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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

MEMBER OF EOTA



European Technical Assessment ETA-21/0886 of 2021/10/04

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:

GMS-CHEMICAL MORTAR POLY SF 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:

GMS-Bautechnik GmbH
Sonnengasse 13
A-9020 Klagenfurt
Tel +43 463 481111
Internet www.gms-systeme.com

Manufacturing plant:

GMS-Bautechnik GmbH
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:

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (except the confidential Annexes referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

The Injection system GMS-CHEMICAL MORTAR POLY SF Injection anchor is a bonded anchor (injection type) consisting of a mortar cartridge with GMS-CHEMICAL MORTAR POLY SF 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 documentation¹ 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.

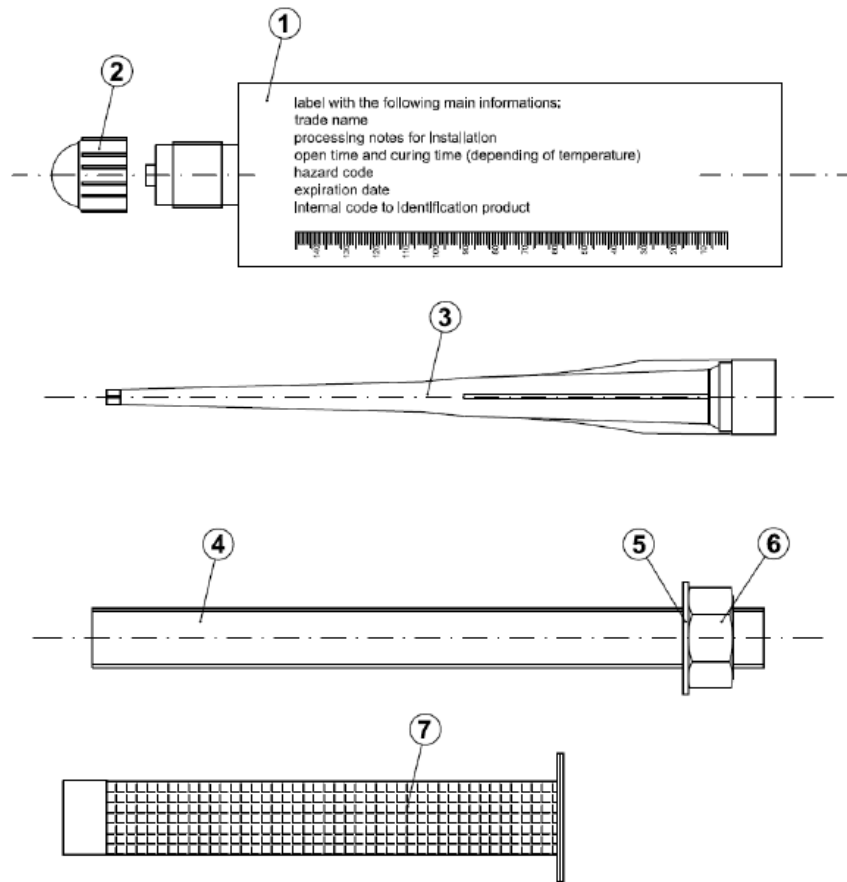
5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

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 2021-10-04 by



Thomas Bruun
Manager, ETA-Danmark



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

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.

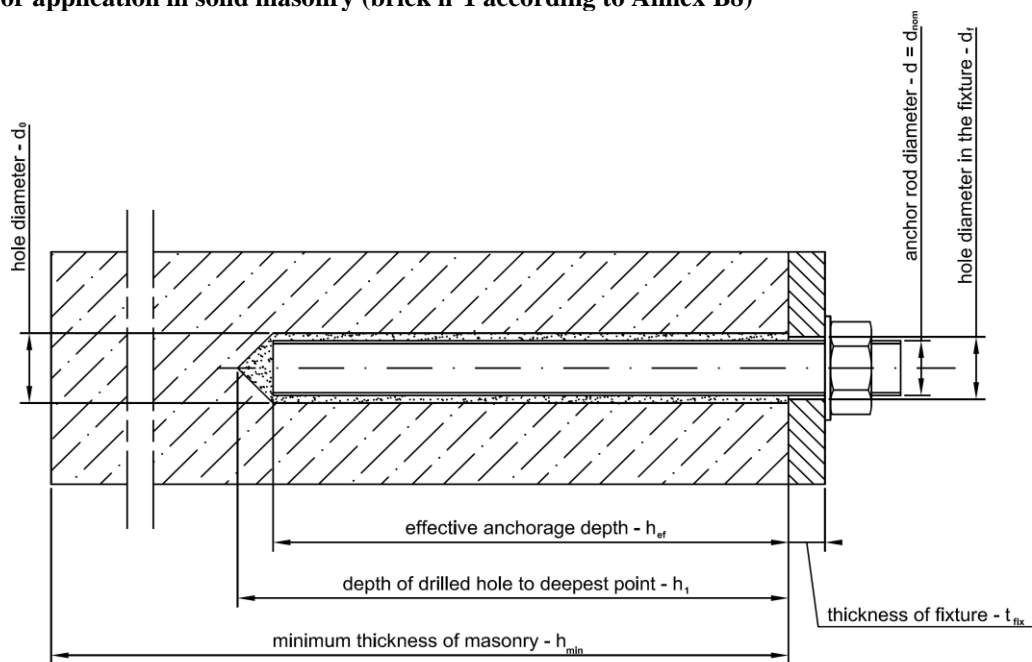
Temperature range:

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

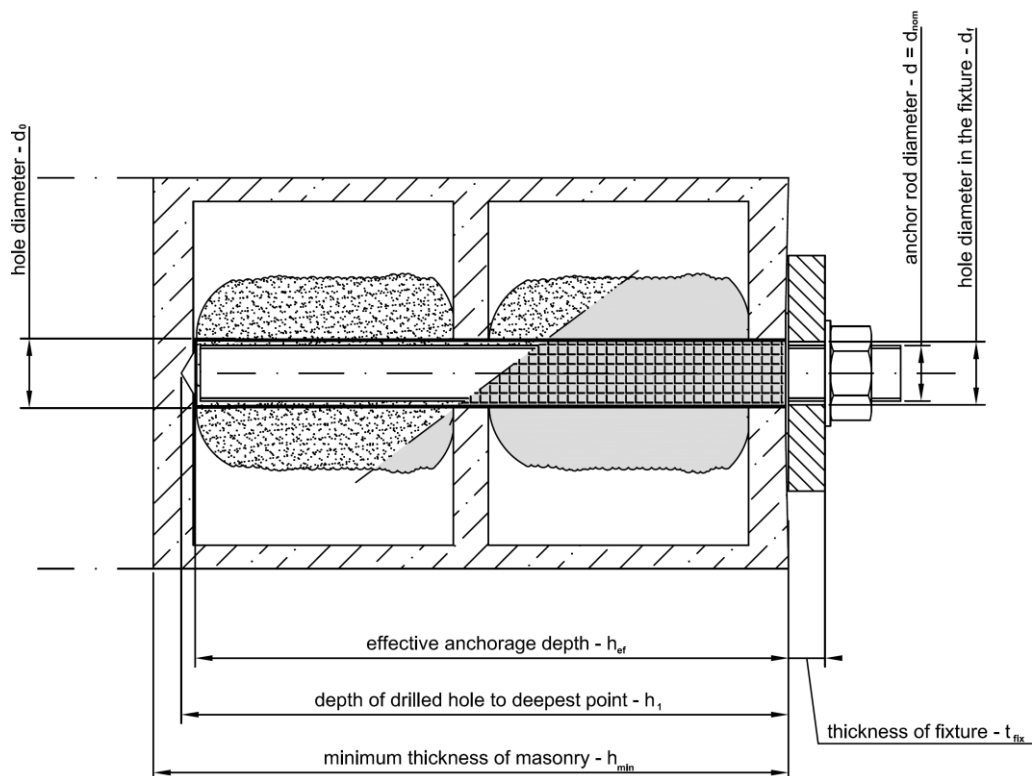
-40°C to +50°C (max. short term temperature +50°C and max. long term temperature +40°C)

| | |
|---|---|
| GMS-CHEMICAL MORTAR POLY SF Injection anchor | Annex A1 of European Technical Assessment ETA-21/0886 |
| Product and intended use (1) | |

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)



GMS-CHEMICAL MORTAR POLY SF Injection anchor

Product and intended use (2)

Annex A2

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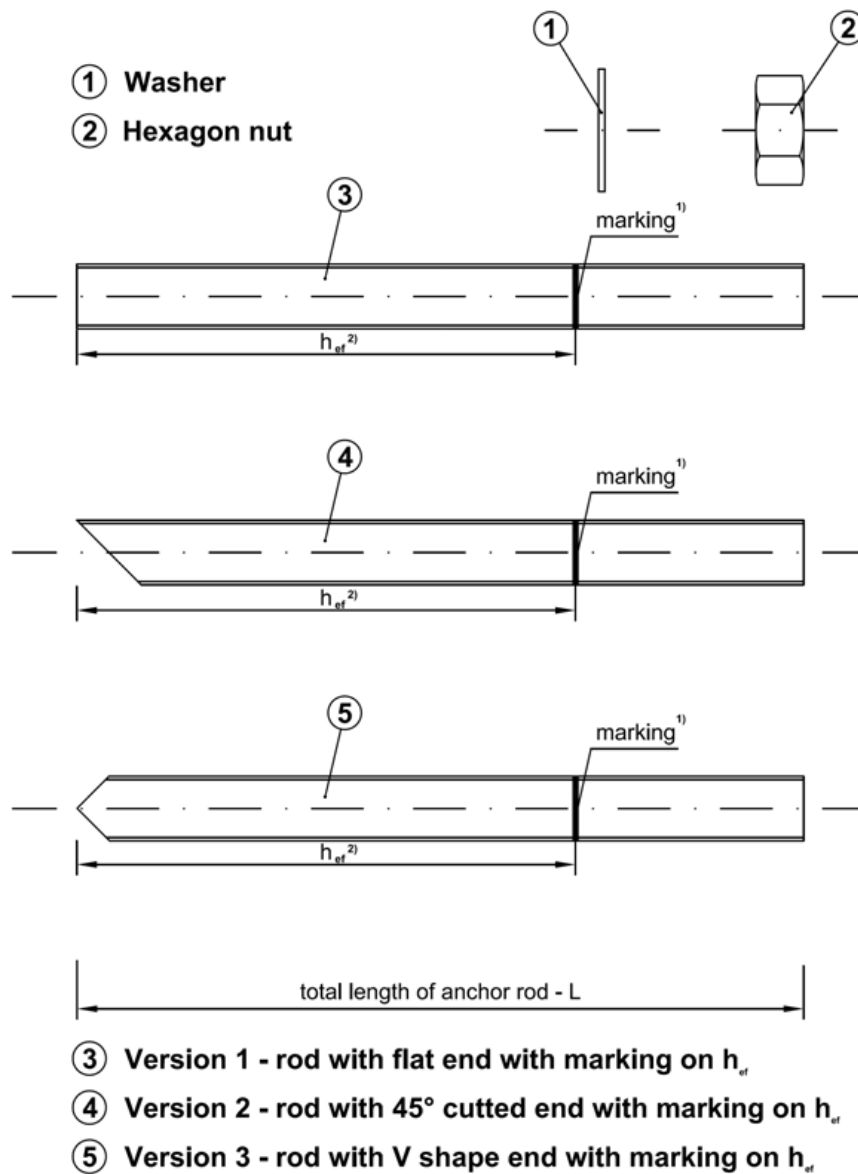


Table A1: Threaded rod dimensions

| Size | d [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.

GMS-CHEMICAL MORTAR POLY SF Injection anchor

Threaded rod types and dimensions

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Table A2: Threaded rods materials

| Part | Designation | |
|--------------|--|--|
| | Steel, zinc plated $\geq 5 \mu\text{m}$ 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 |
|--|---|
| GMS-CHEMICAL MORTAR POLY SF Injection anchor two components injection mortar | Additive: quartz Bonding agent: polyester resin styrene free Hardener: dibenzoyl peroxide |

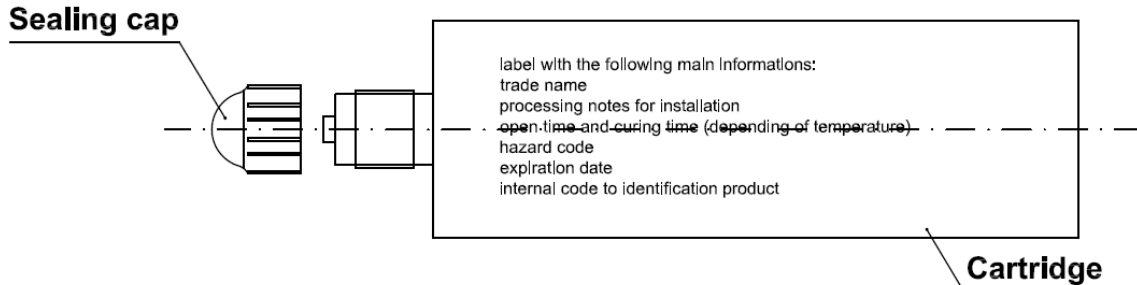
Table A4: Minimum curing time³⁾

| 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 |

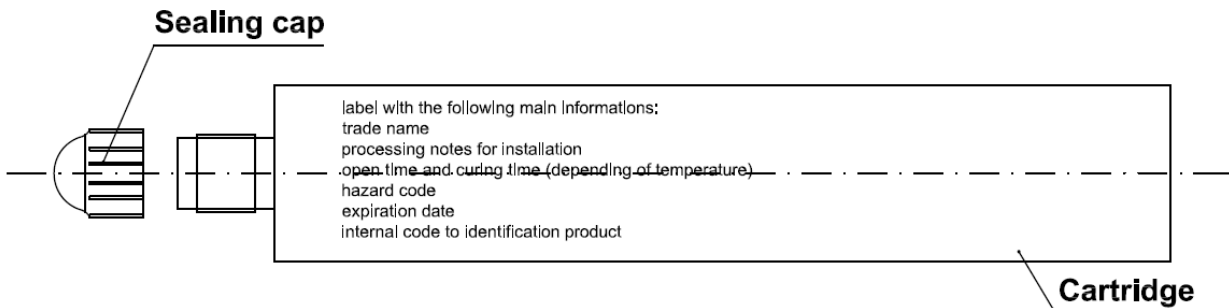
- 3) the minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer).
 4) minimum resin temperature recommended, for injection between 5°C and 0°C, equal to 5°C.
 5) minimum curing time for dry and wet conditions.

| | |
|---|---|
| GMS-CHEMICAL MORTAR POLY SF Injection anchor | Annex A4 of European Technical Assessment ETA-21/0886 |
| Materials and curing time | |

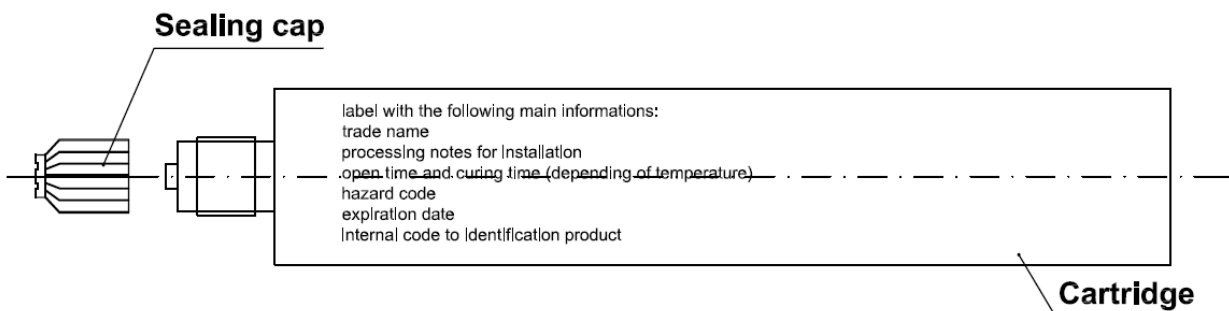
coaxial cartridge - sizes from 75 ml to 420 ml



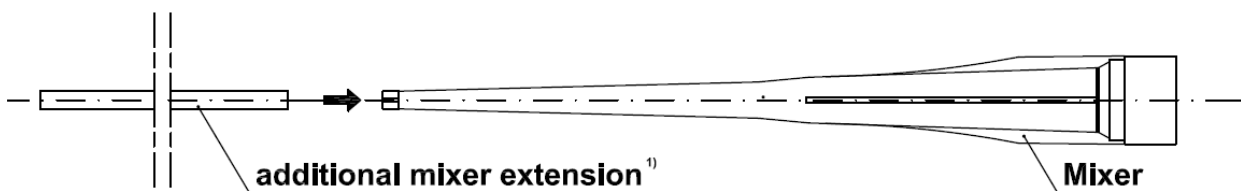
CIC foil cartridge - sizes from 165 ml to 300 ml



coaxial peeler cartridge - size of 280 ml



MIXER - the mixer is suitable for each type of cartridge



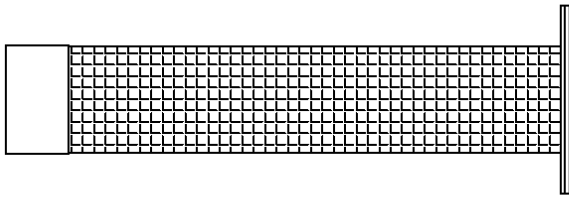
1) Variable length from 380 mm up to 1000 mm

GMS-CHEMICAL MORTAR POLY SF Injection anchor

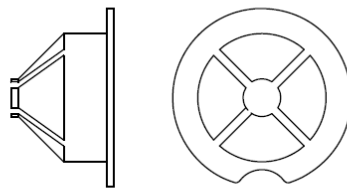
Cartridge types and sizes

Annex A5
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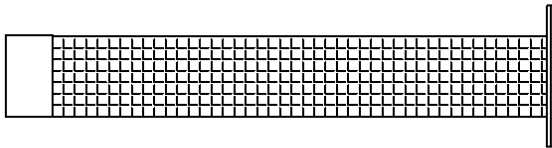
Plastic sleeve for hollow/perforated masonry: nominal dimensions and material



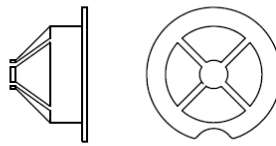
Plastic sleeve 20x85 for M12
 Nominal diameter 20 mm
 Nominal length 85 mm



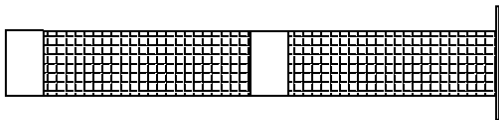
Lateral and top view of plastic centering cap for 20x85 plastic sleeve



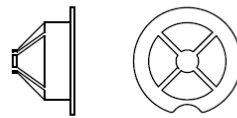
Plastic sleeve 15x85 for M10
 Nominal diameter 15 mm
 Nominal length 85 mm



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) |

GMS-CHEMICAL MORTAR POLY SF Injection anchor

Plastic sleeve

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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

| | |
|---|---|
| GMS-CHEMICAL MORTAR POLY SF Injection anchor | Annex B1 of European Technical Assessment ETA-21/0886 |
| Intended use - Specification | |

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 |

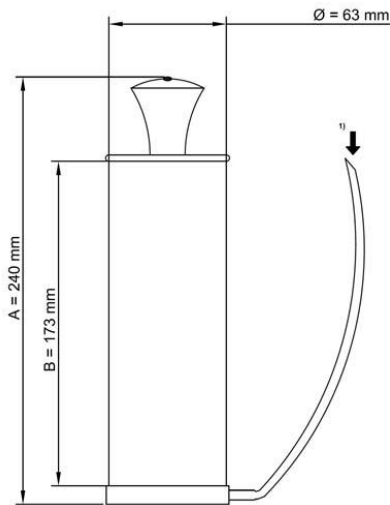
* Type of bricks are detailed in the Annex B7

GMS-CHEMICAL MORTAR POLY SF Injection anchor

Intended use - data

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Manual blower pump: nominal dimensions



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 extension



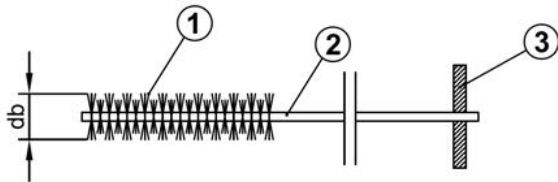
Suitable min pressure 6 bar at 6 m³/h
Oil-free compressed air
Recommended air gun with an orifice opening of minimum 3.5 mm in diameter

1) Position to insert the mixer extension

Brush

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 | | |
|------------------------|--------------------|------|----------------------|-----|-----|----------------------------------|-------|-------|
| | | | M8 | M10 | M12 | M8 | M10 | M12 |
| Type of threaded rod | | | M8 | M10 | M12 | M8 | M10 | M12 |
| Type of plastic sleeve | | | - | - | - | 12x80 | 15x85 | 20x85 |
| d₀ | Nominal drill hole | [mm] | 10 | 12 | 14 | 12 | 16 | 20 |
| d_b | Brush diameter | [mm] | 12 | 14 | 16 | 12 | 16 | 20 |

GMS-CHEMICAL MORTAR POLY SF Injection anchor

Cleaning tools

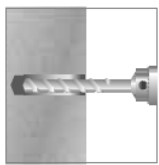
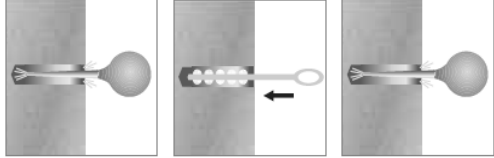
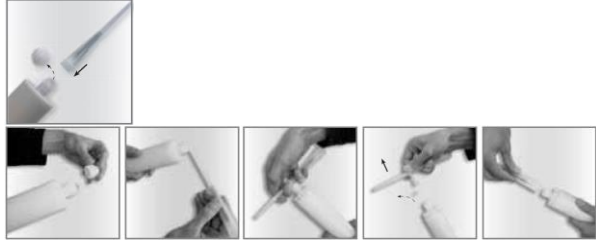
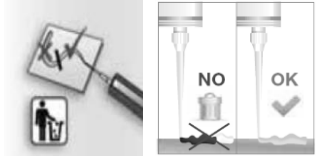
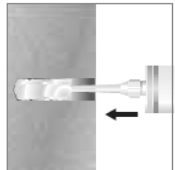
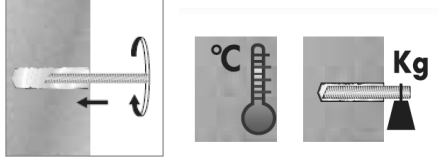
Annex B3
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| Resin injection pump details | | |
|---|----------------------------|--------|
| Pump example | Size cartridge | Type |
|  | 400 ml | Manual |
|  | 300 ml 280 ml 165 ml | Manual |

GMS-CHEMICAL MORTAR POLY SF Injection anchor

Tools for injection

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| | | |
|--|---|---|
| 1 |  | <p>Drill the hole with the correct diameter and depth using a rotary percussive machine. Check the perpendicularity of the hole during the drilling operation.</p> |
| 2 |  <p style="text-align: center;">4x 4x 4x</p> <p style="text-align: center;">Blower Pump Brush Blower Pump</p> <p>(instead of the blower manual pump it is also possible to use the compressed air free oil)</p> | <p>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.</p> |
| 3 |  | <p>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:</p> <ul style="list-style-type: none"> - 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 |  | <p>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.</p> |
| 5 |  | <p>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.</p> |
| 6 |  | <p>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.</p> |
| <p>GMS-CHEMICAL MORTAR POLY SF Injection anchor</p> | | <p>Annex B5 of European Technical Assessment ETA-21/0886</p> |
| <p>Procedure for solid masonry</p> | | |

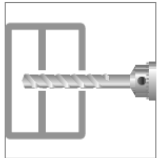
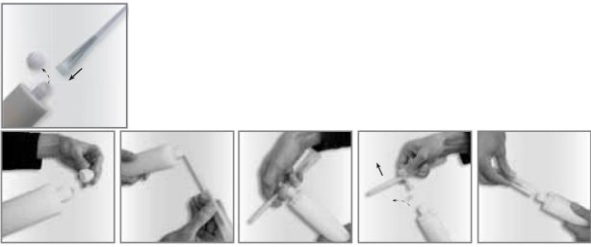
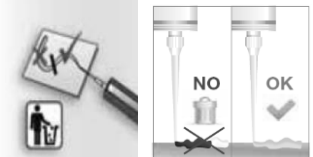
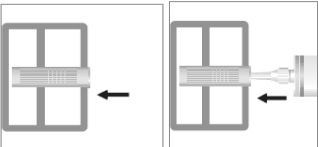
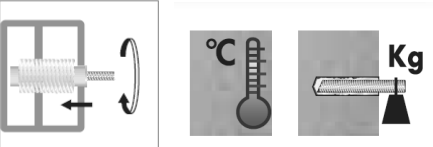
| | | |
|--|--|---|
| 1 |  | <p>Drill the hole with the correct diameter and depth using a rotary machine. Check the perpendicularity of the hole during the drilling operation.</p> |
| 2 | <p>4x Blower Pump 2x Brush 4x Blower Pump (instead of the blower manual pump it is also possible to use the compressed air free oil)</p> | <p>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.</p> |
| 3 |  | <p>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:</p> <ul style="list-style-type: none"> - 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 |  | <p>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.</p> |
| 5 |  | <p>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.</p> |
| 6 |  | <p>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.</p> |
| <p>GMS-CHEMICAL MORTAR POLY SF Injection anchor</p> | | <p>Annex B6 of European Technical Assessment ETA-21/0886</p> |
| <p>Procedure for hollow/perforated masonry</p> | | |

Table B5: Type of solid and hollow/perforated masonry

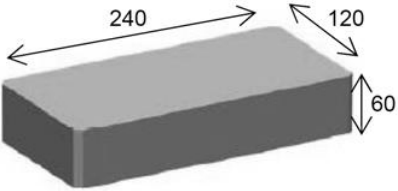
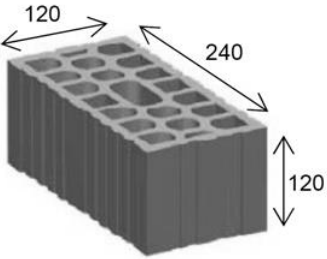
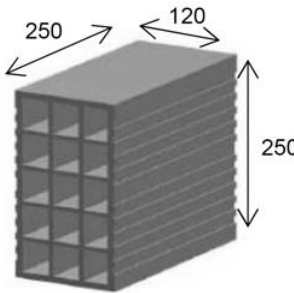
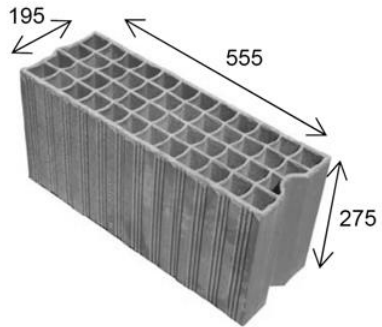
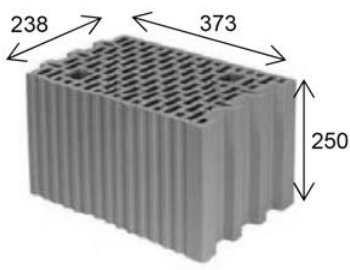
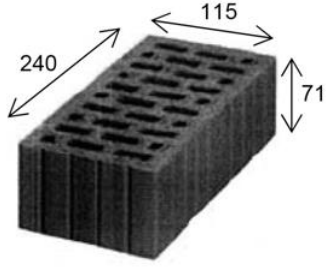
| | | |
|---|---|---|
| <p>Brick n°1 – Solid according to EN 771-1 - HD (High density)</p>  <p>Dimensions [mm]: 120 x 240 x 60 f_b class $\geq 73 \text{ N/mm}^2$ density $\rho_m \geq 1700 \text{ kg/m}^3$ (e.g. type "Mattone Pieno")</p> | <p>Brick n°2 – Hollow/perforated according to EN 771-1 - LD (Low density)</p>  <p>Dimensions [mm]: 240 x 120 x 120 f_b class $\geq 18,3 \text{ N/mm}^2$ density $\rho_m \geq 810 \text{ kg/m}^3$ (e.g. type "Mattone Doppio UNI")</p> | |
| <p>Brick n°3 – Hollow/perforated according to EN 771-1 - LD (Low density)</p>  <p>Dimensions [mm]: 120 x 250 x 250 f_b class $\geq 5,3 \text{ N/mm}^2$ density $\rho_m \geq 550 \text{ kg/m}^3$ (e.g. type "Forato")</p> | <p>Brick n°4 – Hollow/perforated according to EN 771-1 - LD (Low density)</p>  <p>Dimensions [mm]: 555 x 195 x 275 f_b class $\geq 4,0 \text{ N/mm}^2$ density $\rho_m \geq 600 \text{ kg/m}^3$ (e.g. type "Brique creuse RC 40")</p> | |
| <p>Brick n°5 – Hollow/perforated according to EN 771-1 - LD (Low density)</p>  <p>Dimensions [mm]: 373 x 238 x 250 f_b class $\geq 15 \text{ N/mm}^2$ density $\rho_m \geq 800 \text{ kg/m}^3$ (e.g. type "Porotherm 25 P+W")</p> | <p>Brick n°6 – Hollow/perforated according to EN 771-1 - LD (Low density)</p>  <p>Dimensions [mm]: 115 x 240 x 71 f_b class $\geq 12 \text{ N/mm}^2$ density $\rho_m \geq 900 \text{ kg/m}^3$ (e.g. type "Hiz B – 1.0 1NF 12-1")</p> | |
| <p>GMS-CHEMICAL MORTAR POLY SF Injection anchor</p> <p>Type and dimensions of brick</p> | | <p>Annex B7 of European Technical Assessment ETA-21/0886</p> |

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 | | |

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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 | β [-] 0,70 | β [-] 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 |
| | δ _{N∞} [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 |
| | δ _{N∞} [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 |
| | δ _{N∞} [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 |
| | δ _{N∞} [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 |
| | δ _{N∞} [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 |
| | δ _{N∞} [mm] | 0,24 | 0,16 | 0,16 |

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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 |

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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 _l | 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 _{ure,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 |
| τ _{Rk,ucr} | Characteristic bond resistance in un-cracked concrete class C20/25 |
| γ ₂ = γ _{inst} | Partial safety factors for installation |
| ψ _{cr,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 (ucr) or cracked concrete (cr) for tensile (N) or shear load (V) |
| δ _∞ | Long term displacement under service load in un-cracked (ucr) or cracked concrete (cr) for tensile (N) or shear load (V) |
| NPA | No performance assessed |

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Terminology and symbols

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