

Declaration of Performance No 1488-CPD-0163/W

According to the Regulation EU No 305/2011

Item code: **DGE02 Sinto ST-VE, DGE12 Sinto ST-VEW, DGE22 Sinto ST-VES**

Manufacturer: **Tecfi S.p.A. - S.S. Appia, km 193 - 81050 Pastorano (CE), Italy**

1. Intended use	
Product-type:	Metal anchor for use in concrete
Anchor type:	Bonded anchor with anchor rod for use in concrete under static and quasi-static loads
Technical description of the product:	The DGE02 Sinto ST-VE, DGE12 Sinto ST-VEW, DGE22 Sinto ST-VES are bonded anchors (injection type) consisting of an injection mortar cartridge equipped with a special mixing nozzle and threaded anchor rod of the sizes M8 to M24 made of: <ul style="list-style-type: none"> - galvanized carbon steel - stainless steel A4-70, A4-80 or high corrosion resistant stainless steel with hexagon nut and washer.
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 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.
Base material:	Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1. <ul style="list-style-type: none"> - Non cracked concrete: sizes from M8 to M24. - Cracked concrete: sizes from M10 to M20.
Installation:	The anchors may be installed in: <ul style="list-style-type: none"> - Dry or wet concrete (use category 1): sizes from M8 to M24. - Flooded holes with the exception of seawater (use category 2): sizes from M8 to M24. - All the diameters may be used overhead: sizes from M8 to M24. - The anchor is suitable for hammer drilled holes: sizes from M8 to M24.
Loading:	- Static and quasi-static loads: sizes from M8 to M24.
Durability:	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).

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1. Intended use	
Service temperature:	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 +80°C (max. short term temperature +80°C and max. long term temperature +50°C). c) -40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C).
Resistance to fire:	No Performance Declared (NPD)
Reaction to fire:	No Performance Declared (NPD)
Information referred to in article 31 of Regulation (EC) No 1907/2006 (REACH):	See MSDS
European Assessment Document:	ETAG001, part 1 and part 5, April 2013 edition
European Technical Assessment:	ETA 10/0102
Technical Assessment Body:	INSTYTUT TECHNIKI BUDOWLANEJ (ITB), ul. Filtrowa 1, PL 00-611 Warszawa, Poland
Design methods:	- EOTA Technical Report TR029 (September 2010) or CEN/TS 1992-4:2009.
Assessment and Verification of Constancy of Performance:	EC Certificate No. 1488-CPD-0163/W
Notified Body:	INSTYTUT TECHNIKI BUDOWLANEJ (ITB), ul. Filtrowa 1, PL 00-611 Warszawa, Poland
Under the system:	1

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2. Anchor's components

Table 2.a: Threaded rods materials

Part	Designation		
	Steel, zinc plated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042	Stainless steel	High corrosion resistance stainless steel (HRC)
Threaded rod	Steel property class 4.8 to 12.9 acc. to EN ISO 898-1	Material 1.4401/1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529/1.4565/1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506
Hexagonal nut	Steel property class 4 to 12 acc. to EN 898-2; corresponding to threaded rod material	Material 1.4401/1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529/1.4565/1.4547 acc. to EN 10088; property class 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	Material 1.4529/1.4565/1.4547 acc. to EN 10088; corresponding to threaded rod material

Commercial standard threaded rods with (property class ≤ 8.8):

- material and mechanical properties according to the previous table
- 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

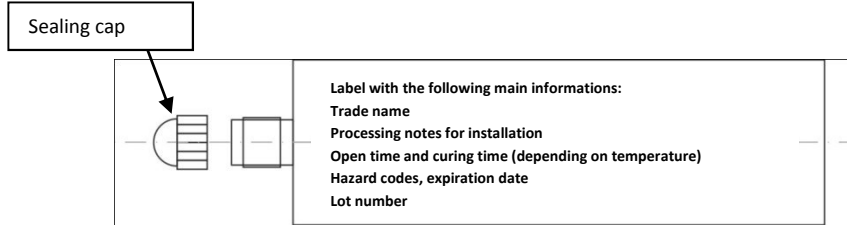
Table 2.b: Injection mortar

Injection mortar	Composition
DGE 02 Sinto ST-VE DGE 12 Sinto ST-VEW DGE 22 Sinto ST-VES Two components injection mortars	Additive: quartz Bonding agent: vinylester resin styrene free Hardener: dibenzoyl peroxide

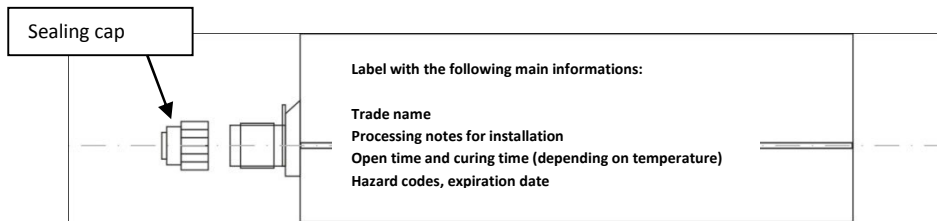
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2. Anchor's components

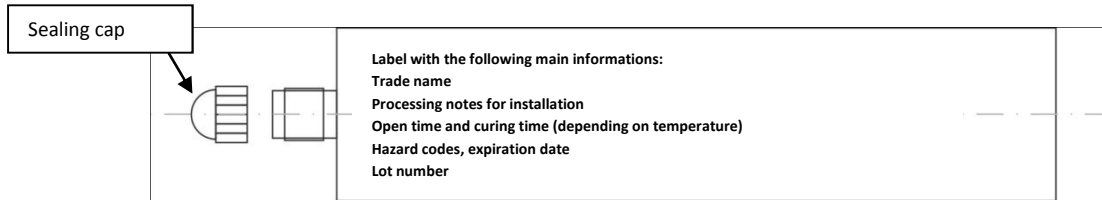
Cartridge 300 ml – Coaxial



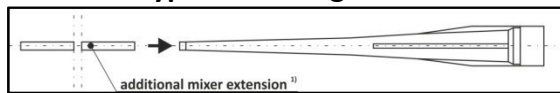
Cartridge 345 ml – Side by side



Cartridge 400 ml – Coaxial

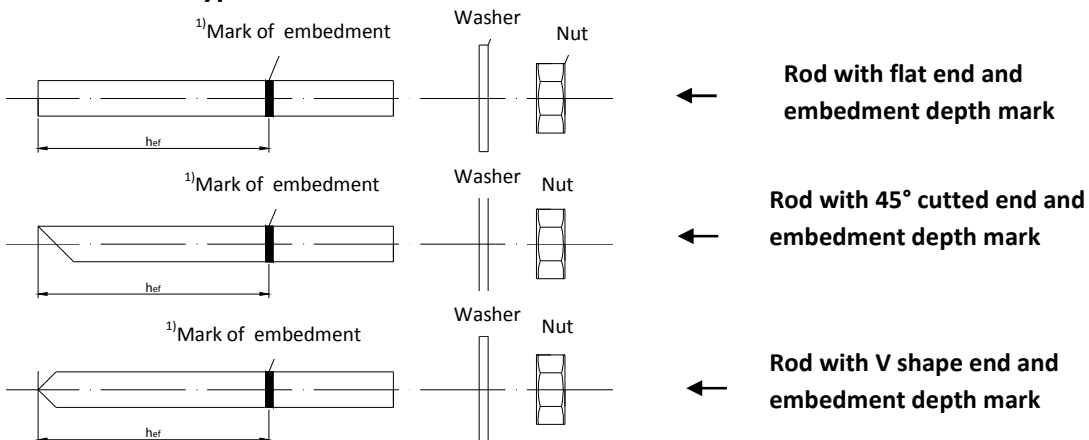


Mixer – the mixer is suitable for each type of cartridge



¹⁾Variable length from 380 [mm] to 1000 [mm]

Threaded rod types:



¹⁾Marking according to clause 2.1.2 of ETAG 001 - 5

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3. Installation

3.1 Installation information

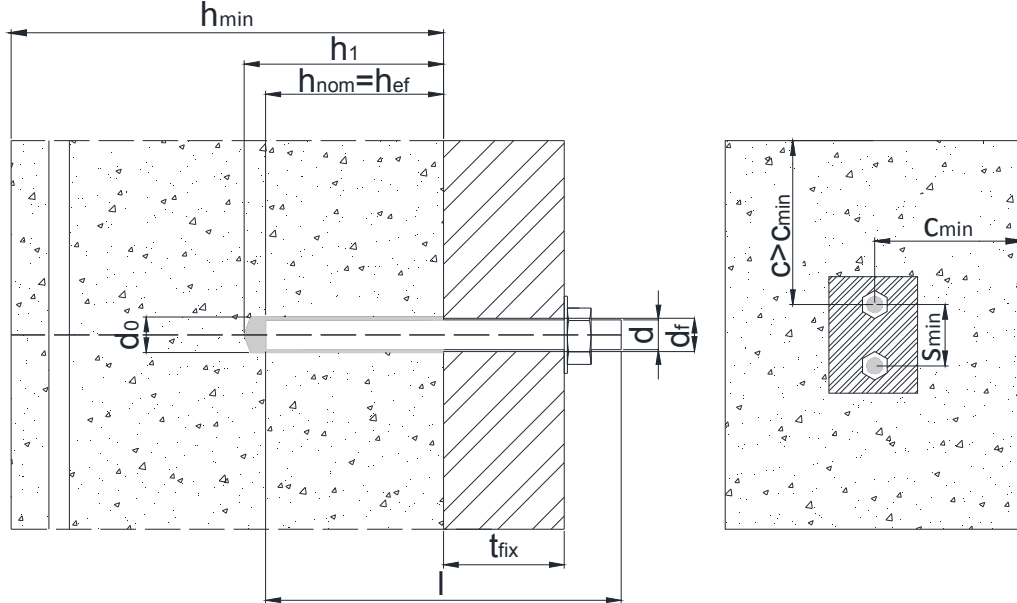


Table 3.a: Installation details

Symbol	Details description
d	Thread diameter
l	Rod's length
d ₀	Drill hole diameter
d _f	Diameter of clearance hole in the fixture
t _{fix}	Thickness of fixture
h _{min}	Minimum thickness of concrete member
h ₁	Depth of the drill hole
h _{nom}	Overall anchor embedment depth
h _{ef}	Effective anchorage depth
T _{inst}	Required torque moment
s _{min}	Minimum allowable spacing
c _{min}	Minimum allowable edge distance

Table 3.b: Installation data

Rod's size	d [mm]	d ₀ [mm]	d _f [mm]	h ₁ [mm]	h _{min} [mm]	h _{ef,min} [mm]	h _{ef,max} [mm]	T _{inst} [Nm]	t _{fix} [mm]	s _{min} [mm]	c _{min} [mm]
M8	8	10	9	h _{ef} +5	h _{ef} +30≥100	60	160	10	< 1500	40	40
M10	10	12	12	h _{ef} +5	h _{ef} +30≥100	70	200	20	< 1500	40	40
M12	12	14	14	h _{ef} +5	h _{ef} +30≥100	80	240	40	< 1500	40	40
M16	16	18	18	h _{ef} +5	h _{ef} +2 d ₀	100	320	80	< 1500	50	50
M20	20	24	22	h _{ef} +5	h _{ef} +2 d ₀	120	400	130	< 1500	60	60
M24	24	28	26	h _{ef} +5	h _{ef} +2 d ₀	145	480	200	< 1500	80	80

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Table 3.c.1: DGE02 Sinto ST-VE minimum curing time¹⁾

Concrete temperature ²⁾ [°C]	Processing time	Minimum curing time ³⁾
-10	105 min	1320 min
-5	65 min	780 min
0	45 min	420 min
5	25 min	90 min
10	16 min	60 min
15	11,5 min	45 min
20	7,5 min	40 min
25	5 min	35 min
30	3 min	30 min
35	2 min	25 min
40	1 min	20 min

¹⁾The minimum time from the end of the mixing to the time when the anchor may be torque or loaded.

²⁾The minimum recommended resin temperature is 5[°C]and the maximum is 30[°C]

³⁾ For wet condition and flooded holes the curing time must be doubled.

Table 3.c.2: DGE12 Sinto ST-VEW minimum curing time¹⁾

Concrete temperature ²⁾ [°C]	Processing time	Minimum curing time ³⁾
-20	120 min	1440 min
-15	90 min	1000 min
-10	60 min	600 min
-5	40 min	210 min
0	25 min	100 min
5	15 min	70 min
10	10 min	50 min
15	7 min	35 min
20	5 min	30 min

¹⁾The minimum time from the end of the mixing to the time when the anchor may be torque or loaded.

²⁾The minimum recommended resin temperature is 5[°C]and the maximum is 30[°C]

³⁾ For wet condition and flooded holes the curing time must be doubled.

Table 3.c.3: DGE22 Sinto ST-VES minimum curing time¹⁾

Concrete temperature ²⁾ [°C]	Processing time	Minimum curing time ³⁾
20	14 min	60 min
25	11 min	50 min
30	8 min	40 min
35	6 min	30 min
40	4 min	20 min
45	3 min	20 min
50	2 min	20 min

¹⁾The minimum time from the end of the mixing to the time when the anchor may be torque or loaded.

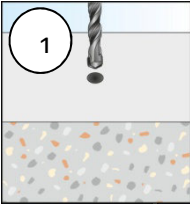
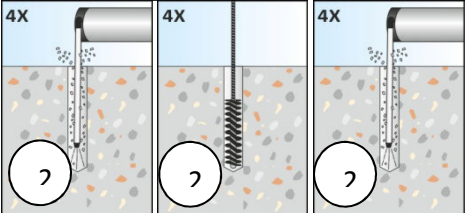
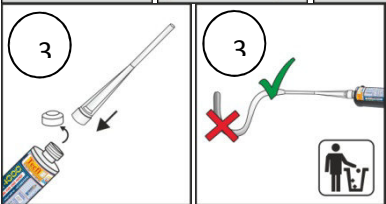
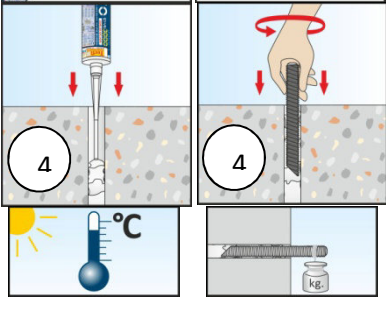
²⁾The minimum recommended resin temperature is 5[°C]and the maximum is 30[°C]

³⁾ For wet condition and flooded holes the curing time must be doubled.

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Table 3.d: Installation procedure up to 300 [mm] embedment depth

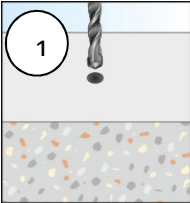
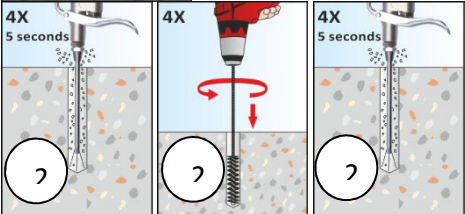
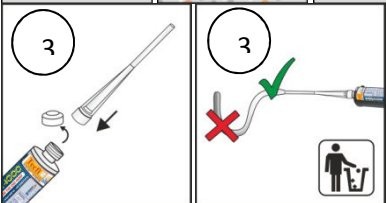
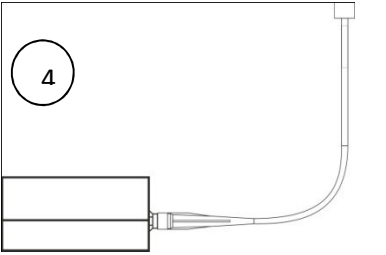
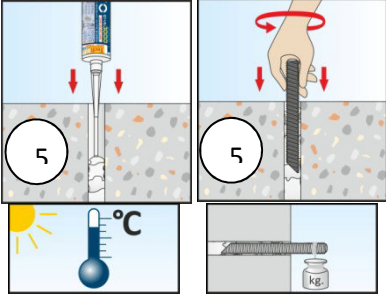
	<p>1 – Drill the hole perpendicularly to the concrete surface with the correct diameter and depth using a rotary percussive machine.</p>
	<p>2 – Clean the hole from drilling dust: the hole shall be cleaned by at least 4 blowing operations, by at least 4 brushing operations followed again by at least 4 blowing operations; before brushing, clean the brush and check if the brush diameter is sufficient.</p>
	<p>3 – Unscrew the front cap of the cartridge, screw in the mixer and insert the cartridge in the extruder. 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 the mixing of the two components, comes out from the mixer with an uniform color.</p>
	<p>4 – Fill the drill hole uniformly starting from the bottom, in order to avoid entrapment of the air; remove the mixer slowly during the extrusion. Fill the drill hole with a quantity of injection mortar corresponding to 2/3 of the drill hole depth. 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 and the curing time before torque or load the anchor. (the rod must be free from oil or other contaminations)</p>

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Table 3.e: Installation procedure up to 480 [mm] embedment depth

	<p>1 – Drill the hole perpendicularly to the concrete surface with the correct diameter and depth using a rotary percussive machine.</p>
	<p>2 – 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 brushing operations; before brushing, clean the brush and check if the brush diameter is sufficient.</p>
	<p>3 – Unscrew the front cap of the cartridge, screw in the mixer and insert the cartridge in the proper pneumatic-pump. 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 the mixing of the two components, comes out from the mixer with an uniform color.</p>
	<p>4 – Before starting the injection insert the mixer extension and the injection plug (see paragraph 3.3.2.2).</p>
	<p>5 – Fill the drill hole uniformly starting from the bottom, in order to avoid entrapment of the air; remove the mixer slowly during the extrusion. Fill the drill hole with a quantity of injection mortar corresponding to 2/3 of the drill hole depth. 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 and the curing time before torque or load the anchor (the rod must be free from oil or other contaminations)</p>

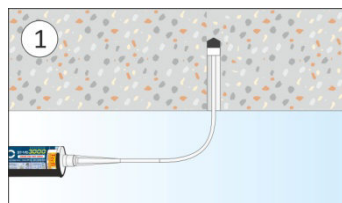
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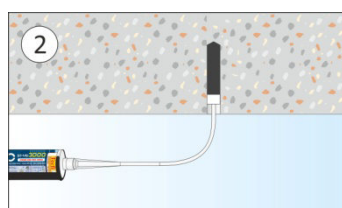
3. Installation

Table 3.f: Overhead application

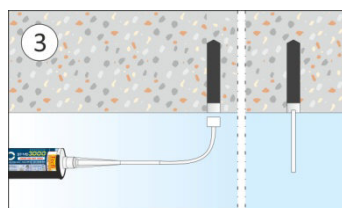
In addition to standard procedure, for overhead installation, follow the instructions below



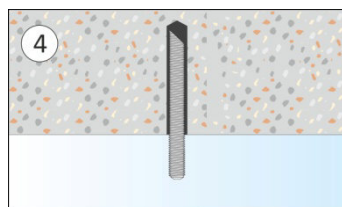
1 – Start injection: Inject from the bottom of the hole using the proper pneumatic-pump. Hold this position during the injection phase.



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



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)

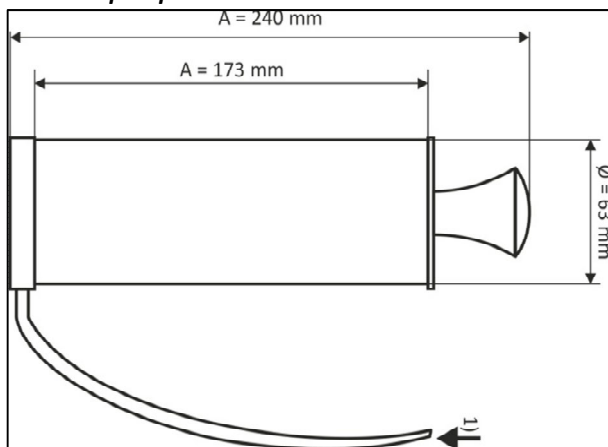
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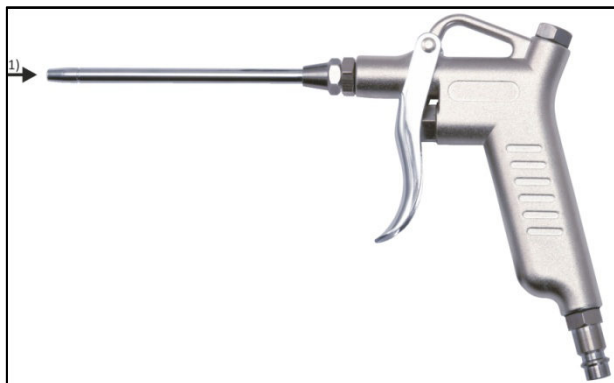
3.2: Cleaning tools

- Manual blower pump



It's possible to use the mixer extension with the manual blower pump

- Mechanical air system (compressed air)



The use of the mixer extension is also allowed if using the compressor (compressed air)

- **Minimum suitable pressure 6 [bar] at 6 [m³/h].**
- **Oil free compressed air.**
- **Recommended air gun with an orifice opening minimum 3,5 [mm] in diameter.**

¹⁾Position to insert the mixer extension²⁾

²⁾Mixer extension (from 380 [mm] to 1000 [mm]) with nominal diameter equal to 8 [mm]

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- Standard brush

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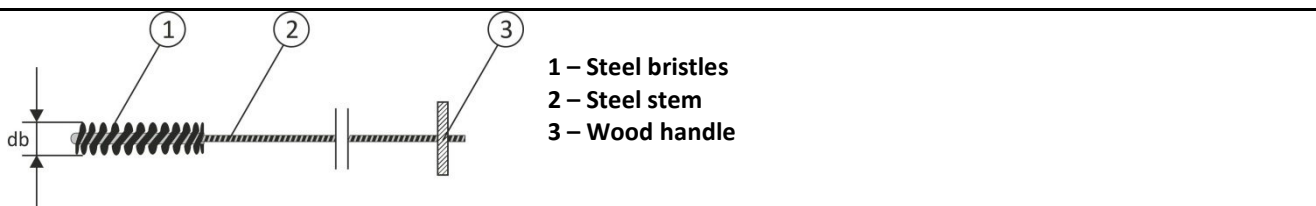


Table 3.g: Standard brush diameter

Threaded rod diameter - d			M8	M10	M12	M16	M20	M24
d ₀	Nominal drill hole	[mm]	10	12	14	18	24	28
d _b	Brush diameter	[mm]	12	14	16	20	26	30

- Special brush

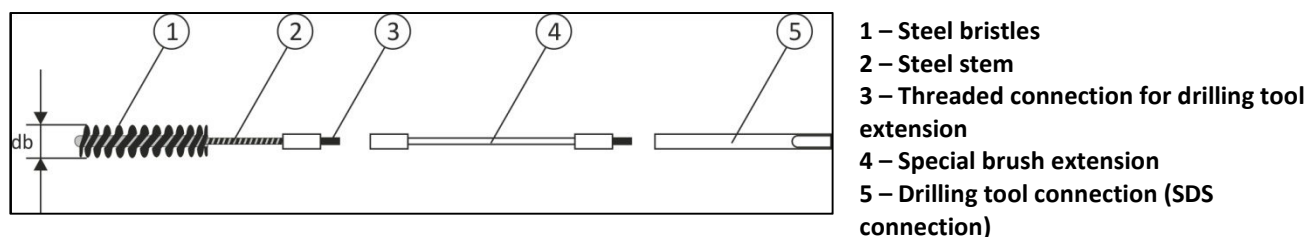


Table 3.h: Special brush diameter (mechanical brush)

Threaded rod diameter - d			M16	M20	M24
d ₀	Nominal drill hole	[mm]	18	24	28
d _b	Brush diameter	[mm]	20	26	30

3. Installation

3.3: Tools for injection

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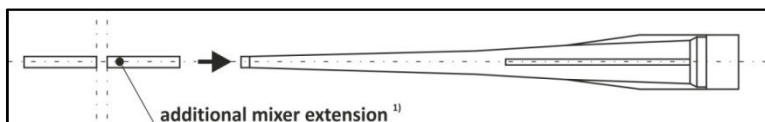
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3.3.1 Standard installation conditions:

Installation procedure up to 300 [mm] embedment depth (no overhead installation)

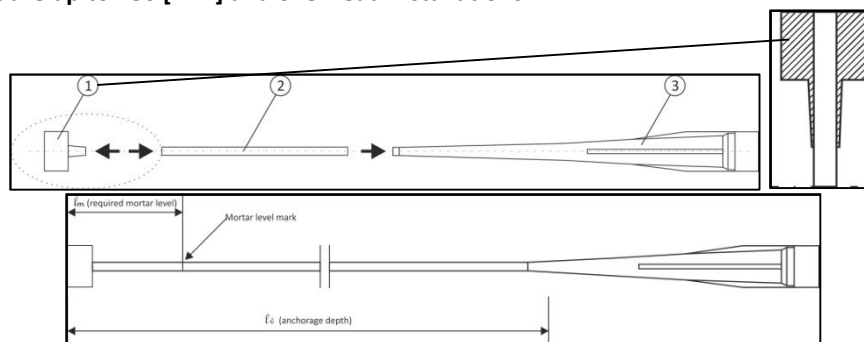
3.3.2 Special installation conditions:

3.3.2.1 Use the mixer extension (assembled on the standard mixer) in the installation procedure up to 300 [mm] embedment depth if needed



¹⁾Variable length from 380 [mm] to 1000 [mm]

3.3.2.2 Use the mixer extension (assembled on the standard mixer) with the injection plug for installation procedure up to 480 [mm] and overhead installations



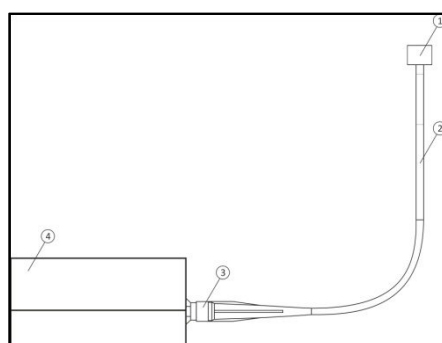
1 – Injection plug (nominal diameter according to the nominal diameter of the drill hole)

2 – Special mixer extension (variable length, with nominal diameter 10 [mm])

Mark the required mortar level l_m and embedment depth l_v with tape or marker on the injection extension.
 Quick estimation $l_m = 1/3 l_v$. Continue the injection until the mortar level mark l_m become visible.

3 – Standard mixer (suitable for all cartridges size)

- System assembled



- 1 – Injection plug
- 2 – Special mixer extension
- 3 – Standard mixer
- 4 – Cartridge
- 5 – Injection pneumatic pump



3. Installation

Table 3.i: Resin injection pump details

Pump example	Cartridge size	Type
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<p>DH 03 00 400</p> 	<p>400 ml</p>	<p>Pneumatic¹⁾</p>
<p>DH 01 00 400</p> 	<p>400 ml</p>	<p>Manual (up to 300 [mm] embedment depth)</p>
<p>DH 01 00 345</p> 	<p>345 ml</p>	<p>Manual (up to 300 [mm] embedment depth)</p>
<p>DH 01 01 300</p> 	<p>300 ml</p>	<p>Manual (up to 300 [mm] embedment depth)</p>

¹⁾The pneumatic injection pump is recommended for all special applications

4. Declared performance according to ETAG001 part 1, part 5 and Annex E

Table 4.a: Combined pull-out and concrete cone failure to tension load in non-cracked concrete

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Size		M8	M10	M12	M16	M20	M24
Concrete C20/25, temperature range [-40°C ; +40°C] ($T_{mlp}=24^{\circ}\text{C}$)	$\tau_{Rk,ucr}$ [N/mm ²]	16,0	12,0	12,0	12,0	9,5	9,5
Concrete C20/25, temperature range [-40°C ; +80°C] ($T_{mlp}=50^{\circ}\text{C}$)	$\tau_{Rk,ucr}$ [N/mm ²]	11,0	8,5	8,5	8,5	7,0	7,0
Concrete C20/25, temperature range [-40°C ; +120°C] ($T_{mlp}=72^{\circ}\text{C}$)	$\tau_{Rk,ucr}$ [N/mm ²]	6,0	4,5	4,5	4,5	4,0	4,0
Concrete C30/37 amplification factor	Ψ_c C30/37	1,12					
Concrete C40/50 amplification factor	Ψ_c C40/50	1,23					
Concrete C50/60 amplification factor	Ψ_c C50/60	1,30					
Installation safety factor for use category 1	γ_2	1,00					
Installation safety factor for use category 2	γ_2	1,20					

Table 4.b: Combined pull-out and concrete cone failure to tension load – cracked concrete

Size		M10	M12	M16	M20
Concrete C20/25, temperature range [-40°C ; +40°C] ($T_{mlp}=24^{\circ}\text{C}$)	$\tau_{Rk,cr}$ [N/mm ²]	9,0	9,0	9,0	6,5
Concrete C20/25, temperature range [-40°C ; +80°C] ($T_{mlp}=50^{\circ}\text{C}$)	$\tau_{Rk,cr}$ [N/mm ²]	6,5	6,5	6,5	4,5
Concrete C20/25, temperature range [-40°C ; +120°C] ($T_{mlp}=72^{\circ}\text{C}$)	$\tau_{Rk,cr}$ [N/mm ²]	3,5	3,5	3,5	2,5
Concrete C30/37 amplification factor	Ψ_c C30/37	1,12			
Concrete C40/50 amplification factor	Ψ_c C40/50	1,23			
Concrete C50/60 amplification factor	Ψ_c C50/60	1,30			
Installation safety factor for use category 1	γ_2	1,00			
Installation safety factor for use category 2	γ_2	1,20			

Table 4.c: Splitting failure to tension load

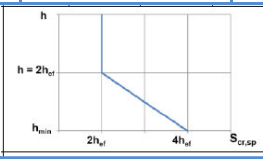
Size		M8	M10	M12	M16	M20	M24
Edge distance	$C_{cr,sp}$ [mm]	If $h = h_{min}$					
		2,5 h_{ef}		2,0 h_{ef}		1,5 h_{ef}	
							
		If $h \geq 2 h_{min}$					
Spacing	$s_{cr,sp}$ [mm]	$C_{cr,Np}$ $2 C_{cr,sp}$					

Table 4.d: Concrete pryout failure to shear load – cracked and non-cracked concrete

Size		M8	M10	M12	M16	M20	M24
Equation 5.7 of the EOTA TR029 factor	k [-]	2					

4. Declared performance according to ETAG001 part 1, part 5 and Annex E

Table 4.e: Characteristic displacement in non-cracked concrete C20/25 to C50/60 under tension loads

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According to the Regulation EU No 305/2011

Size		M8	M10	M12	M16	M20	M24
Admissible service load ¹⁾	F [kN]	9,6	10,8	14,3	23,8	29,6	42,4
Displacement	δ_{N0} [mm]	0,30	0,30	0,35	0,35	0,35	0,40
	$\delta_{N\infty}$ [mm]	0,85	0,85	0,85	0,85	0,85	0,85

Table 4.f: Characteristic displacement in cracked concrete C20/25 to C50/60 under tension loads

Size		M10	M12	M16	M20
Admissible service load ¹⁾	F [kN]	9,5	14,3	21,4	23,8
Displacement	δ_{N0} [mm]	0,50	0,50	0,70	0,60
	$\delta_{N\infty}$ [mm]	0,85	0,85	0,85	0,85

Table 4.g: Characteristic displacement in cracked and non-cracked concrete C20/25 to C50/60 under shear loads

Size		M8	M10	M12	M16	M20	M24
Admissible service load ¹⁾	F [kN]	3,7	5,8	8,4	15,7	24,5	35,3
Displacement	δ_{V0} [mm]	2,0	2,0	2,0	2,0	2,0	2,0
	$\delta_{V\infty}$ [mm]	3,0	3,0	3,0	3,0	3,0	3,0

¹⁾these values are valid for each temperature range

5. Label

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10 **11** **12** **13** **14** **15** **16**

ETA 10/0102 **ETA 10/0103**

SINTO ST-VE 3000 RESINA VINILESTER

caratteristiche
favorevole
benessere

Tecfi Sistemi di fissaggio
ISO 14001:2004

300 ml
DISEGNO 000000

xx / yyyy
DGE02xxxxx

Pericolo! Danger! Gefahr! Peligro!

1 Item Code
2 Descriptions
3 Cartridge capacity (ml)
4 EAN 13 code
5 Installation sequence
6 Expiring date
7 Lot Number
8 Warnings
9 Danger symbols
10 Identification number of the Notified Body
11 Last two digits of the year in which the marking was first affixed
12 European standard applied and intended use
13 DoP number
14 Link to DoP
15 European Assessment Document's number
16 Declared level of performance

6. Item codes

Table 6.a: Item codes

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According to the Regulation EU No 305/2011

Cartridge capacity	Cartridge type	Item code
300 ml	Coaxial	DGE 02 00 300
345 ml	Side by side (shuttle)	DGE 02 00 345
400 ml	Coaxial	DGE 02 00 400 – DGE 12 00 400 – DGE22 00 400

The performance of the product identified above is in conformity with the set of declared performances. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Name and function	Place and date of issue	Signature
President Antonio Guarino	Pastorano, April 30 th 2014	