c _{cr} and c _{min} _{k,c} see Technica alid for steel 5.6	al Report TF	R 054, excep	t for shear lo	ad parallel to	free edge w			
Anchor size	Sleeve	Effective anchorag depth h _e	e N	δ _N / N	δ _{ΝΟ}	δ _{N∞}	v	$\delta_{VD}$	δ _{V∞}	
Allere	All after	[mm]	[kN]	[mm/kN]		[mm]	[kN]	[mm]	[mm]	
All sizes	All sizes	All sizes	0,34	0,90	0,31	0,62	0,86	0,9	1,35	
ESSVE I	jection sy	stem ONE, O	NE ICE fo	r masonry	a.			10	0.1	



and the second	Brick type			Solid light weight concrete brick				
Bulk density	0,6		10	1.1				
Bulk density $\rho [kg/dm^3]$ Compressive strength $f_b \ge [N/mm^2]$		2		Contra la	24			
Code	EN 771-3							
Producer (country code)	e.g. Bisotherm (D		Q. 我都					
Brick dimensions	300 x 123 x 248		Constant of the local diversion of the local					
Drilling method	Rotary		ALL AND A					
Table C112: Installation	n parameter							
Anchor size	100		[-]		All sizes	-		
Edge distance	Cor	[mm]			1,5*h _{ef}			
Minimum edge distance C _{min}		[mm]			60			
Spacing S _{cr}		[mm]			3*h _{ef}			
Vinimum spacing	Smin	[mm]			120			
Configuration II: anchors placed parallel to horizontal		with c ≥ 90		120	QaNil		1,1	
parallel to horizontal		1,5*hef		3*h _{ef}	α _{g,N,I}	[-]	2,0	
joint		124						
⊥: anchors placed perpendicular to		124		120	α _{g,N,⊥}		1,1	
horizontal joint	1	1,5*hef		3*h _{ef}	wg,N,T		2,0	
	or for ancho	r aroun in case of	shear load	ing parallel to	free edge			
Table C114: Group fact Configuration	or for anche			with s ≥				
Configuration		with c ≥		with s ≥			0.6	
				with s ≥ 120 120	α _{g,V,II}			
Configuration II: anchors placed parallel to horizontal joint		with c ≥ 60		120	α _{g,V,II}	[-]	0,6 2,0 0,6	
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to		with c ≥ 60 90		120 120	α _{g,V,I}	[-]	2,0	
Configuration		with c ≥       60       90       60       124		120 120 120 120	α _{g,V,L}		2,0 0,6	
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact		with c ≥         60         90         60         124         or group in case of		120 120 120 120	α _{g,V,L}		2,0 0,6	
Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration		with c ≥         60         90         60         124         or group in case of         with c ≥		120 120 120 120 120 iing perpendic with s ≥	α _{g,V,L}		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		with c ≥         60         90         60         124         or group in case of		120 120 120 120 120	α _{g,V,L}		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		with c ≥         60         90         60         124         or group in case of         with c ≥         60		120 120 120 120 iing perpendic with s ≥ 120	ular to free		2,0 0,6	
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 L: anchors placed		with c ≥         60         90         60         124         or group in case of         with c ≥         60         90		120 120 120 120 iing perpendic with s ≥ 120 120	$\alpha_{g,V,L}$	edge	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 Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint		with c ≥         60         90         60         124         or group in case of         with c ≥         60         90         60		120 120 120 120 iing perpendic with s ≥ 120 120 120	ular to free	edge	2,0 0,6 2,0 0,6 2,0	

#### Deutsches Institut für Bautechnik

Anchor size		Effective anchorage depth	Characteristic resistance Use category							
	Sleeve		9	d/d			d/d w/d w/w			
			40°C/24°C	80°C/50°	C 120°C/72°C	C 40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range	
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$			$N_{Rk,b} = N_{Rk,p}^{1}$			
		[mm]	[kN]						$V_{Rk,b}^{2)3)}$	
			Con	npressive	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		3,0	2,5	2,0	3,0	2,5	2,0	3,0	
M12 / M16		85	2,5	2,5	2,0	2,5	2,5	2,0	3,0	
/ IG-M8 / IG-M10	20x130 20x200		2,5 2,5	2,5 2,5	2,0	2,5	2,5 2,5	2,0 2,0	3,0 3,0	
<ol> <li>For ca</li> <li>³⁾ The va</li> </ol>	lculation o alues are v	of V _{Rk,c} see E	TAG029, Ann 5.6 or greater	ex C	single anchors		0,8			
Anchor size		Sleeve	Effective anchorage depth h _{ef}	N ð	$\delta_N / N = \delta_I$	νο δ _Ν	• V	δ _{vo}	δ _{∨∞}	
			[mm]	[kN] [n	ım/kN] [m	m] [mr	m] [kN	] [mm]	[mm]	
M8 M8 / M10/ IG-M6		-	80							
		-	90	0,86	0,50 0,4	43 0,8				
M10 / IG-M8		-	100	1,00	0,35 0,3	35 0,7	70			
M16 / IG-M10		-	100	0,86	0,3					
M8		12x80	80		0,50 0,5	36 0,7	71 0,9	0,25	0,38	
M8 / M10/ IG-M6		16x85	85							
		16x130	130	0,71						
		20x85	85	5,71	0,35 0,3	5 0,5				
	16/			1		, , , , , , , , , , , , , , , , , , ,	1		1	
M12 / M IG-M8 / IG		20x130	130							

# 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