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Authorised and notified according to Article 10 of the Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products

MEMBER OF EOTA

European Technical Approval ETA-11/0533

Trade name:

Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01 bonded anchor

Holder of approval:

Tecfi SpA
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Generic type and use of construction product:

Bonded anchor with anchor rod made of galvanized steel or stainless steel of sizes M8, M10 and M12, for use in masonry

Valid from:
to:

2011-12-22
2016-11-08

Manufacturing plant:

Tecfi SpA
Manufacturing Plant I

This European Technical Approval contains:

25 pages including 17 annexes which form an integral part of the document



European Organisation for Technical Approvals

Europæisk Organisation for Tekniske Godkendelser

I LEGAL BASIS AND GENERAL CONDITIONS

1 This European Technical Approval is issued by ETA-Danmark A/S in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, as amended by Council Directive 93/68/EEC of 22 July 1993².
- Bekendtgørelse 559 af 27-06-1994 (afløser bekendtgørelse 480 af 25-06-1991) om ikrafttræden af EF direktiv af 21. december 1988 om indbyrdes tilnærmelse af medlemsstaternes love og administrative bestemmelser om byggevarer.
- Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC³.
- ETAG 029 - Guideline for European Technical Approval of METAL INJECTION ANCHORS FOR USE IN MASONRY, Edition June 2010

2 ETA-Danmark A/S is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.

4 This European Technical Approval may be withdrawn by ETA-Danmark A/S pursuant to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of ETA-Danmark A/S. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

6 This European Technical Approval is issued by ETA-Danmark A/S in English. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities N° L40, 11 Feb 1989, p 12.

2 Official Journal of the European Communities N° L220, 30 Aug 1993, p 1.

3 Official Journal of the European Communities N° L 17, 20 Jan 1994, p 34.

II SPECIAL CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

The Injection system Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01 is a bonded anchor (injection type) consisting of a mortar cartridge with Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01 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 1 and Annex 2.

Intended 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 Essential Requirements 1 and 4 of Council Directive 89/106/EEC 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 12. The mortar strength class of the masonry has to 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.

Assumed working life

The provisions made in this European Technical Approval 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 Approval 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.

2 Characteristics of product and assessment

2.1 Characteristics of product

The anchor in the range of M8, M10 and M12 and the mortar cartridges corresponds to the drawings and provisions given in the Annexes. 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 documentation⁴ of this European Technical Approval.

The characteristic anchor values for the design of anchorages are given in Annexes 13 to 17.

The anchor is assumed to satisfy the requirements for class A1 of the characteristic reaction to fire.

Regarding resistance to fire no performance is determined.

2.2 Methods of verification

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 Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Injection Anchors for Use in Masonry", ETAG 029, based on the Use Categories b and c in respect of the base material and Category w/d in respect of installation and use.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

⁴ The technical documentation of this European Technical Approval is deposited at ETA-Danmark and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies

3 Attestation of Conformity and CE marking

3.1 Attestation of Conformity system

The system of attestation of conformity 2 (i) (referred to as system 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

- a) tasks for the manufacturer:
 - 1. factory production control,
 - 2. further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan.
- b) tasks for the notified body:
 - 3. initial type-testing of the product,
 - 4. initial inspection of factory and of factory production control,
 - 5. continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval. The factory production control shall be in accordance with the control plan⁵ which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at ETA-Danmark. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

⁵ The control plan has been deposited at ETA-Danmark and is only made available to the approved bodies involved in the conformity attestation procedure.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2 For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

3.2.2. Tasks of notified bodies

3.2.2.1 Initial type testing of the product

For initial type testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type testing has to be agreed between ETA-Danmark and the notified body

3.2.2.2 Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the control plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in 2.1 as well as to the Annexes to the European Technical Approval.

3.2.2.3 Continuous surveillance

The approved body shall visit the factory at least once a year for regular inspection. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to ETA-Danmark. In cases where the provisions of the European Technical Approval and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.

3.3 CE marking

The CE marking shall be affixed on each packaging of anchors and/or injection mortar cartridge. The symbol « CE » shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the producer and manufacturing plant;
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity;
- No. of ETA Guideline (ETAG 029)
- number of the European Technical Approval;
- use category (b, c and w/d)
- size

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The anchors are manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during inspection of the plant by ETA-Danmark and the approved body and laid down in the technical documentation.

4.2 Installation

4.2.1 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the ETAG 029, Annex C, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.

Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage (nature and strength of the base materials), 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 (e.g. position of the anchor relative to supports etc.).

The characteristic resistances are only valid for kind of bricks according to Annex 12.

The characteristic resistances for use in solid masonry are also valid for larger brick sizes and larger compressive strength of the masonry unit.

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 ETAG, Annex B under consideration of the β -factor according to Annex 14, Table 12.

4.2.2 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site,
- use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor,
- anchor installation in accordance with the

manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European technical approval,

- commercial standard threaded rods, washers and hexagon nuts made of zinc coated steel or stainless steel A4 may also be used if the following requirements are fulfilled:
 - material, dimensions and mechanical properties of the metal parts according to the specifications given in Annex 4, Table 2,
 - confirmation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN 10204:2004, the documents should be stored,
 - marking of the threaded rod with the envisage embedment depth. This may be done by the manufacturer of the rod or the person on jobsite.
- checks before placing the anchor to ensure that the use category applies and that the characteristic values of the base material in which the anchor is to be placed, is identical with the values, which the characteristic loads apply for.
- holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit,
- in case of aborted drill hole the drill hole shall be filled with mortar,
- hole cleaning and anchor installation in accordance with manufacturer's installation instructions (Annex 9 and 10),
- keeping the installation parameters (Annex 4 and 11),
- marking and keeping the effective anchorage depth,
- keeping edge distance and spacing according to Annex 14 without minus tolerances,
- observing the curing time according to Annex 4, Table 4 until the anchor may be loaded.

4.2.3 Responsibility of the manufacturer

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to in 4.2.1. and 4.2.2. is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition all installation data shall be shown clearly on the package

and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- installation parameters according to Annex 4 and 11,
- material and property class of metal parts according to Annex 4, Table 2,
- information on the installation procedure, including cleaning of the hole with the cleaning equipment, preferably by means of an illustration,
- exact volume of injection mortar depend on the relevant installation,
- storage temperature of anchor components, minimum and maximum temperature of the base material, processing time (open time) of

the mortar and curing time until the anchor may be loaded according to Annex 4, identification of the manufacturing batch.

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All data shall be presented in a clear and explicit form.

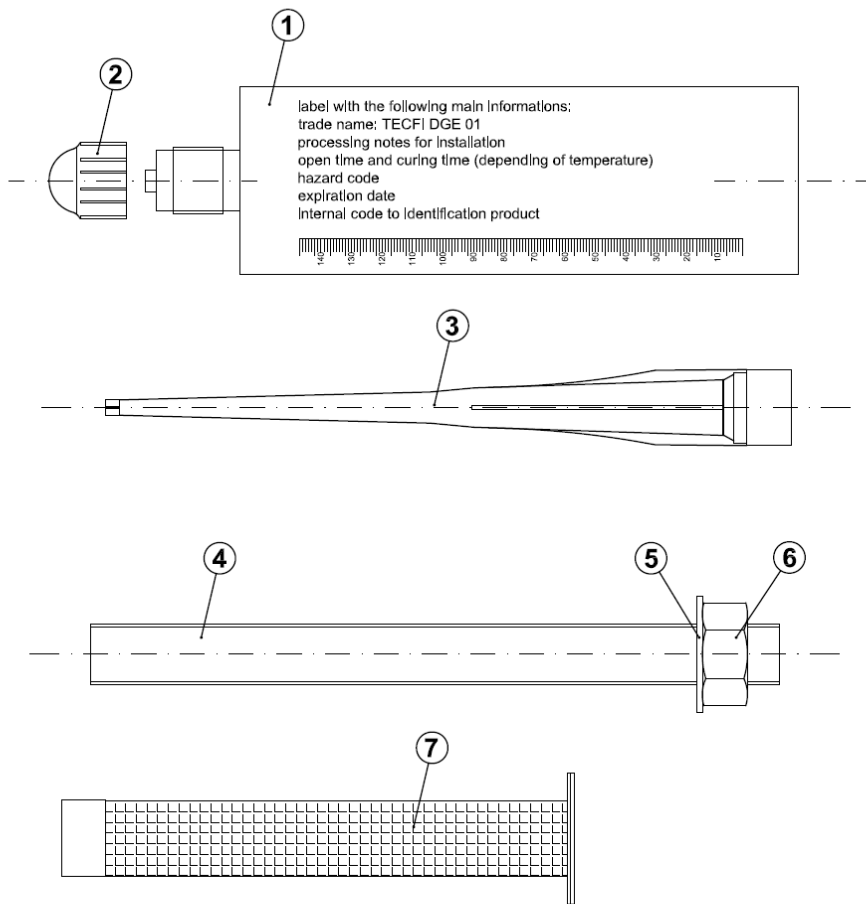
5 Recommendations on packaging, transport and storage

The mortar cartridges shall be protected against sun radiation and shall be stored according to the manufacturer's instructions in dry conditions at temperatures of at least +5°C to not more than +30°C.

Mortar cartridges with expired shelf life must no longer be used.



Thomas Bruun
Manager, ETA-Danmark



- ① Cartridge TECFI DGE 01 ④ Anchor threaded rod ⑦ Plastic sleeve
- ② Sealing cap ⑤ Washer
- ③ Mixer ⑥ Hexagon nut

Use category in respect of the base material:

Use category b: metal injection anchors for use in solid masonry.

Use category 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.

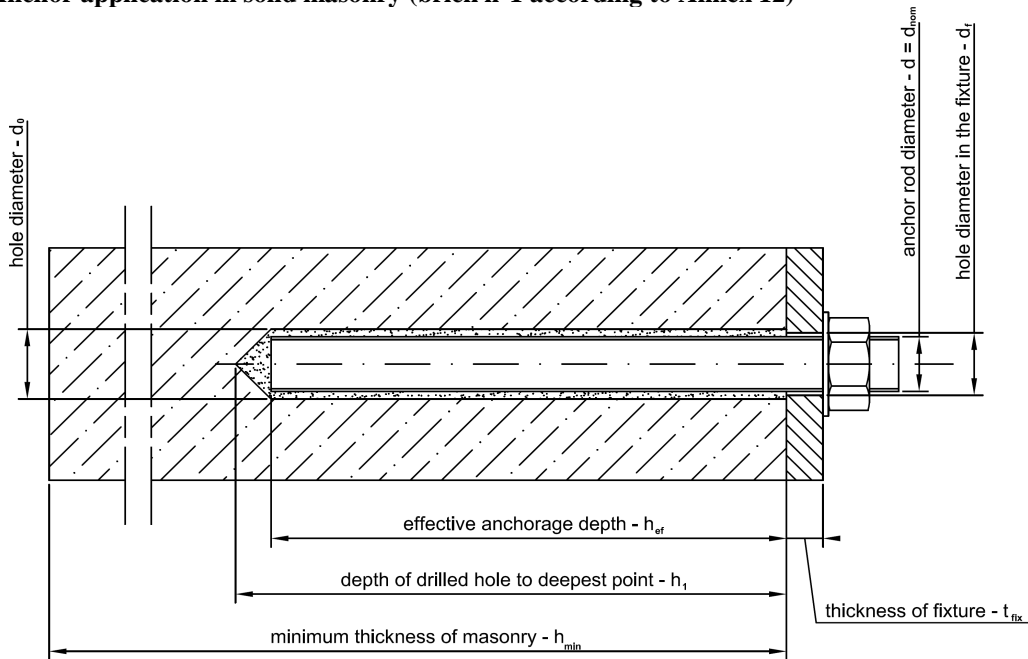
Temperature range:

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

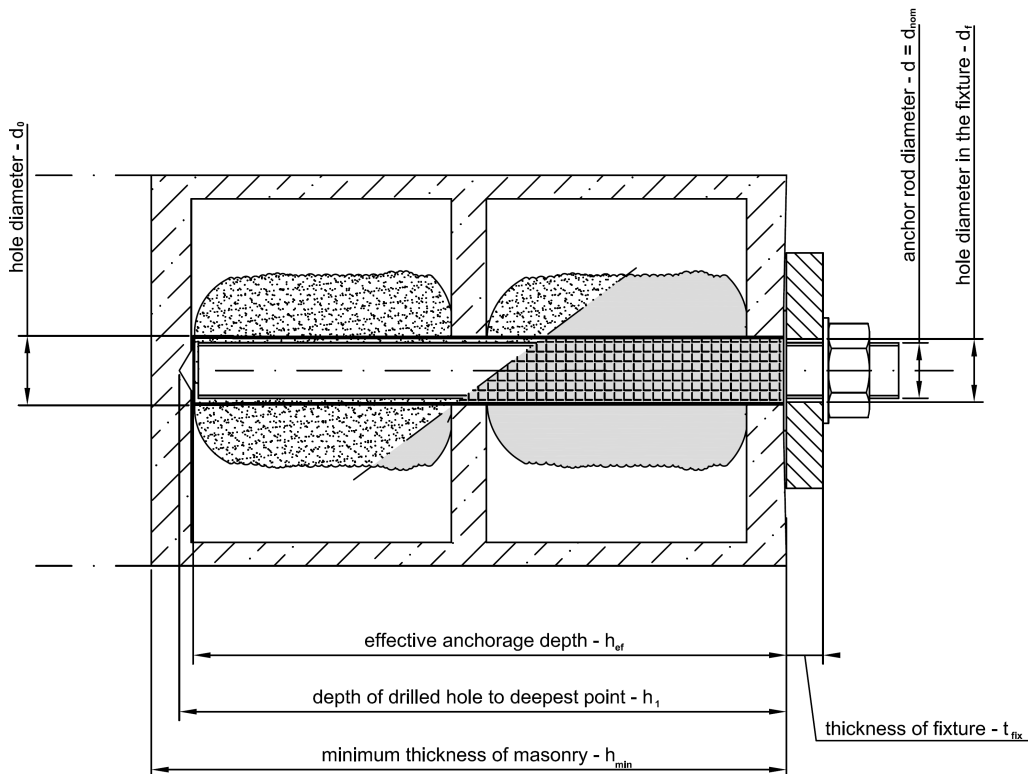
-40°C to +50°C (max. short term temperature +50°C and max. long term temperature +40°C)

Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01	Annex 1 of European Technical Approval ETA-11/0533
Product and intended use (1)	

Anchor application in solid masonry (brick n°1 according to Annex 12)



Anchor application in hollow/perforated masonry with plastic sleeve (brick n°2 to 6 according to Annex 12)



Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01

Product and intended use (2)

Annex 2

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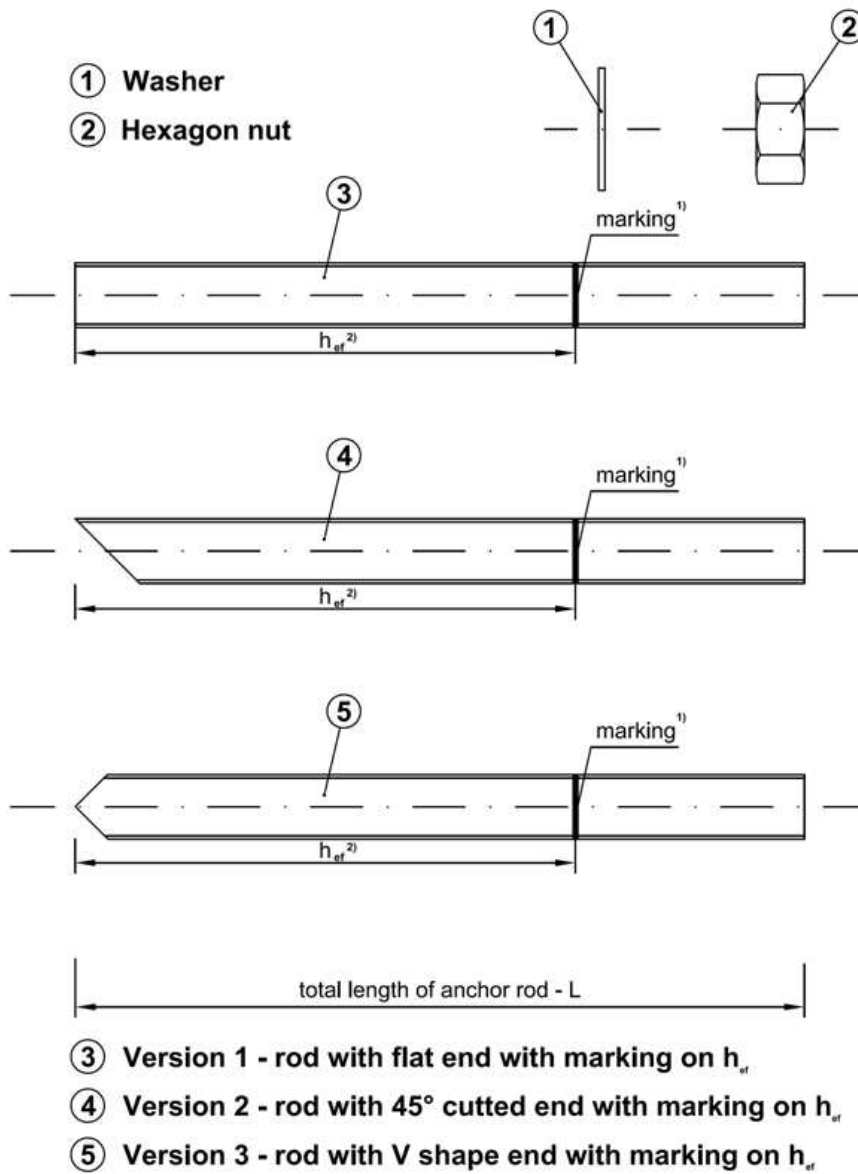


Table 1: Threaded rod dimensions

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 clause 4.3 point 3 of ETAG 029 – June 2010.
- 2) Effective anchorage depths according to the range specified in table 1.

Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01	Annex 3 of European Technical Approval ETA-11/0533
Threaded rod types and dimensions	

Table 2: 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 3: Injection mortar

Product	Composition
Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01 two components injection mortar	Additive: quartz Bonding agent: polyester resin styrene free Hardener: dibenzoyl peroxide

Table 4: 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

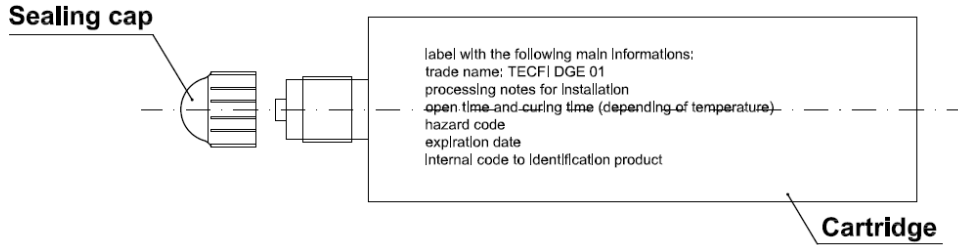
3) the minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer).

4) minimum resin temperature recommended, for injection between 5°C and 0°C, equal to 5°C.

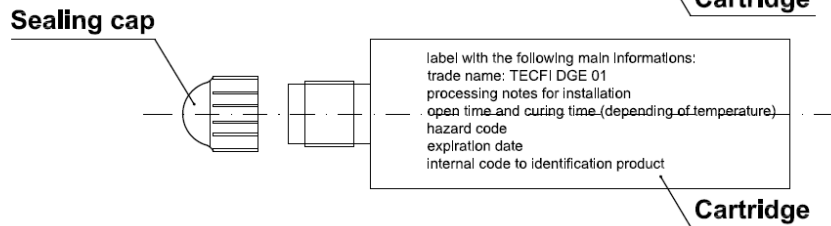
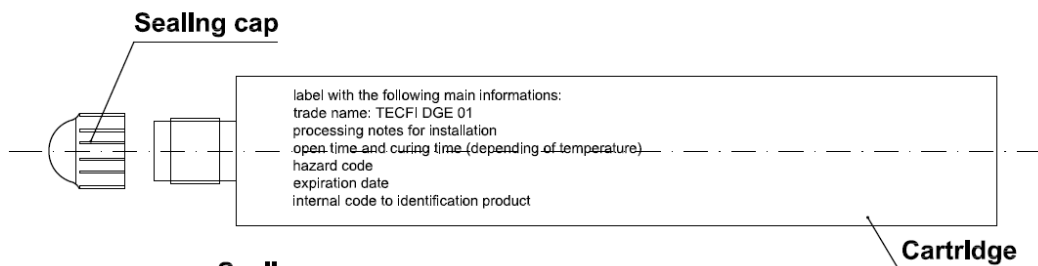
5) minimum curing time for dry and wet conditions.

Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01	Annex 4 of European Technical Approval ETA-11/0533
Materials and curing time	

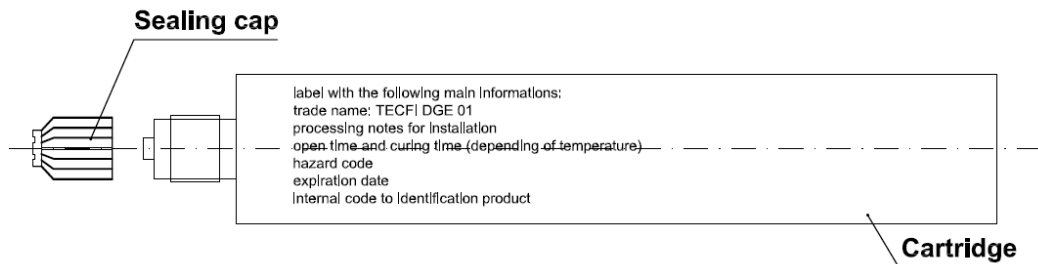
TECFI DGE 01 - 400 ml cartridge - coaxial cartridge



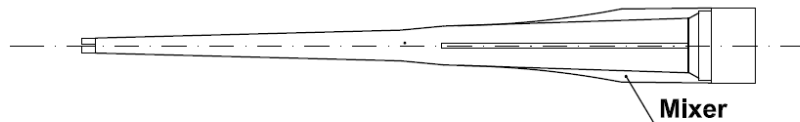
TECFI DGE 01 - 300 ml and 165 ml cartridge - foil cartridge



TECFI DGE 01 - 280 ml cartridge - peeler cartridge



MIXER - the mixer is suitable for each type of cartridge

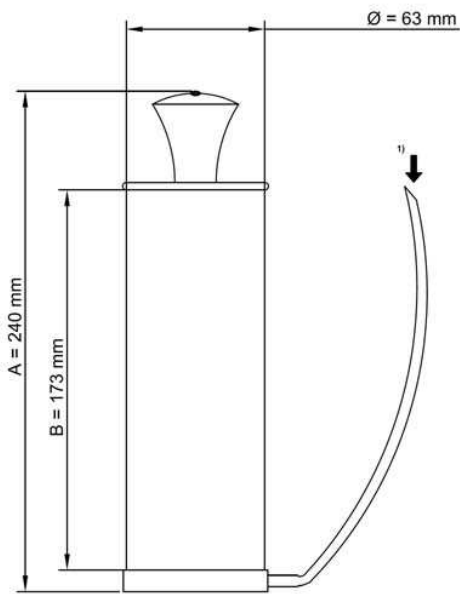


Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01

Cartridge types and sizes

Annex 5
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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

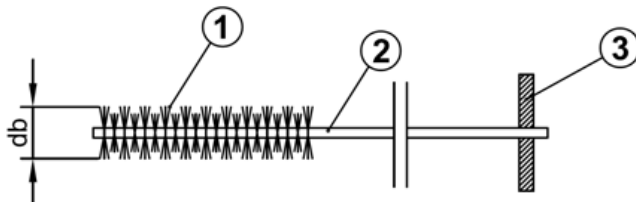


Suitable min pressure 6 bar at 6 m³/h
Oil-free compressed air
Recommended air gun with an orifice opening of minimum 3.5 mm in diameter

1) Position to insert the mixer extension

Mixer extension Ø 8 mm

Brush



- ① Steel bristles
- ② Steel stem
- ③ Wood handle

Table 5: Brush diameter

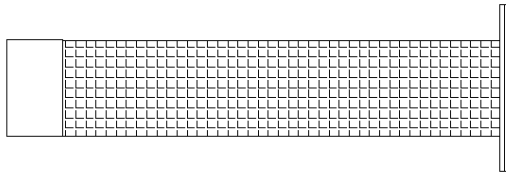
Type of threaded rod			Use in solid masonry			Use in hollow/perforated masonry		
			M8	M10	M12	M8	M10	M12
Type of plastic sleeve			-	-	-	12x80	15x85	20x85
d ₀	Nominal drill hole	[mm]	10	12	14	12	16	20
d _b	Brush diameter	[mm]	12	14	16	12	16	20

Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01

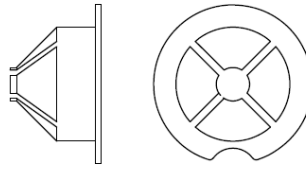
Cleaning tools

Annex 6
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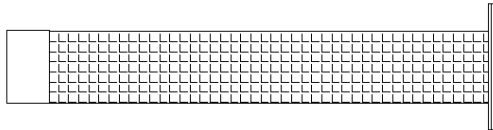
Plastic sleeve for hollow/perforated masonry: nominal dimensions and material



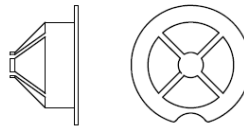
Plastic sleeve 20x85 for M12
Nominal diameter 20 mm
Nominal length 85 mm



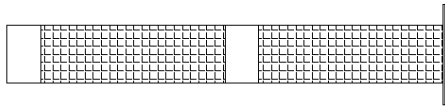
Lateral and top view of plastic centering cap for 20x85 plastic sleeve



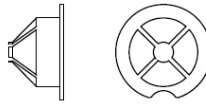
Plastic sleeve 15x85 for M10
Nominal diameter 15 mm
Nominal length 85 mm



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 6: Plastic sleeve materials


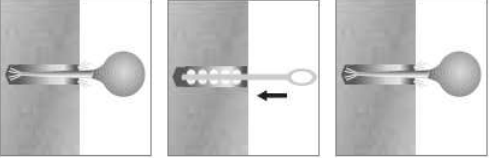
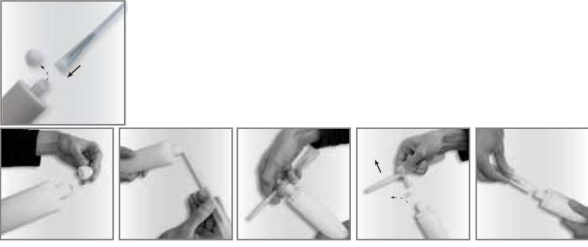
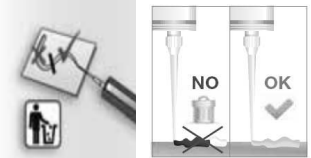
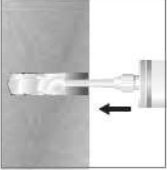
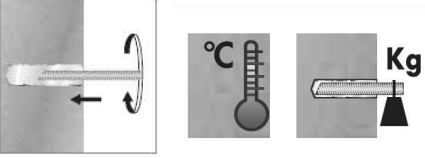
Part	Designation
Plastic sleeve	Polypropylene (PP) / Polyethylene (PE)
Centering cap	Polypropylene (PP) / Polyethylene (PE)

Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01

Plastic sleeve

Annex 7
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Resin injection pump details		
Pump example	Size cartridge	Type
	400 ml	Manual
	300 ml 280 ml 165 ml	Manual
<p>Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01</p>		<p>Annex 8 of European Technical Approval ETA-11/0533</p>
<p>Tools for injection</p>		

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 5 in Annex 6) if the brush diameter is sufficient. For the blower tools see Annex 6.</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 component, comes out from the mixer with an uniform color.</p>
5		<p>Fill the drilled hole uniformly starting from the drilled hole bottom, in order 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 4. Wait the curing time according Annex 4.</p>
<p>Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01</p>		<p>Annex 9</p>
<p>Installation procedure for solid masonry</p>		<p>of European Technical Approval ETA-11/0533</p>

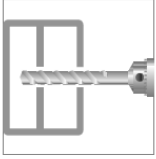
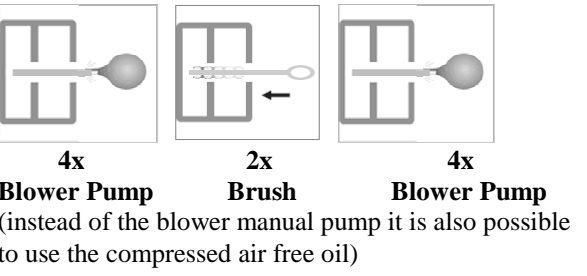
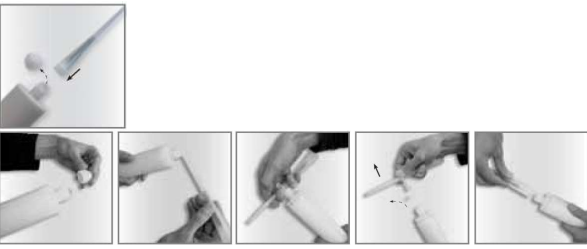
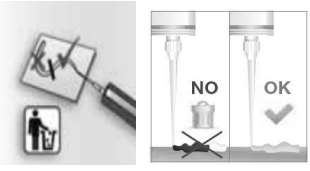
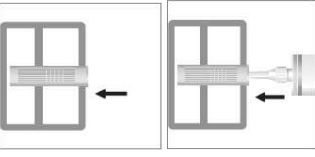
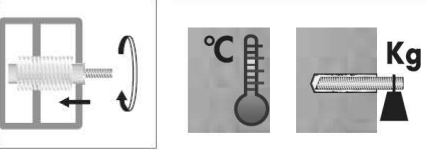
<p>1</p>		<p>Drill the hole with the correct diameter and depth using a rotary machine. Check the perpendicularity of the hole during the drilling operation.</p>
<p>2</p>		<p>Clean the hole from drilling dust: the hole shall be cleaned by at least 4 blowing operations, by at least 2 brushing operations followed again by at least 4 blowing operations; before brushing clean the brush and check (see Table 5 in Annex 6) if the brush diameter is sufficient. For the blower tools see Annex 6.</p>
<p>3</p>		<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.
<p>4</p>		<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 component, comes out from the mixer with an uniform color.</p>
<p>5</p>		<p>Remove the centering cap from the plastic sleeve. Insert in the hole the plastic sleeve (see Annex 7). 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>
<p>6</p>		<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 4. Wait the curing time according Annex 4.</p>
<p>Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01</p>		<p>Annex 10 of European Technical Approval</p>
<p>Installation procedure for hollow/perforated masonry</p>		<p>ETA-11/0533</p>

Table 7: 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]	50		
Minimum edge distance	C_{min} [mm]	50		

* Type of bricks are detailed in the Annex 12

Table 8: 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 12

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Installation data

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Table 9: Type of solid and hollow/perforated masonry

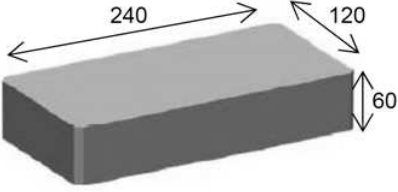
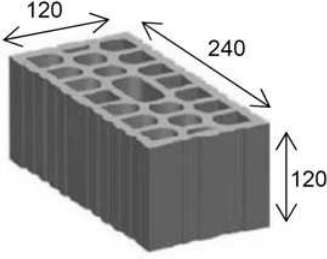
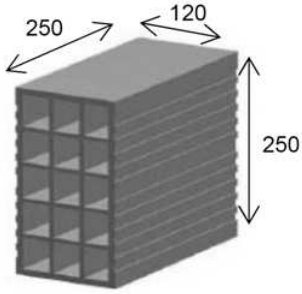
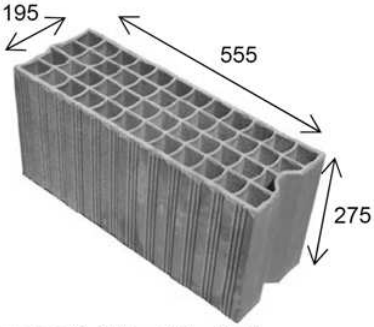
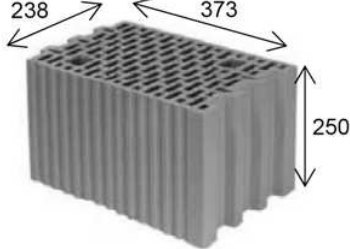
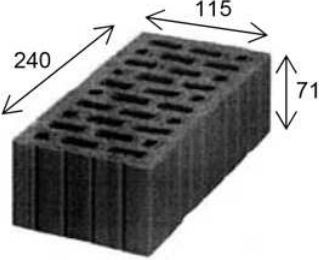
<p>Brick n°1 – Solid according to EN 771-1 - HD (High density)</p>  <p>Dimensions [mm]: 120 x 240 x 60 f_b class $\geq 73 \text{ N/mm}^2$ density $\rho_m \geq 1700 \text{ kg/m}^3$ (e.g. type "Mattone Pieno")</p>	<p>Brick n°2 – Hollow/perforated according to EN 771-1 - LD (Low density)</p>  <p>Dimensions [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 "Hlz B – 1.0 1NF 12-1")</p>	
<p>Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01</p>		<p>Annex 12 of European Technical Approval ETA-11/0533</p>
<p>Type and dimensions of brick</p>		

Table 10: Characteristic values for tension and shear load

Size			M8	M10	M12
Solid masonry (High density - HD)					
Characteristic tension and shear resistance in the temperature range: -40°C/+40°C and -40°C/+50°C (explanation see Annex 1)					
Brick n°1 according to EN 771-1 f_b class ≥ 73 N/mm ² density $\rho_m \geq 1700$ kg/m ³	$N_{Rk}^{1)}$	[kN]	1,50	2,50	3,00
	$V_{Rk}^{2)}$	[kN]	1,50	2,50	3,00
Partial safety factor	γ_M	[-]	2,50		
Hollow/perforated masonry (Low density - LD)					
Characteristic tension and shear resistance in the temperature range: -40°C/+40°C and -40°C/+50°C (explanation see Annex 1)					
Brick n°2 according to EN 771-1 f_b class $\geq 18,3$ N/mm ² density $\rho_m \geq 810$ kg/m ³	$N_{Rk}^{1)}$	[kN]	3,50	4,00	5,00
	$V_{Rk}^{2)}$	[kN]	3,50	4,00	5,00
Partial safety factor	γ_M	[-]	2,50		
Brick n°3 according to EN 771-1 f_b class $\geq 5,3$ N/mm ² density $\rho_m \geq 550$ kg/m ³	$N_{Rk}^{1)}$	[kN]	0,60	1,50	1,50
	$V_{Rk}^{2)}$	[kN]	0,60	1,50	1,50
Partial safety factor	γ_M	[-]	2,50		
Brick n°4 according to EN 771-1 f_b class $\geq 4,0$ N/mm ² density $\rho_m \geq 600$ kg/m ³	$N_{Rk}^{1)}$	[kN]	0,90	0,90	0,60
	$V_{Rk}^{2)}$	[kN]	0,90	0,90	0,60
Partial safety factor	γ_M	[-]	2,50		
Brick n°5 according to EN 771-1 f_b class ≥ 15 N/mm ² density $\rho_m \geq 800$ kg/m ³	$N_{Rk}^{1)}$	[kN]	2,00	2,00	2,50
	$V_{Rk}^{2)}$	[kN]	2,00	2,00	2,50
Partial safety factor	γ_M	[-]	2,50		
Brick n°6 according to EN 771-1 f_b class ≥ 12 N/mm ² density $\rho_m \geq 900$ kg/m ³	$N_{Rk}^{1)}$	[kN]	3,00	4,00	4,00
	$V_{Rk}^{2)}$	[kN]	3,00	4,00	4,00
Partial safety factor	γ_M	[-]	2,50		

1) For design according to ETAG 029 Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,pb}$ – steel failure is not decisive2) For design according to ETAG 029 Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,c}$ – steel failure without lever arm is not decisive**Sinto ST-PE Tecfi Polyester Resin without styrene - DGE01**

Characteristic resistance under tension and shear loads

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Table 11: Characteristic bending moments

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 12: β -factor for job site tests according to ETAG 029 Annex B

Type of brick and size			temperature range: -40°C/+40°C and -40°C/+50°C (explanation see Annex 1)
Brick n° 1, 2, 3, 4, 6 with all size	β	[-]	0,70
Brick n° 5 with M8/ 12x80	β	[-]	0,65
Brick n° 5 with M10/ 15x85 and M12/ 20x85	β	[-]	0,70

Table 13: Edge distances and spacing

Type of brick	Size					
	M8		M10		M12	
	$S_{cr,N}$ [mm]	$C_{cr,N}$ [mm]	$S_{cr,N}$ [mm]	$C_{cr,N}$ [mm]	$S_{cr,N}$ [mm]	$C_{cr,N}$ [mm]
1	160	80	200	100	240	120
2*	240	120	240	120	240	120
3*	250	125	250	125	250	125
4*	555	278	555	278	555	278
5*	373	187	373	187	373	187
6*	240	120	240	120	240	120

* Installation with plastic sleeve

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Characteristic bending moments
 β -factor for job site tests
 Edge distances and spacing

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Table 14: Displacement under tension load

Brick n°1 – Solid brick			M8	M10	M12
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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

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Displacement under tension load

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Table 15: Displacement under shear load

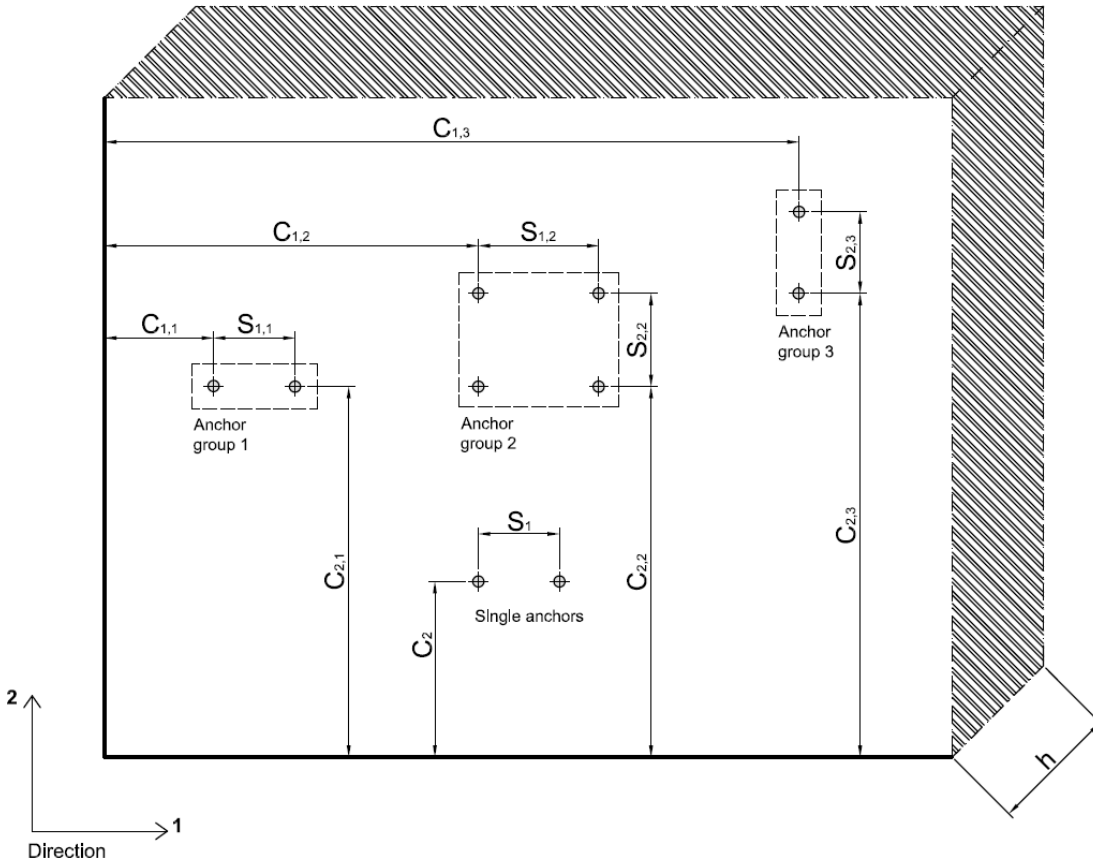
Brick n°1 – Solid brick			M8	M10	M12
Admissible service load	F	[kN]	1,32	2,94	2,62
Displacement	δ_{v0}	[mm]	0,23	0,48	0,38
	$\delta_{v\infty}$	[mm]	0,34	0,72	0,57
Brick n°2 – Hollow/perforated brick			M8 12x80	M10 15x85	M12 20x85
Admissible service load	F	[kN]	1,72	2,03	2,93
Displacement	δ_{v0}	[mm]	0,20	0,38	0,34
	$\delta_{v\infty}$	[mm]	0,30	0,57	0,51
Brick n°3 – Hollow/perforated brick			M8 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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 12x80	M10 15x85	M12 20x85
Admissible service load	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

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Displacement under shear load

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Position of anchors: indicative layout



The design method according to ETAG 029 Annex C is valid for single anchors and anchor groups with two or four anchors. In an anchor group only anchors of the same type, size and length shall be used.

General rules for spacing and edge distances:

$S_{i,j} \geq S_{min}$ detailed in Annex 11

$C_{i,j} \geq C_{min}$ detailed in Annex 11

Installation in solid masonry		Installation in hollow/perforated masonry	
Tension load	Shear load	Tension load	Shear load
$S_{cr,N} = 20 d$ [mm] $C_{cr,N} = 10 d$ [mm]	$S_{cr,V} = C_{cr,V} = 20 d$ [mm]	$S_{cr,N} = l_{unit,max}$ [mm] $C_{cr,N} = 0,5 l_{unit,max}$ [mm]	$S_{cr,V} = C_{cr,V} = l_{unit,max}$ [mm]

Note :

d : nominal diameter of threaded rod according table 1 Annex 1

$l_{unit,max}$: max dimension of unit masonry

h : thickness of masonry

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Position of anchors, anchor groups and number of anchors

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