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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-16/0939 of 08/12/2016

### 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:**

Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor

**Product family to which the above construction product belongs:**

Bonded anchor with anchor rod for use in non-cracked concrete. Sizes: M8-M10-M12-M16

**Manufacturer:**

Tecfi SpA  
Strada Statale Appia, Km. 193  
IT-81050 Pastorano (CE)  
Tel. +39 823 88 33 38  
Fax +39 823 88 32 60  
Internet [www.tecfi.it](http://www.tecfi.it)

**Manufacturing plant:**

Tecfi SpA  
Manufacturing Plant 3

**This European Technical Assessment contains:**

19 pages including 14 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:**

Guideline for European Technical Approval (ETAG) No. 001 Metal Anchors for use in concrete, Part 5 – Bonded anchors, April 2013, used as European Assessment Document (EAD).

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 Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor is a bonded anchor (injection type) consisting of an injection mortar cartridge equipped with a special mixing nozzle and threaded anchor rod of the sizes from M8 to M16 made of:

- galvanized carbon steel,
- stainless steel A4-70, A4-80 or high corrosion resistant stainless steel with hexagon nut and washer.

The threaded rod is placed into a drilled hole previously injected (using an applicator gun) with a mortar with a slow and slight twisting motion. The anchor rod is anchored by the bond between rod, mortar and concrete.

The threaded rod is available for all diameters with three type of tip end a one side 45° chamfer, a two sided 45° chamfer or a flat. The threaded rods are either delivered with the mortar cartridges or commercial standard threaded rods purchased separately. Each mortar cartridge is marked with the identifying mark of the producer and with the trade name. The mortar cartridges are available in different sizes.

The anchor in the range of M8 to M16 and the mortar cartridges corresponds to the drawings given in the Annex A1 to A4.

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<sup>1</sup> of this European Technical Assessment.

The anchors are intended to be used with embedment depth given in Annex A2, Table A1. For the installed anchor see Figure given in Annex A1. 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 performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B1 to B6.

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.

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<sup>1</sup> 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**

Regulation, these requirements need also to be complied with, when and where they apply.

#### **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 C3.

##### **Hygiene, health and the environment (BWR3):**

The product does not contain/release dangerous substances specified in TR 034, dated March 2012.

Regarding the dangerous substances contained in this European Technical Assessment, 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 Regulation, these requirements need also to be complied with, when and where they apply.

##### **Safety in use (BWR4):**

For basic requirement Safety in use the same criteria are valid for Basic Requirement Mechanical resistance and stability (BR1).

##### **Sustainable use of natural resources (BWR7)**

No performance determined

Other Basic 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 « Guideline for European Technical Assessment of Metal Anchors for use in Concrete », Part 1 « Anchors in general » and Part 5 « Bonded anchors », on the basis of Option 7.

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, 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

#### **4 Attestation and verification of constancy of performance (AVCP)**

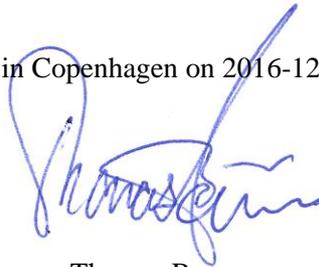
##### **4.1 AVCP system**

According to the decision 96/582/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 2016-12-08 by



Thomas Bruun  
Manager, ETA-Danmark

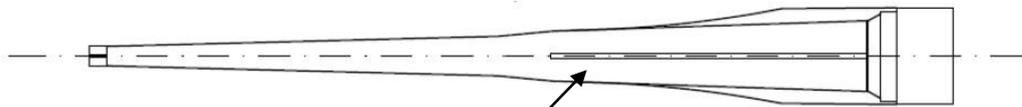
Sealing Cap



Cartridge  
Tecfi SINTO-  
ST DGE01

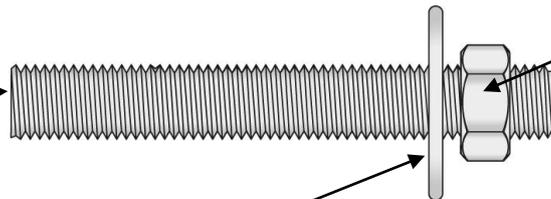
Label with the following main information:

- Trade Name: Tecfi SintoST-PE DGE01
- Processing note for installation
- Open time and curing time (depending of temperature)
- Hazard code
- Expiration date
- Internal code for product identification



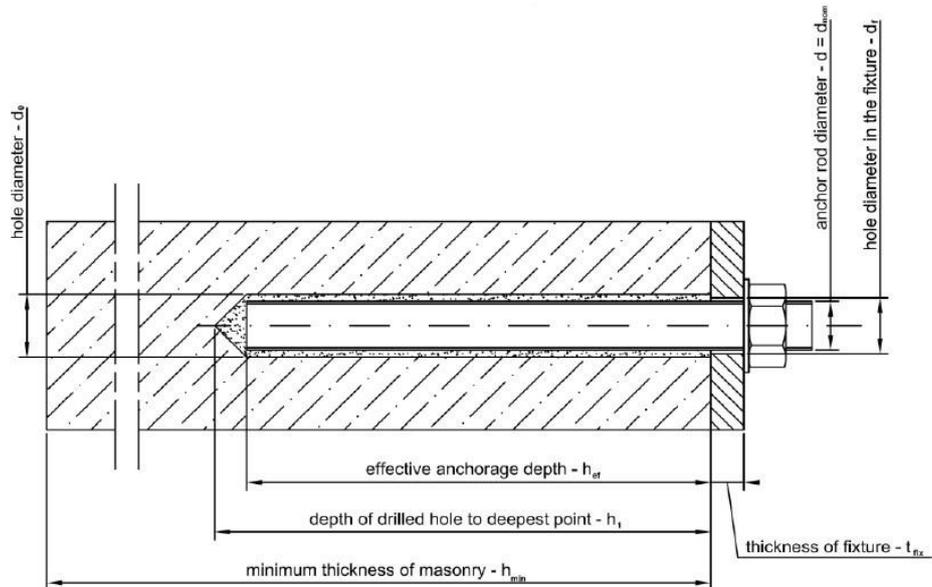
Mixer

Anchor treaded rod



Hexagonal nut

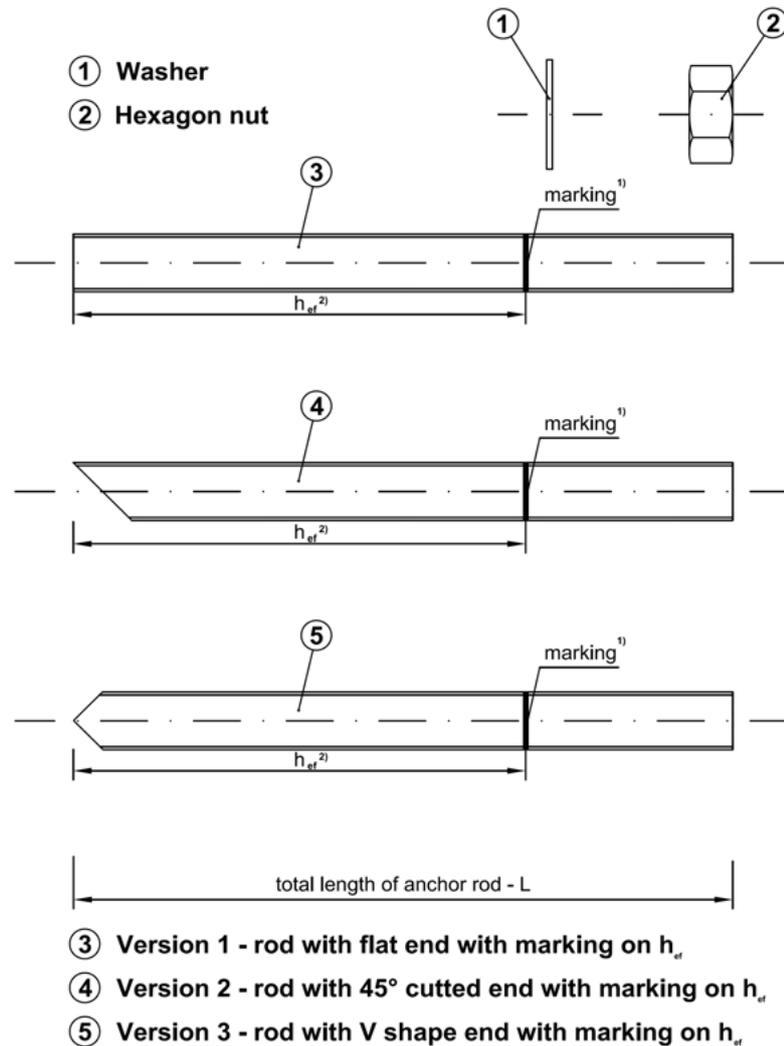
Washer



**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Product and intended use

**Annex A1**  
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**Table A1: Threaded rod dimensions**

Size	d [mm]	$h_{ef,min}$ [mm]	$h_{ef,max}$ [mm]
M8	8	60	160
M10	10	70	200
M12	12	80	240
M16	16	100	320

<sup>1)</sup> Marking according to clause 2.1.2. of ETAG 001 – 5

<sup>2)</sup> Effective anchorage depths according to the range specified in Table A1.

<b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b>	<b>Annex A2</b> of European Technical Assessment ETA-16/0939
Threaded rod types and dimensions	

**Table A2: Threaded rod materials**

Part	Designation		
	Steel: zinc plated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 hot dipped galvanized $\geq 45 \mu\text{m}$ EN ISO 10684	Stainless steel A4	High corrosion resistance stainless steel (HCR)
Threaded rod	Steel property class from 4.8 to 8.8, acc. to EN ISO 898-1	Material 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062 acc. to EN 10088-1; property class 50, 70 or 80 acc. to EN ISO 3506-1	Material 1.4529 / 1.4565, acc. to EN 10088-1; property class 50, 70 or 80 acc. to EN ISO 3506-1
Washer EN ISO 7089	Steel acc. to corresponding to threaded rod material	Material 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062 acc. to EN 10088-1; corresponding to threaded rod material	Material 1.4529 / 1.4565, acc. to EN 10088-1; corresponding to threaded rod material
Hexagon nut	Steel, property class from 4 to 8 acc. to EN 898-2; corresponding to threaded rod material	Material 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062 acc. to EN 10088-1; property class 50, 70 or 80 acc. to EN ISO 3506-1	Material 1.4529 / 1.4565, acc. to EN 10088-1; property class 50, 70 or 80 acc. to EN ISO 3506-1

Commercial standard threaded rods with:

- material and mechanical properties according to Table A2,
- 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.

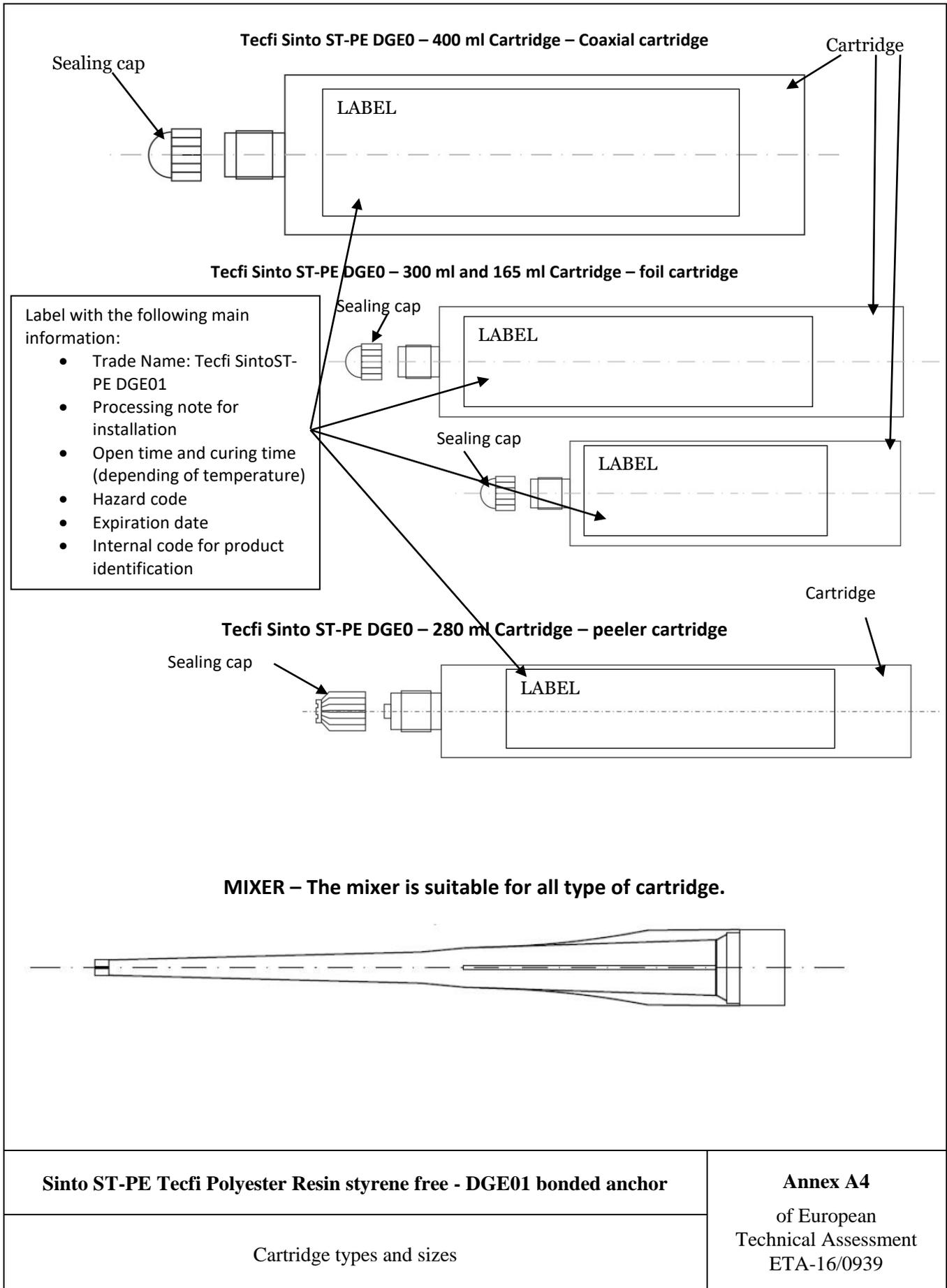
**Table A3: Injection mortar**

Product	Composition
Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor two components injection mortar <sup>1)</sup>	Mortar resin styrene-free, hardener, filler

**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Materials

**Annex A3**  
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**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Cartridge types and sizes

**Annex A4**  
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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 M16.

**Base materials:**

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.
- Non cracked concrete.

**Temperature range:**

The anchors may be used in the following temperature range:

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

**Use conditions (Environmental conditions):**

- Elements made of galvanized steel may be used in structures subject to dry internal conditions only.
- Elements made of stainless steel may be used in structures subject to dry internal conditions and also in concrete subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).
- Elements made of high corrosion resistant steel may be used in structures subject to dry internal conditions and also in concrete subject to external atmospheric exposure or exposure in permanently damp internal conditions or in other particular aggressive conditions. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

**Installation:**

The anchors may be installed in:

- Dry or wet concrete (use category 1): sizes from M8 to M16.
- All the diameters may be used overhead: sizes from M8 to M16.
- The anchor is suitable for hammer drilled holes: sizes from M8 to M16.

**Proposed design methods:**

- Static and quasi-static load: EOTA Technical Report TR029 or CEN/TS 1992-4:2009.

<b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b>	<b>Annex B1</b> of European Technical Assessment ETA-16/0939
Intended use - Specification	

**Table B1: Installation data**

Size		M8	M10	M12	M16
Nominal drilling diameter	$d_0$ [mm]	10	12	14	18
Maximum diameter hole in the fixture	$d_{fix}$ [mm]	9	12	14	18
Embedment depth	$h_{ef,min}$ [mm]	60	70	80	100
	$h_{ef,max}$ [mm]	160	200	240	320
Depth of the drilling hole	$h_1$ [mm]	$h_{ef} + 5$ mm			
Minimum thickness of the slab	$h_{min}$ [mm]	$h_{ef} + 30$ mm; $\geq 100$ mm			$h_{ef} + 2d_0$
Torque moment	$T_{inst}$ [Nm]	10	20	40	80
Thickness to be fixed	$t_{fix,min}$ [mm]	$> 0$			
	$t_{fix,max}$ [mm]	$< 1500$			
Minimum spacing	$S_{min}$ [mm]	40	40	40	50
Minimum edge distance	$C_{min}$ [mm]	40	40	40	50

**Table B2: Minimum curing time <sup>1)</sup>**

Concrete temperature	Processing time	Minimum curing time <sup>3)</sup>
0°C <sup>2)</sup>	25 min	180 min
5°C <sup>2)</sup>	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

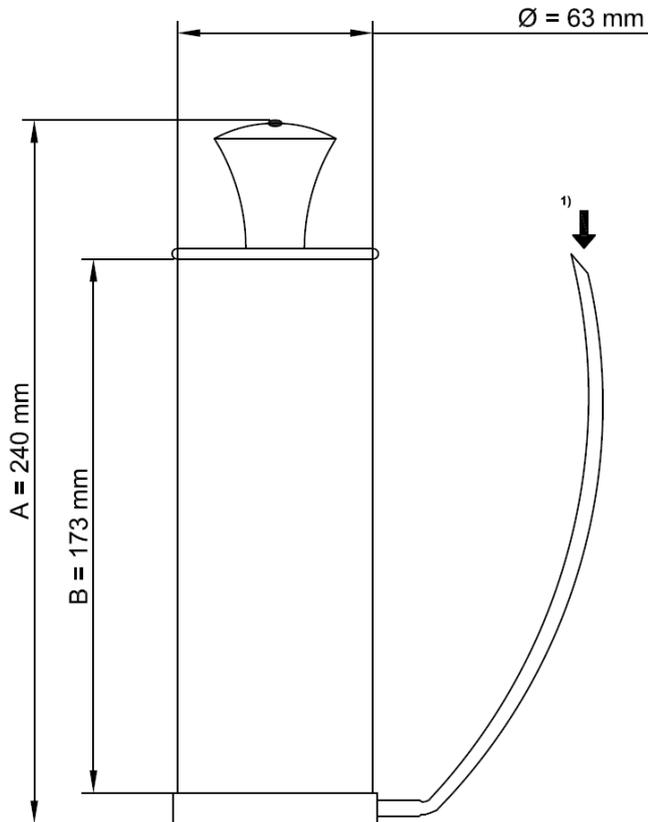
- 1) the minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer).  
2) minimum resin temperature recommended, for injection between 5°C and 0°C, equal to 10°C.  
3) minimum curing time for dry and wet conditions.

**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Intended use – Installation data

**Annex B2**  
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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 m<sup>3</sup>/h  
Oil-free compressed air  
Recommended air gun with an orifice opening of minimum 3.5 mm in diameter**

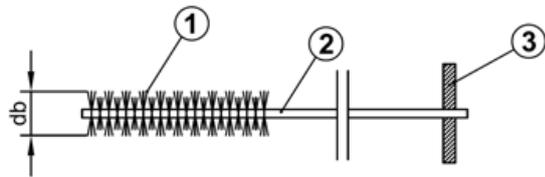
1) Position to Insert the mixer extension



**Mixer extension (from 380 mm to 1000 mm) with nominal diameter equal to 8 mm**

<p><b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b></p>	<p><b>Annex B3</b> of European Technical Assessment ETA-16/0939</p>
<p>Cleaning tools (1)</p>	

### Standard brush

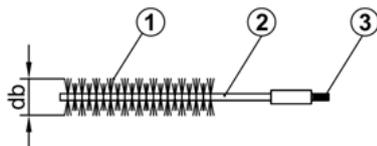


- ① Steel bristles
- ② Steel stem
- ③ Wood handle

**Table B3: Standard brush diameter**

Threaded rod diameter - d			M8	M10	M12	M16
<b>d<sub>0</sub></b>	Nominal drill hole	[mm]	10	12	14	18
<b>d<sub>b</sub></b>	Brush diameter	[mm]	12	14	16	20

### Special brush



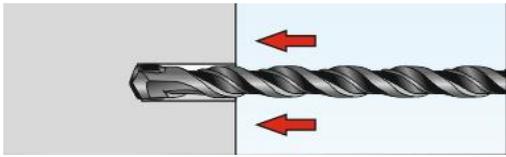
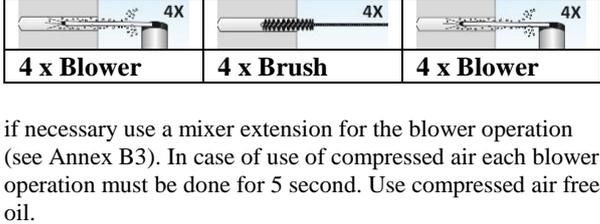
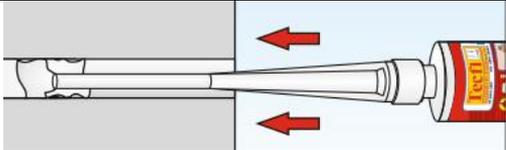
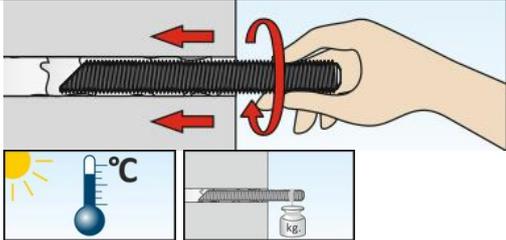
- ① Steel bristles
- ② Steel stem
- ③ Threaded connection for drilling tool extension
- ④ Extension special brush
- ⑤ Drilling tool connection (SDS connection)



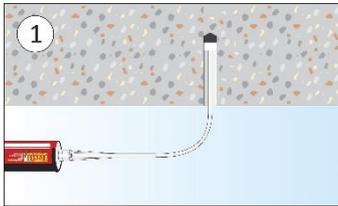
**Table B4: Special brush diameter (mechanical brush)**

Threaded rod diameter - d			M8	M10	M12	M16
<b>d<sub>0</sub></b>	Nominal drill hole	[mm]	10	12	14	18
<b>d<sub>b</sub></b>	Brush diameter	[mm]	12	14	16	20

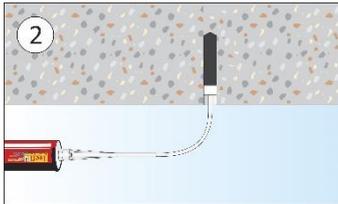
<b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b>	<b>Annex B4</b> of European Technical Assessment ETA-16/0939
Cleaning tools (2)	

<p>1</p>		<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>
<p>2</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 Annex B4) if the brush diameter is sufficient. For the blower tools see Annex B3.</p>
<p>3</p>		<p>For coaxial and peeler cartridges 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. In the version without extractor cut the foil pack. After that, screw on the mixer and insert the cartridge in the gun.</p>
<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 components, comes out from the mixer with an uniform color.</p>
<p>5</p>	 <p>if necessary use a mixer extension for the injection (see Annex A4)</p>	<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>
<p>6</p>	 <p>ATTENTION: Use the rods dry and free oil and other contaminants</p>	<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 B2. Wait the curing time according Annex B2.</p>
<p><b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b></p>		<p><b>Annex B5</b> of European Technical Assessment ETA-16/0939</p>
<p>Procedure of installation</p>		

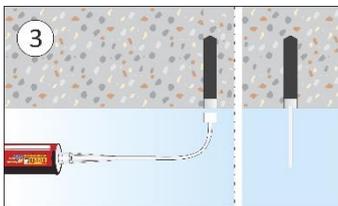
**For overhead installation follow the standard procedure detailed in Annex B5 up to point 4. Put the mixer extension (cut the proper length) on the mixer and follow the below procedure:**



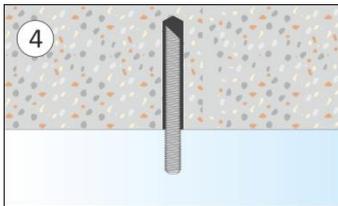
**1** – Start injection: Inject from the bottom of the hole using the proper pneumatic-pump. Hold this position during the injection phase.



**2** – Injection phase: inject the product about 2/3 of the hole depth. During the injection hold this position to assure the correct



**3** – End injection: remove the injection plug. Insert immediately the rod (turn the rod during the insertion).



**4** – End installation: to avoid the slipping of the rod during the open time of the product (due to the rod own weight) use a temporary interlocking element (e.g. wedge of wood)

**Observe the open time and wait the curing time according to Annex B2.**

**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Overhead application

**Annex B6**  
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**Table C1: Characteristic values for tension and shear load in non cracked concrete.**

HARMONIZED TECHNICAL SPECIFICATION: ETAG 001 PART 5					
ESSENTIAL CHARACTERISTICS		PERFORMANCE			
<b>Installation parameters</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>
d [mm]		8	10	12	16
d <sub>0</sub> [mm]		10	12	14	18
d <sub>fix</sub> [mm]		9	12	14	18
h <sub>1</sub> [mm]		h <sub>ef</sub> + 5 mm			
h <sub>min</sub> [mm]		h <sub>ef</sub> + 30 mm; ≥ 100 mm			h <sub>ef</sub> + 2d <sub>0</sub>
T <sub>inst</sub> [Nm]		10	20	40	80
t <sub>fix</sub> [mm]	Min	> 0			
	Max	≤ 1500 mm			
S <sub>min</sub> [mm]		40	40	40	50
C <sub>min</sub> [mm]		40	40	40	50
γ <sub>2</sub> = γ <sub>inst</sub> [-]	Category 1 – for tensile and shear load	1,00			
<b>Characteristic resistance for tension load</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>
<b>Steel failure</b> <sup>1)</sup>					
N <sub>Rk,s</sub> [kN]		Characteristic resistance according to the design method specified in Annex B1			
<b>Concrete cone failure</b>					
N <sub>Rk,c</sub> [kN]		Characteristic resistance according to the design method specified in Annex B1			
<b>Combined pullout and concrete cone failure</b>					
τ <sub>Rk,ucr</sub> [N/mm <sup>2</sup> ] concrete C20/25		12	12	11	9
Temperature range -40°C/+50°C (T <sub>imp</sub> = +40°C)					
ψ <sub>c,ucr</sub> C30/37 [-]		1,04			
ψ <sub>c,ucr</sub> C40/50 [-]		1,07			
ψ <sub>c,ucr</sub> C50/60 [-]		1,09			
<b>Splitting failure</b>					
S <sub>cr,sp</sub> [mm]	for h = h <sub>min</sub>	S <sub>cr,sp</sub> = 4 h <sub>ef</sub>			
	if h <sub>min</sub> ≤ h < 2 h <sub>ef</sub>	S <sub>cr,sp</sub> = interpolated value			
	if h ≥ 2 h <sub>ef</sub>	S <sub>cr,sp</sub> = S <sub>cr,Np</sub> = 20 d (τ <sub>Rk,ucr</sub> /7,5) <sup>0,5</sup> ≤ 3 h <sub>ef</sub>			
C <sub>cr,sp</sub> [mm]		0,5 S <sub>cr,sp</sub>			
<b>Resistance for shear load</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>
<b>Steel failure without lever arm</b> <sup>1)</sup>					
V <sub>Rk,s</sub> [kN]		Characteristic resistance according to the design method specified in Annex B1			
<b>Steel failure with lever arm</b> <sup>1)</sup>					
M <sup>0</sup> <sub>Rk,s</sub> [kN]		Characteristic resistance according to the design method specified in Annex B1			
<b>Concrete pry-out failure</b>					
k = k <sub>3</sub> [-]		2			
<b>Concrete edge failure</b>					
V <sub>Rk,c</sub> [kN]		Characteristic resistance according to the design method specified in Annex B1			
<sup>1)</sup> Note: Steel property class according to Annex A3 Table A2.					
<b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b>				Annex C1 of European Technical Assessment ETA-16/0939	
Performance for static and quasi-static loads: Resistances					

**Table C2: Displacements under service loads (static and quasi static) in non cracked concrete.**

<b>HARMONIZED TECHNICAL SPECIFICATION: ETAG 001 PART 5</b>				
<b>ESSENTIAL CHARACTERISTICS</b>	<b>PERFORMANCE</b>			
<b>Displacement under service load Tensile load</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>
$F_{unc}$ [kN] for concrete from C20/25 to C50/60	9,5	13,8	16,9	23,6
$\delta_{N0,unc}$ [mm]	0,30	0,30	0,35	0,35
$\delta_{N\infty,unc}$ [mm]	0,73			
<b>Displacement under service load Shear load</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>
$F_{unc}$ [kN] for concrete from C20/25 to C50/60	10,5	16,6	24,1	44,8
$\delta_{V0,unc}$ [mm]	2,00	2,00	2,00	2,00
$\delta_{V\infty,unc}$ [mm]	3,00			

**Note: Design method according to Annex B1.**

**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Performance for static and quasi-static loads: Displacements

**Annex C2**  
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**Table C3: Resistance to fire**

<b>HARMONIZED TECHNICAL SPECIFICATION: ETAG 001 PART 1 PARAGRAPH 5.2.2 AND TECHNICAL REPORT TR020</b>	
<b>ESSENTIAL CHARACTERISTICS</b>	<b>PERFORMANCE</b>
<b>Resistance to fire</b>	NPA

**Table C4: Reaction to fire**

<b>HARMONIZED TECHNICAL SPECIFICATION: ETAG 001 PART 1 PARAGRAPH 5.2.1</b>	
<b>ESSENTIAL CHARACTERISTICS</b>	<b>PERFORMANCE</b>
<b>Reaction to fire</b>	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 to the smoke hazard.

<b>Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor</b>	<b>Annex C3</b> of European Technical Assessment ETA-16/0939
Performance for exposure to fire	

**Table C5: Terminology and symbols**

<b>TERMINOLOGY AND SYMBOLS</b>	
d	Diameter of anchor bolt or thread diameter
d <sub>0</sub>	Drill hole diameter
d <sub>fix</sub>	Diameter of clearance hole in the fixture
h <sub>ef</sub>	Effective anchorage depth
h <sub>1</sub>	Depth of the drilling hole
h <sub>min</sub>	Minimum thickness of concrete member
T <sub>inst</sub>	Torque moment to installation
t <sub>fix</sub>	Thickness to be fixed
S <sub>min</sub>	Minimum allowable spacing
C <sub>min</sub>	Minimum allowable edge distance
S <sub>cr,sp</sub>	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 <sub>cr,sp</sub>	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 <sub>Rk,s</sub>	Characteristic tension resistance for steel failure
N <sub>Rk,c</sub>	Characteristic tension resistance for concrete cone failure
V <sub>Rk,s</sub>	Characteristic shear resistance for steel failure without lever arm
M <sup>0</sup> <sub>Rk,s</sub>	Characteristic shear resistance for steel failure with lever arm
V <sub>Rk,c</sub>	Characteristic shear resistance for concrete edge failure
τ <sub>Rk,ucr</sub>	Characteristic bond resistance in un-cracked concrete class C20/25
γ <sub>2</sub> = γ <sub>inst</sub>	Partial safety factors for installation
ψ <sub>e,ucr</sub>	Increasing factor for un-cracked concrete
k = k <sub>3</sub>	Factor for concrete pry-out failure
F	Service load in un-cracked (ucr) or cracked concrete (cr) in tensile or shear load
δ <sub>0</sub>	Short term displacement under service load in un-cracked (ucr) or cracked concrete (cr) for tensile (N) or shear load (V)
δ <sub>∞</sub>	Long term displacement under service load in un-cracked (ucr) or cracked concrete (cr) for tensile (N) or shear load (V)
NPD	No declared performance

**Sinto ST-PE Tecfi Polyester Resin styrene free - DGE01 bonded anchor**

Terminology and symbols

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