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Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

European Technical Assessment ETA-19/0816 of 2019/12/13

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	CA POLY - EKOR Injection anchor
Product family to which the above construction product belongs:	Bonded anchor with anchor rod made of galvanized steel or stainless steel of sizes M8, M10 and M12, for use in masonry
Manufacturer:	Torggler Chimica S.p.A Via Prati Nuovi, 9 IT-39020 Marlegno (BZ) Tel. +39 0473 282400 Internet www.torggler.com
Manufacturing plant:	Torggler Chimica S.p.A Manufacturing plant II
This European Technical Assessment contains:	22 pages including 17 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	EAD 330076-00-0604, Metal injection anchors for use in masonry
This version replaces:	

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
The Injection system CA POLY - EKOR Injection anchor is a bonded anchor (injection type) consisting of a mortar cartridge with CA POLY - EKOR Injection anchor injection mortar, a perforated sleeve, and an anchor rod with hexagon nut and washer in the range of M8, M10 and M12.

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.

An illustration of the product and intended use is given in Annex A1 and Annex A2.

The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation[1] of this European Technical Assessment.

The anchors are intended to be used with embedment depth given in Annex A3, Table A1. For the installed anchor see Figure given in Annex A2. The intended use specifications of the product are detailed in the Annex B1.

2 Specification of the intended use in accordance with the applicable EAD

The anchors are intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation (EU) 305/2011 shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

The anchor is to be used only for anchorages subject to static or quasi-static loading in solid masonry (use category b) or hollow or perforated masonry (use category c) according to Annex B8. The mortar strength class of the masonry must be M 2,5 according to EN 998-2:2010 at minimum.

The anchors may be installed in Category w/d: installation in wet substrate and use in structures subjected to dry, internal conditions.

The anchors may be used in the following temperature range:
a) -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C),
b) -40°C to +50°C (max. short term temperature +50°C and max. long term temperature +40°C).

Elements made of galvanized steel or stainless steel may be used in structures subject to dry internal conditions only.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, 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.

1 The technical documentation of this European Technical Assessment is deposited at ETA-Danmark and, as far as relevant for the tasks of the Notified bodies involved in the attestation of conformity procedure, is handed over to the notified bodies.

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

3.1 Characteristics of product

Mechanical resistance and stability (BWR 1):
The essential characteristics are detailed in the Annex from C1 to C3.

Safety in case of fire (BWR 2):
The essential characteristics are detailed in the Annex from C4.

Hygiene, health and the environment (BWR3):
No performance assessed

Safety in use (BWR4):
For basic requirement Safety in use the same criteria are valid for Basic Requirement Mechanical resistance and stability (BWR1).

Sustainable use of natural resources (BWR7)
No performance determined

Other Basic Works Requirements are not relevant

3.2 Methods of assessment

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 has been made in accordance with the "European Assessment Document, EAD 330076-00-0604, Metal injection anchors for use in masonry ".

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

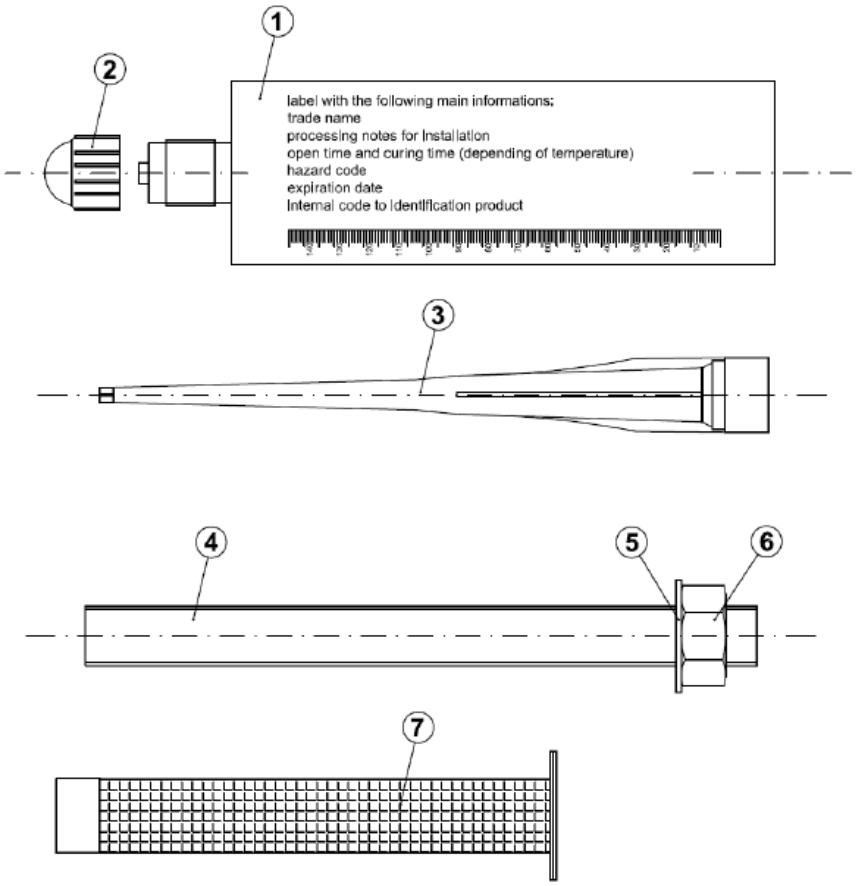
According to the decision 1997/177/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2019-12-13 by

Thomas Bruun
Manager, ETA-Danmark



① Cartridge	④ Anchor threaded rod	⑦ Plastic sleeve
② Sealing cap	⑤ Washer	
③ Mixer	⑥ Hexagon nut	

The base materials are divided in to the following groups:

Masonry group b: metal injection anchors for use in solid masonry.

Masonry group c: metal injection anchors for use in hollow or perforated masonry.

Use category in respect of installation and use:

Category w/d: installation in wet substrate and use in structures subjected to dry, internal conditions.

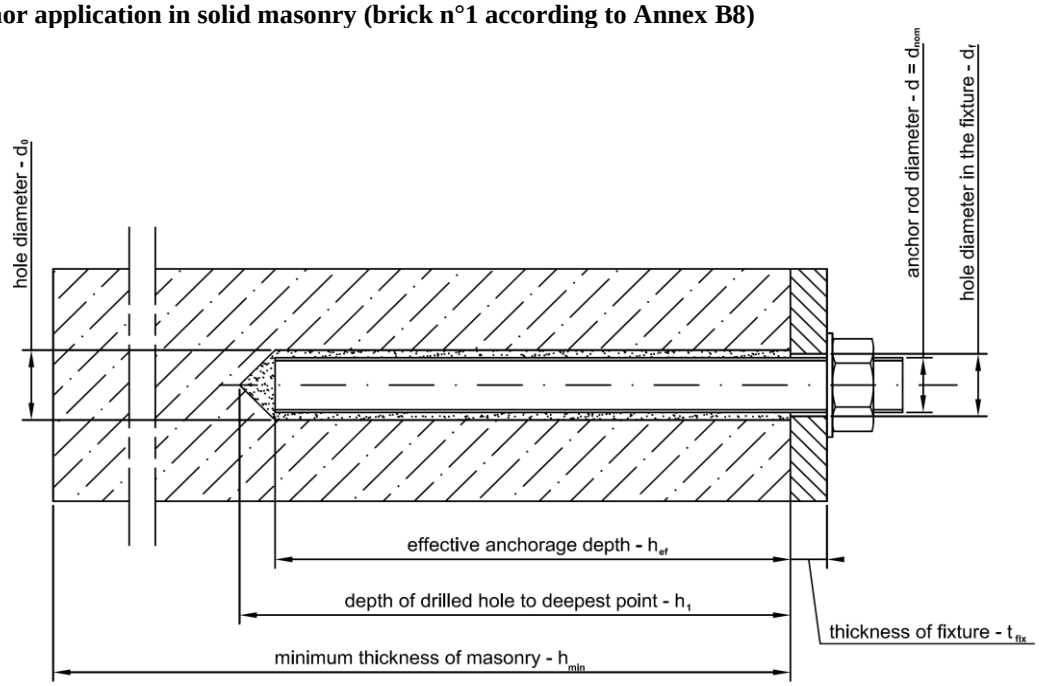
Temperature range:

-40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C)

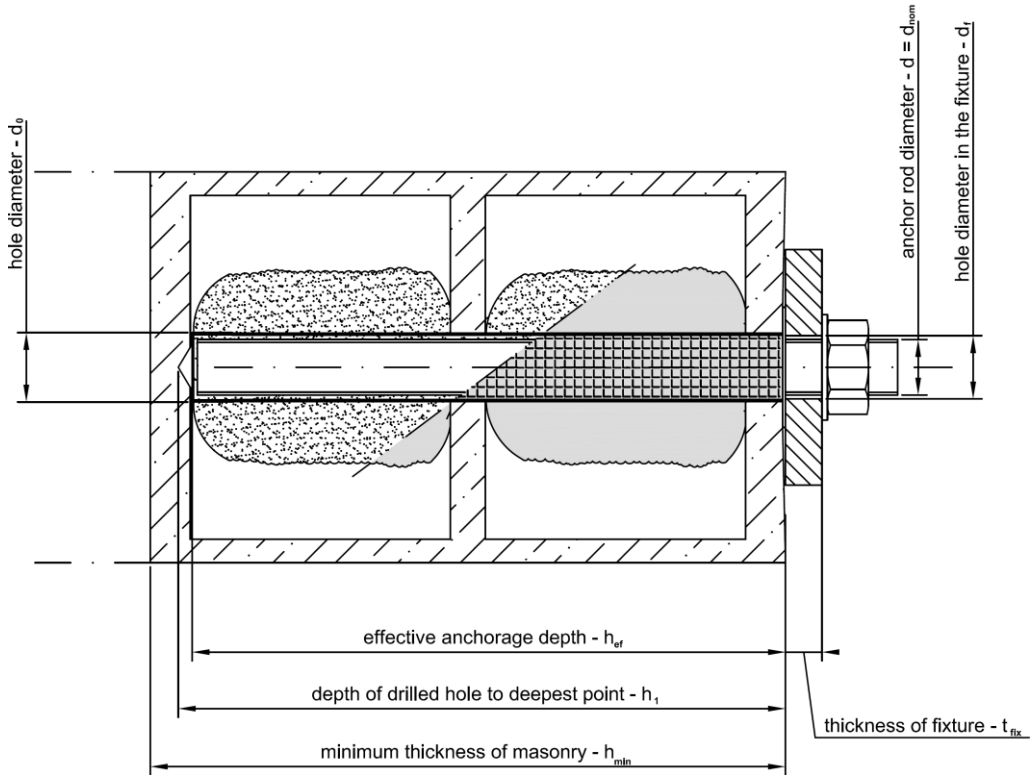
-40°C to +50°C (max. short term temperature +50°C and max. long term temperature +40°C)

CA POLY - EKOR Injection anchor	**Annex A1**
Product and intended use (1)	of European Technical Assessment ETA-19/0816

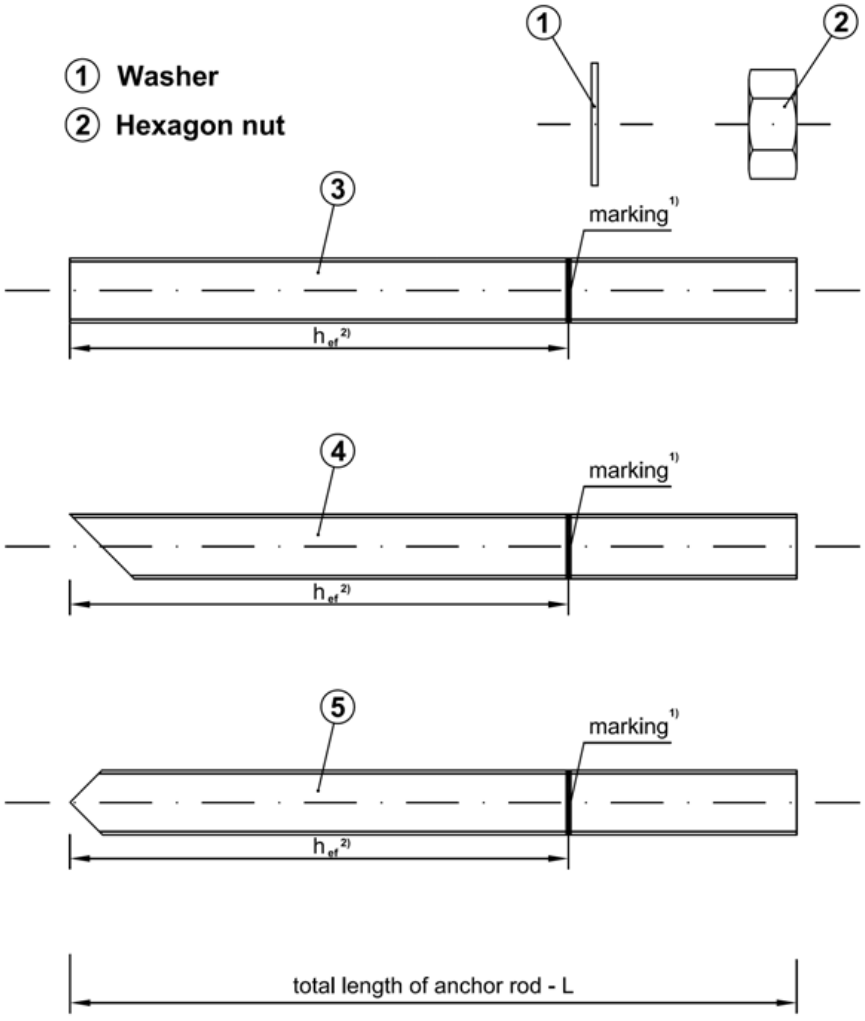
Anchor application in solid masonry (brick n°1 according to Annex B8)



Anchor application in hollow/perforated masonry with plastic sleeve (brick n°2 to 6 according to Annex B7)



CA POLY - EKOR Injection anchor	**Annex A2**
Product and intended use (2)	of European Technical Assessment ETA-19/0816



③ Version 1 - rod with flat end with marking on h_{ef}

④ Version 2 - rod with 45° cutted end with marking on h_{ef}

⑤ Version 3 - rod with V shape end with marking on h_{ef}

Table A1: Threaded rod dimensions

Size	d [mm]	h_{ef} [mm]	h_{ef} [mm]
		solid masonry	hollow/perforated masonry
M8	8	80	80
M10	10	85	85
M12	12	95	85

1) Marking according to EAD 330076-00-0604

2) Effective anchorage depths according to the range specified in table 1.

CA POLY - EKOR Injection anchor	Annex A3 of European Technical Assessment ETA-19/0816
Threaded rod types and dimensions	

Table A2: Threaded rods materials

Part	Designation	
	Steel, zinc plated ≥ 5 µm acc. to EN ISO 4042	**Stainless steel**
Threaded rod	Steel, property class 5.8 or 6.8, acc. to EN ISO 898-1	Material 1.4401 / 1.4571 acc. to EN 10088; property class 70 (A4-70) acc. to EN ISO 3506
Hexagon nut	Steel, property class 5 or 6, acc. to EN 20898-2; corresponding to threaded rod material	Material 1.4401 / 1.4571 acc. to EN 10088; property class 70 (A4-70) acc. to EN ISO 3506
Washer	Steel, acc. to EN ISO 7089; corresponding to threaded rod material	Material 1.4401 / 1.4571 acc. to EN 10088; corresponding to threaded rod material

Commercial standard threaded rods with:

– material and mechanical properties according to Table 2;
– confirmation of material and mechanical properties by inspection certificate 3.1 according to EN-10204:2004;
– marking of the threaded rod with the embedment depth.

Table A3: Injection mortar

Product	**Composition**
CA POLY - EKOR Injection anchor **two components injection mortar**	Additive: quartz Bonding agent: polyester resin styrene free Hardener: dibenzoyl peroxide

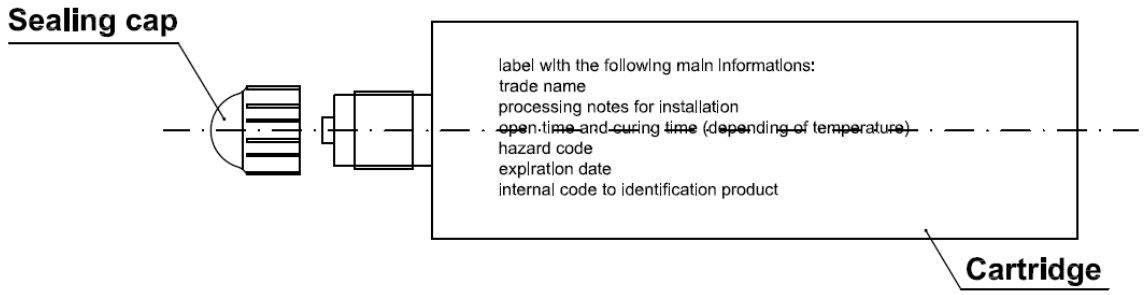
Table A4: Minimum curing time[3)]

Masonry temperature	Processing time	Minimum curing time[5)]
0°C[4)]	25 min	180 min
5°C[4)]	15 min	120 min
10°C	12 min	90 min
15°C	8 min	60 min
20°C	6 min	45 min
25°C	4 min	30 min
30°C	3 min	20 min

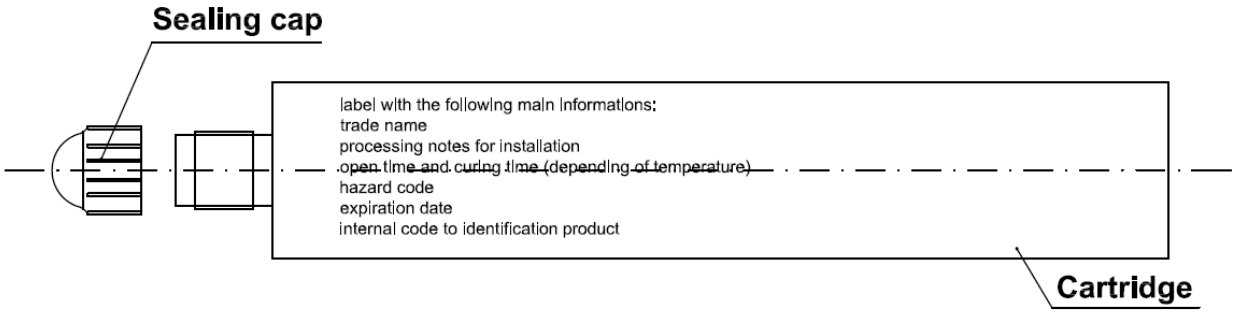
3) the minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer).
4) minimum resin temperature recommended, for injection between 5°C and 0°C, equal to 5°C.
5) minimum curing time for dry and wet conditions.

CA POLY - EKOR Injection anchor	**Annex A4** of European Technical Assessment ETA-19/0816
Materials and curing time	

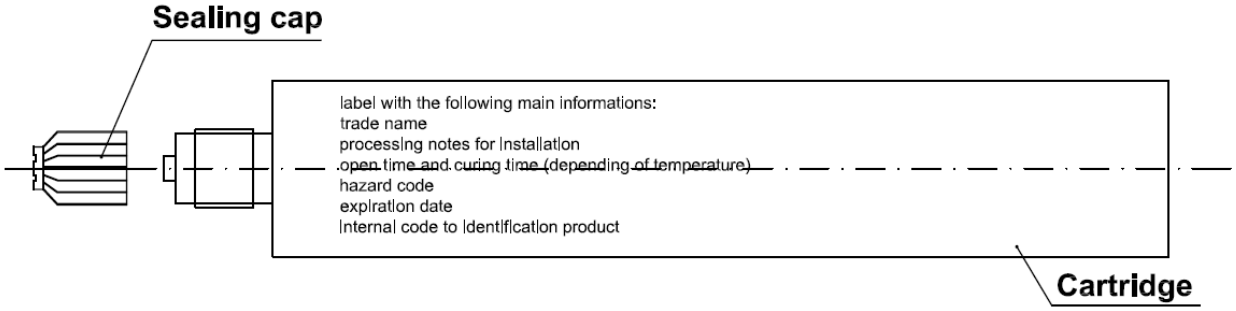
coaxial cartridge - sizes from 75 ml to 420 ml



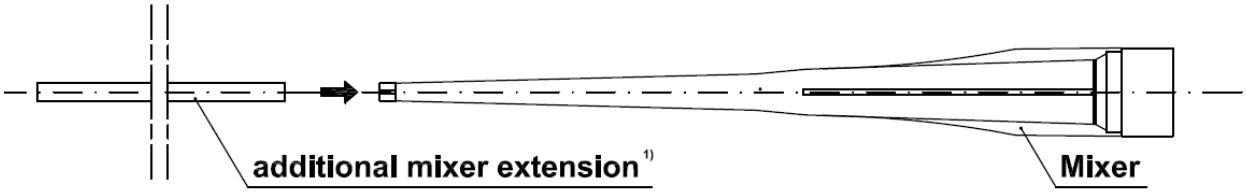
CIC foil cartridge - sizes from 165 ml to 300 ml



coaxial peeler cartridge - size of 280 ml



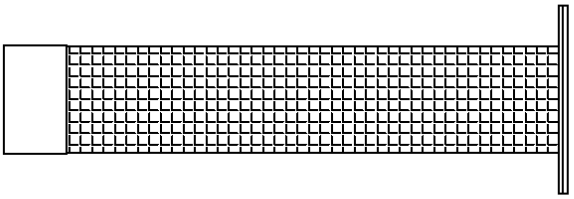
MIXER - the mixer is suitable for each type of cartridge



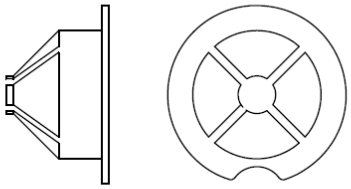
1) Variable length from 380 mm up to 1000 mm

CA POLY - EKOR Injection anchor	**Annex A5** of European Technical Assessment ETA-19/0816
Cartridge types and sizes	

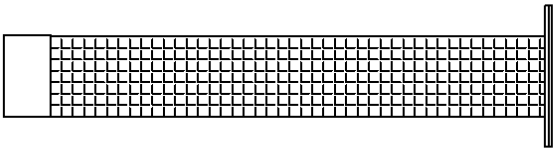
Plastic sleeve for hollow/perforated masonry: nominal dimensions and material



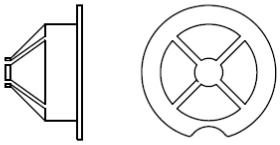
Plastic sleeve 20x85 for M12
Nominal diameter 20 mm
Nominal length 85 mm



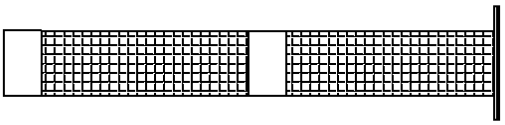
Lateral and top view of plastic centering cap for 20x85 plastic sleeve



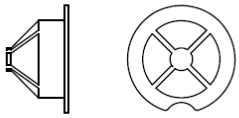
Plastic sleeve 15x85 for M10
Nominal diameter 15 mm
Nominal length 85 mm



Lateral and top view of plastic centering cap for 15x85 plastic sleeve



Plastic sleeve 12x80 for M8
Nominal diameter 12 mm
Nominal length 80 mm



Lateral and top view of plastic centering cap for 12x80 plastic sleeve

Table A5: Plastic sleeve materials

Part	Designation
Plastic sleeve	Polypropylene (PP) / Polyethylene (PE)
Centering cap	Polypropylene (PP) / Polyethylene (PE)

CA POLY - EKOR Injection anchor	**Annex A6** of European Technical Assessment ETA-19/0816
Plastic sleeve	

Use:
The anchors are intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

Anchors subject to:
- Static and quasi-static loads: sizes from M8 to M12.

Base materials:
- Solid masonry (masonry group b) or hollow or perforated masonry (masonry group c) according to Annex B7. The mortar strength class of the masonry has to be M 2,5 according to EN 998-2:2010 at minimum.

Temperature range:
The anchors may be used in the following temperature range:
a) -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C),
b) -40°C to +50°C (max. short term temperature +50°C and max. long term temperature +40°C).

Use conditions (Environmental conditions):
Threaded rods:
a) Carbon galvanized steel class 5.8 or 6.8 according to EN ISO 898-1 for dry internal conditions.
b) Stainless steel A4-70 and A4-80 according to EN ISO 3506 for dry internal conditions.

Nuts and washers:
Corresponding to anchor rod material above mentioned for the different environmental exposures.

Installation:
- Condition w/d: installation in dry or wet substrate and use in structures subjected to dry, internal conditions.
- Perforation with drilling machine

Proposed design methods:
- TR054, Design method A

Table B1 Installation data for solid masonry (brick n°1)*

Size		**M8**	**M10**	**M12**
Nominal drilling diameter	d_0 [mm]	10	12	14
Maximum diameter hole in the fixture	d_{fix} [mm]	9	12	14
Embedment depth	h_{ef} [mm]	80	85	95
Depth of the drilling hole	h_1 [mm]	h_{ef} + 5 mm		
Torque moment	T_{inst} [Nm]	5	8	10
Thickness to be fixed	$t_{fix,min}$ [mm]	> 0		
	$t_{fix,max}$ [mm]	< 1500		
Minimum spacing	S_{min} [mm]	240	255	285
Minimum edge distance	C_{min} [mm]	120	128	143

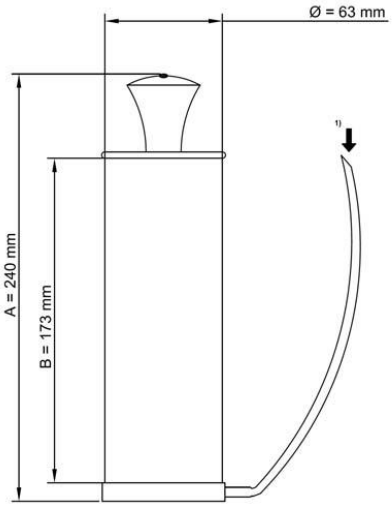
* Type of bricks are detailed in the Annex B7

Table B2: Installation data for hollow/perforated masonry (brick n° 2 to 6) *

Size		**M8**	**M10**	**M12**
Plastic sleeve		**12x80**	**15x85**	**20x85**
Nominal drilling diameter	d_0 [mm]	12	16	20
Maximum diameter hole in the fixture	d_{fix} [mm]	9	12	14
Embedment depth	h_{ef} [mm]	80	85	85
Depth of the drilling hole	h_1 [mm]	h_{ef} + 5 mm		
Torque moment	T_{inst} [Nm]	3	4	6
Thickness to be fixed	$t_{fix,min}$ [mm]	> 0		
	$t_{fix,max}$ [mm]	< 1500		
Minimum spacing	S_{min} [mm]	100	100	120
Minimum edge distance	C_{min} [mm]	100	100	120

* Type of bricks are detailed in the Annex B7

Manual blower pump: nominal dimensions



Brush

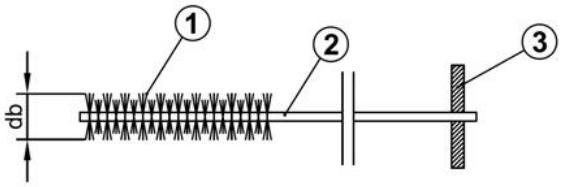
It is possible to use the mixer extension with the manual blower pump.
However it is possible to blow the hole using the mechanical air system (compressed air) also with the mixer estension

Suitable min pressure 6 bar at 6 m³/h
Oil-free compressed air
Recommended air gun with an orifice opening of minimum 3.5 mm in diameter

1) Position to insert the mixer extension

Mixer extension Ø 8 mm

Brush



① Steel bristles
② Steel stem
③ Wood handle

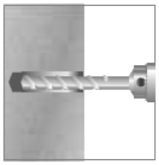
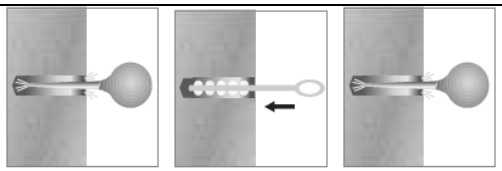
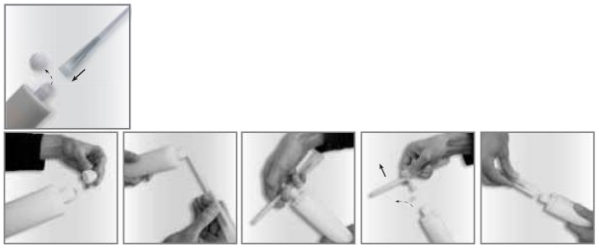
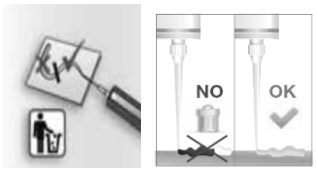
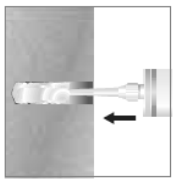
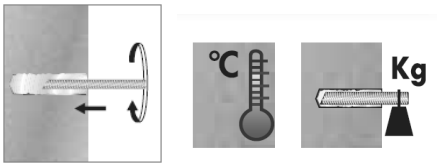
Table B3: Brush diameter

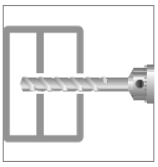
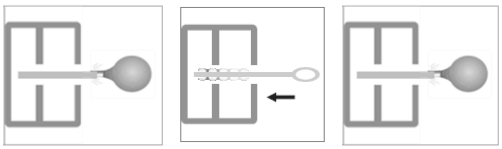
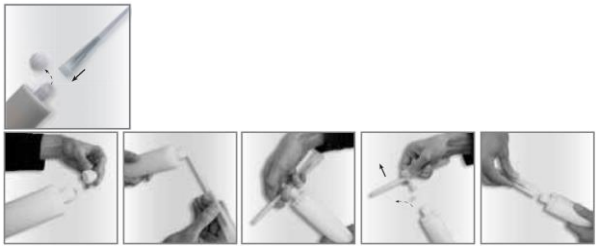
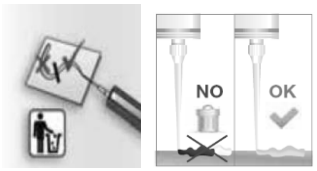
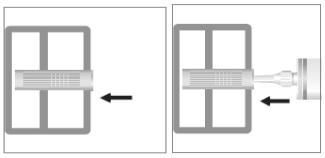
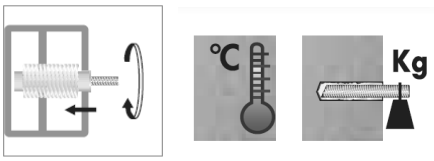
			Use in solid masonry			Use in hollow/perforated masonry		
Type of threaded rod			**M8**	**M10**	**M12**	**M8**	**M10**	**M12**
Type of plastic sleeve			**-**	**-**	**-**	**12x80**	**15x85**	**20x85**
d_0	Nominal drill hole	[mm]	10	12	14	12	16	20
d_b	Brush diameter	[mm]	12	14	16	12	16	20

CA POLY - EKOR Injection anchor	**Annex B3**
Cleaning tools	of European Technical Assessment ETA-19/0816

Resin injection pump details		
Pump example	**Size cartridge**	**Type**
	400 ml	Manual
	300 ml 280 ml 165 ml	Manual

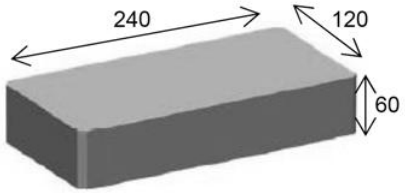
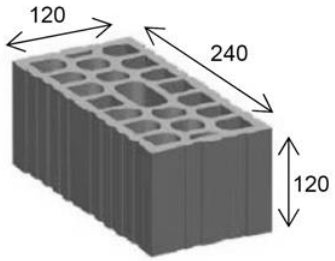
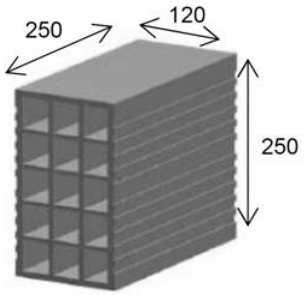
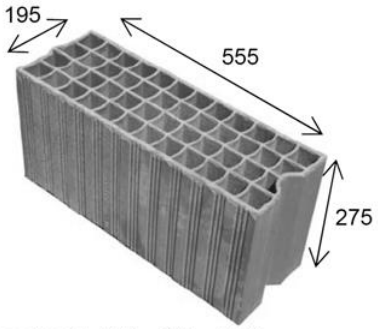
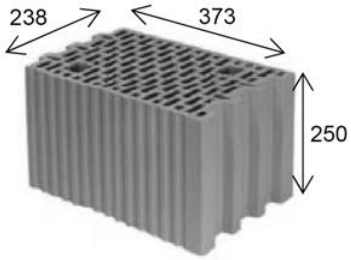
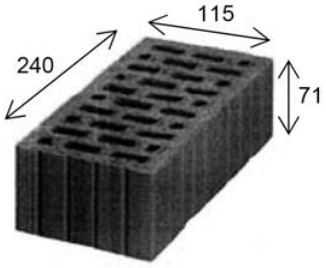
CA POLY - EKOR Injection anchor	**Annex B4**
Tools for injection	of European Technical Assessment ETA-19/0816

1		Drill the hole with the correct diameter and depth using a rotary percussive machine. Check the perpendicularity of the hole during the drilling operation.
2	 **4x Blower Pump** **4x Brush** **4x Blower Pump** (instead of the blower manual pump it is also possible to use the compressed air free oil)	Clean the hole from drilling dust: the hole shall be cleaned by at least 4 blowing operations, by at least 4 brushing operations followed again by at least 4 blowing operations; before brushing clean the brush and check (see Table B3 in Annex B3) if the brush diameter is sufficient. For the blower tools see Annex B3.
3		For sizes 400 ml and 280 ml unscrew the front cup, screw on the mixer and insert the cartridge in the gun. For the size 300 ml and 165 ml, unscrew the front cup, pull-out the steel closing clip according to the following operations: - insert the mixer in the eye of the plastic extractor, - pull the extractor to unhook the steel closing clip of the foil. After that, screw on the mixer and insert the cartridge in the gun.
4		Before starting to use the cartridge, eject a first part of the product, being sure that the two components are completely mixed. The complete mixing is reached only after that the product, obtained by mixing the two components, comes out from the mixer with a uniform color.
5		Fill the drilled hole uniformly starting from the drilled hole bottom, to avoid entrapment of the air; remove the mixer slowly bit by bit during pressing-out; filling the drill hole with a quantity of the injection mortar corresponding to 2/3 of the drill hole depth.
6		Insert immediately the rod, marked according to the proper anchorage depth, slowly and with a slight twisting motion, removing excess of injection mortar around the rod. Observe the processing time according Annex A4. Wait the curing time according Annex A4.

1		Drill the hole with the correct diameter and depth using a rotary machine. Check the perpendicularity of the hole during the drilling operation.
2	 **4x Blower Pump** **2x Brush** **4x Blower Pump** (instead of the blower manual pump it is also possible to use the compressed air free oil)	Clean the hole from drilling dust: the hole shall be cleaned by at least 4 blowing operations, by at least 2 brushing operations followed again by at least 4 blowing operations; before brushing clean the brush and check (see Table B3 in Annex B3) if the brush diameter is sufficient. For the blower tools see Annex B3.
3		For sizes 400 ml and 280 ml unscrew the front cup, screw on the mixer and insert the cartridge in the gun. For the size 300 ml and 165 ml, unscrew the front cup, pull-out the steel closing clip according to the following operations: - insert the mixer in the eye of the plastic extractor, - pull the extractor to unhook the steel closing clip of the foil. After that, screw on the mixer and insert the cartridge in the gun.
4		Before starting to use the cartridge, eject a first part of the product, being sure that the two components are completely mixed. The complete mixing is reached only after that the product, obtained by mixing the two components, comes out from the mixer with a uniform color.
5		Remove the centering cap from the plastic sleeve. Insert in the hole the plastic sleeve (see Annex A6). Fill the sleeve uniformly starting from the sleeve bottom. Remove the mixer slowly bit by bit during pressing-out: remove the mixer about 10 mm for each pressing operation. Filling the sleeve completely.
6		Put on the centering cup on the filled plastic sleeve. Insert immediately the rod, marked according to the proper anchorage depth, slowly and with a slight twisting motion, removing excess of injection mortar around the rod. Observe the processing time according Annex A4. Wait the curing time according Annex A4.

CA POLY - EKOR Injection anchor	**Annex B6**
Procedure for hollow/perforated masonry	of European Technical Assessment ETA-19/0816

Table B5: Type of solid and hollow/perforated masonry

Brick n°1 – Solid **according to EN 771-1 - HD (High density)**  Dimensions [mm]: 120 x 240 x 60 f_b class ≥73 N/mm^2 density ρm ≥ 1700 kg/m^3 (e.g. type "Mattone Pieno")	**Brick n°2 – Hollow/perforated** **according to EN 771-1 - LD (Low density)**  Dimensions [mm]: 240 x 120 x 120 f_b class ≥ 18,3 N/mm^2 density ρm ≥ 810 kg/m^3 (e.g. type "Mattone Doppio UNI")
Brick n°3 – Hollow/perforated **according to EN 771-1 - LD (Low density)**  Dimensions [mm]: 120 x 250 x 250 f_b class ≥ 5,3 N/mm^2 density ρm ≥ 550 kg/m^3 (e.g. type "Forato")	**Brick n°4 – Hollow/perforated** **according to EN 771-1 - LD (Low density)**  Dimensions [mm]: 555 x 195 x 275 f_b class ≥ 4,0 N/mm^2 density ρm ≥ 600 kg/m^3 (e.g. type "Brique creuse RC 40")
Brick n°5 – Hollow/perforated **according to EN 771-1 - LD (Low density)**  Dimensions [mm]: 373 x 238 x 250 f_b class ≥ 15 N/mm^2 density ρm ≥ 800 kg/m^3 (e.g. type "Porotherm 25 P+W")	**Brick n°6 – Hollow/perforated** **according to EN 771-1 - LD (Low density)**  Dimensions [mm]: 115 x 240 x 71 f_b class ≥ 12 N/mm^2 density ρm ≥ 900 kg/m^3 (e.g. type "Hlz B – 1.0 1NF 12-1")

CA POLY - EKOR Injection anchor	**Annex B7** of European Technical Assessment ETA-19/0816
Type and dimensions of brick	

Table C1: Essential Characteristics

ESSENTIAL CHARACTERISTICS		**PERFORMANCE**		
Installation parameters		**M8**	**M10**	**M12**
d [mm]		8	10	12
d_0 [mm] category b (solid masonry)		10	12	14
d_0 [mm] category c (hollow or perforated masonry)		12	16	20
Type of plastic sleeve for use in category c		GC 12x80	GC 15x85	GC 20x85
d_{fix} [mm]		9	12	14
h_1 [mm]		h_{ef} + 5 mm		
t_{fix} [mm]	Min	> 0		
	Max	≤ 1500 mm		
T_{inst} [Nm] category b (solid masonry)		5	8	10
T_{inst} [Nm] category c (hollow or perforated masonry)		3	4	6
S_{min} [mm] category b (solid masonry)		240	255	285
C_{min} [mm] category b (solid masonry)		120	128	143
S_{min} e C_{min} [mm] category c (hollow or perforated masonry)		100	100	120
*** Resistance for tensile and shear load Temperature range -40°C/+40°C (T_{mlp} = 24°C) and -40°C/+50°C (T_{mlp} = 40°C)**		**M8**	**M10**	**M12**
Brick n°1	N_{Rk} [kN]	1,50	2,50	3,00
	V_{Rk} [kN]	1,50	2,50	3,00
Brick n°2	N_{Rk} [kN]	3,50	4,00	5,00
	V_{Rk} [kN]	3,50	4,00	5,00
Brick n°3	N_{Rk} [kN]	0,60	1,50	1,50
	V_{Rk} [kN]	0,60	1,50	1,50
Brick n°4	N_{Rk} [kN]	0,90	0,90	0,60
	V_{Rk} [kN]	0,90	0,90	0,60
Brick n°5	N_{Rk} [kN]	2,00	2,00	2,50
	V_{Rk} [kN]	2,00	2,00	2,50
Brick n°6	N_{Rk} [kN]	3,00	4,00	4,00
	V_{Rk} [kN]	3,00	4,00	4,00

* For design according to EOTA TR054: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,pb}$ – steel failure is not decisive

* For design according to EOTA TR054: $V_{Rk} = V_{Rk,b}$ – steel failure without lever arm is not decisive – $V_{Rk,c}$ according to EOTA TR054

Table C2: Characteristic bending moments

ESSENTIAL CHARACTERISTICS			**PERFORMANCE**		
Size			**M8**	**M10**	**M12**
Characteristic resistance with standard threaded rod grade 5.8	$M_{Rk,s}$	[Nm]	19	37	65
Partial safety factor	γ_{Ms}	[-]	1,25		
Characteristic resistance with standard threaded rod grade 6.8	$M_{Rk,s}$	[Nm]	22	45	79
Partial safety factor	γ_{Ms}	[-]	1,25		
Characteristic resistance with standard threaded rod stainless steel A4-70 (class 70)	$M_{Rk,s}$	[Nm]	26	52	92
Partial safety factor	γ_{Ms}	[-]	1,56		

Table C3: Characteristic values for tension and shear load.

ESSENTIAL CHARACTERISTICS		**PERFORMANCE**		
*** Resistance for tensile and shear load Temperature range -40°C/+40°C (T_{mlp} = 24°C) and -40°C/+50°C (T_{mlp} = 40°C)**		**M8**	**M10**	**M12**
γ_{Mm} [-] Condition w/d			2,50	
Brick n°1	$S_{cr,N}$ [mm]	240	255	285
	$C_{cr,N}$ [mm]	120	128	143
Brick n°2	$S_{cr,N}$ [mm]	240	240	240
	$C_{cr,N}$ [mm]	120	120	120
Brick n°3	$S_{cr,N}$ [mm]	250	250	250
	$C_{cr,N}$ [mm]	125	125	125
Brick n°4	$S_{cr,N}$ [mm]	555	555	555
	$C_{cr,N}$ [mm]	278	278	278
Brick n°5	$S_{cr,N}$ [mm]	373	373	373
	$C_{cr,N}$ [mm]	187	187	187
Brick n°6	$S_{cr,N}$ [mm]	240	240	240
	$C_{cr,N}$ [mm]	120	120	120
β coefficient for in situ test (EAD 330076-00-0604) Temperature range: -40°C/+40°C e -40°C/+50°C		**M8**	**M10**	**M12**
Brick n° 1, 2, 3, 4, 6	β [-]		0,70	
Brick n° 5	β [-]	0,65	0,70	0,70
Displacement under service load Tensile load				
Brick n°1 – Solid brick		**M8**	**M10**	**M12**
Admissible service load in tensile	F [kN]	0,65	1,03	1,15
Displacement	δ_{N0} [mm]	0,08	0,07	0,06
	$\delta_{N\infty}$ [mm]	0,16	0,16	0,16
Brick n°2 – Hollow/perforated brick		**M8 GC 12x80**	**M10 GC 15x85**	**M12 GC 20x85**
Admissible service load in tensile	F [kN]	1,48	1,81	2,09
Displacement	δ_{N0} [mm]	0,06	0,08	0,10
	$\delta_{N\infty}$ [mm]	0,16	0,16	0,20
Brick n°3 – Hollow/perforated brick		**M8 GC 12x80**	**M10 GC 15x85**	**M12 GC 20x85**
Admissible service load in tensile	F [kN]	0,29	0,73	0,80
Displacement	δ_{N0} [mm]	0,06	0,08	0,07
	$\delta_{N\infty}$ [mm]	0,16	0,16	0,16
Brick n°4 – Hollow/perforated brick		**M8 GC 12x80**	**M10 GC 15x85**	**M12 GC 20x85**
Admissible service load in tensile	F [kN]	0,39	0,44	0,26
Displacement	δ_{N0} [mm]	0,06	0,06	0,06
	$\delta_{N\infty}$ [mm]	0,16	0,16	0,16
Brick n°5 – Hollow/perforated brick		**M8 GC 12x80**	**M10 GC 15x85**	**M12 GC 20x85**
Admissible service load in tensile	F [kN]	0,92	0,91	1,02
Displacement	δ_{N0} [mm]	0,06	0,06	0,06
	$\delta_{N\infty}$ [mm]	0,16	0,16	0,16
Brick n°6 – Hollow/perforated brick		**M8 GC 12x80**	**M10 GC 15x85**	**M12 GC 20x85**
Admissible service load in tensile	F [kN]	1,19	1,69	1,78
Displacement	δ_{N0} [mm]	0,12	0,07	0,06
	$\delta_{N\infty}$ [mm]	0,24	0,16	0,16

Table C3 cont.: Characteristic values for tension and shear load.

ESSENTIAL CHARACTERISTICS		PERFORMANCE		
Displacement under service load **Shear load**				
Brick n°1 – Solid brick		**M8**	**M10**	**M12**
Admissible service load in shear	F [kN]	1,32	2,94	2,62
Displacement	δ_{V0} [mm]	0,23	0,48	0,38
	$\delta_{V\infty}$ [mm]	0,34	0,72	0,57
Brick n°2 – Hollow/perforated brick		**M8** **GC 12x80**	**M10** **GC 15x85**	**M12** **GC 20x85**
Admissible service load in shear	F [kN]	1,72	2,03	2,93
Displacement	δ_{V0} [mm]	0,20	0,38	0,34
	$\delta_{V\infty}$ [mm]	0,30	0,57	0,51
Brick n°3 – Hollow/perforated brick		**M8** **GC 12x80**	**M10** **GC 15x85**	**M12** **GC 20x85**
Admissible service load in shear	F [kN]	0,93	1,08	0,86
Displacement	δ_{V0} [mm]	0,31	0,23	0,18
	$\delta_{V\infty}$ [mm]	0,46	0,34	0,27
Brick n°4 – Hollow/perforated brick		**M8** **GC 12x80**	**M10** **GC 15x85**	**M12** **GC 20x85**
Admissible service load in shear	F [kN]	0,44	0,63	0,44
Displacement	δ_{V0} [mm]	0,10	0,18	0,27
	$\delta_{V\infty}$ [mm]	0,15	0,27	0,40
Brick n°5 – Hollow/perforated brick		**M8** **GC 12x80**	**M10** **GC 15x85**	**M12** **GC 20x85**
Admissible service load in shear	F [kN]	0,78	1,06	1,00
Displacement	δ_{V0} [mm]	0,23	0,19	0,31
	$\delta_{V\infty}$ [mm]	0,34	0,28	0,46
Brick n°6 – Hollow/perforated brick		**M8** **GC 12x80**	**M10** **GC 15x85**	**M12** **GC 20x85**
Admissible service load in shear	F [kN]	1,25	2,23	1,65
Displacement	δ_{V0} [mm]	0,17	0,69	0,13
	$\delta_{V\infty}$ [mm]	0,25	1,03	0,19

Table C4: Reaction to fire.

ESSENTIAL CHARACTERISTICS	PERFORMANCE
Reaction to fire	In the final application the thickness of the mortar layer is about 1 to 2 mm and most of the mortar is material classified class A1 according to EC Decision 96/603/EC. Therefore, it may be assumed that the bonding material (synthetic mortar or a mixture of synthetic mortar and cementitious mortar) in connection with the metal anchor in the end use application do not make any contribution to fire growth or to the fully developed fire and they have no influence on the smoke hazard.

Table C5: Resistance to fire.

ESSENTIAL CHARACTERISTICS	PERFORMANCE
Resistance to fire	NPA

Table C6: Terminology and symbols

TERMINOLOGY AND SYMBOLS	
d	Diameter of anchor bolt or thread diameter
d_0	Drill hole diameter
d_{fix}	Diameter of clearance hole in the fixture
h_{ef}	Effective anchorage depth
h_1	Depth of the drilling hole
h_{min}	Minimum thickness of concrete member
T_{inst}	Torque moment to installation
t_{fix}	Thickness to be fixed
S_{min}	Minimum allowable spacing
C_{min}	Minimum allowable edge distance
$k_{urc,N}$ [-]	Factor for concrete cone in uncracked concrete
$S_{cr,N}$	Characteristic spacing between two different anchors for the concrete cone failure
$C_{cr,N}$	Characteristic edge distance between two different anchors for the concrete cone failure
$S_{cr,sp}$	Spacing for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects in case of splitting failure
$C_{cr,sp}$	Edge distance for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects in case of splitting failure
$N_{Rk,s}$	Characteristic tension resistance for steel failure
$N_{Rk,c}$	Characteristic tension resistance for concrete cone failure
$V_{Rk,s}$	Characteristic shear resistance for steel failure without lever arm
k_7	Ductility factor for steel failure in shear load
$M^0_{Rk,s}$	Characteristic shear resistance for steel failure with lever arm
$V_{Rk,c}$	Characteristic shear resistance for concrete edge failure
d_{nom} [mm]	Outside diameter of fastener
l_f [mm]	Parameter for evaluation of concrete edge failure
$\tau_{Rk,ucr}$	Characteristic bond resistance in un-cracked concrete class C20/25
$\gamma_2 = \gamma_{inst}$	Partial safety factors for installation
$\psi_{c,ucr}$	Increasing factor for un-cracked concrete
$k = k_3 = k_8$ [-]	Factor for concrete pry-out failure
F	Service load in un-cracked (ucr) or cracked concrete (cr) in tensile or shear load
δ_0	Short term displacement under service load in un-cracked (uncr) or cracked concrete (cr) for tensile (N) or shear load (V)
δ_∞	Long term displacement under service load in un-cracked (uncr) or cracked concrete (cr) for tensile (N) or shear load (V)
NPA	No performance assessed