



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
LTA-10/0042 (2010-10-08)		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 Deutsches Institut für Bautechnik European Technical Assessment: Trade name of the construction product Injection system ESSVE ONE or ESSVE ONE-ICE for concrete Product family Bonded fastener for use in concrete to which the construction product belongs **ESSVE** Produkter AB Manufacturer Esbogatan 14 164 74 KISTA SCHWEDEN ESSVE Plant No. 671 Manufacturing plant This European Technical Assessment 31 pages including 3 annexes which form an integral part contains of this assessment This European Technical Assessment is EAD 330499-01-0601 issued in accordance with Regulation (EU) No 305/2011, on the basis of This version replaces ETA-18/0617 issued on 15 February 2019



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

Page 2 of 31 | 11 December 2019

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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

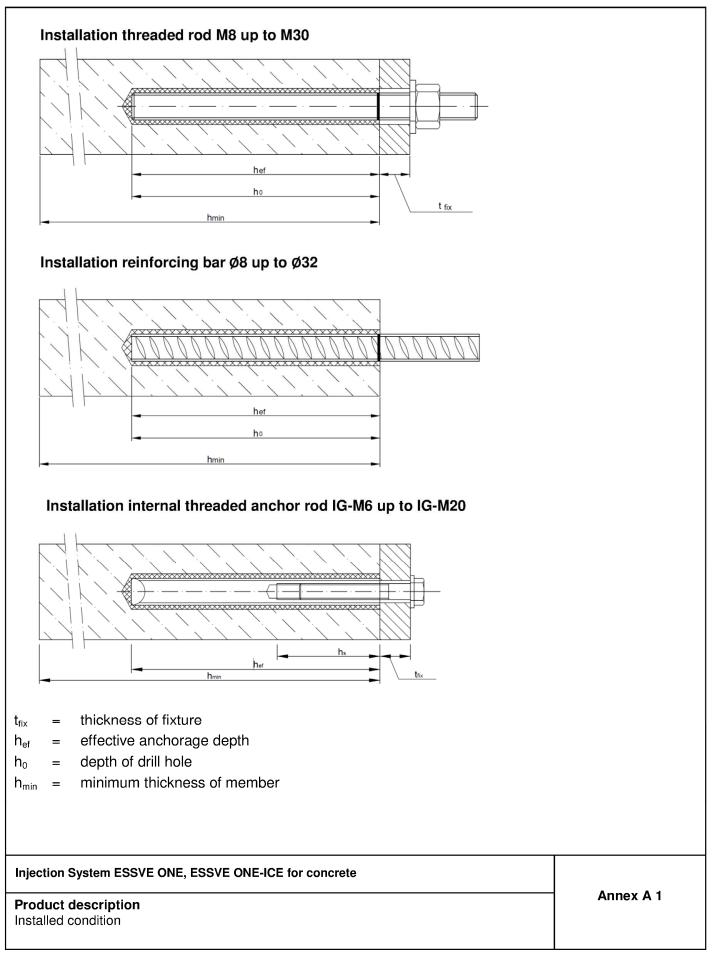
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

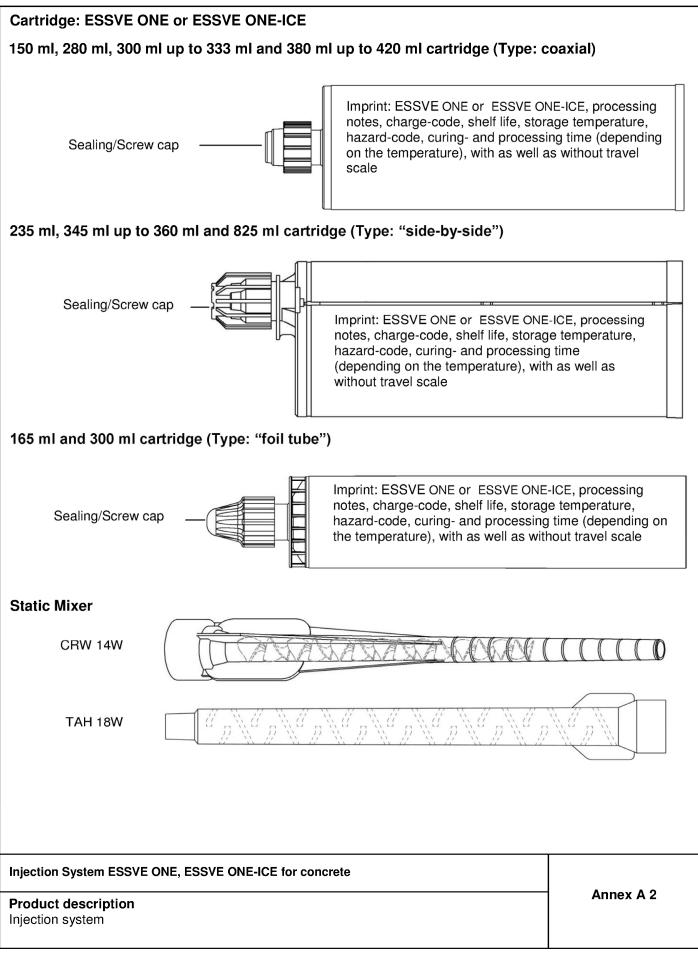
Issued in Berlin on 11 December 2019 by Deutsches Institut für Bautechnik

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











Threaded rod M8, M10, M12, M16, M	120, M24, M27, M30 with washer and hexag	on nut
	Commercia rod with: - Mater mecha Table - Inspecto to EN	ction certificate 3.1 acc. 10204:2004 ng of embedment
Internal threaded anchor rod IG-M6	, IG-M8, IG-M10, IG-M12, IG-M16, IG-M20	
Threaded rod or screw	Mark of the producer	4)
	° ↓ · · · · · · · · · · · · · · · · · ·	σ
	Marking: e.g. M8	
	Marking Internal thread	
	Mark	
	M8 Thread size (Internal thread)A4 additional mark for stainless steelHCR additional mark for high-corrosion resi	istance steel
Filling washer and mixer reduction fixture	nozzle for filling the annular gap between	anchor rod and
() () () () () () () () () () () () () (
Injection System ESSVE ONE, ESSVE ONE Product description Threaded rod, internal threaded rod and f		Annex A 3



	Designation	Material				
itee		o EN 10087:1998 or EN 102	63:200	1)		
hc		acc. to EN ISO 4042:1999 acc. to EN ISO 1461:2009 acc. to EN ISO 17668:2016	and EN	NISO 10684:2004+	AC:2009 or	
		Property class		Characteristic tensile strength	Characteristic yield strength	Elongation at fracture
			4.6	$f_{uk} = 400 \text{ N/mm}^2$	f _{yk} = 240 N/mm ²	A ₅ > 8%
1	Threaded rod		4.8	f _{uk} = 400 N/mm ²	f _{vk} = 320 N/mm ²	A ₅ > 8%
			5.6	f _{uk} = 500 N/mm ²	f _{yk} = 300 N/mm ²	A ₅ > 8%
		EN ISO 898-1:2013		$f_{uk} = 500 \text{ N/mm}^2$	$f_{vk} = 400 \text{ N/mm}^2$	A ₅ > 8%
				$f_{uk} = 800 \text{ N/mm}^2$	$f_{yk} = 640 \text{ N/mm}^2$	A ₅ ≥ 8%
			4	for threaded rod c	,	
2	Hexagon nut	acc. to EN ISO 898-2:2012	5	for threaded rod c	lass 5.6 or 5.8	
			8	for threaded rod c		
3a	Washer	Steel, zinc plated, hot-di (e.g.: EN ISO 887:2006,	EN IS	O 7089:2000, EN I	SO 7093:2000 or E	EN ISO 7094:200
3b	Filling washer	Steel, zinc plated, hot-di	p galva			1
	Internal threaded	Property class		Characteristic tensile strength	Characteristic yield strength	Elongation at fracture
4	anchor rod	acc. to	5.8	f _{uk} = 500 N/mm ²	$f_{yk} = 400 \text{ N/mm}^2$	A ₅ > 8%
		EN ISO 898-1:2013	8.8	f _{uk} = 800 N/mm ²	f _{yk} = 640 N/mm ²	A ₅ > 8%
		Property class		Characteristic tensile strength	Characteristic yield strength	Elongation at fracture
1	Threaded rod ¹⁾³⁾		50	f _{uk} = 500 N/mm ²	$f_{yk} = 210 \text{ N/mm}^2$	A ₅ ≥ 8%
		acc. to EN ISO 3506-1:2009		f _{uk} = 700 N/mm ²	$f_{yk} = 450 \text{ N/mm}^2$	A ₅ ≥ 8%
			80	f _{uk} = 800 N/mm ²	$f_{yk} = 600 \text{ N/mm}^2$	A ₅ ≥ 8%
	1\2\	acc. to	50	for threaded rod c		
2	Hexagon nut ¹⁾³⁾	EN ISO 3506-1:2009	70	for threaded rod o		
		A2: Material 1.4301 / 1.4 A4: Material 1.4401 / 1.4 HCR: Material 1.4529 or (e.g.: EN ISO 887:2006,	1307 / 1 1404 / 1 1 1.456	.4571 / 1.4362 or 5, acc. to EN 1008	1.4541, acc. to EN 1.4578, acc. to EN 3-1: 2014	10088-1:2014
3a	Washer	(0.g.: En 100 007.2000,		ion registeres stas		
	Filling washer	Stainless steel A4, High		ion resistance stee		
3a 3b			corros	Characteristic tensile strength	Characteristic yield strength	Elongation at fracture
3b	Filling washer	Stainless steel A4, High Property class acc. to	corros	Characteristic tensile strength f _{uk} = 500 N/mm ²	Characteristic yield strength f _{yk} = 210 N/mm ²	fracture A ₅ > 8%
3b 4	Filling washer Internal threaded anchor rod ¹⁾²⁾	Stainless steel A4, High Property class acc. to EN ISO 3506-1:2009	corros 50 70	Characteristic tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ²	Characteristic yield strength $f_{yk} = 210 \text{ N/mm}^2$ $f_{yk} = 450 \text{ N/mm}^2$	fracture
3b 4 ¹⁾	Filling washer Internal threaded anchor rod ¹⁾²⁾	Stainless steel A4, High Property class acc. to EN ISO 3506-1:2009 ed rods up to M24 and Internal ss 50	corros 50 70	Characteristic tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ²	Characteristic yield strength $f_{yk} = 210 \text{ N/mm}^2$ $f_{yk} = 450 \text{ N/mm}^2$	fracture A ₅ > 8%



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						
	Ι	Т					
Part	Designation	Material					
Reinf	orcing bars						
1	Rebar EN 1992-1-1:2004+AC:2010, Annex C	Bars and de-coiled rods class B or C f_{yk} and k according to NDP or NCL of EN $f_{uk} = f_{tk} = k \cdot f_{yk}$	1992-1-1/NA				
Injec	tion System ESSVE ONE, ESSVE ONE-ICE for o	concrete	_				
	luct description erials reinforcing bar		Annex A 5				



Specifications of intended use

Anchorages subject to:

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

Base materials:

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

Temperature Range:

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

Use conditions (Environmental conditions):

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

Design:

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

Installation:

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

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Intended Use Specifications Annex B 1

Deutsches Institut für Bautechnik

Anchor size			M8	3 M [.]	10	M12	M16		M20	M24	M27	M30
Outer diameter of anchor	d _{nom} [m	m] =	8	1	0	12	16		20	24	27	30
Nominal drill hole diameter	d ₀ [m	m] =	10	1	2	14	18		24	28	32	35
Effective embedment depth	h _{ef,min} [m	m] =	60	6	0	70	80		90	96	108	120
Effective embedment depth	h _{ef,max} [m	_{,max} [mm] =) 20	00	240	320		400	480	540	600
Diameter of clearance hole in the fixture	d _f [m	m] ≤	9	1	2	14	18		22	26	30	33
Diameter of steel brush	d _b [m	m] ≥	12	1	4	16	20		26	30	34	37
Maximum torque moment	T _{inst} [N	m] ≤	10	2	0	40	80		120	160	180	200
Minimum thickness of member	er h _{min} [mm]	h _{ef} +	- 30 mm	n ≥ 100) mm			ł	$n_{ef} + 2d_0$)	
Minimum spacing	S _{min} [mm]	40	5	0	60	80		100	120	135	150
Minimum edge distance	C _{min} [mm]	40	5	0	60	80		100	120	135	150
Rebar size	parameters fo	_		Ø 10	Ø 12	Ø1	4 Ø	16	Ø 20	Ø 25	Ø 2	3 Ø 32
Outer diameter of anchor	d _{nom} [mm] =	= 8	8	10	12	14	- 1	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	200	240	28	0 3	20	400	500	580	640
Diameter of steel brush	d _b [mm] 2		4	16	18	20) 2	22	26	34	37	41,5
Minimum thickness of member	h _{min} [mm	1 5	h _{ef} + 30 mm ≥ 100 mm						h _{ef} + 2d			
Minimum spacing	s _{min} [mm		.0	50	60	70		80	100	125	140	
Minimum edge distance	c _{min} [mm] 4	.0	50	60	70) [8	30	100	125	140	160
Table B3: Installation	parameters fo	or inte	ernal	thread IG-M6		hor ro	od IG-M	10	IG-M1	2 16	-M16	IG-M20
Internal diameter of anchor		2 [mm	1_	6		8	10-10		12		16	20
Outer diameter of anchor ¹⁾		<u>, [</u> mm	-	10		12	16		20		24	30
Nominal drill hole diameter				12		14	18		22		28	35
Effective embedment depth	h _{ef,mi}	, [mm] =	60		70	80		90		96	120
	h _{ef,max}	mm، [mm] =	200	2	40	320)	400	4	480	600
Diameter of clearance hole in the fixture		_f [mm	-	7		9	12		14		18	22
Maximum torque moment	T _{in}	_{st} [Nm	<u>]≤</u>	10		10	20		40		60	100
Thread engagement length min/max	l _{ic}	_ց [mm] =	8/20	8	/20	10/2	:5	12/30) 1	6/32	20/40
min/max Minimum thickness of member		h _{min} [mm]			30 mi 00 mm				ŕ	$n_{ef} + 2d_0$		
Minimum thickness of member				- 1	••••							
Minimum thickness of memory Minimum spacing Minimum edge distance		_{min} [m _{min} [m		50 50	(50 50	80 80		100 100		120 120	150 150

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Intended Use Installation parameters Annex B 2



	<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>		8		*****	-			ð	
Threaded Rod	Rebar	Internal threaded Anchor rod	d ₀ Drill bit - Ø HD, HDB, CA	d Brusl		d _{b,min} min. Brush - Ø	Piston Installation direction ar plug of piston plug			
[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		Ļ	\Rightarrow	
M8			10	RBT10	12	10,5				
M10	8	IG-M6	12	RBT12	14	12,5	1	Nie wiete		-1
M12	10	IG-M8	14	RBT14	16	14,5	1	NO PISTON P	olug require	d
	12		16	RBT16	18	16,5	1			
M16	14	IG-M10		RBT18	20	18,5	VS18			
	16			RBT20	22	20,5	VS20	4		
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	
M30	28 32	IG-M20	35 40	RBT35 RBT40	37 41,5	35,5 40,5	VS35 VS40	_		
		1 AL			_					
Drill bit dia Drill hole d						- Rec. com bit diameter (d			(min 6 ba	r)
Drill bit dia Drill hole d Only in no	lepth (h ₀): < n-cracked c	10 mm to 20 10 d _{nom}	mm		Drill I		d _o): all dia		(min 6 ba	r) ∃(



Installation instruct	ions	
Drilling of the bore	hole	
	1. 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 hammer 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 mort	ner (HD), hollow (HDB) y in combination with a
	Attention! Standing water in the bore hole must be removed bef	ore cleaning.
MAC: Cleaning for b	pore hole diameter $d_0 \le 20$ mm and bore hole depth $h_0 \le 10d_{nom}$ (und	cracked concrete only!)
4x	 2a. Starting from the bottom or back of the bore hole, blow the hole c (Annex B 3) a minimum of four times. 	lean by a hand pump ¹⁾
<u>*********</u> **	 2b. Check brush diameter (Table B4). Brush the hole with an appropriate of the second s	
<u></u>	2c. Finally blow the hole clean again with a hand pump (Annex B 3) a	a minimum of four times.
4x	¹⁾ It is permitted to blow bore holes with diameter between 14 mm and 20 mm up to 10d _{nom} also in cracked concrete with hand-pump.	and an embedment depth
CAC: Cleaning for a	Il bore hole diameter in uncracked and cracked concrete	
4x	2a. Starting from the bottom or back of the bore hole, blow the hole c compressed air (min. 6 bar) (Annex B 3) a minimum of four times stream is free of noticeable dust. If the bore hole ground is not recent extension must be used.	until return air
<u>********</u> ***	 2b. Check brush diameter (Table B4). Brush the hole with an appropriate of the second s	
4x	2c. Finally blow the hole clean again with compressed air (min. 6 bar minimum of four times until return air stream is free of noticeable ground is not reached an extension must be used.	
	After cleaning, the bore hole has to be protected against re-c an appropriate way, until dispensing the mortar in the bore he the cleaning has to be repeated directly before dispensing th In-flowing water must not contaminate the bore hole again.	ole. If necessary,
Injection System ESS	VE ONE, ESSVE ONE-ICE for concrete	
Intended Use Installation instruction	ns	Annex B 4



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

Installation instructions (continuation)



-10 °C to -6°C -5 °C to -1°C	Gelling- / working time	Minimum curing time in dry concrete ¹⁾
-5 °C to 1°C	90 min ²⁾	24 h ²⁾
-5 0 10 -1-0	90 min	14 h
0 °C to +4°C	2 45 min	7 h
+5 °C to +9°C	25 min	2 h
- 10 °C to +19°0	15 min	80 min
- 20 °C to +29°C	6 min	45 min
- 30 °C to +34°C	2 4 min	25 min
- 35 °C to +39°C	2 min	20 min
+ 40 °C	1,5 min	15 min
Cartridge temperature n wet concrete the curing	+5°C to	+40°C
able B6: Maximum ESSVE ON	working time and minimum curing time IE-ICE	
Concrete temperature	Gelling- / working time	Minimum curing time in dry concrete ¹⁾
Concrete temperature	Gelling- / working time 75 min	Minimum curing time in dry concrete ¹⁾ 24 h
		in dry concrete ¹⁾
-20 °C to -16°C	75 min	in dry concrete ¹⁾ 24 h
-20 °C to -16°C -15 °C to -11°C	75 min 55 min	in dry concrete ¹⁾ 24 h 16 h
-20 °C to -16°C -15 °C to -11°C -10 °C to -6°C	75 min 55 min 35 min	in dry concrete ¹⁾ 24 h 16 h 10 h
-20 °C to -16°C -15 °C to -11°C -10 °C to -6°C -5 °C to -1°C	75 min 55 min 35 min 20 min	in dry concrete ¹⁾ 24 h 16 h 10 h 5 h
-20 °C to -16°C -15 °C to -11°C -10 °C to -6°C -5 °C to -1°C 0 °C to +4°C	75 min 55 min 35 min 20 min 10 min	in dry concrete ¹⁾ 24 h 16 h 10 h 5 h 2,5 h



Т	able C1: Characteristic values for si 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										
St	eel, 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			
٦	Steel, Property class 4.6 and 4.8	V ⁰ _{Rk,s}	[kN]	9 (8)	14 (13)	20	38	59	85	110	135
r arm	Steel, Property class 5.6 and 5.8	V ⁰ Rk,s	[kN]	11 (10)	17 (16)	25	47	74	106	138	168
eve	Steel, Property class 8.8	V ⁰ Rk.s	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
Without lever	Stainless steel A2, A4 and HCR, class 50	V ⁰ Rk,s	[kN]	9	15	21	39	61	88	115	140
/ithc	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 ^o 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
	Steel, Property class 8.8	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
Wit	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	2)									
St	eel, Property class 4.6 and 5.6	γMs,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



$\begin{tabular}{ c c c c } \hline Concrete cone failure & k_{ucr,N} & [-] & 11,0 & & \\ \hline Cracked concrete & k_{cr,N} & [-] & 7,7 & & \\ \hline Cracked concrete & k_{cr,N} & [mm] & 1,5 h_{ef} & & \\ \hline Cracked concrete & $c_{cr,N} & [mm] & 2 c_{cr,N} & & \\ \hline Axial distance & $c_{cr,N} & [mm] & 2 c_{cr,N} & & \\ \hline Splitting & & & \\ \hline Edge distance & $\frac{h/h_{ef} \ge 2,0}{2,0 \cdot h/h_{ef} > 1,3} & $c_{cr,sp} & [mm] & $1,0 h_{ef} & & \\ \hline 2,0 > h/h_{ef} > 1,3 & $c_{cr,sp} & [mm] & $2 \cdot h_{ef} & $2,b_{ef} & $2,b_{ef$	Anchor size				All Anchor types and sizes
$\begin{tabular}{ c c c c c } \hline Cracked concrete & $k_{cr,N}$ & [-] & 7,7 \\ \hline Edge distance & $c_{cr,N}$ & [mm] & 1,5 h_{ef} \\ \hline Axial distance & $s_{cr,N}$ & [mm] & $2 $c_{cr,N}$ \\ \hline Splitting & & \\ \hline Edge distance & $\frac{h/h_{ef} \ge 2,0}{2,0 > h/h_{ef} > 1,3}$ & $c_{cr,sp}$ & [mm] & $2 $\cdot h_{ef}$ & $2 $\cdot h_{ef}$ & $2,5 $- $\frac{h}{h_{ef}$}$ \\ \hline $2,0 > h/h_{ef} \le 1,3$ & $c_{cr,sp}$ & [mm] & $2 $\cdot h_{ef}$ & $2,6 $- $\frac{h}{h_{ef}$}$ \\ \hline $2,4 h_{ef} & $2,4 h_{e	Concrete cone fa	ailure	1		
$\begin{array}{c c c c c c } \hline Cracked concrete & k_{cr,N} & [-] & 7,7 \\ \hline Edge distance & $c_{cr,N}$ & [mm] & 1,5 h_{ef}$ \\ \hline Axial distance & $s_{cr,N}$ & [mm] & $2 c_{cr,N}$ \\ \hline Splitting & \\ \hline Edge distance & $\frac{h/h_{ef} \geq 2,0}{2,0 > h/h_{ef} > 1,3}$ \\ \hline c_{cr,sp} & [mm] & $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}}\right)$ \\ \hline 2.0 > h/h_{ef} \leq 1,3 & $c_{cr,sp}$ & [mm] & $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}}\right)$ \\ \hline 2.4 h_{ef}$ & $2,4 h_{ef}$ \\ \hline \end{array}$	Non-cracked conc	rete	k _{ucr,N}	[-]	11,0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Cracked concrete		k _{cr,N}	[-]	
Splitting Edge distance $h/h_{ef} \ge 2,0$ $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ $h/h_{ef} \le 1,3$ $[mm]$ $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$ $2,4 h_{ef}$	Edge distance			[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] $2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$ $h/h_{ef} \le 1,3$ $2,4 h_{ef}$	Splitting				
Edge distance $2,0 > h/h_{ef} > 1,3$ $c_{cr,sp}$ $[mm]$ $2 \cdot h_{ef} \left(2,5 - \frac{h_{ef}}{h_{ef}}\right)$ $h/h_{ef} \le 1,3$ $2,4 h_{ef}$		h/h _{ef} ≥ 2,0			1,0 h _{ef}
	Edge distance	2,0 > h/h _{ef} > 1,3	C _{cr,sp}	[mm]	$2 \cdot \left[1_{\text{of}} \right] 2 \cdot 2 =$
Axial distance s _{cr,sp} [mm] 2 c _{cr,sp}		h/h _{ef} ≤ 1,3			
	Axial distance	·	s _{cr,sp}	[mm]	2 c _{cr.sp}

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

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



	or size threaded ro	d			M8	M10	M12	M16	M20	M24	M27	M30
<u>Steel fa</u>	ailure teristic tension resi	stanco	Ne	[kN]			A • f.	u (or s	ee Tab	le C1)		
Partial		Stance	N _{Rk,s} γ _{Ms,N}	[-]					able C1			
	ined pull-out and	concrete failure						000 10				
Charac	cteristic bond resist	ance in non-crac	ked concrete	C20/25		1	T		T			1
۵.	I: 40°C/24°C				10	12	12	12	12	11	10	9
ange	II: 80°C/50°C	Dry, wet concrete			7,5	9	9	9	9	8,5	7,5	6,5
Temperature range	III: 120°C/72°C		[−] ^τ Rk,ucr	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
perai	I: 40°C/24°C		- HK,UCI	[]	7,5	8,5	8,5	8,5	_			
Tem	II: 80°C/50°C	flooded bore hole			5,5	6,5	6,5	6,5			ormanc ed (NPA	
	III: 120°C/72°C				4,0	5,0	5,0	5,0				
Charac	cteristic bond resist	ance in cracked	concrete C20/	/25								
Ð	l: 40°C/24°C	Dry, wet			4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5
rang	II: 80°C/50°C	concrete			2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5
Temperature range	II: 80°C/50°C Dry, wer III: 120°C/72°C		^τ Rk,cr	[N/mm²]	2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5
bera	I: 40°C/24°C				4,0	4,0	5,5	5,5		No Dorformon		_
Terr	II: 80°C/50°C	flooded bore hole			2,5	3,0	4,0	4,0		No Performano Assessed (NP		
	III: 120°C/72°C				2,0	2,5	3,0	3,0				
Reduk	tion factor ψ^0_{sus} in	cracked and no	n-cracked cor	ncrete C20/25								
ture	I: 40°C/24°C	Dry, wet			0,73							
Temperature range	II: 80°C/50°C	concrete and flooded bore	Ψ^0 sus	[-]	0,65							
Tem	III: 120°C/72°C	hole						0,	57			
			C25/30					,	02			
Increa	sing factors for con	crete	C30/37 C35/45					,	04			
Ψc	sing factors for con-	CIElE	C35/45 C40/50						07 08			
. 0			C45/55						09			
			C50/60					1,	10			
	ete cone failure ant parameter							see Ta	able C2			
Splitti	ng											
	ant parameter ation factor							see la	able C2			
	and wet concrete				1,0				1,2			
-	ded bore hole		γinst	[-]	,	1	,4		,	N	PA	
Inject	ion System ESSVE	ONE, ESSVE ON	NE-ICE for cor	ncrete								
	r mances cteristic values of te	nsion loads under	static and qua	asi-static action	ion Annex C 3							



Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Steel failure without lever arm										1
Characteristic shear resistance Steel, strength class 4.6, 4.8, 5.6 and 5.8	V ⁰ Rk,s	[kN]			0,6 •	A _s ∙f _{uk}	(or see	Table C	1)	
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A2, A4 and HCR, all classes	V ⁰ _{Rk,s}	[kN]			0,5 ·	A _s ∙f _{uk}	(or see	Table C	1)	
Partial factor	γ _{Ms,V}	[-]				see	Table C	1		
Ductility factor	k ₇	[-]					1,0			
Steel failure with lever arm										
Characteristic bending moment	M ⁰ Rk,s	[Nm]			1,2 • \	W _{el} • f _{uk}	(or see	Table C	;1)	
Elastic section modulus	W _{el}	[mm ³]	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]		n	nin(h _{ef} ; 1	2 · d _{nor}	m)		min(h _{ef} ;	300mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γ _{inst}	[-]		-			1,0			

Injection Systen	n ESSVE O	IE, ESSVE	ONE-ICE	for concrete
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Performances

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

Annex C 4



Anchor size internal threaded a	anchor 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	and 8.8	γMs,N	[-]			1	,5	1	1
Characteristic tension resistance	Stainless		[kN]	14	26	41	59	110	124
Steel A4 and HCR, Strength clas	s 70 ²⁾	N _{Rk,s}		14	20		- 59	110	
Partial factor		γMs,N	[-]			1,87			2,86
Combined pull-out and concret			- 000/05						
Characteristic bond resistance in	non-cracked	concret	e 020/25	12	12	12	12	11	9
n <u>1. 40 C/24 C</u> D II: 80°C/50°C D	ry, wet			9	9	9	9	8,5	6,5
$\begin{array}{c} 1.1 & +0 & 0/2 + 0 \\ \hline 1.1 & 80^{\circ} C/50^{\circ} C \\ \hline 1.1 & 120^{\circ} C/72^{\circ} C \\ \hline 1.1 & 40^{\circ} C/24^{\circ} C \\ \hline 1.1 & 80^{\circ} C/50^{\circ} C \\ \hline$	oncrete			6,5	6,5	6,5	6,5	6,5	5,0
e e e iii 120°C/72°C c		^τ Rk,ucr	[N/mm ²]	8,5	8,5	8,5			
E II: 80°C/50°C	ooded bore			6,5	6,5	6,5	No Perfe	ormance A	ssessec
⊢ <u>III: 120°C/72°C</u> h	ole			5,0	5,0	5,0		(NPA)	
Characteristic bond resistance in	cracked con	L Icrete C2	20/25	5,0	0,0	5,0			
I: 40°C/24°C				5,0	5,5	5,5	5,5	5,5	6,5
	ry, wet			3,5	4,0	4,0	4,0	4,0	4,5
B III: 120°C/72°C	oncrete			2,5	3,0	3,0	3,0	3,0	3,5
e e u : 120°C/72°C c : 1: 40°C/24°C e u :		^τ Rk,cr	[N/mm ²]	4,0	5,5	5,5	0,0	0,0	0,0
	ooded bore			3,0	4,0	4,0	No Perfe	ormance A	ssesse
⊢ <u>III: 120°C/72°C</u> h	ole			2,5	3,0	3,0		(NPA)	
Reduktion factor ψ^0_{SUS} in cracke	d and non-ci	racked c	oncrete C		_ , _				
						0	70		
E 40°C/24°C	ry, wet					0,	73		
	oncrete and ooded bore	Ψ^0_{sus}	[-]				65		
[™] III: 120°C/72°C ⁿ	ole					0,	57		
			5/30				02		
			0/37				04		
Increasing factors for concrete			5/45				07		
Ψc			0/50 5/55				08 09		
			0/60			,	10		
Concrete cone failure			0/00				10		
Relevant parameter						see Ta	able C2		
Splitting failure									
Relevant parameter						see la	able C2		
Installation factor							,2		
for dry and wet concrete for flooded bore hole		γ _{inst}	[-]		1,4	I	,2 	NPA	
		 			,		. (1)		al a al
 ¹⁾ Fastenings (incl. nut and washer The characteristic tension resista ²⁾ For IG-M20 strength class 50 is 	ance for steel				al and prop			nal threade	d rod.
Injection System ESSVE ONE, E	SSVE ONE-I	ICE for c	oncrete						



Anchor size for internal threade	ed anch	or rods		IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Steel failure without lever arm ¹⁾					•	•	•		
Characteristic shear resistance,	5.8	V ⁰ Rk,s	[kN]	5	9	15	21	38	61
Steel, strength class	8.8	V ⁰ Rk,s	[kN]	8	14	23	34	60	98
Partial factor, strength class 5.8 a	nd 8.8	γ _{Ms,V}	[-]				1,25	•	
Characteristic shear resistance, Stainless Steel A4 and HCR, Strength class 70 ²⁾		V ⁰ _{Rk,s}	[kN]	7	13	20	30	55	40
Partial factor		γ _{Ms,V}	[-]			1,56			2,38
Ductility factor		k ₇	[-]				1,0		
Steel failure with lever arm ¹⁾									
Characteristic bending moment,	5.8	M ⁰ _{Rk,s}	[Nm]	8	19	37	66	167	325
Steel, strength class	8.8	M ⁰ Rk,s	[Nm]	12	30	60	105	267	519
Partial factor, strength class 5.8 a	nd 8.8	γ _{Ms,V}	[-]				1,25		
Characteristic bending moment, Stainless Steel A4 and HCR, Strength class 70 ²⁾		M ⁰ Rk,s	[Nm]	11	26	52	92	233	456
Partial factor		γMs,V	[-]			1,56			2,38
Concrete pry-out failure									•
Factor		k ₈	[-]				2,0		
nstallation factor		γ _{inst}	[-]				1,0		
Concrete edge failure									
Effective length of fastener		۱ _f	[mm]		min	(h _{ef} ; 12 • d	nom)		min (h _{ef} ; 300mn
Outside diameter of fastener		d _{nom}	[mm]	10	12	16	20	24	30
nstallation factor		γ _{inst}	[-]			•	1,0		•
 ¹⁾ Fastenings (incl. nut and washer The characteristic tension resista ²⁾ For IG-M20 strength class 50 is y 	ance for s	steel failure	is valid	for the inte	ernal thread	ded rod and	d the faste	ning eleme	ent.

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Performances

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

Annex C 6



Table C7: Characte	ristic values	s of tensior	ı loads u	nder s	tatic a	nd qua	isi-sta	tic acti	ion			
Anchor size reinforcing Steel failure	bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Characteristic tension resi	stance	N _{Rk,s}	[kN]					A _s ∙f _{uk}	1)			
Cross section area	Stariee	A _s	[mm ²]	50	79	113	154	201	314	491	616	804
Partial factor		-			19	115	134	1,4 ²⁾	514	491	010	004
Combined pull-out and c	oporata failu	^γ Ms,N	[-]					1,4				
Characteristic bond resista			rata C20/2	5								
L: 40°C/24°C				10	12	12	12	12	12	11	10	8,5
II: 80°C/50°C	Dry, wet			7,5	9	9	9	9	9	8,0	7,0	6,0
Image: Second state Image: Second state	concrete	-	[N] / 21	5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5
କୁ ଜୁ <u>ା: 40°C/24°C</u>	flooded	^τ Rk,ucr	[N/mm ²]	7,5	8,5	8,5	8,5	8,5		lo Perfe	ormono	
୍ର <u>II: 80°C/50°C</u>	bore hole			5,5	6,5	6,5	6,5	6,5		SSesse		
III: 120°C/72°C				4,0	5,0	5,0	5,0	5,0				·/
Characteristic bond resista	ance in cracke	ed concrete	C20/25	1.0	5.0						0.5	
(a) <u>I: 40°C/24°C</u> <u>II: 80°C/50°C</u>	Dry, wet			4,0 2,5	5,0 3,5	5,5	5,5 4,0	5,5 4,0	5,5	5,5	6,5 4,5	6,5
iii: 80°C/50°C	concrete			2,5	3,5 2,5	4,0 3,0	4,0 3,0	4,0 3,0	4,0 3,0	4,0 3,0	4,5 3,5	4,5 3,5
III: 120°C/72°C		^τ Rk,cr	[N/mm ²]	4,0	4,0	5,5	5,5	5,5				
1: 40 °C/24 °C 11: 80 °C/50 °C 111: 80 °C/24 °C 111: 120 °C/24 °C 11: 80 °C/24 °C 11: 80 °C/24 °C 11: 80 °C/24 °C 11: 80 °C/24 °C	flooded			2,5	3,0	4,0	4,0	4,0		lo Perfo		
⊢ III: 120°C/72°C	bore hole			2,0	2,5	3,0	3,0	3,0		ssesse	a (NP/	4)
Reduktion factor ψ^0_{SUS} in	cracked and	non-cracked	concrete	C20/25	5							
	Dry, wet concrete							0,73				
L: 40°C/24°C L: 40°C/24°C II: 80°C/50°C III: 120°C/72°C	and flooded	Ψ^0 sus	[-]					0,65				
[□] □ III: 120°C/72°C	bore hole							0,57				
		C25/						1,02				
		C30/						1,04				
Increasing factors for cond	crete	C35/						1,07				
Ψc		C40/ C45/						1,08				
		C45/						1,09 1,10				
Concrete cone failure		000/	00					1,10				
Relevant parameter							see	Table	C2			
Splitting				I								
Relevant parameter							see	a Table	C2			
Installation factor												
for dry and wet concrete			1 1	1,2				1	,2			
for flooded bore hole		γinst	[-]			1,4				N	PA	
 f_{uk} shall be taken from th in absence of national re 	e specificatior gulation	is of reinforci	ng bars									
Injection System ESSVE	ONE, ESSVE	ONE-ICE fo	r concrete)						٨	v 0 7	
Performances Characteristic values of ter	nsion loads un	der static and	d quasi-sta	tic actio	on					Anne	ex C 7	



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

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

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Annex C 8

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



Table C9: Dis	splacements	s under tension load ¹	¹⁾ (thread	ded rod)					
Anchor size thread	led rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concre	ete C20/25 u	nder static and quasi-	static ac	tion						
Temperature range	δ_{N0} -factor	[mm/(N/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	δ_{N0} -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
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
III: 120°C/72°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
Cracked concrete C	20/25 under	static and quasi-stati	c action							
Temperature range	δ_{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	δ_{N0} -factor	[mm/(N/mm ²)]	0,2	219			0,1	70		
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,2	255			0,2	245		
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,2	219			0,1	70		
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		t τ: action bond stress for	rtension							

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

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

Anchul Size line	aded rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked con	crete C20/25 u	nder static and quasi-	static ac	tion						
All temperature	δ_{V0} -factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
Cracked concrete	C20/25 under	r static and quasi-stati	c action							
All temperature	δ_{V0} -factor	[mm/kN]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10
$\delta_{V_{\infty}} = \delta_{V_{\infty}}$ -facto	or ·V;									
Injection System Performances	ESSVE ONE, E	SSVE ONE-ICE for con	crete					Ar	nnex C S)



Table C11: Dis	placements u	Inder tension loa	ad ¹⁾ (Intern	al threade	d anchor r	od)		
Anchor size Interna	al threaded ar	nchor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked concre	ete C20/25 und	er static and qua	si-static a	tion				
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,023	0,026	0,031	0,036	0,041	0,049
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,033	0,037	0,045	0,052	0,060	0,071
Temperature range	δ_{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	δ_{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	δ_{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	δ_{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	δ_{N0} -factor	[mm/(N/mm ²)]	0,219			0,170		
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,255			0,245		

¹⁾ Calculation of the displacement

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

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

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

Anchor size Inte	ernal threaded	anchor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked and	er static and	quasi-stati						
All temperature	δ_{V0} -factor	[mm/kN]	0,07	0,06	0,06	0,05	0,04	0,04
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,10	0,09	0,08	0,08	0,06	0,06
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 reinf	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	o under static ar	nd quasi	-static a	ction						
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
range I: 40°C/24°C	δ _{N∞} -factor	[mm/(N/mm ²)]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,075
Temperature	δ_{N0} -factor	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126	
range II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,18
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,12
range III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	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	Jasi-stat	ic actior	ì						
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,0)90				0,070			
range I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,1	05				0,105			
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,2	219				0,170			
range II: 80°C/50°C	$\delta_{N\infty}\text{-factor}$	[mm/(N/mm ²)]	0,2	255				0,245			
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,2	219				0,170			
range III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255				0,245			
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C14: D	·τ; ·τ;	τ: action bonc									
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D	τ; τ; isplaceme	τ: action bonc			Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\begin{array}{ll} \delta_{N0} = \delta_{N0} \text{-factor} \\ \delta_{N\infty} = \delta_{N\infty} \text{-factor} \end{array}$ Table C14: D Anchor size reinfo	τ; τ; isplaceme orcing bar	τ: action bonc nt under shear	load ¹⁾ (I Ø 8	rebar) Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\begin{array}{lll} \delta_{N0} = \delta_{N0} \text{-factor} \\ \delta_{N\infty} = \delta_{N\infty} \text{-factor} \end{array}$ Table C14: D Anchor size reinformation Non-cracked conc	τ; τ; isplaceme orcing bar	τ: action bonc nt under shear	load ¹⁾ (I Ø 8	rebar) Ø 10	Ø 12	Ø 14 0,04	Ø 16	Ø 20 0,04	Ø 25	Ø 28 0,03	
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D Anchor size reinformation of the second state of	τ; τ; orcing bar rete C20/25	τ: action bond nt under shear	load ¹⁾ (i Ø 8 nd quasi	rebar) Ø 10 -static a	Ø 12 ction			[0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D Anchor size reinformation of the second state of	τ; τ; isplaceme orcing bar rete C20/25 $δ_{Vo}$ -factor $δ_{V\infty}$ - factor	τ: action bond nt under shear under static ar [mm/kN] [mm/kN]	load ¹⁾ (i Ø 8 nd quasi 0,06 0,09	rebar) Ø 10 -static a 0,05 0,08	Ø 12 ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D Anchor size reinformation in the second	τ; τ; isplaceme orcing bar rete C20/25 δ_{V0} -factor $\delta_{V\infty}$ - factor C20/25 unc δ_{V0} -factor	τ: action bond nt under shear under static ar [mm/kN] [mm/kN]	load ¹⁾ (i Ø 8 nd quasi 0,06 0,09	rebar) Ø 10 -static a 0,05 0,08	Ø 12 ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	Ø 32 0,03 0,04 0,06
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D Anchor size reinformation in the second	τ; τ; isplaceme orcing bar rete C20/25 δ_{Vo} -factor $\delta_{V\infty}$ - factor C20/25 unc δ_{Vo} -factor $\delta_{V\infty}$ - factor $\delta_{V\infty}$ - factor	r: action bond nt under shear under static ar [mm/kN] [mm/kN] [mm/kN] [mm/kN]	load ¹⁾ (i Ø 8 nd quasi 0,06 0,09 uasi-stat	rebar) Ø 10 -static a 0,05 0,08 ic action	Ø 12 ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D Anchor size reinformation of the second state of	τ; τ; isplaceme orcing bar rete C20/25 δ_{V0} -factor $\delta_{V\infty}$ - factor C20/25 unc δ_{V0} -factor $\delta_{V\infty}$ - factor he displaceme	r: action bond nt under shear under static ar [mm/kN] [mm/kN] [mm/kN] [mm/kN]	load ¹⁾ (1 Ø 8 nd quasi 0,06 0,09 uasi-stat 0,12 0,18	rebar) Ø 10 -static a 0,05 0,08 ic action 0,12	Ø 12 ction 0,05 0,08 0,11	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	ailure steristic tension resi	stance	N _{Rk,s,eq}	[kN]				1.0 •	N _{Rk,s}			
Partial		Starice	γ _{Ms,N}	[-]				see Ta				
	ined pull-out and o	concrete failure						300 10				
	cteristic bond resist		ked and crack	ed concrete	C20/25							I
	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	Dry, wet concrete			1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1
ture r	III: 120°C/72°C			[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
perat	I: 40°C/24°C		^{− τ} Rk,eq		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 ψ^0_{SUS} in	cracked and no	n-cracked con	crete C20/25								
ture	I: 40°C/24°C	Dry, wet						0,	73			
Temperature range	II: 80°C/50°C	concrete and flooded bore	ψ^0 sus	[-]				0,0	65			
Tem	III: 120°C/72°C	hole						0,	57			
Increas	sing factors for con	crete ψ _C	C25/30 to C	50/60				1	,0			
	ete cone failure											
Releva Splitti	ant parameter							see Ta	ible C2			
Releva	ant parameter							see Ta	ble C2			
	ation factor		[10				1.0			
	and wet concrete		γ _{inst}	[-]	1,0	1	1		1,2	N	<u></u>	
Iniocti	ion System ESSVE	ONE, ESSVE ON	IE-ICE for con	icrete								



Table C16: Characteristic valu (performance cate)		loads u	Inder s	seismic	action	l				
Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Steel failure without lever arm										
Characteristic shear resistance (Seismic C1)	V _{Rk,s,eq}	[kN]				0,70)∙V ⁰ Rk	,S		
Partial factor	[-]	see Table C1								
Ductility factor k ₇ [-] 1,0							1,0			
Steel failure with lever arm										
Characteristic bending moment	M ⁰ _{Rk,s,eq}	[Nm]			No Pe	forman	ce Asse	ssed (N	PA)	
Concrete pry-out failure										
Factor	k ₈	[-]					2,0			
Installation factor	γ _{inst}	[-]					1,0			
Concrete edge failure										
Effective length of fastener	۱ _f	[mm]		m	in(h _{ef} ; 1	2 • d _{nor}	m)		min(h _{ef} ;	300mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γ _{inst}	[-]					1,0			
Factor for annular gap	α_{gap}	[-]				0,5	5 (1,0) ¹⁾			
Annex A 3 is required										
Injection System ESSVE ONE, ESSV	/E ONE-ICE f	or conci	rete						Annex C	13
Performances Characteristic values of shear loads ur	nder seismic a	ction (pe	erforma	nce cate	gory C1))				



Table C17: Characteristic values (performance categor)		n loads ui	nder s	eismic	actio	n					
Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure Characteristic tension resistance	No	[kN]				1.0	• A _s • 1	: 1)			
Cross section area	N _{Rk,s,eq}		50	79	113	154	201	<u>ик</u> 314	491	616	804
Partial factor	-	[mm ²]	50	79	113	154	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	C20/25	5						
			2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5
$\begin{array}{c} 1. & 40 \text{ C/}24 \text{ C} \\ 11. & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ 111: & 120^{\circ}\text{C}/72^{\circ}\text{C} \\ 111: & 120^{\circ}\text{C}/24^{\circ}\text{C} \\ 111: & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ 111: & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ 111: & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ 111: & 80^{\circ}\text{C}/50^{\circ}\text{C} \\ 111: & 80^{\circ}\text{C}/24^{\circ}\text{C} $			1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1
III: 120°C/72°C concrete III: 120°C/24°C floodod	^τ Rk, eq	[N/mm ²]	1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4
l: 40°C/24°C flooded		[]	2,5	2,5	3,7	3,7	3,7	1	No Perf	ormanc	e
$ = \frac{\text{II: 80°C/50°C}}{\text{III: 120°C/72°C}} bore hole $			1,6 1,3	1,9 1,6	2,7 2,0	2,7 2,0	2,7 2,0	<i> </i>	Assesse	ed (NPA	4)
Reduktion factor ψ^0_{sus} in cracked and	non-cracked	d concrete	,	/	2,0	,0					
							0,73				
I: 40°C/24°C Dry, wet and III: 80°C/50°C and flooded III: 120°C/72°C bore hole	Ψ^0 sus	[-]					0,65				
E E flooded ■ III: 120°C/72°C bore hole							0,57				
Increasing factors for concrete $\psi_{\textbf{C}}$	C25/30 to	C50/60					1,0				
Concrete cone failure											
Relevant parameter						see	e Table	C2			
Splitting							Tabla	<u></u>			
Relevant parameter Installation factor						see	e Table	62			
for dry and wet concrete			1,2				1	,2			
for flooded bore hole	γinst	[-]	-, -		1,4			, <u> </u>	N	PA	
¹⁾ f _{uk} shall be taken from the specification ²⁾ in absence of national regulation	is of reinforci	ng bars									
Injection System ESSVE ONE, ESSVE	ONE-ICE fo	or concrete)						_		
Performances Characteristic values of tension loads un	der seismic a	action (perf	ormand	e cateç	jory C1)			Anne	x C 14	



Table C18: Characteristic val (performance cat		loads u	nder s	eismic	actio	n					
Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure without lever arm			•			•	•				•
Characteristic shear resistance	V _{Rk,s,eq}	[kN]	0,35 • A _s • f _{uk} ²⁾								
Cross section area	A _s	A _s [mm ²] 50 79 113 154 201 314 491						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 P	erforma	ance As	sessec	d (NPA)		
Concrete pry-out failure			•								
Factor	k ₈	[-]					2,0				
Installation factor	γinst	[-]					1,0				
Concrete edge failure			•								
Effective length of fastener	۱ _f	[mm]		mi	n(h _{ef} ; 1	2•d _{no}	m)		min(h _{ef} ; 300)mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	25	28	32
Installation factor	γinst	[-]					1,0	·			
Factor for annular gap	α _{gap}	[-]				1	0,5 (1,0) ³⁾			
¹⁾ f _{uk} shall be taken from the specifica ²⁾ in absence of national regulation ³⁾ Value in breakets valid for filled and		-	w and a			- +h - fi	turo Lla				20 4

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

Injection System ESSVE ONE, ESSVE ONE-ICE for concrete

Performances

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

Annex C 15



Anchor size thread	ded rod			M8	M10	M12	M16	M20	M24	M27	M30
Cracked and non-c		vroto C20/25 um	dor ooi								
	1								070		
Temperature range I: 40°C/24°C	δ_{N0} -factor	[mm/(N/mm ²)	-	-	090				070		
1. 40 0/24 0	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)	-	-	105			,	105		
Temperature range II: 80°C/50°C	δ_{N0} -factor	[mm/(N/mm ²)	-	-	219				170		
11: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)	-	-	255				245		
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)	-	-	219				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	^{ı)} (rebar)						
Anchor size reinfo	rcing bar		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Cracked and non-c	racked conc	rete C20/25 un	der seis	smic C1	action						
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,0	090				0,070			
I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,	105				0,105			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,:	219				0,170			
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,5	255				0,245			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,3	219				0,170			
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,3	255				0,245			
¹⁾ Calculation of the $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor	·τ;	nt τ: action bond s	stress for	rtension							
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$	· τ; · τ;					1	I	I	I	I	
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$	τ; τ; splacement	τ: action bond s				M12	M16	M20	M24	M27	M30
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C21: Dis	τ; τ; splacement ded rod	τ: action bond s	load ²⁾ ((threado	ed rod) M10	M12	M16	M20	M24	M27	M30
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C21: Dis	τ; τ; splacement ded rod	τ: action bond s	load ²⁾ ((threado	ed rod) M10	M12	M16	M20	M24	M27	M30 0,07
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C21: Dis Anchor size thread Cracked and non-c	τ; τ; splacement ded rod racked conc	τ: action bond s	load ²⁾ ((thread) M8 smic C1	ed rod) M10 action		I	I T	I	I	
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C21: Distance of the constraint	τ; τ; splacement ded rod racked conc δ _{vo} -factor δ _{v∞} -factor	τ: action bond s	der seis	(thread) M8 smic C1 0,12 0,18	ed rod) M10 action 0,12	0,11	0,10	0,09	0,08	0,08	0,07
$\begin{split} \delta_{N0} &= \delta_{N0}\text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty}\text{-factor} \end{split}$ Table C21: Distribution Anchor size thread Cracked and non-c All temperature ranges Table C22: Distribution	τ; τ; splacement ded rod racked conc $δ_{V0}$ -factor $δ_{V∞}$ -factor splacement	τ: action bond s s under shear crete C20/25 un [mm/kN]	oad ¹⁾ (r	(thread) M8 smic C1 0,12 0,18 ebar)	ed rod) M10 action 0,12 0,18	0,11	0,10	0,09	0,08	0,08	0,07
$\begin{split} \delta_{N0} &= \delta_{N0}\text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty}\text{-factor} \end{split}$ Table C21: Distribution Distributication Di	τ; τ; splacement ded rod racked conc $δ_{V0}$ -factor $δ_{V∞}$ -factor splacement rcing bar	t: action bond s s under shear crete C20/25 un [mm/kN] [mm/kN] under shear I	oad ¹⁾ (r	(thread) M8 smic C1 0,12 0,18 ebar) Ø 10	ed rod) M10 action 0,12 0,18 Ø 12	0,11	0,10	0,09	0,08	0,08	0,07
$\begin{split} \delta_{N0} &= \delta_{N0}\text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty}\text{-factor} \end{split}$ Table C21: Distribution Anchor size thread Cracked and non-c All temperature ranges Table C22: Distribution Anchor size reinfo Cracked and non-c	τ; τ; splacement ded rod racked conc δ _{v0} -factor δ _{v∞} -factor splacement rcing bar racked conc	 τ: action bond s s under shear crete C20/25 un [mm/kN] [mm/kN] under shear I crete C20/25 un 	oad ¹⁾ (r Ø 8 der seis	(thread) M8 smic C1 0,12 0,12 0,18 ebar) Ø 10 smic C1	ed rod) M10 action 0,12 0,18 Ø 12 action	0,11 0,17 Ø 14	0,10 0,15 Ø 16	0,09 0,14 Ø 20	0,08 0,13 Ø 25	0,08 0,12 Ø 28	0,07 0,10 Ø 32
$\delta_{N0} = \delta_{N0} \text{-factor}$ $\delta_{N\infty} = \delta_{N\infty} \text{-factor}$ Table C21: Distinct thread Cracked and non-control thread thre	τ; τ; splacement ded rod racked conc δ_{vo} -factor splacement rcing bar racked conc δ_{vo} -factor	τ: action bond s s under shear crete C20/25 un [mm/kN] [mm/kN] cunder shear I crete C20/25 un [mm/kN]	oad ¹⁾ (r Ø 8 0,12	(thread) M8 smic C1 0,12 0,12 0,18 ebar) Ø 10 smic C1 0,12	ed rod) M10 action 0,12 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	0,09 0,14 Ø 20 0,09	0,08 0,13 Ø 25 0,08	0,08 0,12 Ø 28 0,07	0,07 0,10 Ø 32 0,06
$\begin{split} \delta_{N0} &= \delta_{N0}\text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty}\text{-factor} \end{split}$ Table C21: Distribution Distributication Di	τ; splacement ded rod racked conc δ_{V0} -factor $\delta_{V\infty}$ -factor splacement rcing bar racked conc δ_{V0} -factor splacement rcing bar racked conc δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor V_{V0} -factor e displacement V;	τ: action bond s s under shear crete C20/25 un [mm/kN] [mm/kN] crete C20/25 un crete C20/25 un [mm/kN]	oad ¹⁾ (r Ø 8 0,12 0,18	(thread) M8 smic C1 0,12 0,12 0,18 ebar) Ø 10 smic C1	ed rod) M10 action 0,12 0,18 Ø 12 action	0,11 0,17 Ø 14	0,10 0,15 Ø 16	0,09 0,14 Ø 20	0,08 0,13 Ø 25	0,08 0,12 Ø 28	0,07 0,10 Ø 32
$\begin{split} \delta_{N0} &= \delta_{N0}\text{-}factor\\ \delta_{N\infty} &= \delta_{N\infty}\text{-}factor \end{split}$ Table C21: Distribution Distributica Distributica Distributica Distributica Distributica Distrib	τ; splacement ded rod racked conc δ_{V0} -factor splacement rcing bar racked conc δ_{V0} -factor splacement rcing bar racked conc δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor v_{V0} -factor v_{V0}-factor v_V V; V;	τ: action bond s as under shear crete C20/25 un [mm/kN] [mm/kN] aunder shear l crete C20/25 un [mm/kN] aunder shear l crete C20/25 un [mm/kN] crete C20/25 un [mm/kN] v: action shear	oad ¹⁾ (r Ø 8 0,12 0,18	(thread) M8 smic C1 0,12 0,18 ebar) Ø 10 smic C1 0,12 0,18	ed rod) M10 action 0,12 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	0,09 0,14 Ø 20 0,09	0,08 0,13 Ø 25 0,08 0,12	0,08 0,12 Ø 28 0,07	0,07 0,10 Ø 32 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

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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

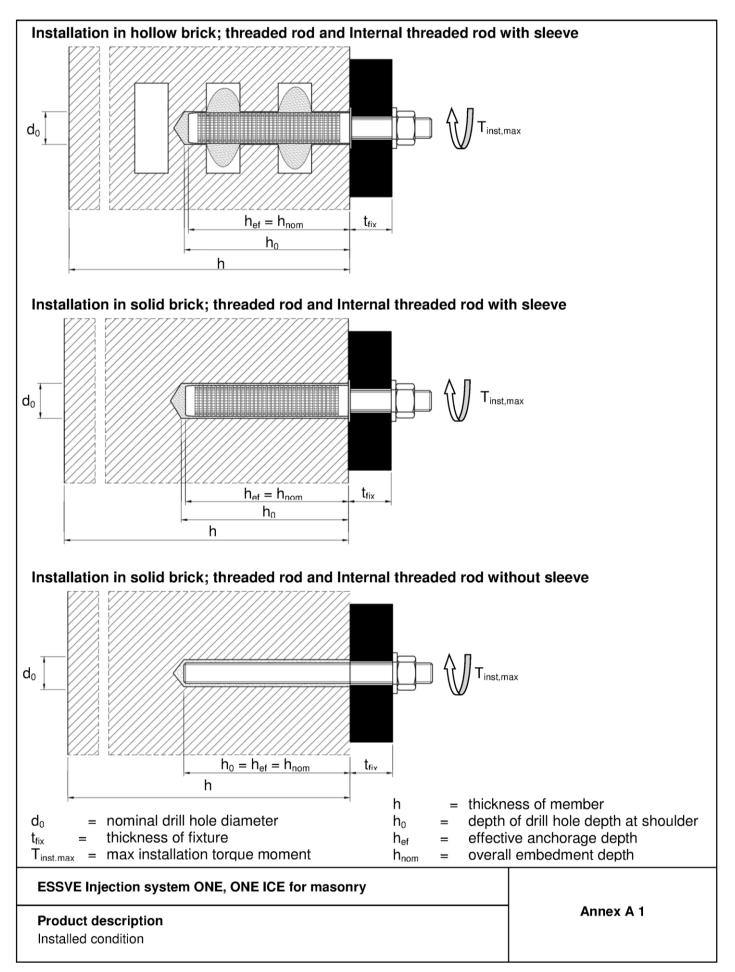
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

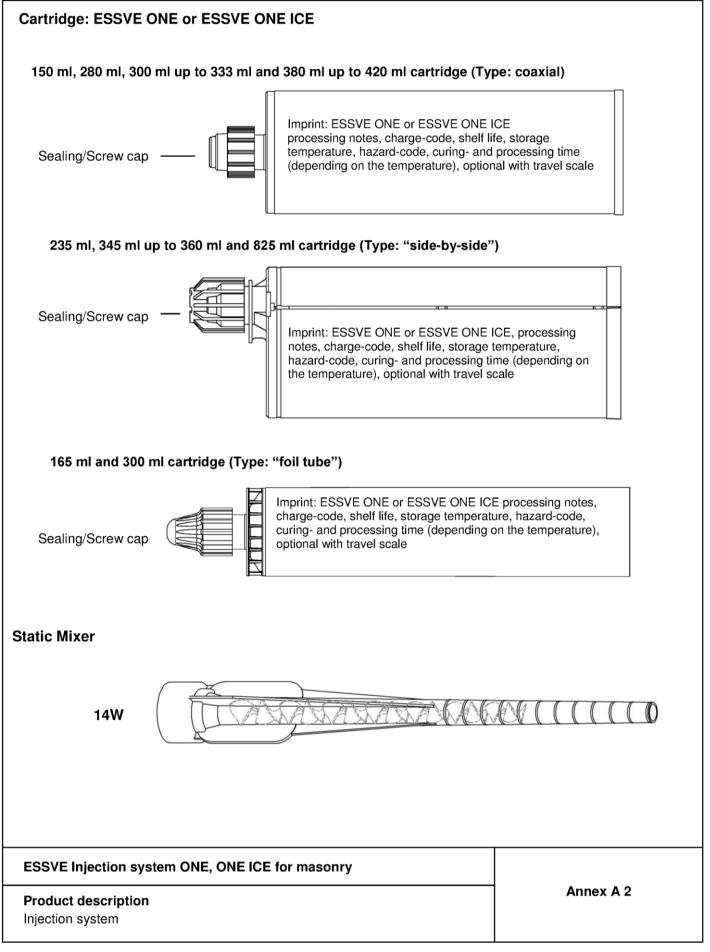
Issued in Berlin on 8 October 2018 by Deutsches Institut für Bautechnik

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



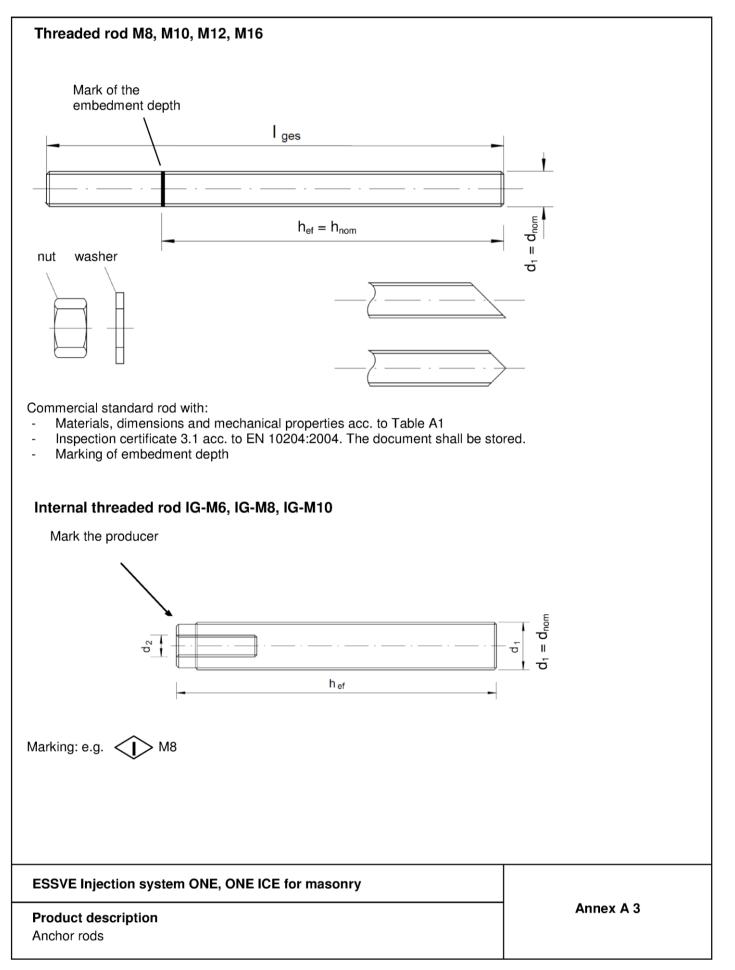






Page 7 of European Technical Assessment ETA-18/0642 of 8 October 2018







1999 or Steel, 61:2009 and EN ISO 10684:2004+AC:2009				
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				
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				
Steel, zinc plated or hot-dip galvanised				
Steel, zinc plated Property class 5.6, 5.8 and 8.8 EN ISO 898-1:2013				
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, Property class 70 (for class 70 rod) EN ISO 3506-2:2009 Property class 80 (for class 80 rod) EN ISO 3506-2:2009				
Material 1.4401, 1.4404 or 1.4571, EN 10088-1:2014				
Stainless steel: 1.4401 / 1.4404 / 1.4571, EN 10088-1:2014 Property class 70 (for class 70 rod) EN ISO 3506-1:2009				
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				
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				
Material 1.4529 / 1.4565, EN 10088-1:2014				
Stainless steel: 1.4529 / 1.4565, EN 10088-1:2014 Property class 70 (for class 70 rod) EN ISO 3506-1:2009				
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 d₅			L _s =	h _{ef} = h _{nom}					
SH 16x130 SH 20x130 SH 20x200 d _s			L _s = h _{ef}	= h _{nom}					
Table A3: Sizes sleeve									
		S	leeve	12x80	16x85	16x130	20x85	20×130	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]	W	sleeve: hef		hef + t _{fix} + 9,5	hef + t _{fix} + 11,5	hef + t _{fix} + 17,5	hef + t _f + 20,0
¹⁾ Internal threaded rod with me	etric exte	ernal thi	read						
ESSVE Injection system O Product description Sleeves	NE, OI	NE ICE	for mase	onry			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_{Rk,p} = N_{Rk,b} see Annex C4 to C45; N_{Rk,s} see Annex C2; N_{Rk,pb} see Technical Report TR 054
- $V_{\text{Rk,b}}$ and $V_{\text{Rk,c}}$ see Annex C4 to C45; $V_{\text{Rk,s}}$ see Annex C2; $V_{\text{Rk,pb}}$ see Technical Report TR 054
- For application with sleeve with drill bit size ≤ 15 mm installed in joints not filled with mortar:

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

$$\circ V_{\text{Rk,c,j}} = 0,15 \text{ V}_{\text{Rk,c}} \text{ and } V_{\text{Rk,b,j}} = 0,15 \text{ V}_{\text{Rk,b}} = 0,15 \text{ V}_{\text{Rk,b}} \text{ (N}_{\text{Rk,b}} = N_{\text{Rk,b}} \text{ see Annex C4 to C43)}$$

- 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

 $t \sim C(45)$



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	concrete units accor	ding EN 771	-4	1	1	
1	Autoclaved Aerated Concrete AAC6	Ī	499 240 249	6	0,6	M8/M10/M12/M16/IG-M6/IG-M8/IG-M10	C4 C5
alc	ium silicate mas	onry units accordin	g 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 C1
4	Calcium silicate hollow brick KSL-12DF	in the second	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 a	according EN 771-1					
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 C2(
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
Ir	tended Use	n system ONE, ON		-	ements	Annex B 2	



Brick-No.	Brick type	Picture	Brick size length width height	Compressive strength	Bulk density	Sleeve - Anchor type	Annex
_			[mm]	[N/mm ²]	[kg/dm ³]		
Clay	masonry units	according EN 771	-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	H	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	175/	ete according EN 7	71-3				
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
lı	ntended Use	on system ONE, (onts	Annex B 3	



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 80 90 100 h_{ef} [mm] Minimum wall thickness $h_{ef} + 30$ [mm] h_{min} Diameter of clearance d_f ≤ 9 12 7 14 9 18 12 [mm] hole in the fixture RBT18 RBT10 RBT12 RBT14 Diameter of steel brush 12 14 16 20 d_{b} [mm] Minimum diameter of steel brush 12,5 d_{b.min} 10,5 14,5 18,5 [mm] 2 (14 for Mz DF) Max installation torque moment [Nm] T_{inst,max}

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

Anchor size			M8	M8 / M1	0 / IG-M6	M12 / M	16 / IG-M8	/ IG-M10
	\$	Sleeve	12x80	16x85	16x130	20x85	20x130	20x200
Nominal drill hole diameter	do	[mm]	12	16	16	20	20	20
Drill hole depth	ho	[mm]	85	90	135	90	135	205
Effective anchorage depth	h _{ef}	[mm]	80	85	130	85	130	200
Minimum wall thickness	\mathbf{h}_{min}	[mm]	115	115	175	115	175	240
Diameter of clearance hole in the fixture	d _f ≤	[mm]	9	7 (IG-M6) / 9 (M8) / 12 (M10)		9 (IG-M8) / 12 (IG-M10 14 (M12) / 18 (M16)		
Diameter of staal 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

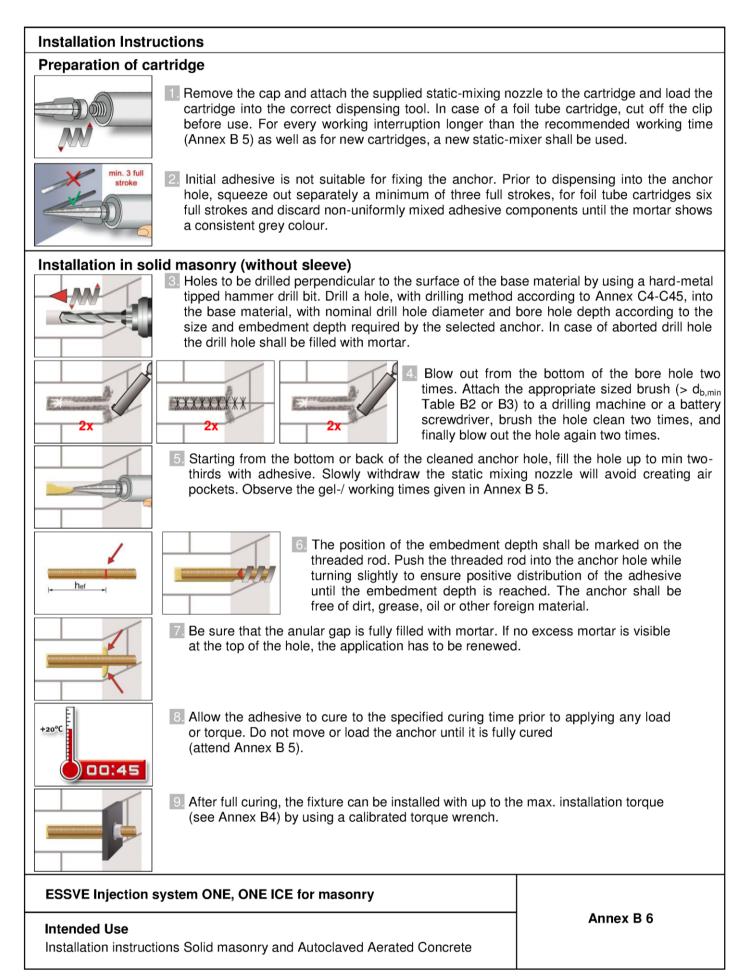
Installation parameters and cleaning brush

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	U	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 woo 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	v	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	Jbled	
	he curing time <u>must</u> be dou	Jbled	

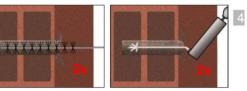






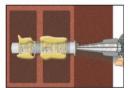
Installation in solid and hollow masonry (with sleeve)

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

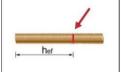


Blow out from the bottom of the bore hole two times. Attach the appropriate sized brush (> $d_{b,min}$ Table B3) to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.

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



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





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



- 8. Allow the adhesive to cure to the specified curing time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Annex B 5).
- 9. 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	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

 β -factors for job site testing under tension load

Г



Size			IG-M6	IG-M8	IG-M10	M8	M10	M12	M16
						WIO	WITC	11112	
Characteristic tension resistance					т т				
steel, property class 4.6	$N_{Rk,s}$	[kN]	-	-	-	15	23	34	63
	γMs	[-]		-		4.5	2	/	00
steel, property class 4.8	N _{Rk,s}	[kN] [-]	-	-	-	15	23	34 ,5	63
	$\frac{\gamma_{Ms}}{N_{Rk,s}}$	[kN]	10	- 18	29	18	29	42	79
steel, property class 5.6	γ _{Ms}	[-]		2,0	23	10	1	,0	15
	N _{Rk,s}	[kN]	10	17	29	18	29	42	79
steel, property class 5.8	γ _{Ms}	[-]		1,5				,5	
	N _{Rk.s}	[kN]	16	27	46	29	46	67	126
steel, property class 8.8	γMs	[-]		1,5			1.	,5	
Stainless steel A4 / HCB, property class 70	N _{Rk,s}	[kN]	14	26	41	26	41	59	110
Stainless steel A4 / HCR, property class 70	γ́Ms	[-]		1,87			1,	87	
Stainless steel A4 / HCR, property class 80	$N_{Rk,s}$	[kN]	16	29	46	29	46	67	126
Stamless steel A47 HOR, property class of	γMs	[-]		1,6			1	,6	
Characteristic shear resistance									
	$V_{Rk,s}$	[kN]	-	-	-	7	12	17	31
steel, property class 4.6	γMs	[-]		-			1,	67	
taal property alage 4.9	V _{Rk,s}	[kN]	-	-	-	7	12	17	31
steel, property class 4.8	γMs	[-]		-	-		1,	25	
ataal property alage E.C.	$V_{Rk,s}$	[kN]	5	9	15	9	15	21	39
steel, property class 5.6	γMs	[-]		1,67			1,	67	
eel, property class 5.8	$V_{Rk,s}$	[kN]	5	9	15	9	15	21	39
steel, property class 5.6	γMs	[-]		1,25			1,:	25	
steel, property class 8.8	$V_{Rk,s}$	[kN]	8	14	23	15	23	34	63
	γMs	[-]		1,25				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
steel, property class 4.0	γMs	[-]		-			1,	67	
steel, property class 4.8	$M_{Rk,s}$	[Nm]	-	-	-	15	30	52	133
	γ̈́Ms	[-]		-			1	25	
steel, property class 5.6	$M_{Rk,s}$	[Nm]	8	19	37	19	37	66	167
	γMs	[-]		1,67			1,		
steel, property class 5.8	M _{Rk,s}	[Nm]	8	19	37	19	37	66	167
· · ·	ΎMs	[-]	10	1,25	00	00	1,		0.00
steel, property class 8.8	$M_{Rk,s}$	[Nm]	12	30	60	30	60	105	266
	γMs	[-]		1,25	50	00	1,:		000
Stainless steel A4 / HCR, property class 70	M _{Rk,s}	[Nm]	11	26	52	26	52	92	233
	ΎMs	[-]	10	1,56	60	20		56	000
Stainless steel A4 / HCR, property class 80	$M_{Rk,s}$	[Nm]	12	30	60	30	60	105	266

ESSVE Injection system ONE, ONE ICE for masonry

Performances

Characteristic resistance under tension and shear load - steel failure



Spacing and edge distances							
	ance ing mum) spacing for	r anchors placed para r anchors placed perp	•				
Load direction Anchor position	nsion load	Shear load parallel edge		load perpendicular to free edge			
Anchors places parallel to bed joint s _{cr,II ;} (s _{min,II})							
Anchors places perpendicular to bed joint $s_{cr, \perp}$; $(s_{min, \perp})$							
to bed joint $s_{cr,\perp}$; $(s_{min,\perp})$ $\alpha_{g,N,II} =$ Group factor in case of tension load for anchors placed parallel to the bed joint $\alpha_{g,V,II} =$ Group factor in case of shear load for anchors placed parallel to the bed joint $\alpha_{g,N,\perp} =$ Group factor in case of tension load for anchors placed perpendicular to the bed joint $\alpha_{g,V,\perp} =$ Group factor in case of shear load for anchors placed perpendicular to the bed joint $\alpha_{g,V,\perp} =$ Group factor in case of shear load for anchors placed perpendicular to the bed joint Group of two anchors: $N^{g}_{Rk} = \alpha_{g,N} * N_{RK}$ and $V^{g}_{Rk} = \alpha_{g,V} * V_{Rk}$ Group of four anchors: $N^{g}_{Rk} = \alpha_{g,N,II} * \alpha_{g,N,\perp} * N_{RK}$ and $V^{g}_{Rk} = \alpha_{g,V,II} * \alpha_{g,V,\perp} * V_{Rk}$ $(N_{Rk:} N_{Rk,b} \text{ or } N_{Rk,b,j} \text{ for } c_{cr})$ $(V_{Rk:} V_{Rk,c;}; V_{Rk,b,j} \text{ for } c_{cr})$ $(With the relevant \alpha_{g})$							
ESSVE Injection system ONE, ONE ICE Performances Edge distance and anchor spacing	E for masonry		An	nex C 3			



	G-M8 00	M16/IG-M10
Compressive strength $f_b ≥ [N/mm^2]$ 6 Code EN 771-4 Producer (country code) e.g. Porit (DE) Brick dimensions [mm] 499 x 240 x 249 Drilling method Rotary Table C4: Installation parameter Anchor size [-] M8 M10/IG-M6 M12/I Effective anchorage depth [mm] 80 90 10 Edge distance Ccr [mm] 1,5*hef Minimum edge distance Cmin, V,II (Cmin, v, ⊥) ¹⁾ [mm] 75 (1,5*hef Spacing scr [mm] 3*hef		M16/IG-M1
Code EN 771-4 Producer (country code) e.g. Porit (DE) Brick dimensions [mm] 499 x 240 x 249 Drilling method Rotary Table C4: Installation parameter Anchor size [-] M8 M10/IG-M6 M12/I Effective anchorage depth [mm] 80 90 10 Edge distance C_{cr} [mm] 75 75 Minimum edge distance $C_{min,V,II} (C_{min,v, \perp})^{1)}$ [mm] 75 (1,5*h effective) Spacing S_{cr} [mm] 3*hefective)		M16/IG-M1
Producer (country code) e.g. Porit (DE) Brick dimensions [mm] 499 x 240 x 249 Drilling method Rotary Table C4: Installation parameter Anchor size [-] M8 M10/IG-M6 M12/I Effective anchorage depth [mm] 80 90 10 Edge distance C_{cr} [mm] 1,5*hef Minimum edge distance $C_{min,N}$ [mm] 75 Spacing S_{cr} [mm] 3*hef		M16/IG-M1
Brick dimensions [mm] 499 x 240 x 249 Drilling method Rotary Table C4: Installation parameter Anchor size [-] M8 M10/IG-M6 M12/I Effective anchorage depth [mm] 80 90 10 Edge distance C_{cr} [mm] 1,5*h_{eff} Minimum edge distance $C_{min,V,II}$ [mm] 75 Spacing s_{cr} [mm] 3*h_{eff}		M16/IG-M1
Drilling method Rotary Table C4: Installation parameter Anchor size [-] M8 M10/IG-M6 M12/I Effective anchorage depth [mm] 80 90 10 Edge distance C_{cr} [mm] 1,5*hef Minimum edge distance $C_{min,N}$ [mm] 75 Spacing S_{cr} [mm] 3*hef		M16/IC-M1
Table C4: Installation parameterAnchor size[-]M8M10/IG-M6M12/IEffective anchorage depth[mm]809010Edge distance c_{cr} [mm]1,5*h_{eff}Minimum edge distance $c_{min,V,II}$ [mm]75Cmin,V,II $(c_{min,v, \perp})^{1)}$ [mm]75 (1,5*h_{eff})Spacing s_{cr} [mm]3*h_{eff}		M16/IQ-M1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		M16/IG-M1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		N/16/1(N/1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	10	No. of the second second
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		100
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		
Spacing s _{cr} [mm] 3 [*] h _{ef}	- ()	
	ef)	
¹⁾ $C_{min,V,II}$ for shear loading parallel to the free edge; $C_{min,V,I}$ for shear loading perpendicular the free edge		
L: anchors placed 75 100	[-]	2,0 1,4
$\begin{array}{c c c c c c c c c } \hline & & & & & & & & & & & & & & & & & & $		2,0
Table C6: Group factor for anchor group in case of shear loading parallel to free edge		
Configuration with c ≥ with s ≥		
II: anchors placed parallel to horizontal ioint751001,5*hef3*hef		1,2 2,0
joint 1,5 her 3 her	[-]	2,0



fective	v - • •	s of I	resistance	1,5*hef 1,5*hef e under		acteristic		hef oads		x _{g,V,II} x _{g,V,⊥}	. [-]		2,0
racteristi	c value	s of I	resistance				near l	oads		Xg,V,⊥			2,0
fective	c value	s of I	resistance	e under									
					Char	acteristi	c resi	stance					
						Use cat	tegor	y					/ -1
			d/d			w/w w/d 40°C/24°C 80°C/50						/d //d /w	
chorage depth	40°C/2	24°C	80°C/50°	C 120°	C/72°C			80°C/50°C		80°C/50°C 120°C/72		/72°C	For all temperatur range
h _{ef}			$N_{Bkb} = N_{Bl}$	1)	1)		Nek h =					VBk	2)3) b
[mm]				κ.p		[kN		110,0	-110,0			- 10	,0
• •			Compres	sive str	ength f								
80	2,5 (2	2,0)						2,0 (1	,5)	1,5 (1,2)	6	,0
90			·······		(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
100	6,5 (4	1,5)	5,5 (3,5)) 4,0	(3,0)			,5)	4,0 (3,0)		1(0,0	
		o or gr	eater. For S	1eei 4.6 a	เกิด 4.8 N	unipiy V	Rk,b Dy	0,8					
h _{ef}	Ν	δι	N/N	δΝΟ		δN∞	,	V		δνο			δ∨∞
			-				[k	:N]					mm]
				· ·				-		<u> </u>			,20
		C),18 –	,						,		_	,80
				-								_	,
100	1,8		,08	0,14),29	2	.,1		1,4			2,10
	80 90 100 id for c _{cr} , v o f V _{Rk,c} s e valid for	h _{ef}	[mm] 80 2,5 (2,0) 90 4,0 (2,5) 100 5,0 (3,5) 100 6,5 (4,5) id for c _{cr} , values in brack of V _{Rk,c} see ETAG029, e valid for steel 5.6 or gr accements h _{ef} N δ _f [mm] [kN] [min] 80 0,9 0	h _{ef} N _{Rk,b} = N _{Rl} [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) id for c _{cr} , values in brackets are valied for steel 5.6 or greater. For sevalid for steel 5.6 or gr	$\begin{tabular}{ c c c c c } \hline h_{ef} & N_{Rk,b} = N_{Rk,p}^{1} \\ \hline \hline \\ \hline \mm] & \\ \hline \hline \\ \hline \hline \\ \hline \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	h _{ef} N _{Rk,b} = N _{Rk,p} (k) [mm] [k] Compressive strength f _b ≥ 6 N/r 80 2,5 (2,0) 2,5 (1,5) 2,0 (1,2) 2,5 (1) 90 4,0 (2,5) 3,0 (2,0) 2,5 (1,5) 3,5 (2) 100 5,0 (3,5) 4,0 (3,0) 3,0 (2,5) 4,5 (3) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4) id for c _{cr} , values in brackets are valid for single anchors with cond of V _{Rk,c} see ETAG029, Annex C; avalid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V accements h _{ef} N δ _N / N δ _{N∞} [mm] [kN] [mm/kN] [mm] [mm] 80 0,9 0.18 0,16 0,32	h _{ef} N _{Rk,b} = N _{Rk,p} ¹⁾ I [mm] [kN] Compressive strength f _b ≥ 6 N/mm ² 80 2,5 (2,0) 2,5 (1,5) 2,0 (1,2) 2,5 (1,5) 90 4,0 (2,5) 3,0 (2,0) 2,5 (1,5) 3,5 (2,5) 100 5,0 (3,5) 4,0 (3,0) 3,0 (2,5) 4,5 (3,0) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) id for c _{cr} , values in brackets are valid for single anchors with c _{min} of V _{Rk,c} see ETAG029, Annex C; avalid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V _{Rk,b} by accements [mm] [kN] [mm/kN] [mm] [mm] 80 0,9 0.18 0,16 0,32 1	h _{ef} N _{Rk,b} = N _{Rk,p} ¹⁾ N _{Rk,b} = N [mm] [kN] Compressive strength f _b ≥ 6 N/mm ² 80 2,5 (2,0) 2,5 (1,5) 2,0 (1,2) 2,5 (1,5) 2,0 (1 90 4,0 (2,5) 3,0 (2,0) 2,5 (1,5) 3,5 (2,5) 3,0 (2 100 5,0 (3,5) 4,0 (3,0) 3,0 (2,5) 4,5 (3,0) 3,5 (2 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3 id for c _{cr} , values in brackets are valid for single anchors with c _{min} of V _{Rk,c} see ETAG029, Annex C; evalid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V _{Rk,b} by 0,8 lacements M _{ef} N δ _N / N δ _{N0} δ _{N∞} V [mm] [kN] [mm] [mm] [kN] [kN] 80 0,9 0.18 0.16 0.32 1,3	h _{ef} N _{Rk,b} = N _{Rk,p} ¹⁾ N _{Rk,b} = N _{Rk,p} ¹⁾ [mm] [kN] Compressive strength f _b ≥ 6 N/mm ² 80 2,5 (2,0) 2,5 (1,5) 2,0 (1,2) 2,5 (1,5) 2,0 (1,5) 90 4,0 (2,5) 3,0 (2,0) 2,5 (1,5) 3,5 (2,5) 3,0 (2,0) 100 5,0 (3,5) 4,0 (3,0) 3,0 (2,5) 4,5 (3,0) 3,5 (2,5) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) id for c _{cr} , values in brackets are valid for single anchors with c _{min} of V _{Rk,c} see ETAG029, Annex C; evalid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V _{Rk,b} by 0,8 lacements [mm] [kN] [mm] [kN] 80 0,9 0,18 0,16 0,32 1,3	hef N _{Rk,b} = N _{Rk,p} ¹⁾ N _{Rk,b} = N _{Rk,p} ¹⁾ Imm] [kN] [kN] Compressive strength $f_b \ge 6$ N/mm² 80 2,5 (2,0) 2,5 (1,5) 2,0 (1,2) 2,5 (1,5) 2,0 (1,5) 1,5 (1,5) 90 4,0 (2,5) 3,0 (2,0) 2,5 (1,5) 3,5 (2,5) 3,0 (2,0) 2,5 (1,5) 100 5,0 (3,5) 4,0 (3,0) 3,0 (2,5) 4,5 (3,0) 3,5 (2,5) 3,0 (1,0) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) 4,0 (2,0) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) 4,0 (2,0) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) 4,0 (2,0) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) 4,0 (2,0) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) 4,0 (2,0) 100 6,5 (4,5) 5,6 (7,0) 5,0 (3,5)	hef N _{Rk,b} = N _{Rk,p} ¹⁾ N _{Rk,b} = N _{Rk,p} ¹⁾ Imm] [kN] Compressive strength f _b ≥ 6 N/mm ² 80 2,5 (2,0) 2,5 (1,5) 2,0 (1,2) 2,5 (1,5) 2,0 (1,5) 1,5 (1,2) 90 4,0 (2,5) 3,0 (2,0) 2,5 (1,5) 3,5 (2,5) 3,0 (2,0) 2,5 (1,5) 100 5,0 (3,5) 4,0 (3,0) 3,0 (2,5) 4,5 (3,0) 3,5 (2,5) 3,0 (2,5) 100 6,5 (4,5) 5,5 (3,5) 4,0 (3,0) 5,5 (4,0) 5,0 (3,5) 4,0 (3,0) id for c _{cr} , values in brackets are valid for single anchors with c _{min} of V _{Rk,c} see ETAG029, Annex C; evalid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply V _{Rk,b} by 0,8 lacements No No N∞ V õv0 101 [kN] [mm] [mm] [mm] [mm]	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$



Brick type: Calcium silicate solic	brick KS-NF		
Table C10: Description of the brid	ck .		
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		
Table C11: Installation parameter			
Anchor size [-]	All sizes	

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

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

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

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

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

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

tion.					
ation	with c ≥	with s ≥			
	60	120			1,0
	1,5*hef	3*h _{ef}	α _{g,V,II}	F 1	2,0
	60	120		[-]	1,0
	1,5*hef	3*h _{ef}	α _{g,V,⊥}		2,0
		60 1,5*hef 60 60	60 120 1,5*hef 3*hef 60 120	60 120 1,5*hef 3*hef 60 120 α _{g,V,II} α _{g,V,II}	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

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Performances calcium solid brick KS-NF

Installation parameters

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

Brick	type: Cal	cium silicat	e solid br	ick KS-NF					
Table (C15: Cł	naracteristic v	alues of r	esistance u	under tensio	on and she	ar loads		
					Cha	racteristic r			
						Use categ	jory		
Anchor	Olasus	Effective anchorage depth		d/d			w/d w/w		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)		$N_{Rk,b} = N_{Rk,p}$	1)	V _{Rk,b} ²⁾³⁾
		[mm])	[kN])	- חג,ט
		[]	Con	nressive	strength f _b ≥				
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 ≥	20 N/mm ²			
M8	-	80	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,0 (2,5)	5,0 (2,5)	3,5 (1,5)	4,0 (2,5)
M10 / IG-M6	-	90	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		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)

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)

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Performances calcium solid brick KS-NF

Characteristic values of resistance under tension and shear load



					Cha	racteristic r	esistance		
						Use categ	jory		
Anchor	Sleeve	Effective anchorage depth		d/d			w/d w/w		d/d w/d w/w
size	Sleeve	h _{ef} [mm]	40°C/24°C	80°C/50°C		40°C/24°C		120°C/72°C	For All temperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,t}$	1) ວ		$N_{Rk,b} = N_{Rk,p}$	1)	$V_{Rk,b}^{(2)3)}$
		[mm]				[kN]			
					strength f _b ≥				
M8	-	80	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M10 / IG-M6	-	90	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	5,5 (3,0)
M12 / IG-M8	-	100	7,0 (3,5)	6,5 (3,0)	5,0 (2,5)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M16 / IG-M10	-	100	6,0 (3,0)	5,5 (2,5)	4,5 (2,0)	6,0 (3,0)	5,5 (2,5)	4,0 (2,0)	4,5 (2,5)
M8	12x80	80	6,5 (3,0)	6,0 (3,0)	4,5 (2,0)	5,5 (2,5)	5,0 (2,5)	3,5 (1,5)	4,5 (2,5)
M8 /	16x85	85	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	4,5 (2,5)
M10/ IG-M6	16x130	130	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	5,5 (2,5)	5,0 (2,5)	4,0 (2,0)	4,5 (2,5)
M12 /	20x85	85	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,5 (2,5)
M16 /	20x130	130	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,5 (2,5)
IG-M8 / IG-M10	20x200	200	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	5,0 (2,5)	4,5 (2,0)	3,5 (1,5)	4,5 (2,5)

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

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

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

Table C17: Displacements

Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ_{N0}	δ _{N∞}	V	δ_{V0}	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80					1,7	0,90	1,35
M10 / IG-M6	-	90	2,0		0,30	0,60	2,0	1,10	1,65
M12 / IG-M8	-	100							
M16 / IG-M10	-	100	1,7	0,15	0,26	0,51			
M8	12x80	80		0,10	,				
M8 / M10/	16x85	85	1 4		0.01	0.42	1,7	0,90	1,35
IG-M6	16x130	130	1,4		0,21	0,43			
M12/M16/	20x85	85] [
IG-M8 /	20x130	130	1,3		0,19	0,39			
IG-M10	20x200	200]						

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Performances calcium solid brick KS-NF

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



Brick type		Calcium silicate hol KSL-3DF	llow brick				
	o [kg/dm ³]	1,4					
	≥ [N/mm²]	8, 12 or 14				1°0	
	- [[%/11111]	EN 771-2				697	
Producer (country code)		e.g. Wemding (DE)	<u> </u>			Y	l.
Brick dimensions	[mm]	240 x 175 x 113					
Drilling method	[]	Rotary					
	175			14 44 14 32 14 44			
	16	5 44 14 38 17	38 14	14 44 16			
Table C19: Installation p Anchor size				×	All sizes		
Anchor size			38 14	×	All sizes 100 (120))	
Anchor size Edge distance	parameters		[-]	×)	
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} S _{cr,II}		[-] [mm] [mm]	×	100 (120) ¹ 60 240)	
Anchor size Edge distance Minimum edge distance Spacing	C _{cr} C _{min} S _{cr,⊥}		[-] [mm] [mm] [mm] [mm]	×	100 (120) ¹ 60 240 120)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} S _{cr,⊥} S _{min}	\$ \$	[-] [mm] [mm]	×	100 (120) ¹ 60 240)	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH20	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	\$ \$	[-] [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 SH20	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	3 130 and SH20x200	[-] [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 SH20 Table C20: Group factor Configuration	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	130 and SH20x200 or group in case of te	[-] [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 SH20 Table C20: Group factor Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	5 130 and SH20x200 or group in case of te with c ≥	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ding 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 SH20 Table C20: Group factor Configuration II: anchors placed	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	s 130 and SH20x200 or group in case of te with c ≥ 60	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ding 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 SH20 Table C20: Group factor Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	5 130 and SH20x200 or group in case of te with c ≥ 60 C _{cr}	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ding 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 SH20 Table C20: Group factor Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} S _{cr,II} S _{cr,⊥} S _{min} 0x85; SH20x	5 130 and SH20x200 or group in case of te 60 c _{cr} 160	[-] [mm] [mm] [mm] [mm] [mm]	44 16 ding with s ≥ 120 240 120	100 (120) ¹ 60 240 120 120		2,0 2,0



	Configur	ation		with c ≥		with s	>			
II: anchoi			г	60		120	-			1,0
parallel to		V ••	1	160		120	c	χ _{g,V,II}		1,6
joi				Ccr		240		9, 1,		2,0
⊥: ancho	rs placed		E .	60		120			[-]	1,0
perpend horizon				C _{cr}		120	C	xg,∨,⊥		2,0
Table C2	2: Grou	p factor for a	nchor grou	up in case o	of shear loa	ding perpe	endicular t	to free	edge	
	Configur	ation		with c ≥		with s a	2			
II: anchor				60		120				1,0
parallel to joi				Ccr		240	C	Xg,V,II	[-]	2,0
⊥: ancho				60		120			^[-]	1,0
perpend horizon				C _{cr}		120	C	χ́g,V,⊥		2,0
Table C2	3: Char	acteristic val	ues of res	istance und	der tension	and shear	loads			
					Char	acteristic re	sistance			
						Use catego	ory			
Anchor		Effective anchorage		d/d			w/d; w/w	/		d/d; w/d; w/w
size	Sleeve	depth	40°C/24°C		120°C/72°C		80°C/50°C		C/72°C	For all temperature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}$	1)		$N_{Rk,b} = N_{Rk}$	1) .,p		V _{Rk,b} ⁴⁾
		[mm]				[kN]				
	10.00				rength f _b ≥ 8		1.0			-2 (2.2)
M8	12x80	80	1,5	1,5	1,2	1,5	1,2	_	0,9	$2,5^{2}$ $(0,9)^{3}$ $4,0^{2}$ $(1,5)^{3}$
M8 / M10 / IG-M6	16x85	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	$4,0^{2}$ (1,5) ³ $4,0^{2}$ (1,5) ³
M12 /	16x130 20x85	85					4,0			$4,0^{2}(1,5)^{3}$
M16 /			4,5	4,0	3,0	4,5	,		3,0	
IG-M8 /	20x130	130	4,5	4,0	3,0	4,5	4,0	_	3,0	$4,0^{2}$ $(1,5)^{3}$
IG-M10	20x200	200	4,5	4,0	3,0	4,5	4,0		3,0	$4,0^{2}$ $(1,5)^{3}$
• • •					ength f _b ≥ 1					a a21
M8	12x80	80	2,0	2,0	1,5	2,0	1,5		1,2	$3,0^{2}$ $(1,2)^{3}$
M8 / M10	16x85	85	2,0	2,0	1,5	2,0	2,0		1,5	$4,5^{2}$ $(1,5)^{3}$
/ IG-M6 M12 /	16x130	130	2,5	2,5	1,5	2,5	2,5		1,5	$4,5^{2}$ $(1,5)^{3}$
M12/ M16/	20x85	85	6,0	5,5	4,0	6,0	5,5	_	4,0	$4,5^{2}$ $(1,5)^{3}$
IG-M8 /	20x130	130	6,0	5,5	4,0	6,0	5,5	_	4,0	$4,5^{2}$ $(1,5)^{3}$
IG-M10	20x200	200	6,0	5,5	4,0	6,0	5,5	4	4,0	$4,5^{2}$ $(1,5)^{3}$
 ²⁾ V_{Rk,c,II} ³⁾ V_{Rk,c,⊥} 	= V _{Rk,b} valic = V _{Rk,b} (valu	or c _{cr} and c _{min} I for shear load ues in brackets) Ilid for steel 5.6	valid for sh	ear load in di			8			
ESSVE	Injection	system ONE	ONE ICE	for masonr	у					
								_	nex C 1	



Brick typ	be: Calci	um silicate	hollow bri	ck KS L-3	BDF				
Table C2	4: Cha	racteristic v	alues of res	istance ur			-	tinue)	
					Char	acteristic re			
		Effective	e	d/d		Use catego	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
		h _{ef}		$N_{Rk,b} = N_{Rk}$	1) .p		$N_{Rk,b} = N_{Rk,c}$	1)	V _{Rk,b} ⁴⁾
		[mm]				[kN]			
			Comp	ressive st	rength 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
 ²⁾ V_{Rk,c,II} ³⁾ V_{Rk,c,⊥} ⁴⁾ The va Table C2 	= V _{Rk,b} valid = V _{Rk,b} (val alues are va 5: Disp	ues in bracke alid for steel 5 lacements	ad parallel to fr ts) valid for sh 6.6 or greater. Effective nchorage	ear load in c For steel 4.6		oly V _{Rk,b} by 0,		δνο	
Anchor si	ze Sle		lepth h _{ef}						
M8	10	x80	[mm] 80	[kN] [mm	n/kN] [mn	1] [mm		[mm]	[mm]
				0.71	0.0	4 4 4 4	1,0	1,0	1,50
M8 / M10 IG-M6		x85 x130	85	0,71	0,64	4 1,29	1		
				0,	90			1.0	0.05
M12 / M1	0/	x85	85	1 00		7 0.0	1,7	1,9	2,85
IG-M8 /	20	×130	130	1,86	1,6	7 3,34	+		

ESSVE Injection system ONE, ONE ICE for masonry

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

200

Annex C 11

IG-M10

20x200



Table C26: Descriptio	on of the brid	Calcium silicate hollo	ave beight				
Brick type		KSL-12DF	OW DRICK				
Bulk density	ρ [kg/dm³]	1,4					
•	$_{\rm b} \ge [\rm N/mm^2]$	10, 12 or 16					
Code		EN 771-2					1
Producer (country code)		e.g. Wemding (DE)					
Brick dimensions	[mm]	498 x 175 x 238					
Drilling method		Rotary					
						59 23 59 17	*
, 35 , 59	, 64 ,	59 , 64 ,	59	64	59 / 35	1	
Table C27: Installation	n parameters	1 1 5	[-]	64	All sizes	1	
Table C27: Installation Anchor size Edge distance	n parameters	3 3	[-] [mm]	64 /	All sizes 100 (120) ¹)	
Table C27: Installation Anchor size Edge distance	n parameters	3 3	[-] [mm]	64 /	All sizes 100 (120) ¹ 100 (120) ¹)	
1 1 .	C _{cr} C _{min} ²⁾ S _{cr,II}	1 1 3	[-] [mm] [mm]	64 /	All sizes 100 (120) ¹ 100 (120) ¹ 498)	
Table C27: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing	n parameters C _{or} C _{min} ²⁾ S _{cr,⊥} S _{min}	1 1 S	[-] [mm]	64 /	All sizes 100 (120) ¹ 100 (120) ¹)	
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} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	1 1 S	[-] [mm] [mm] [mm] [mm] [mm]		All sizes 100 (120) ¹ 100 (120) ¹ 498 238)	
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	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	Aleport TR 054	[-] [mm] [mm] [mm] [mm] [mm]	Jing	All sizes 100 (120) ¹ 100 (120) ¹ 498 238)	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 For Value	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	1 1 s l20x130 Report TR 054 or group in case of ten with c ≥ 100	[-] [mm] [mm] [mm] [mm] [mm]	Jing with s ≥ 120	All sizes 100 (120) ¹ 100 (120) ¹ 498 238)	
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	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} H20x85 and SH to Technical F	A A A A A A A A A A A A A A A A A A A	[-] [mm] [mm] [mm] [mm] [mm]	ding with s ≥ 120 498	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120)	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: control of the second se	n parameters	a 1 a 1 a 1 a 1 b 1 a 20×130 a 1 b 20×130 a 1 b 20×130 a 1 b 1 c 100 a 100 b	[-] [mm] [mm] [mm] [mm] [mm]	ding with s ≥ 120 498 120	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120 α _{g,N,II})	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	n parameters C _{or} C _{min} ²⁾ S _{or,⊥} S _{min} H20x85 and SH to Technical F tor for ancho	A A A A A A A A A A A A A A A A A A A	[-] [mm] [mm] [mm] [mm] [mm]	ding with s ≥ 120 498	All sizes 100 (120) ¹ 100 (120) ¹ 498 238 120)	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 joint Image: control of the second	n parameters C _{cr} C _{min} ²⁾ S _{cr,I} S _{or,⊥} S _{min} H20x85 and SH to Technical F tor for ancho	s 20×130 Report TR 054 or group in case of ten with c ≥ 100 c_{cr} 100 c_{cr}	[-] [mm] [mm] [mm] [mm] [mm]	ding 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			with c ≥		with s ≥	:		
II: anchors parallel to ho joint	placed prizontal	V ••		C _{cr}		498		g,V,II	2,0
⊥: anchors perpendicu horizontal	lar to			C _{cr}		238	α	g,V,_	2,0
Table C30:	Group fac	tor for anch	or group	in case of	shear load	ling perpe	ndicular t	o free edge	
	Configuration			with c ≥		with s ≥	:		
parallel to ho	II: anchors placed parallel to horizontal joint			C _{cr}		498	α	g,V,II	2,0
⊥: anchors perpendicu horizontal	lar to			C _{cr}		238	α	[-]	2,0
Table C31:	Characte	ristic values	of resista	ance unde		nd shear racteristic r Use cate	resistance		
	Effective anchorage depth		d/d			w/d w/w		d/d w/d w/w	
Anchor size	Sleeve	doptin	40°C/24°C	80°C/50°C	120°C/72°C			120°C/72°C	For all temperatur range
		h _{ef}		$N_{Rk,b} = N_{Rk,c}$	1) p	1	$N_{Rk,b} = N_{Rk,b}$	1) p	$V_{Rk,b}^{(2)3)}$
		[mm]				[kN]			
					gth f _b ≥ 10				
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
/12 / M16 / IG-M8 /	20x85	85	1,5	1,5	0,9	1,5	1,5	0,9	5,5
IG-M10	20x130	130	2,5	2,5	2,0	2,5	2,5	2,0	5,5
			Compres	sive stren	gth f _b ≥ 12	N/mm ²	1		
M8	12x80	80	0,75	0,6	0,5	0,6	0,6	0,4	3,0
M8 / M10 /	16x85	85	0,75	0,6	0,5	0,75	0,6	0,5	6,5
IG-M6	16x130	130	3,0	3,0	2,0	3,0	3,0	2,0	6,5
M12 / M16 /	20x85	85	1,5	1,5	1,2	1,5	1,5	1,2	6,5
IG-M8 / IG-M10	20x130	130	3,0	3,0	2,0	3,0	3,0	2,0	6,5
¹⁾ Values a ²⁾ Calculati	re valid for c _{cr} on of V _{Rk,c} see es are valid for	Technical Rep						n c ≥ 120 mm	$: \mathbf{V}_{Rk,c,II} = \mathbf{V}_{Rk,t}$
ESSVE In	jection syste	em ONE, ON	E ICE for	masonry					



Brick type:	Calcium si	licate holl	ow brick	KS L-120)F					
Table C32:	Character	istic values	of resista	ince unde	r tension a	nd shear I	loads (cor	ntinue)		
			Characteristic resistance Use category							
Anchor size Sleeve	Effective anchorage depth		d/d			w/d w/w		d/d w/d w/w		
Anchor Size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range	
		h _{ef}	1	$V_{Rk,b} = N_{Rk,c}$	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}	Ν	δ _N / N	δ _{N0}	δ _{N∞}	V	δ_{V0}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0,26		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	-	
Table C34: Description of the bric	k	
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	

[-]	All sizes
[mm]	1,5*h _{ef}
[mm]	60
[mm]	3*h _{ef}
[mm]	120
	[mm] [mm]

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

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

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

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

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

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



M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 M8 M12 / M16 / IG-M8 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10	Sleeve - - - 12x80 16x85 16x130 20x85 20x130 20x200 -	Effective anchorage depth [mm] Compressive s 80 90 100 100 100 100 100 100 100 100 100	$\begin{array}{c c} 3,5 \ (1,5) \\ \hline 3,5 \ (1,5) \\ \hline 4,0 \ (2,0) \\ \hline 4,0 \ (2,0) \\ \hline 3,5 \ (1,5) \$	Use d/d w/d w/w $80^{\circ}C/50^{\circ}C$ $N_{Rk,b} = N_{Rk,p}^{1}$ N/mm^2 3,5 (1,5) 3,5 (1,5)	ristic resistance category 120°C/72°C [kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	$\begin{array}{c} d/d \\ w/d \\ w/w \\ For all \\ temperature \\ range \\ V_{Rk,b}^{2)3)} \\ \hline \\ \hline \\ 3,5 (1,2) \\ 3,5 (1,$
M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M10	- - - 12x80 16x85 16x130 20x85 20x130 20x200	anchorage depth hef [mm] Compressive s 80 90 100 100 100 80 85 130 85 130 85 130 85 130 85	trength $f_b \ge 10$ 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	$\frac{d/d}{w/d} \\ w/w \\ 80^{\circ}C/50^{\circ}C \\ \hline N_{Rk,b} = N_{Rk,p}^{1/2} \\ \hline N/mm^{2} \\ \hline 3,5 (1,5) \\ \hline 3,5 (1,5) \\ \hline 4,0 (2,0) \\ \hline 4,0 (2,0) \\ \hline 4,0 (2,0) \\ \hline 3,5 (1,5) \\ \hline 3$	120°C/72°C [kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	$\begin{tabular}{ c c c c c } & w/d & w/w & \\ & For all & \\ temperature & \\ & range & \\ & V_{Rk,b}^{2(3)} & \\ \hline & & \\ & & \\ \hline & & \\$
M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M10	- - - 12x80 16x85 16x130 20x85 20x130 20x200	anchorage depth hef [mm] Compressive s 80 90 100 100 100 80 85 130 85 130 85 130 85 130 85	trength $f_b \ge 10$ 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	$w/d \\ w/w$ $80^{\circ}C/50^{\circ}C$ $N_{Bk,b} = N_{Bk,p}^{1}$ N/mm^{2} $3,5 (1,5)$ $3,5 (1,5)$ $4,0 (2,0)$ $4,0 (2,0)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$	[kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	$\begin{tabular}{ c c c c c } & w/d & w/w & \\ & For all & \\ temperature & \\ & range & \\ & V_{Rk,b}^{2(3)} & \\ \hline & & \\ & & \\ \hline & & \\$
M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M10	- - - 12x80 16x85 16x130 20x85 20x130 20x200	depth h _{ef} [mm] Compressive s 80 90 100 100 100 80 85 130 85 130 85 130 200 Compressive s	trength $f_b \ge 10$ 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	$\begin{tabular}{ c c c c } \hline w/w \\ \hline 80^\circ C/50^\circ C \\ \hline N_{Rk,b} = N_{Rk,p}^{-1} \\ \hline N/mm^2 \\ \hline 3.5 (1.5) \\ \hline 3.5$	[kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	$\begin{array}{r} \mbox{w/w} \\ For all \\ temperature \\ range \\ \mbox{$V_{\rm Rk,b}$}^{2/3)} \\ \hline \\ \mbox{$3,5$ (1,2)$} \\ \mb$
M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 IG-M6 M12 / IG-M8 M8 / M10 / IG-M6 M12 / IG-M6 M12 / IG-M6 M12 / M16 / IG-M8 / IG-M10	- - - 12x80 16x85 16x130 20x85 20x130 20x200	h _{ef} [mm] Compressive s 80 90 100 100 100 80 85 130 85 130 85 130 200 Compressive s	trength $f_b \ge 10$ 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	$80^{\circ}C/50^{\circ}C$ $N_{Rk,b} = N_{Rk,p}^{1}$ $3,5 (1,5)$ $3,5 (1,5)$ $4,0 (2,0)$ $4,0 (2,0)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$	[kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	For all temperature range $V_{Rk,b}^{(2)3)}$ 3,5 (1,2) 3,5 (1,2)
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 X	- - 12x80 16x85 16x130 20x85 20x130 20x200	[mm] Compressive s 80 90 100 100 80 85 130 85 130 200 Compressive s	trength $f_b \ge 10$ 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	$N_{Rk,b} = N_{Rk,p}^{1}$ N/mm^{2} $3,5 (1,5)$ $3,5 (1,5)$ $4,0 (2,0)$ $4,0 (2,0)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$ $3,5 (1,5)$	[kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	$\begin{array}{r} \text{temperature} \\ range \\ V_{\text{Rk,b}}^{2)3)} \\ \hline \\ $
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 X	- - 12x80 16x85 16x130 20x85 20x130 20x200	[mm] Compressive s 80 90 100 100 80 85 130 85 130 200 Compressive s	$\begin{array}{c c} 3,5 \ (1,5) \\ \hline 3,5 \ (1,5) \\ \hline 4,0 \ (2,0) \\ \hline 4,0 \ (2,0) \\ \hline 3,5 \ (1,5) \$	N/mm ² 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	[kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	V _{Rk,b} ²⁾³⁾ 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 5,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 M8	- - 12x80 16x85 16x130 20x85 20x130 20x200	Compressive s 80 90 100 100 80 85 130 85 130 200 Compressive s	$\begin{array}{c c} 3,5 \ (1,5) \\ \hline 3,5 \ (1,5) \\ \hline 4,0 \ (2,0) \\ \hline 4,0 \ (2,0) \\ \hline 3,5 \ (1,5) \$	N/mm ² 3,5 (1,5) 3,5 (1,5) 4,0 (2,0) 4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	[kN] 2,5 (1,2) 3,0 (1,5) 3,5 (1,5) 3,5 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	$\begin{array}{r} 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 5,5 \ (1,5) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \\ 3,5 \ (1,2) \end{array}$
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M8 / IG-M10 X	- - 12x80 16x85 16x130 20x85 20x130 20x200	80 90 100 80 85 130 85 130 200 Compressive s	$\begin{array}{c c} 3,5 \ (1,5) \\ \hline 3,5 \ (1,5) \\ \hline 4,0 \ (2,0) \\ \hline 4,0 \ (2,0) \\ \hline 3,5 \ (1,5) \$	$\begin{array}{c} 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 4,0 \ (2,0) \\ 4,0 \ (2,0) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \end{array}$	$\begin{array}{c} 3,0 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,0 \ (1,2) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \end{array}$	3,5 (1,2) 3,5 (1,2) 5,5 (1,5) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M6 M12 / M16 / IG-M8 / IG-M10 2 2 2 2 2 2 2 2 2 2 2 2 2	- - 12x80 16x85 16x130 20x85 20x130 20x200	80 90 100 80 85 130 85 130 200 Compressive s	$\begin{array}{c c} 3,5 \ (1,5) \\ \hline 3,5 \ (1,5) \\ \hline 4,0 \ (2,0) \\ \hline 4,0 \ (2,0) \\ \hline 3,5 \ (1,5) \$	$\begin{array}{c} 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 4,0 \ (2,0) \\ 4,0 \ (2,0) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \end{array}$	$\begin{array}{c} 3,0 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,0 \ (1,2) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \\ 3,0 \ (1,5) \end{array}$	3,5 (1,2) 3,5 (1,2) 5,5 (1,5) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 M8 M12 / M16 / IG-M8 / IG-M10 M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 IG-M6 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M10	- 12x80 16x85 16x130 20x85 20x130 20x200	100 100 80 85 130 85 130 200 Compressive s	$\begin{array}{c} 4,0\ (2,0)\\ 4,0\ (2,0)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ \end{array}$	$\begin{array}{r} 4,0\ (2,0)\\ 4,0\ (2,0)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\\ 3,5\ (1,5)\end{array}$	3,5 (1,5) 3,5 (1,5) 3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	3,5 (1,2) 5,5 (1,5) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 X M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M10 M8 M8 / M10 / IG-M8 / IG-M8 / IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG-M10 X IG-M10 X IG-M10 X IG-M10 X IG-M10 X IG IG-M10 X IG IG-M10 X IG-M10 X IG IG-M10 X IG-M10 X IG-M10 X IG-M10 X IG IG-M10 X IG IG-M10 X IG IG-M10 X IG-M10 X IG IG-M10 X IG-M10 X IG IG-M10 X IG IG-M10 X IG-M10 X IG-M10 X IG-M10 X IG-M10 X IG IG IG IG IG IG IG IG IG IG IG IG IG	- 12x80 16x85 16x130 20x85 20x130 20x200	100 80 85 130 85 130 200 Compressive s	$\begin{array}{c c} 4,0 & (2,0) \\\hline 3,5 & (1,5) \\\hline trength f_b \geq 20 \end{array}$	4,0 (2,0) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	3,5 (1,5) 3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	3,5 (1,2) 5,5 (1,5) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 X M8 M10 / IG-M6 M12 / IG-M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M12 / IG-M8 M16 / IG-M10 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M10	16x85 16x130 20x85 20x130 20x200	80 85 130 85 130 200 Compressive s	$\begin{array}{c c} 4,0 & (2,0) \\\hline 3,5 & (1,5) \\\hline trength f_b \geq 20 \end{array}$	3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	3,0 (1,2) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	5,5 (1,5) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M8 / M10 / IG-M6 IG-M6 IG-M6 M12 / M16 / IG-M8 / IG-M10 IG M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M16 / IG-M10 M8 M16 / IG-M10 IG-M6 IG-M10 IG-M6 IG-M6 M12 / M16 / IG-M8 / IG-M8 / IG-M10	16x85 16x130 20x85 20x130 20x200	85 130 85 130 200 Compressive s	$\begin{array}{c} 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ \end{array}$	3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	3,0 (1,5) 3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
IG-M6 1 M12 / M16 / 1 IG-M8 / 2 IG-M10 2 M8 1 M10 / IG-M6 1 M12 / IG-M8 1 M16 / IG-M10 1 M8 1 M16 / IG-M10 1 IG-M6 1 IG-M6 1 IG-M6 1 IG-M6 1 IG-M8 / 2 IG-M10 2	16x130 20x85 20x130 20x200	130 85 130 200 Compressive s	$\begin{array}{c c} 3,5 \ (1,5) \\ \hline 3,5 \ (1,5) \\ trength \ f_b \geq 20 \end{array}$	3,5 (1,5) 3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	3,0 (1,5) 3,0 (1,5) 3,0 (1,5)	3,5 (1,2) 3,5 (1,2) 3,5 (1,2)
M12 / M16 / IG-M8 / IG-M10 2 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 2 M12 / M16 / IG-M8 / IG-M10 2	20x85 20x130 20x200	85 130 200 Compressive s	$\begin{array}{c} 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ 3,5 \ (1,5) \\ \end{array}$	3,5 (1,5) 3,5 (1,5) 3,5 (1,5)	3,0 (1,5) 3,0 (1,5)	3,5 (1,2) 3,5 (1,2)
IG-M8 / 2 IG-M10 2 M8 4 M10 / IG-M6 4 M12 / IG-M8 4 M16 / IG-M10 4 M8 / M10 / 4 IG-M6 4 M12 / M16 / 4 IG-M8 / 2 IG-M8 / 2 IG-M10 2	20x130 20x200	130 200 Compressive s	3,5 (1,5) 3,5 (1,5) trength f _b ≥ 20	3,5 (1,5) 3,5 (1,5)	3,0 (1,5)	3,5 (1,2)
IG-M10 2 M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 2 M12 / M16 / IG-M8 / 2 IG-M10 2 M8	20x200	200 Compressive s	3,5 (1,5) trength f _b ≥ 20	3,5 (1,5)		
M8 M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M6 M12 / M16 / IG-M8 / IG-M10		Compressive s	trength f _b ≥ 20		3,0 (1,5)	
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10	-			N/mm ²		
M10 / IG-M6 M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10	-					
M12 / IG-M8 M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 2		00	4,5 (2,5)	4,5 (2,5)	4,0 (2,0)	5,0 (1,5)
M16 / IG-M10 M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10 2	-	90	5,5 (2,5)	5,5 (2,5)	4,5 (2,0)	5,0 (1,5)
M8 M8 / M10 / IG-M6 M12 / M16 / IG-M8 / IG-M10	-	100	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,0 (1,5)
M8 / M10 / IG-M6 / M12 / M16 / IG-M8 / 2 IG-M10 2	-	100	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	8,0 (2,5)
IG-M6 M12 / M16 / IG-M8 / IG-M10	12x80	80	4,5 (2,5)	4,5 (2,5)	4,0 (2,0)	5,0 (1,5)
M12 / M16 / IG-M8 / IG-M10	16x85	85	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)
IG-M8 / 2 IG-M10	16x130	130	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)
IG-M10	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)
	20x200	200	5,0 (2,5)	5,0 (2,5)	4,0 (2,0)	5,0 (1,5)
140		Compressive s	trength f _b ≥ 28	N/mm ²		
M8	-	80	5,5 (2,5)	5,5 (2,5)	4,5 (2,5)	5,5 (2,0)
M10 / IG-M6	-	90	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
M12 / IG-M8	-	100	7,0 (3,5)	7,0 (3,5)	6,0 (3,0)	5,5 (2,0)
M16 / IG-M10	-	100	7,0 (3,5)	7,0 (3,5)	6,0 (3,0)	9,0 (3,0)
M8	12x80	80	5,5 (2,5)	5,5 (2,5)	4,5 (2,5)	5,5 (2,0)
M8 / M10 /	16x85	85	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
IG-M6	16x130	130	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
M12 / M16 /	20x85	85	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)
IG-M8 / IG-M10		130	6,0 (3,0)	6,0 (3,0)	5,0 (2,5)	5,5 (2,0)

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

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

³⁾ The values are valid for steel 5.6 or greater. For steel 4.6 and 4.8 multiply $V_{Rk,b}$ by 0.8

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 bi	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	δ_{V0}	δγ∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	-	80	1,3		0,19	0,39			
M10 / IG-M6	-	90	1,6		0,24	0,47	1,9		
M12 / IG-M8	-	100	17		0.00	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			0.10	0.00	1.0		
M12 / M16 /	20x85	85	1,3		0,19	0,39	1,9		
IG-M8 /	20x130	130	1						
IG-M10	20x200	200	1						

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Performances clay solid brick Mz-DF Displacements



Brick type		Clay hollow brick					
	ρ [kg/dm³]	HLz-16-DF 0,8			A STOR	and the second sec	
	$\geq [N/mm^2]$	6, 8, 12, 14					
Code		EN 771-1				-	
Producer (country code)		e.g. Unipor DE)					
Brick dimensions	[mm]	497 x 240 x 238					
Drilling method		Rotary					
U Y C					+13 #-6		
	14 + + + 14,5		~~~~~	6-14			
				6-14			
Anchor size	parameter		[-]	6-14	All sizes)	
Anchor size Edge distance	parameters		[mm]	6-14	100 (120) ¹		
Anchor size Edge distance Minimum edge distance	parameters			6-14			
Anchor size Edge distance Minimum edge distance Spacing	c _{cr}		[mm] [mm] [mm] [mm]	6-1	100 (120) ¹ 100 (120) ¹ 497 238		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	Ccr Cmin ² Scr,II Scr, I Smin Scr, SH20>	s (130 and SH20x200	[mm] [mm] [mm]	6-1	100 (120) ¹ 100 (120) ¹ 497		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according t	Ccr Cmin ² Scr,II Scr,⊥ Smin 20x85; SH20> o Technical F	s (130 and SH20x200	[mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 497 238		1,3 2,0 1,1 2,0



Con	figuration	with c a	2	with s ≥			
II: anchors place parallel to horizor joint	ed 5	C _{cr}		497	α _{g,V,II}	[]	2,0
⊥: anchors place perpendicular to horizontal joint	o 🛛 🕹 💙 🏅	C _{cr}		238	$\alpha_{g,V,\perp}$	[-]	2,0
Table C45: G	roup factor for anc	hor group in case	e of shear load	ding perpendi	cular to free e	dge	
Con	figuration	with c a	2	with s ≥			
II: anchors placed parallel to horizontal joint		C _{cr}		497	α _{g,V,II}	r 1	2,0
⊥: anchors place perpendicular to horizontal joint	o V →	C _{cr}		238	$\alpha_{g,V,\perp}$	[-]	2,0
Table C46: C	characteristic value	s of resistance u	nder tension a	Characte	ds ristic resistance e category		
				036	Juligory		d/d
Anchor size		Effective		w/d			w/d
		anchorage depth		w/w			w/w
	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	For all temperatu range	
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$)	\ \	2)3) Rk,b
		[mm]		[kN]			
		Compressive s	trength $f_b \ge 6$	N/mm ²			
M8	12x80	80	2,5	2,5	2,0		2,5
M8 / M10/	16x85	85	2,5	2,5	2,0		4,5
IG-M6	16x130	130	3,5	3,5	3,0		4,5
M12/M16/	20x85	85	2,5	2,5	2,0		5,0
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 s					
M8	12x80	80	3,0	3,0	2,5		3,0
M8 / M10/	16x85	85	3,0	3,0	2,5		5,5
IG-M6	16x130	130	4,5	4,5	3,5		5,5
M12/M16/	20x85	85	3,0	3,0	2,5		6,0
G-M8 / IG-M10	20x130	130	4,5	4,5	3,5		7,0
¹⁾ Values ar	$\frac{20 \times 200}{\text{e valid for } c_{cr} \text{ and } c_{min}}$ in of V _{Rk,c} see Technica	nande Medi x oneringen ande Produktion anderskander	na na na mana n	overse indet 🗶 on administration fam van etwarde inneres – Selderson		 125 mm	7,0 : V _{Rk,c,II} =
V _{Rk,b} 3) The welve	s are valid for steel 5.6	or greater. For stee	14.6 and 4.8 mu	IUPIY VRk,b by 0,3	8		
³⁾ The value	ion system ONE, O	NE ICE for masor	ırv				



			nder tension a			
				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	Goptii				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
	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 / HG-M8 / IG-M10 H	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	δ_{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	1.96	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	2 15
IG-M10	20x200	200	1,57		0,16	0,31	2,57	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



Driek ture e		Clay hollow hollow brick				
Brick type		Porotherm Homebric				
Bulk density	ρ [kg/dm³]	0,7			HEHE	
	≥ [N/mm²]	4, 6 or 10			물급	
Code		EN 771-1			₿₩	
Producer (country code)		e.g. Wienerberger (FR)				
Brick dimensions	[mm]	500 x 200 x 299				
Drilling method		Rotary				
6		in the second				
0		494		10,5	-	
4,5 200 10,5						
Table C50: Installation Anchor size Edge distance	parameters	; ; [-] [mm] [mm]		All sizes 100 (120) ¹ 100 (120) ¹		
Table C50: Installation Anchor size Edge distance Minimum edge distance Minimum edge distance	C _{cr}	[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500		
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Edge distance	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥}	[-] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500 299		
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : cmin according to the second	$\begin{array}{c} C_{cr} \\ C_{min}^{(2)} \\ \hline S_{cr, } \\ \hline S_{cr, \perp} \\ \hline S_{min} \\ \hline 20x85 \text{ and SH} \\ to Technical F \end{array}$	[-] [mm] [mm] [mm] [mm] [20x130 Report TR 054 er group in case of tension le		100 (120) ¹ 100 (120) ¹ 500		
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according for Configuration Configuration Configuration	$\begin{array}{c} C_{cr} \\ C_{min}^{(2)} \\ \hline S_{cr, } \\ \hline S_{cr, \perp} \\ \hline S_{min} \\ \hline 20x85 \text{ and SH} \\ to Technical F \end{array}$	[-] [mm] [mm] [mm] [mm] [20x130 Report TR 054 or group in case of tension lo with c ≥	with s ≥	100 (120) ¹ 100 (120) ¹ 500 299		2.0
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according for Configuration II: anchors placed parallel to horizontal Image: Configuration	C _{cr} C _{min²⁾} S _{cr,⊥} S _{min} 20x85 and SH to Technical F	[-] [mm] [mm] [mm] [mm] 220×130 Report TR 054 or group in case of tension lo with c ≥ 200	with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 299		2,0
Table C50: Installation Anchor size Edge distance Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according for Configuration Table C51: Group factor Configuration II: anchors placed	C _{cr} C _{min²⁾} S _{cr,⊥} S _{min} 20x85 and SH to Technical F	[-] [mm] [mm] [mm] [mm] [20x130 Report TR 054 or group in case of tension lo with c ≥	with s ≥	100 (120) ¹ 100 (120) ¹ 500 299 100		2,0
Fable C50: Installation Inchor size Installation Inimum edge distance Inimum edge distance Spacing Inimum spacing Inimum spacing Inimum spacing Value in brackets for SH2 For V _{Rk,c} : cmin according for the state of the st	C _{cr} C _{min²⁾} S _{cr,⊥} S _{min} 20x85 and SH to Technical F	[-] [mm] [mm] [mm] [mm] [20x130 Report TR 054 or group in case of tension lo with c ≥ 200 C _{or}	with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 299 100		2,0



Configurat	ion	with	C≥	with s	2			
II: anchors placed parallel to horizontal joint		C	or	500	α	I,V,II	[_]	2,0
⊥: anchors placed perpendicular to horizontal joint		C	or.	299	α	I,V,⊥	[-]	2,0
able C53: Group	factor for and	chor group in ca	ise of shear l	oading perp	endicular to	o free	edge	
Configurat	ion	with	C≥	with s	2			
II: anchors placed parallel to horizontal joint	V	Co	or	500	α	I, V,II	C 1	2,0
⊥: anchors placed perpendicular to horizontal joint		C	or	299	α	I,V,⊥	[-]	2,0
able C54: Charac	cteristic value	es of resistance	under tensio		r loads cteristic resi	etano	0	
					Use categor		5	
		Effective		d/d	ose categor	/	d/c	4
		anchorage		w/d			w/c	
Anchor size	Sleeve	depth		w/w			w/v	
			40°C/24°C	80°C/50°C	120°C/72°C	F	or all tem	
	-	b)		ranç V _{Rk,b}	2)3)
	-	h _{ef} [mm]		$N_{Rk,b} = N_{Rk,p}$	[kN]		V Rk,b	
		Compressive	strength f	\geq 4 N/mm ²	[KK]			
M8	12x80	80	0,9	0,9	0,75		2,0)
	16x85	85	0,9	0,9	0,75		2,0	2
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	5
IG-M8 / IG-M10	20x130	130	1,2	1,2	0,9		2,5	5
		Compressive	e strength f _b	≥ 6 N/mm ²		_		
M8	12x80	80	0,9	0,9	0,9	_	2,5	
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,9		2,5	
	16x130	130	1,2	1,2	1,2		2,5	
M12 / M16 / IG-M8 / IG-M10	20x85	85	0,9	0,9	0,9	-	3,0	
 Values are valid Calculation of V_F V_{Rk,b} 	_{Rk,c} see Technic	130 al Report TR 054, 6 or greater. For st				vith c	<u>3,0</u> ≥ 200 mm	
		ONE ICE for mas	onry					



							ristic resist e category	ance	
Anchor	ine	Cleave	Effective anchorag depth		١	d/d w/d w/w		d/c w/c w/v	k
Anchor s	ize	Sleeve	depth	40°C/2			0°C/72°C	For all tem	perature
			h _{ef}		N _{Rk,b}	$= N_{Rk,p}^{1)}$		V _{Rk,b}	
			[mm]				[kN]		
			-	sive strengt					
M8		12x80	80	1,2		,2	1,2	3,0	
M8 / M10/ I	G-M6 –	16x85	85	1,2		1,2	1,2	3,0	
		16x130	130	1,5		1,5	1,5	3,5	
M12 / M1 IG-M8 / IG		20x85 20x130	<u>85</u> 130	1,2		l,2 l,5	1,2 1,5	4,0 4,0	
²⁾ Calcula V _{Rk,b}	ation of $V_{Rk,c}$			054, except for for steel 4.6 an		-	-	:h c ≥ 200 mm:	: V _{Rk,c,II} =
²⁾ Calcula V _{Rk,b} ³⁾ The va	ation of $V_{Rk,c}$	see Technic d for steel 5.0	6 or greater. F ctive orage N	-		-	-	th c ≥ 200 mm: δ _{V0}	$V_{Rk,c,II} = \delta_{V^{\infty}}$
²⁾ Calcula V _{Rk,b} ³⁾ The va	ation of V _{Rk,c} lues are vali Displace	see Technic d for steel 5.0 ments Effec ancho	6 or greater. F stive prage N n h _{ef}	for steel 4.6 an δ _N / N	d 4.8 multip	bly V _{Rk,b} by (0,8		δ _{V∞}
²⁾ Calcula V _{Rk,b} ³⁾ The va	ation of V _{Rk,c} lues are vali Displace	see Technic d for steel 5.0 ments Effec ancho depth	6 or greater. F brage N n h _{ef} [kN]	or steel 4.6 an δ _N / N [mm/kN]	d 4.8 multip δ _{N0} [mm]	bly V _{Rk,b} by (δ _{N∞} [mm]	0,8 V	δ _{V0}	
²⁾ Calcula V _{Rk,b} ³⁾ The va Table C56: Anchor size	ation of V _{Rk,c} lues are vali Displace Sleeve	see Technic d for steel 5.4 ments Effec ancho depth [mr	6 or greater. F brage N n h _{ef} [kN]	or steel 4.6 an δ _N / N [mm/kN]	ld 4.8 multip δ _{N0}	oly V _{Rk,b} by (δ _{N∞}	0,8 V [kN]	δ _{V0}	δ _{V∞}
²⁾ Calcula ³⁾ The va Table C56: Anchor size	ation of V _{Rk,c} lues are vali Displace Sleeve 12x80	see Technic d for steel 5.0 ments Effec ancho depth [mr 80	6 or greater. F brage N n h _{ef} N m] [kN] 0 0,34	or steel 4.6 an δ _N / N [mm/kN]	d 4.8 multip δ _{N0} [mm]	bly V _{Rk,b} by (δ _{N∞} [mm]	0,8 V [kN] 0,9	δ _{vo} [mm]	δ _{√∞} [mm]
²⁾ Calcula ³⁾ The va Table C56: Anchor size M8 M8 / M10/	ation of V _{Rk,c} lues are vali Displace Sleeve 12x80 16x85	see Technic d for steel 5.6 ments Effec ancho depth [mr 80 85	6 or greater. F etive orage N m] [kN] 0 0,34 0 0,43	or steel 4.6 an δ _N / N [mm/kN] 0,80	d 4.8 multip δ _{N0} [mm] 0,27	δ _{N∞} [mm] 0,55	0,8 V [kN] 0,9 0,9	δ _{V0}	δ _{∨∞}

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					
	a [kg/dm ³]	BGV Thermo					
Bulk density	ρ [kg/dm³] ₀ ≥ [N/mm²]	0,6					
	₀ < [IN/mm]	4, 6 or 10 EN 771-1					
Code							
Producer (country code) Brick dimensions	[mm]	e.g. Leroux (FR) 500 x 200 x 314					
Drilling method	[IIIII]	Rotary					
		5					
200						5	
Table C58: Installation		 		5			
Anchor size		3 3		5	All sizes		
Anchor size Edge distance	C _{cr}	<u> </u>	[mm]	5	100 (120) ¹		
Anchor size Edge distance	C _{cr} ²⁾	s	[mm] [mm]	5	100 (120) ¹ 100 (120) ¹		
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾ S _{cr,II}	3	[mm] [mm] [mm]	5	100 (120) ¹ 100 (120) ¹ 500		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} ²⁾	3	[mm] [mm]	5	100 (120) ¹ 100 (120) 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 Table C59: Group fact	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	120x130 Report TR 054 or group in case of t	[mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according Table C59: Group fact Configuration	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	l20x130 Report TR 054 or group in case of t with c ≥	[mm] [mm] [mm] [mm]	ading with s ≥	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 Table C59: Group fact Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	120x130 Report TR 054 or group in case of t with c ≥ 200	[mm] [mm] [mm] [mm]	ading with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH ²⁾ For V _{Rk,c} : c _{min} according Table C59: Group fact Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of t with c ≥ 200 c _{cr}	[mm] [mm] [mm] [mm]	ading with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100		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 Table C59: Group fact Configuration II: anchors placed parallel to horizontal joint \bot : anchors placed	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	120x130 Report TR 054 or group in case of t with c ≥ 200	[mm] [mm] [mm] [mm]	ading with s ≥ 100	100 (120) ¹ 100 (120) ¹ 500 314 100		
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 C59: Group fact	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	120x130 Report TR 054 or group in case of t	[mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 500 314		
Anchor size	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of t with c ≥ 200 c _{cr}	[mm] [mm] [mm] [mm]	ading with s ≥ 100 500 100	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 C59: Group fact Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min} ²⁾ S _{cr,I} S _{cr,⊥} S _{min} I20x85 and SH to Technical F	H20x130 Report TR 054 or group in case of t with c ≥ 200 c_{cr}	[mm] [mm] [mm] [mm]	ading with s ≥ 100 500	100 (120) ¹ 100 (120) ¹ 500 314 100		2,0



Configura	tion	with c ≥	with s ≥			
II: anchors placed barallel to horizontal joint		C _{cr}	500	α _{g,V,II}	[]	2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr} 314		$lpha_{g,V,\perp}$	[-]	2,0
able C61: Group	factor for anchor	group in case of shear	r loading perpendic	ular to free	edge	
Configura	tion	with c ≥	with s ≥			
II: anchors placed parallel to horizontal joint		C _{cr}	500	α _{g,V,II}		2,0
⊥: anchors placed perpendicular to horizontal joint		C _{cr}	314	$lpha_{g,V,\perp}$	- [-]	2,0



Brick type:	-	w brick BGV							
Table C62:	Character	istic values of	resistar	nce under t	ension and	shear load	ls		
					Cha	aracteristic	resistanc	e	
						Use cate	gory		
		Effectiv	-		d/d			d/d	
		anchorag	ge	w/d				w/d	
Anchor size	Sleeve	depth			w/w			w/w	
			4	0°C/24°C	80°C/50°C		;/72°C	For all temp range	е
		h _{ef}			$N_{Rk,b} = N_{Rk}$			V _{Rk,b} ²)3)
		[mm]		•		[kN]			
			ompress		th f _b ≥ 4 N/m				
M8	12x80	80		0,6	0,6	0,		2,0	
M8 / M10/	16x85	85		0,6	0,6	0,		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	
		C	ompress	sive streng	th f _b ≥6 N/m	<u>າ</u> ຫ2			
M8	12x80	80		0,9	0,9	0,	75	2,5	
M8 / M10/	16x85	85		0,9	0,9	0,	75	2,5	
IG-M6	16x130	130		1,5	1,5	1,	,2	3,0	
M12 / M16 / IG-M8 /	20x85	85		0,9	0,9	0,	75	3,0	
IG-M10	20x130	130		1,5	1,5	1,	,2	3,0	
	1	C	ompress	ive strenat	h f _b ≥ 10 N/r	nm ²			
M8	12x80	80		0,9	0,9	0,	.9	3,5	
M8 / M10/	16x85	85		0,9	0,9	0.		3,5	
IG-M6	16x130	130		2,0	2,0	1,		4,0	
M12 / M16 / IG-M8 /	20x85	85		0,9	0,9	0,		4,0	
IG-M10	20x130	130		2,0	2,0	1,	,5	4,0	
²⁾ Calcula V _{Rk,b}		c _{er} and c _{min} see Technical Re for steel 5.6 or g						h c ≥ 250 mm:	V _{Rk,c,II} =
Table C63:	Displacem	nents							
		Effective							
Anchor size	Sleeve	anchorage depth h _{ef}	Ν	δ _N / N	δ_{N0}	δ _{N∞}	V	δ_{V0}	δ _{V∞}
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0.00			0.14	0 -		
M8 / M10/	16x85	85	0,26		0,21	0,41	0,7		
IG-M6	16x130	130	0,43	0.00	0,34	0,69		1 00	1 50
M12 / M16 /	20x85	85	0,40	0,80	0,21	0,00	0.00	1,00	1,50
IG-M8 /	20x85 20x130	130	0,28	-	0,21	0,69	0,86		
IG-M10					,	,			

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



	n of the brid						
		Clay hollow brick					
Brick type		Calibric R+			- Siles		
Bulk density	ρ [kg/dm³]	0,6			THE REAL	100	
	≥ [N/mm²]	6, 9 or 12			~		7
Code		EN 771-1			and the second s	~	9
Producer (country code)		e.g. Terreal (FR)					
Brick dimensions	[mm]	500 x 200 x 314					
Drilling method		Rotary					
×			500	6			
200							
Table C65: Installation Anchor size		\$	[-]		All sizes		
Edge distance	C _{cr} C _{min} ²⁾		[mm]		100 (120) ¹⁾ 100 (120) ¹⁾		
Minimum edge distance	S _{cr,II}		[mm] [mm]		500		
	Scr,II				314		
Spacing	Ser		[mm]				
Minimum spacing	S _{cr,⊥} S _{min}		[mm] [mm]		100		
Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Bk,c} : c _{min} according to	s _{min} 20x85 and SH o Technical F		[mm]	ading with s ≥			
Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C66: Group facto Configuration II: anchors placed	s _{min} 20x85 and SH o Technical F	Report TR 054 or group in case of	[mm]	0.750			1,7
Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C66: Group facto Configuration II: anchors placed parallel to horizontal	s _{min} 20x85 and SH o Technical F	Report TR 054 or group in case of with c ≥ 175	[mm]	with s ≥ 100			
Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C66: Group facto Configuration II: anchors placed parallel to horizontal joint	s _{min} 20x85 and SH o Technical F	Report TR 054 or group in case of with c ≥ 175 c _{cr}	[mm]	with s ≥ 100 500	100	[-]	2,0
Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C66: Group facto Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	s _{min} 20x85 and SH o Technical F	Report TR 054 or group in case of with c ≥ 175 C _{cr} 175	[mm]	with s ≥ 100 500 100	100	[-]	2,0 1,0
 ²⁾ For V_{Rk,c}: c_{min} according to Table C66: Group facto Configuration II: anchors placed parallel to horizontal joint 1: anchors placed 	S _{min} 20x85 and SH o Technical F or for ancho	Report TR 054 or group in case of with c ≥ 175 C _{cr} 175 C _{cr}	[mm]	with s ≥ 100 500	100	[-]	



(Configuration	w	ith c ≥	with s ≥			
II: anchors pl parallel to hor joint	aced		C _{cr}	500	α _{g,V,II}		2,0
⊥: anchors p perpendicul horizontal j	ar to 🔰 🔤 V		c _{cr} 314		$\alpha_{g,V,\perp}$	[-]	2,0
Table C68:	Group factor f	or anchor group in	case of shear	loading perpend	licular to free e	edge	
(Configuration	w	ith c ≥	with s ≥			
II: anchors pl parallel to hori joint			C _{cr}	500	α _g ,v,ii	[]	2,0
⊥: anchors p perpendicula horizontal j	ar to 🔰 🔤 🗸 🗕		C _{cr}	314	[-]		2,0
Table C69:	Characteristic	values of resistan	ce under tensi	Characteri	stic resistance		
		Effective		Use category d/d w/d			d/d w/d
Anchor size	Sleeve	anchorage depth		w/w			w/w
AIGHUI SIZE	Sieeve	dopin	40°C/24°C	80°C/50°C	120°C/72°C	te	For all mperatur range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{(1)}$,	$V_{Rk,b}^{(2)3)}$
		[mm]			[kN]		
			sive strength f _t				
M8	12x80	80	0,9	0,9	0,75		3,0
M8 / M10/	16x85	85	0,9	0,9	0,75		4,0
IG-M6	16x130	130	1,2	1,2	0,9		4,0
M12 / M16 / IG-M8 /	20x85	85	0,9	0,9	0,75		6,0
IG-M10	20x130	130	1,2	1,2	0,9		6,0
		Compress	sive strength f	, ≥ 9 N/mm²			
M8	12x80	80	1,2	1,2	0,9		3,5
M8 / M10/	16x85	85	1,2	1,2	0,9		5,0
IG-M6	16x130	130	1,5	1,5	1,2		5,0
M12 / M16 /	20x85	85	1,2	1,2	0,9		7,5
IG-M8 / IG-M10	20x130	130	1,5	1,5	1,2		7,5
²⁾ Calcul V _{Rk,b}		nd c _{min} Technical Report TR 05 Steel 5.6 or greater. For			-	250 mm	: V _{Rk,c,II} =
	ection system C	ONE, ONE ICE for m	asonry				
ESSVE Inj							



				Characteri	stic resistance	
				Use	category	
		Effective		d/d		d/d
		anchorage		w/d		w/d
Anchor size	Sleeve	depth		w/w		w/w
			40°C/24°C	80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		V _{Rk,b} ²⁾³⁾		
		[mm]		$N_{Rk,b} = N_{Rk,p}^{1)}$	[kN]	
		Compress	sive 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}		Technical Report TR 0		·	-	50 mm: V _{Rk,c,II} =

Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ_{N} / N	δ_{N0}	δ _{N∞}	V	δ_{V0}	δ∨∞
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
M8	12x80	80	0.24		0.07	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	



Bulk density ρ [kg/dm ³] 0.7 Compressive strength $f_b \ge [N/mm^2]$ 6, 9 or 12 Code EN 771-1 Producer (country code) e.g. Imerys (FR) Brick dimensions [mm] 560 x 200 x 274 Drilling method Rotary Table C73: Installation parameters Anchor size Edge distance Corr Corr [mm] 100 (120) ¹⁰ Minimum edge distance Corr [mm] 100 (120) ¹⁰ Spacing Ser.1 [mm] 274	Brick type		Clay hollow brick					
Compressive strength $f_b \ge [N/mm^n]$ $f_b \ge N771.1$ Producer (country code) e_a , Imerys (FR) Brick dimensions [mm] $560 \times 200 \times 274$ Drilling method Rotary Table C73: Installation parameters Anchor size [1] All sizes Edge distance Corr ² mm Minimum edge distance Corr ² [mm] Minimum spacing Social [mm] 10 View for States Social 10 View for States Social 10 View for States Social 20 63 Social 20 100 100 20 Social [mm]		FL /					EFE	-
Code EN 771-1 Producer (country code) e.g. Imerys (FR) Brick dimensions [mm] 560 x 200 x 274 Drilling method Rotary 560 560 20 6 , 5 20 6 , 3 20 6 , 5 20 6 , 3 20 6 , 3 20 1 , 1 , 1 20 1 , 1 , 1 20 1 , 1 , 1 <						TEE		
Producer (country code) e.g. Imerys (FR) Brick dimensions [mm] 560 x 200 x 274 Drilling method Rotary 560 9 ,5 20 6 ,5 3 1 ,0 1 ,0		≥ [N/mm⁻]				525	5	
Brick dimensions [mm] 560 x 200 x 274 Drilling method Rotary 560 9 ,5 9 ,6 1 ,0 <tr< td=""><td></td><td></td><td></td><td></td><td></td><td>Eta</td><td></td><td></td></tr<>						Eta		
Drilling method Rotary 560 9,5 20 6,5 20 6,5 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 40 640 5,5 200 65 63 40 63 40 640 100 63 100 100 120 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 <td></td> <td>[]</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		[]						
Table C73: Installation parameters Anchor size [] All sizes Edge distance c_{rr} Minimum edge distance c_{rm}^{20} Minimum edge distance c_{rm}^{20} Minimum spacing Secult * Tor Vake: Cran according to Technical Report TR 054 Table C74: Group factor for anchor group in case of tension loading * * * For Vake: Cran according to Technical Report TR 054 Table C74: Group factor for anchor group in case of tension loading * 185 100 $\alpha_{g,N,ii}$ [-] * 185 100 $\alpha_{g,N,ii}$ [-] 1,1 parallel to horizontal ••••••••••••••••••••••••••••••••••••		լուոյ						
Image: second system of the system of th	Drilling method		Rolary					
Image: second system of the system of th								
Image: constraint of the second state of the second st			560			9 9.5		
Image: Second State of								
			20	6,	5			
Fable C73: Installation parameters Anchor size [-] All sizes Edge distance $Carr$ [mm] 100 (120) ¹⁰ Minimum edge distance $Carr$ [mm] 100 (120) ¹⁰ Spacing Ser.1 [mm] 274 Minimum spacing Ser.1 [mm] 100 ¹ Yalue in brackets for SH20x85 and SH20x130 ************************************				-5,	5			
40 40 Anchor size Edge distance Cer [-] All sizes Edge distance Cer [mm] 100 (120) ¹⁾ Minimum edge distance Cm ² [mm] 100 (120) ¹⁾ Spacing ser.it [mm] 100 (120) ¹⁾ Spacing ser.it [mm] 560 System ser.it [mm] 100 ¹ Value in brackets for SH20x85 and SH20x130 * * ² For VRk,c: Cmin according to Technical Report TR 054 * Table C74: Group factor for anchor group in case of tension loading I: anchors placed perpendicular to horizontal joint iss 100 $\alpha_{g,N,ill}$ [-] 1,9 2.0 1.1 cer 560 $\alpha_{g,N,ill}$ [-] 1,1 joint cer 260 $\alpha_{g,N,ill}$ [-] 1,0](ø40)				20	0	
40 40 Anchor size Edge distance Cer [-] All sizes Edge distance Cer [mm] 100 (120) ¹⁾ Minimum edge distance Cm ² [mm] 100 (120) ¹⁾ Spacing ser.it [mm] 100 (120) ¹⁾ Spacing ser.it [mm] 560 System ser.it [mm] 100 ¹ Value in brackets for SH20x85 and SH20x130 * * ² For VRk,c: Cmin according to Technical Report TR 054 * Table C74: Group factor for anchor group in case of tension loading I: anchors placed perpendicular to horizontal joint iss 100 $\alpha_{g,N,ill}$ [-] 1,9 2.0 1.1 cer 560 $\alpha_{g,N,ill}$ [-] 1,1 joint cer 260 $\alpha_{g,N,ill}$ [-] 1,0								
Table C73: Installation parameters Anchor size [-] All sizes Edge distance C_{cr} $[mm]$ 100 (120) ¹) Minimum edge distance C_{min}^{20} $[mm]$ 100 (120) ¹ Spacing $Ser_{.ll}$ $[mm]$ 100 (120) ¹ Spacing $Ser_{.ll}$ $[mm]$ 560 $Spacing$ $Ser_{.ll}$ $[mm]$ 100 ¹ Value in brackets for SH20x85 and SH20x130 $?$ $?$ ² For V _{Rk,c} : Cmin according to Technical Report TR 054 $Table C74$: Group factor for anchor group in case of tension loading Lit: anchors placed 185 100 $\alpha_{g,N,ll}$ $[-]$ $1,9$ $1:$ anchors placed 185 100 $\alpha_{g,N,ll}$ $[-]$ $1,1$ $2:0$ $1:85$ 100 $\alpha_{g,N,ll}$ $[-]$ $2,0$		_ 63						
Table C73: Installation parameters Anchor size [-] All sizes Edge distance C_{cr} $[mm]$ 100 (120) ¹) Minimum edge distance C_{min}^{20} $[mm]$ 100 (120) ¹ Spacing $Ser_{.ll}$ $[mm]$ 100 (120) ¹ Spacing $Ser_{.ll}$ $[mm]$ 560 $Spacing$ $Ser_{.ll}$ $[mm]$ 100 ¹ Value in brackets for SH20x85 and SH20x130 $?$ $?$ ² For V _{Rk,c} : Cmin according to Technical Report TR 054 $Table C74$: Group factor for anchor group in case of tension loading Lit: anchors placed 185 100 $\alpha_{g,N,ll}$ $[-]$ $1,9$ $1:$ anchors placed 185 100 $\alpha_{g,N,ll}$ $[-]$ $1,1$ $2:0$ $1:85$ 100 $\alpha_{g,N,ll}$ $[-]$ $2,0$					40 -			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		parameters						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Anchor size		3					
Ser.⊥ [mm] 274 Minimum spacing Smin [mm] 100 1) Value in brackets for SH20x85 and SH20x130 100 100 2) For V _{Rk,c} : cmin according to Technical Report TR 054 Table C74: Group factor for anchor group in case of tension loading II: anchors placed parallel to horizontal joint With c ≥ with s ≥	Anchor size Edge distance	C _{cr}	;	[mm]		100 (120) ¹⁾		
$\begin{array}{c c c c c c c } \hline 1 \\ \hline 1 \\ \hline 2 \\ \hline 2 \\ \hline 2 \\ \hline 3 \\ \hline 5 \\ \hline 7 \\ \hline 8 \\ \hline 8 \\ \hline 1 \\ \hline 2 \\ \hline 5 \\ \hline 7 \\ \hline 8 \\ \hline 8 \\ \hline 1 \\ 1 \\$	Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾	i	[mm] [mm]		100 (120) ¹⁾ 100 (120) ¹⁾		
²⁾ For V _{Rk,c} : c _{min} according to Technical Report TR 054 Table C74: Group factor for anchor group in case of tension loading	Anchor size Edge distance Minimum edge distance	Ccr Cmin ²⁾ Scr,II		[mm] [mm] [mm]		100 (120) ¹⁾ 100 (120) ¹⁾ 560		
II: anchors placed parallel to horizontal joint185100 $\alpha_{g,N,II}$ 1,9L: anchors placed perpendicular to horizontal joint185100 $\alpha_{g,N,L}$ 2,01,1 c_{cr} 274 $\alpha_{g,N,L}$ 2,0	Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	Ccr Cmin ²⁾ Scr,II Scr,⊥ Smin		[mm] [mm] [mm] [mm]		100 (120) ¹⁾ 100 (120) ¹⁾ 560 274		
parallel to horizontal joint•••••Ccr560α _{g,N,II} 2,0L: anchors placed perpendicular to horizontal joint•••185100α _{g,N,L} 1,1Ccr274α _{g,N,L} 2,0	Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according t	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 /eport TR 054	[mm] [mm] [mm] [mm]	ading	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274		
joint c_{cr} 560 a_{dr} 2,0L: anchors placed perpendicular to horizontal joint1851001,1 c_{cr} 274 $\alpha_{g,N,\perp}$ 2,0	Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C74: Group factor Configuration	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 eport TR 054 r group in case of 1 with c ≥	[mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274		
L: anchors placed perpendicular to horizontal joint1851001,1 c_{cr} 274 $\alpha_{g,N,\perp}$ 2,0	Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH2 ²⁾ For V _{Rk,c} : c _{min} according to Table C74: Group factor Configuration II: anchors placed	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 eport TR 054 r group in case of 1 with c ≥	[mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274 100		1,9
horizontal joint C _{cr} 274 2,0	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 Table C74: Group factor Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 eport TR 054 r group in case of t with c ≥ 185	[mm] [mm] [mm] [mm]	with s ≥ 100	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274 100		
	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 Table C74: Group factor II: anchors placed parallel to horizontal joint ⊥: anchors placed	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 leport TR 054 r group in case of 1 with c ≥ 185 c _{cr}	[mm] [mm] [mm] [mm]	with s ≥ 100 560	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274 100 α _{g,N,II}		2,0
ESSVE Injection system ONE ONE ICE for maconry	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 C74: Group factor II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 teport TR 054 r group in case of 1 with c ≥ 185 C _{cr} 185	[mm] [mm] [mm] [mm]	with s ≥ 100 560 100	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274 100 α _{g,N,II}		2,0 1,1
ESSVE Injection system ONE ONE ICE for maconry	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 C74: Group factor II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 teport TR 054 r group in case of 1 with c ≥ 185 C _{cr} 185	[mm] [mm] [mm] [mm]	with s ≥ 100 560 100	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274 100 α _{g,N,II}		2,0 1,1
	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 C74: Group factor II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	C _{cr} C _{min²⁾} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R	20x130 teport TR 054 r group in case of 1 with c ≥ 185 C _{cr} 185	[mm] [mm] [mm] [mm]	with s ≥ 100 560 100	100 (120) ¹⁾ 100 (120) ¹⁾ 560 274 100 α _{g,N,II}		2,0 1,1
Porformanage alow bollow brick Urbanbrig Annex C 30	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 C74: Group factor II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint	C _{cr} C _{min²} S _{cr,II} S _{cr,⊥} S _{min} 20x85 and SH o Technical R or for ancho	20x130 eport TR 054 r group in case of t with c ≥ 185 C _{or} 185 C _{or}	[mm] [mm] [mm] [mm]	with s ≥ 100 560 100	$\begin{array}{c c} 100 (120)^{1)} \\ \hline 100 (120)^{1)} \\ \hline 560 \\ \hline 274 \\ \hline 100 \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	[-]	2,0 1,1



	ay hollow brick Ur roup factor for anch		of shear loa	ding parallel to	o free edge		
Con	figuration	with c ≥	:	with s ≥			
II: anchors place parallel to horizon joint		C _{cr}		560	α _{g,V,II}	. 1	2,0
⊥: anchors place perpendicular to horizontal joint	D V 🏅	C _{cr}		274	$\alpha_{g,V,\perp}$	[-]	2,0
Table C76: G	roup factor for anch	or group in case	of shear loa	ding perpendi	cular to free e	dge	
Con	figuration	with c ≥	:	with s ≥			
II: anchors place parallel to horizon joint		C _{cr}		560	α _{g,V,II}	[-]	2,0
⊥: anchors place perpendicular to horizontal joint	o V→	C _{cr}		274	$lpha_{g,V,\perp}$	[-]	2,0
Table C77: C	characteristic values	s of resistance ur	der tension	and shear load	ds		
				Character	ristic resistance)	
				Use	category		
		Effective		d/d			d/d
		anchorage		w/d			w/d
Anchor size	Sleeve	depth		w/w			w/w For all
			40°C/24°C	80°C/50°C	120°C/72°C	tem	perature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$		\	(2)3) Rk,b
		[mm]		2	[kN]		
	10.00	Compressive s				1	
M8	12x80	80	0,9	0,9	0,75		3,0
M8 / M10/ IG-M6	16x85	85	0,9	0,9	0,75		3,0
M12 / M16 /	16x130 20x85	130 85	2,0 0,9	2,0 0,9	<u>1,5</u> 0,75		3,0 3,5
IG-M8 / IG-M10	20x130	130	2,0	2,0	1,5		3,5
	20/100	Compressive s	,		1,0		0,0
M8	12x80	80	0,9	0,9	0,9		4,0
M8 / M10/	16x85	85	0,9	0,9	0,9		4,0
IG-M6	16x130	130			2,0		4,0
M12/M16/	20x85	85	0,9	0,9	0,9		
IG-M8 / IG-M10	20x130	130	2,5	2,5	2,0		4,5
²⁾ Calculatio V _{Rk,b}	e valid for c_{cr} and c_{min} n of $V_{Rk,c}$ see Technical s are valid for steel 5.6				-	190 mm	: V _{Rk,c,II} =
ESSVE Inject	ion system ONE, ON	IE ICE for mason	iry				
Installation para	s clay hollow brick l meters (continue) alues of resistance unde				Anne	ex C 31	



Brick type:	Clay hollow	brick Urban	bric								
Table C78:	Characteris	tic values of r	esistan	ce under t	ension a	nd shear loa	ds (continu	ıe)			
						Character	ristic resista	ince			
					Use category						
		a	Effectiv nchorag			d/d w/d w/w			d/d w/d w/w		
Anchor size	Slee	ve	ve depth		C/24°C	80°C/50°C	120°C/72	°C tem	For all perature range		
			h _{ef}			V	/ _{Rk,b} ²⁾³⁾				
			[mm]			$N_{Rk,b} = N_{Rk,p}^{1}$	[kN]				
		Con	npressi	ive strengt	h f _b ≥ 12	N/mm ²					
M8	12x8	30	80		1,2	1,2	0,9		4,5		
M8 / M10/	16x	35	85		1,2	1,2	0,9		4,5		
IG-M6	/16 16x130		130		3,0	3,0	2,5		4,5		
M12 / M16 /	20x8	35	85		1,2	1,2	0,9		5,0		
G-M8 / IG-M1	0 20x1	30	130		3,0	3,0	2,5		5,0		
²⁾ Calcula V _{Rk,b}		e Technical Repo					Ū	c ≥ 190 mm	: V _{Rk,c,II} =		
Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ _{N0}	δ _{N∞}	v	δ_{V0}	δ _{V∞}		
		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]		
M8	12x80	80	0.04			0.55					
M8 / M10/	16x85	85	0,34		0,27	0,55	1,30				
	10.100	100	0.00	1		4.07	1				

0,69

0,27

0,69

1,37

0,55

1,37

1,43

1,00

1,50

0,86

0,34

0,86

0,80

130

85

130

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

IG-M6

M12 / M16 /

IG-M8 /

IG-M10

16x130

20x85

20x130



Table C80: Description o	of the brid	ck				
Brick type		Clay hollow brick Brique creuse C40)			
Bulk density ρ [[kg/dm ³]	0,7)			1
	[N/mm ²]	4, 8 or 12				
Code		EN 771-1				
Producer (country code)		e.g. Terreal (FR)				
Brick dimensions	[mm]	500 x 200 x 200				
Drilling method		Rotary				
				7 7 200		
	arameters		[-]		All sizes	
Anchor size Edge distance	C _{cr}		[-] [mm]		100 (120) ¹	
Anchor size Edge distance	C _{cr} C _{min} ²⁾		[mm] [mm]		100 (120) ¹ 100 (120) ¹	
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾ S _{cr,II}		[mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500	
Anchor size Edge distance Minimum edge distance Spacing	Ccr Cmin ²⁾ Scr,II Scr,⊥		[mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to T Table C82: Group factor f	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	s H20x130 Report TR 054 or group in case of t	[mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 500 200	
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for SH20x ²⁾ For V _{Rk,c} : c _{min} according to T Table C82: Group factor 1 Configuration	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	s 	[mm] [mm] [mm] [mm]	ading with s ≥	100 (120) ¹ 100 (120) ¹ 500 200	
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing 1) Value in brackets for SH20x 2) For V _{Rk,c} : c _{min} according to T Table C82: Group factor f Configuration II: anchors placed parallel to horizontal joint	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	s H20x130 Report TR 054 or group in case of t	[mm] [mm] [mm] [mm]		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 SH20x 2) For V _{Rk,c} : c _{min} according to T Table C82: Group factor f Configuration II: anchors placed parallel to horizontal	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	s 	[mm] [mm] [mm] [mm]	with s ≥	100 (120) ¹ 100 (120) ¹ 500 200 200	2,0



Cont	iguration	with c ≥	:	with s ≥			
II: anchors place parallel to horizon joint		C _{cr}		500	α _{g,V,II}	[1]	2,0
⊥: anchors place perpendicular to horizontal joint	D V ╏	C _{cr}		200	$\alpha_{g,V,\perp}$	[-]	2,0
Table C84: G	roup factor for anc	nor group in case	of shear load	ding perpendi	cular to free e	dge	
Cont	iguration	with c ≥	:	with s ≥			
II: anchors place parallel to horizon joint	d J	C _{cr}		500	α _{g,V,II}		2,0
⊥: anchors place perpendicular to horizontal joint	>	C _{cr}		200	$\alpha_{g,V,\perp}$	[-]	2,0
Table C85: C	haracteristic value	s of resistance ur	nder tension a	Characte Use	ds ristic resistance category	1	
Anchor size		Effective anchorage		d/d w/d w/w			d/d w/d w/w
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°C	120°C/72°C	tem	For all perature range
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$)	\ \	/ _{Rk,b} ²⁾³⁾
		[mm]			[kN]		
		Compressive s	trength $f_b \ge 4$	N/mm ²			
M8	12x80	80	0,6	0,6	0,6		0,9
M8 / M10/	16x85	85	0,6	0,6	0,6		0,9
IG-M6	16x130	130	0,6	0,6	0,6		0,9
M12 / M16 /	20x85	85	0,6	0,6	0,6		0,9
G-M8 / IG-M10	20x130	130	0,6	0,6	0,6		0,9
	Walk M. Walkard	Compressive st			April 1, 1920 1 1930		
M8	12x80	80	0,9	0,9	0,75		1,2
M8 / M10/	16x85	85	0,9	0,9	0,75		1,2
IG-M6	16x130	130	0,9	0,9	0,75		1,2
M12 / M16 / G-M8 / IG-M10	20x85 20x130	85 130	0,9 0,9	0,9	0,75		1,2 1,2
 Values are ²⁾ Calculatio ³⁾ The value 	e valid for c _{cr} and c _{min} n of V _{Rk,c} see Technica s are valid for steel 5.6	l Report TR 054 or greater. For steel	4.6 and 4.8 mu				· ,—
	on system ONE, O	Brique creuse C40			Anne	x C 34	



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all ature e ⁽⁾⁽³⁾
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all ature e ⁽⁾³⁾
ature e ⁽⁾³⁾
)3)
δια
δ _{V∞}
mm
mm]
1 05
1,35
[



Anchor size			
Compressive strength $f_b \ge [N/mm^2]$ 4, 6, 8 or 12 Code EN 771-1 Producer (country code) e.g. Wienerberge Brick dimensions [mm] 250 x 120 x 250 Drilling method Rotary 120 120 25 Table C89: Installation parameters Anchor size			
Code EN 771-1 Producer (country code) e.g. Wienerberge Brick dimensions [mm] 250 x 120 x 250 Drilling method Rotary 120 120 25 120 25 25 Table C89: Installation parameters			
Producer (country code) Brick dimensions [mm] 250 x 120 x 250 Drilling method Rotary			
Brick dimensions [mm] 250 x 120 x 250 Drilling method Rotary			
Drilling method Rotary			
120 1			
Table C89: Installation parameters Anchor size			
Table C89: Installation parameters Anchor size			
	All SI	izes	
Edge distance c _{cr}	[mm] 100 (1		
Minimum edge distance c _{min}	[mm] 60	D	
Spacing Scr.II	[mm] 25		
s _{cr,⊥} Minimum spacing s _{min}	[mm] 12 [mm] 10	10.000	
 ¹⁾ Value in brackets for SH20x85; SH20x130 and SH20x200 Table C90: Group factor for anchor group in case of Configuration with c ≥ 	tension loading with s ≥		
II: anchors placed 60	100		1,0
	αααααααααααα	,11	
parallel to horizontal		2	2,0
parallel to horizontal joint C _{cr}	250	[-]	



II: anchors placed parallel to horizonta joint ⊥: anchors placed perpendicular to		with $c \ge 60^{1}$		with s ≥ 100 ¹⁾			
parallel to horizonta joint ⊥: anchors placed		00		100.7			1,0
⊥: anchors placed					α _{g,V,II}		-
		Ccr		250		[-]	2,0
		60 ¹⁾		100 ¹⁾	(i = 1)		1,6
horizontal joint		C _{cr}		250	α _{g,V,⊥}		2,0
¹⁾ Only valid for $V_{Rk,k}$	according to Table C93	3 and C94 values in	brackets		I		
Table C92: Gro	oup factor for ancho	r group in case o	of shear loadii	ng perpendic	ular to free ed	dge	
Config	guration	with c ≥		with s ≥			
II: anchors placed		60 ¹⁾		100 ¹⁾			1,0
parallel to horizonta joint		C _{cr}		250	α _{g,V,II}		2,0
⊥: anchors placed		60 ¹⁾		100 ¹⁾		[-]	1,6
perpendicular to	V				α _{g,V,⊥}		
horizontal joint	according to Table C93	C _{cr}		250			2,0
		Effective			category w/d; w/w		
				Use)	
Anchor size	Sleeve	, i i i i i i i i i i i i i i i i i i i		80°C/50°C	120°C/72°C	range	
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$			V _{Rk,b} ⁴⁾
		[mm]			[kN]		
M8	12x80	Compressive str 80	engtn 1 _b ≥ 4 N ∣	/mm [_]			
	16x85	85	-				
M8 / M10/ IG-M6	16x130	130	-				
	20x85	85	0,4	0,4	0,3	2,	0 ²⁾ (0,9) ³⁾
M12 / M16 /	20x130	130	-				
G-M8 / IG-M10	20x200	200	-				
		Compressive str	⊥ enath f⊾≥6 N	/mm ²			
M8	12x80	80					
M8 / M10/	16x85	85					
IG-M6	16x130	130					-2)
	20x85	85	0,5	0,5	0,4	2,	5 ²⁾ (1,2) ³⁾
M12 / M16 /	20x130	130	-				
G-M8 / IG-M10	20x200	200	-				
		rt TR 054, except fo ors with c _{min}		-	e with c ≥ 125 n	יm: V _{Rk}	$_{\rm ,c,II} = V_{\rm Rk,b}$
values in black	0						



						Character	istic resistance	
							category	
			⊏ff	ective			d/d	
				horage			w/d	
Anchor siz	e s	Sleeve		epth -		1	w/w	
					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} ⁴⁾
				nm]			[kN]	111,0
						-	• •	
					ngth f _b ≥8 N	l/mm²	1	
M8		12x80		80				
M8 / M10		16x85		85				
IG-M6		6x130		130	0,6	0,6	0,5	$3,0^{2}$ $(1,2)^{3}$
M12 / M16		20x85		85	0,0	0,0	0,0	0,0 (1,2)
G-M8 / IG-N	110	20x130		130				
	2	20x200		200		2		
					gth f _b ≥ 12 N	N/mm ⁻		
M8		12x80		80				
M8 / M10		16x85		85				
IG-M6		6x130		130	0,6	0,6	0,6	$3,5^{2}(1,5)^{3}$
M12 / M16		20x85		85				
G-M8 / IG-N		20x130 20x200		130 200				
1) Volu	es are valid fo			200				
	values are vali	$V_{Rk,c} = V_{Rk,b}$ for a did for steel 5.6 or sments			and 4.8 multi	ply $V_{Rk,b}$ by 0,8		
Table C95:								
Table C95:	•							
Table C95: Anchor size	Sleeve	Effective anchorage depth h _{ef}	N	δ _N / N	δ_{N0}	δ _{N∞}	ν δ _ν	_{′0} δ _{√∞}
Anchor		Effective anchorage	N [kN]	δ _N / N [mm/kN]	δ _{N0} [mm]	δ _{N∞} [mm]	V δ _ν [kN] [mi	



Table C96: Descriptio	on of the brid	Clay hollow brick				
Brick type		Doppio Uni				
Bulk density	ρ [kg/dm ³]	0,9		Station Station		
	$_{\rm D} \ge [\rm N/mm^2]$	10, 16, 20 or 28				
Code		EN 771-1				
Producer (country code)		e.g. Wienerberger (IT)				
Brick dimensions	[mm]	250 x 120 x 120			and the second s	
Drilling method		Rotary				
)		
Anchor size	n parameters	s [-]		All sizes		
Anchor size Edge distance	C _{cr}	[-] [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	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥}	[-] [mm] [mm] [mm] [mm]]]]	100 (120) ¹ 60 250 120)	
Table C97:InstallationAnchor sizeEdge distanceMinimum edge distanceSpacingMinimum 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 SH ²⁾ For V _{Rk,c} : c _{min} according Table C98: Group fact	C _{or} C _{min} ²⁾ S _{cr,⊥} S _{min,II} S _{min,⊥} H20x85; SH20> to Technical F	[-] [mm] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension]]]] n loading	100 (120) ¹ 60 250 120 100)	
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 C98: Group fact Configuration	C _{or} C _{min} ²⁾ S _{cr,⊥} S _{min,II} S _{min,⊥} H20x85; SH20> to Technical F	[-] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension with c ≥]]] n 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 SH ²⁾ For V _{Rk,c} : c _{min} according Table C98: Group fact Configuration II: anchors placed	C _{or} C _{min} ²⁾ S _{cr,⊥} S _{min,II} S _{min,⊥} H20x85; SH20> to Technical F	[-] [mm] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension]]]] n loading	100 (120) ¹ 60 250 120 100 120)	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 Table C98: Group fact Configuration	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{min,⊥} S _{min,⊥} 420x85; SH20> to Technical F	[-] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension with c ≥]]] n loading 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 SH ²⁾ For V _{Rk,c} : c _{min} according Table C98: Group fact Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min} ²⁾ S _{cr,⊥} S _{min,⊥} S _{min,⊥} H20x85; SH20) to Technical F cor for ancho	[-] [mm] [mm] [mm] [mm] (130 and SH20x200 Report TR 054 or group in case of tension with c ≥ 60]]] n loading with s ≥ 100	100 (120) ¹ 60 250 120 100 120)	



Con	figuration	with c ≥		with s ≥			
II: anchors place parallel to horizor joint	ed 5	C _{cr}		250	α _{g,V,II}		2,0
⊥: anchors place perpendicular to horizontal joint	D V 🖁	Ccr		120	$\alpha_{g,V,\perp}$	[-]	2,0
Table C100: G	roup factor for anch	or group in case c	of shear loadi	ng perpendic	ular to free e	dge	
Con	figuration	with c ≥		with s ≥			
II: anchors place parallel to horizor joint		C _{cr}		250	α _{g,V,II}		2,0
⊥: anchors place perpendicular to horizontal joint	o V →	C _{cr}		120	$\alpha_{g,V,\perp}$	[-]	2,0
		Effective			Jse category d/d w/d w/w		
Anchor size	Sleeve	depth	40°C/24°C	80°C/50°C	w/w 120°C/72°C		
		h _{ef}		$N_{Rk,b} = N_{Rk,p}^{1}$)	-	range V _{Rk,b} ²⁾³⁾
		[mm]			[kN]		• HK,D
		Compressive stre	ength $f_b \ge 10$ M	l/mm ²			
M8	12x80	80					
M8 / M10/	16x85	85					
IG-M6	16x130	130	0,6	0,6	0,5		1,5
M12/M16/	20x85	85	0,0	0,0	0,5		1,5
G-M8 / IG-M10	20×130	130					
	20x200	200					
	0.61 5 5	Compressive stre	ength $f_b \ge 16$ N	l/mm²			
M8	12x80	80	_				
M8 / M10/	16x85	85	_				
IG-M6	16x130	130	0,75	0,75	0,6		2,0
M12/M16/	20x85	85	-				
G-M8 / IG-M10	20x130 20x200	130	-				
²⁾ Calculatio	e valid for c_{cr} and c_{min} n of $V_{Rk,c}$ see Technical s are valid for steel 5.6 c	Report TR 054	.6 and 4.8 multi	ply $V_{Rk,b}$ by 0,8			
	ion system ONE, ON	EICE for masonry	v				



For All emperature range V _{Rk,b} ²⁾³⁾	
emperature range	
emperature range	
emperature range	
emperature range	
V _{Rk,b} ^{2/3)}	
2,0	
2,0	
2,5	
δ _{V∞}	
[mm]	
0,45	



Brick type		Hollow light weight	t concrete				
	- [] (o; / o) :oo ³]	Bloc creux B40					
Bulk density	$\rho [kg/dm^3]$	0,8					
	$f_b \ge [N/mm^2]$	4				and the same	AND AND A
Code		EN 771-3					-
Producer (country code)	[]	e.g. Sepa (FR)		5-10-1	and a second second	Charles Participation	an and a
Brick dimensions	[mm]	494 x 200 x 190					
Drilling method		Rotary					
	1	494			1		
200					17		
1							
L				,			
			17				
			17				
Table C105: Installatio	n narameters	s	17				
Table C105: Installatio	on parameters	3					
Anchor size		3	[-]		All sizes)	
Anchor size Edge distance	C _{cr}	3	[-] [mm]		100 (120) ¹		
Anchor size Edge distance	C _{cr} C _{min} ²⁾	\$ 	[-] [mm] [mm]		100 (120) ¹ 100 (120) ¹		
Anchor size Edge distance Minimum edge distance	C _{cr} C _{min} ²⁾ S _{cr,II}	\$ 	[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494		
Anchor size Edge distance Minimum edge distance Spacing	Ccr Cmin ²⁾ Scr,II Scr,⊥	5	[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	Ccr Cmin ²⁾ Scr,II Scr,⊥ Smin		[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing	C _{cr} C _{min} ²⁾ S _{cr,II} S _{cr,⊥} S _{min} SH20x85 and SH	20x130	[-] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin	$\begin{array}{c} & C_{cr} \\ & C_{min}^{(2)} \\ & \\ & S_{cr, \parallel} \\ & \\ & S_{cr, \perp} \\ & \\ S_{min} \\ \\ SH20x85 \text{ and SH} \\ SH20x$	20x130 Report TR 054	[-] [mm] [mm] [mm] [mm]		100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	I20x130 Report TR 054 or group in case of t	[-] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	l20x130 Report TR 054 or group in case of t with c ≥	[-] [mm] [mm] [mm] [mm]	ading with s ≥	100 (120) ¹ 100 (120) ¹ 494 190		
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	I20x130 Report TR 054 or group in case of t	[-] [mm] [mm] [mm] [mm]	ading	100 (120) ¹ 100 (120) ¹ 494 190 100		1,5
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	l20x130 Report TR 054 or group in case of t with c ≥	[-] [mm] [mm] [mm] [mm]	ading with s ≥	100 (120) ¹ 100 (120) ¹ 494 190		1,5
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	20×130 Report TR 054 or group in case of t with c ≥ 100 C _{cr}	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	l20x130 Report TR 054 or group in case of t with c ≥ 100	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494 100	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	20×130 Report TR 054 or group in case of t with c ≥ 100 C _{cr}	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	20×130 Report TR 054 or group in case of t with c ≥ 100 C _{cr}	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494 100	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0 1,0
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494 100	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0 1,0
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to	C _{cr} C _{min²⁾} S _{cr,⊥} S _{cr,⊥} SH20x85 and SH g to Technical F ctor for ancho	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494 100	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0 1,0
Anchor size Edge distance Minimum edge distance Spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint	Ccr Cmin ²⁾ Scr,II Scr,L Smin SH20x85 and SH g to Technical F ctor for ancho	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100 c _{cr}	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494 100	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to	Ccr Cmin ²⁾ Scr,II Scr,L Smin SH20x85 and SH g to Technical F ctor for ancho	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100 c _{cr}	[-] [mm] [mm] [mm] [mm]	ading with s ≥ 100 494 100	100 (120) ¹ 100 (120) ¹ 494 190 100		2,0 1,0
Anchor size Edge distance Minimum edge distance Spacing Minimum spacing ¹⁾ Value in brackets for S ²⁾ For V _{Rk,c} : c _{min} accordin Table C106: Group fac Configuration II: anchors placed parallel to horizontal joint L: anchors placed perpendicular to horizontal joint	Ccr Cmin ²⁾ Scr.II Scr.I Sh20x85 and SH og to Technical F ctor for ancho	20x130 Report TR 054 or group in case of t with c ≥ 100 c _{cr} 100 c _{cr}	[-] [mm] [mm] [mm] [mm] [mm] (mm]	ading with s ≥ 100 494 100	$\begin{array}{c} 100 (120)^{1} \\ \hline 100 (120)^{1} \\ \hline 494 \\ \hline 190 \\ \hline 100 \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$		2,0 1,0



	Configuration	on		with c ≥		with s ≥			
II: anchors				50		100			1,1
parallel to h join				Ccr		494	α	,V,II	2,0
⊥: anchors				100		100		[-]	1,1
perpendic horizonta	ular to			C _{cr}		190	αg	V,⊥	2,0
Table C108	B: Group f	actor for ancl	nor aroup	in case of	shear load	ling perpe	ndicular to	free edge	
	Configuration			with c ≥		with s ≥			
II: anchors parallel to h join	placed orizontal			Ccr		494	αg		2,0
⊥: anchors perpendic horizonta	ular to			C _{cr}		190	αg	.v,⊥ [-]	2,0
					Char	acteristic re Use catego			-1/-1
Anchor size	Sleeve	Effective anchorage depth		d/d	1		w/d w/w	1	d/d w/d w/w
					120°C/72°C			120°C/72°C	For all temperatur range
		h _{ef}		$N_{Rk,b} = N_{Rk,t}$) >		$N_{Rk,b} = N_{Rk,p}$	1)	$V_{\rm Rk,b}^{(2)3)}$
		[mm]	Compre	essive stre	ngth f _b ≥ 4	[kN] N/mm ²			
M8	12x80	80	1,2	0,9	0,75	0,9	0,9	0,75	3,0
M8 / M10/	16x85	85	1,2	0,9	0,75	1,2	0,9	0,75	3,0
IG-M6	16x130	130	1,2	0,9	0,75	1,2	0,9	0,75	3,0
/12/M16/	20x85	85	1,2	0,9	0,75	1,2	0,9	0,75	3,0
IG-M8 / IG-M10	20x130	130	1,2	0,9	0,75	1,2	0,9	0,75	3,0
 Valu Calc V_{Rk,t} The 	ulation of V _R	for c _{cr} and c _{min} _{ik,c} see Technica alid for steel 5.6 ements						vith c ≥ 250 m	nm: V _{Rk,c,ll} =
Anchor size	Sleeve	Effective anchorage depth h _{ef}		δ _N / N	δ _{N0}	δ _{N∞}	V	δ _{vo}	δ _{V∞}
A.U		[mm]	[kN]	[mm/kN]	[mm]	[mm]	[kN]	[mm]	[mm]
All sizes	All sizes	All sizes	0,34	0,90	0,31	0,62	0,86	0,9	1,35
							1		



Brick type		Solid light weight of	concrete b	rick			
Bulk density	ρ [kg/dm³]	0,6					
Compressive strength f _t	, ≥ [N/mm²]	2				ania a	
Code		EN 771-3					
Producer (country code)		e.g. Bisotherm (DI	E)			A COLOR	
Brick dimensions	[mm]	300 x 123 x 248				and the state	
Drilling method		Rotary					
Table C112: Installation	n parameter						
Anchor size			[-]		All sizes		
Edge distance Minimum edge distance	C _{cr}		[mm]		1,5*h _{ef} 60		
Spacing	C _{min}		[mm] [mm]		60 3*h _{ef}		
imum spacing S _{min}			[mm]		120		
II: anchors placed parallel to horizontal	••	90		120	αα.Ν.ΙΙ		1,1
Configuration		with c ≥		with s ≥			
parallel to horizontal	••	1,5*hef		3*h _{ef}	α _{g,N,II}		2,0
joint		-				[-]	
⊥: anchors placed perpendicular to		124		120	α _{g,Ν,⊥}		1,1
horizontal joint		1,5*hef 3*h _{ef}	9, , , L		2,0		
,							
Table C114: Group fact	or for ancho	or group in case of	shear load		free edge		I
Table C114: Group fact Configuration	or for ancho	or group in case of with c ≥	shear load	with s ≥	free edge		
Table C114: Group fact	or for ancho	or group in case of	shear load		free edge		0,6
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint	or for ancho	or group in case of with c ≥ 60	shear load	with s ≥ 120		[-]	2,0
Table C114: Group fact Configuration II: anchors placed parallel to horizontal	or for ancho	or group in case of with c ≥ 60 90	shear load	with s ≥ 120 120		[-]	2,0
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint Table C115: Group fact		or group in case of with c ≥ 60 90 60 124 or group in case of		with s ≥ 120 120 120 120 120 120 120 120 120 120 120 120 120	$\alpha_{g,V,II}$		2,0 0,6
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint		or group in case of with c ≥ 60 90 60 124 or group in case of with c ≥		with s ≥ 120 120 120 120 120 120 120 with s ≥	$\alpha_{g,V,II}$		2,0 0,6 2,0
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed		or group in case of with c ≥ 60 90 60 124 or group in case of		with s ≥ 120 120 120 120 120 120 120 120 120 120 120 120 120	$\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$ ular to free		2,0 0,6 2,0
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint		or group in case of with c ≥ 60 90 60 124 or group in case of with c ≥		with s ≥ 120 120 120 120 120 120 120 with s ≥	$\alpha_{g,V,II}$	edge	2,0 0,6 2,0
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint		or group in case of with $c ≥$ 60 90 60 124 or group in case of with $c ≥$ 60		with s ≥ 120 120 120 120 120 120 120 120 120 120 120 120 120 120 120 120 120 120	$\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$ ular to free		2,0 0,6 2,0 0,6 2,0
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint		or group in case of with $c ≥$ 60 90 60 124 or group in case of with $c ≥$ 60 90 90		with s ≥ 120	$\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$ ular to free	edge	
Table C114: Group fact Configuration II: anchors placed parallel to horizontal joint ⊥: anchors placed perpendicular to horizontal joint Table C115: Group fact Configuration II: anchors placed parallel to horizontal joint		or group in case of with $c ≥$ 60 90 60 124 or group in case of with $c ≥$ 60 90 60 90 60		with s ≥ 120	$\alpha_{g,V,II}$ $\alpha_{g,V,\perp}$ $\alpha_{g,V,\perp}$	edge	2,0 0,6 2,0 0,6 2,0 0,6

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		Effective anchorage depth	Characteristic resistance Use category d/d						
Anchor size									
	Sleeve		d/d				w/d w/w		
			40°C/24°C	80°C/50°	C 120°C/72	°C 40°C/24°	C 80°C/50°C	120°C/72°C	For all temperature range
		h _{ef}		$N_{Pkh} = N_P$	$\mathbf{R}_{R,b} = \mathbf{N}_{R,b}^{(1)}$		$N_{Rk,b} = N_{Rk,p}^{1}$		
		[mm]			[kN]				
	<u> </u>	[]	Con	npressive	strenath f	≥ 2 N/mm ²			
M8	-	80	3,0	2,5	2,0	2,5	2,0	1,5	3,0
M8 / M10/ IG-M6	-	90	3,0	3,0	2,0	2,5	2,5	2,0	3,0
M10 / IG-M8	-	100	3,5	3,0	2,5	3,0	2,5	2,0	3,0
M16 / IG-M10	-	100	3,0	3,0	2,0	3,0	3,0	2,0	3,0
M8	12x80	80	2,5	2,5	2,0	2,5	2,0	1,5	3,0
M8 / M10/	16x85	85	3,0	2,5	2,0	3,0	2,5	2,0	3,0
IG-M6	16x130	130	3,0	2,5	2,0	3,0	2,5	2,0	3,0
V12 / M16 / IG-M8 /		85 130	2,5	2,5	2,0	2,5	2,5	2,0	3,0
IG-M10	20x130 20x200	200	2,5 2,5	2,5 2,5	2,0	2,5	2,5 2,5	2,0 2,0	<u>3,0</u> 3,0
²⁾ For ca	alculation of alues are v	f V _{Rk,c} see E		ex C	-		y 0,8		
	size		Effective anchorage	Νδ	5 _N / N	δ _{N0} δ	N∞ V	δ_{V0}	δ _{V∞}
Anchor		Sleeve	depth h _{ef}						
Anchor		Sleeve	depth h _{ef} [mm]	[kN] [m	ım/kN] [ı	nm] [n	וm] [kN] [mm]	[mm]
M8		-] [mm]	[mm]
M8 M8 / M IG-M	10/ 6		[mm] 80 90	0,86	0,50 (0,43 0	,86] [mm]	[mm]
M8 M8 / M IG-M M10 / IC	10/ 6 3-M8		[mm] 80 90 100	0,86	0,50 (),43 0),35 0	,86] [mm]	[mm]
M8 M8 / M IG-M M10 / IG M16 / IG	10/ 6 3-M8 3-M10	-	[mm] 80 90	0,86	0,50 (),43 0),35 0	,86] [mm]	[mm]
M8 M8 / M IG-M M10 / IC	10/ 6 3-M8 3-M10		[mm] 80 90 100 100 80	0,86 1,00 0,86	0,50 (0,35 (0,43 0 0,35 0 0,30 0	,86		[mm] 0,38
M8 M8 / M IG-M M10 / IG M16 / IG M8 M8 / M	10/ 6 3-M8 i-M10		[mm] 80 90 100 100	0,86 1,00 0,86	0,50 (0,35 (0,43 0 0,35 0 0,30 0	,86 ,70 ,60		
M8 M8 / M IG-M M10 / IG M16 / IG M8	10/ 6 3-M8 3-M10 10/		[mm] 80 90 100 100 80	0,86 1,00 0,86	0,50 (0,35 (0,43 0 0,35 0 0,30 0	,86 ,70 ,60		
M8 M8 / M IG-M M10 / IG M16 / IG M8 M8 / M IG-M	10/ 6 3-M8 3-M10 10/ 6		[mm] 80 90 100 100 80 85	0,86	0,50 (0,35 (0,50 (0,50 (0,43 0 0,35 0 0,30 0 0,36 0	,86 ,70 ,60		
M8 M8 / M IG-M M10 / IG M16 / IG M8 M8 / M	10/ 6 3-M8 i-M10 10/ 6 116 /		[mm] 80 90 100 100 80 85 130	0,86	0,50 (0,35 (0,50 (0,50 (0,43 0 0,35 0 0,30 0 0,36 0	,86 ,70 ,60 ,71 0,9		

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