



**Technical and Test Institute  
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## European Technical Assessment

**ETA 17/0368  
of 24/04/2017**

**Technical Assessment Body issuing the ETA:** Technical and Test Institute  
for Construction Prague

**Trade name of the construction product**

G&B Fissaggi Gebofix EPO PLUS RE

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

Product area code: 33  
Post installed rebar connections  
with EPO PLUS RE

**Manufacturer**

G&B FISSAGGI  
Corso Savona, 22  
10029 Villatellone (TO)  
ITALY

**Manufacturing plant**

G&B Fissaggi S.R.L., Plant 4

**This European Technical Assessment  
contains**

14 pages including 10 Annexes which form  
an integral part of this assessment.

**This European Technical Assessment is  
issued in accordance with regulation  
(EU) No 305/2011, on the basis of**

ETAG 001-Part 1 and Part 5, edition 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.

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## 1. Technical description of the product

The G&B Fissagi Gebofix EPO PLUS RE is used for the connection, by anchoring or overlap joint, of reinforcing bars (rebars) in existing structures made of normal weight concrete. The design of the post-installed rebar connections is done in accordance with the regulations for reinforced concrete constructions.

Reinforcing bars made of steel with a diameter  $d$  from 8 to 40 mm and EPO PLUS RE chemical mortar are used for rebar connections. The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between embedded element, injection mortar and concrete.

The illustration and the description of the product are given in Annex A.

## 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 B.

The provisions made in this European Technical Assessment are based on an assumed 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, but are to be regarded only as a means for choosing the products in relation to the expected economically reasonable working life of the works.

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

### 3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Design values of the ultimate bond resistance	See Annex C 1

### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	No performance assessed

### 3.3 Hygiene, health and environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be 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 Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

### 3.4 Safety in use (BWR 4)

For basic requirement safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

### 3.5 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

### 3.6 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B 1 are kept.

**4. Assessment and verification of constancy of performance (AVCP) system applied with reference to its legal base**

According to the Decision 96/582/EC of the European Commission<sup>1</sup> the system of assessment verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

<b>Product</b>	<b>Intended use</b>	<b>Level or class</b>	<b>System</b>
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements or heavy units such as cladding and suspended ceilings.	-	1

**5. Technical details necessary for the implementation of the AVCP system, as provided in the applicable EAD**

**5.1 Tasks of the manufacturer**

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use raw materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technický a zkušební ústav stavební Praha, s.p.<sup>2</sup> The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in the field of anchors in order to undertake the actions laid down in section 5.2. For this purpose, the control plan referred to in this section and section 5.2 shall be handed over by the manufacturer to the notified body involved.

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

<sup>1</sup> Official Journal of the European Communities L 254 of 08.10.1996

<sup>2</sup> The control plan is a confidential part of the documentation of the European Technical Assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

## 5.2 Tasks of the notified bodies

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified certification body involved by the manufacturer shall issue a certificate of constancy of performance of the product stating the conformity with the provisions of this European Technical Assessment.

In cases where the provisions of the European Technical Assessment and its control plan are no longer fulfilled the notified body shall withdraw the certificate of constancy of performance and inform Technický a zkušební ústav stavební Praha, s.p without delay.

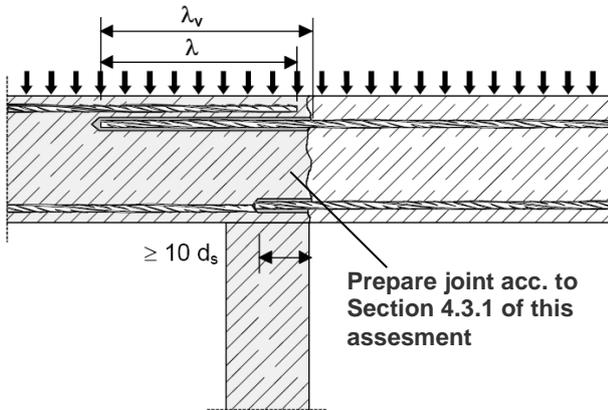
Issued in Prague on 24.04.2017

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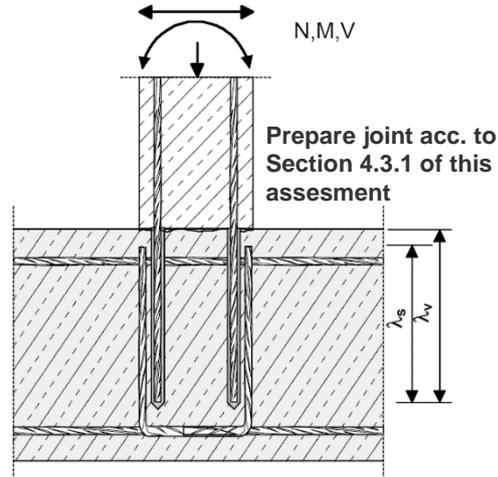
**Ing. Mária Schaan**

Head of the Technical Assessment Body

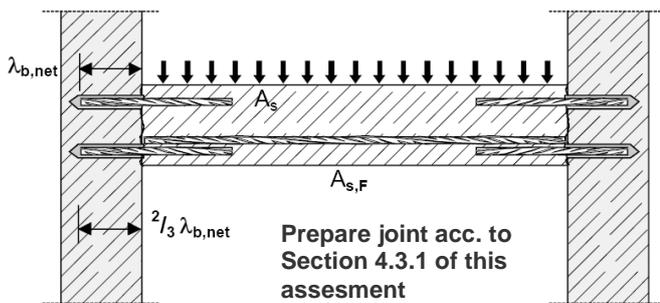
**Figure A1:** Overlap joint for rebar connections of slabs and beams



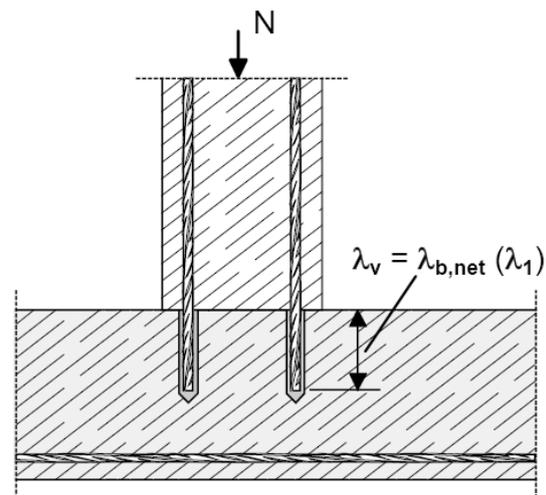
**Figure A2:** Overlap joint at a foundation of a column or wall where the rebars are stressed in tension



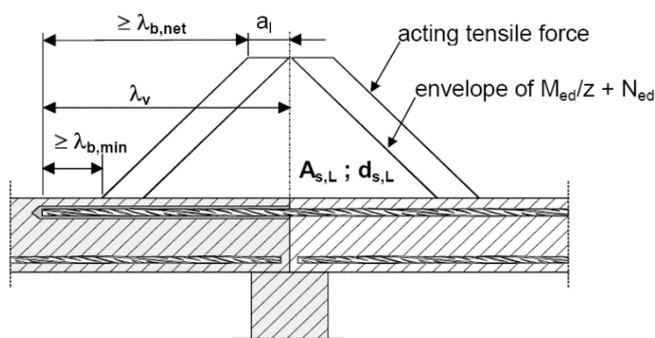
**Figure A3:** End anchoring of slabs or beams, designed as simply supported



**Figure A4:** Rebar connection for components stressed primarily in compression. The rebars are stressed in compression.



**Figure A5:** Anchoring of reinforcement to cover the line of acting tensile force



**Note to Figure A1 to A5:**

In the Figures no transverse reinforcement is plotted, the transverse reinforcement as required by EC 2 shall be present.

The shear transfer between old and new concrete shall be designed according to EC2.

**G&B Fissagi Gebofix EPO PLUS RE**

**Product description**

Installed condition and examples of use for rebars

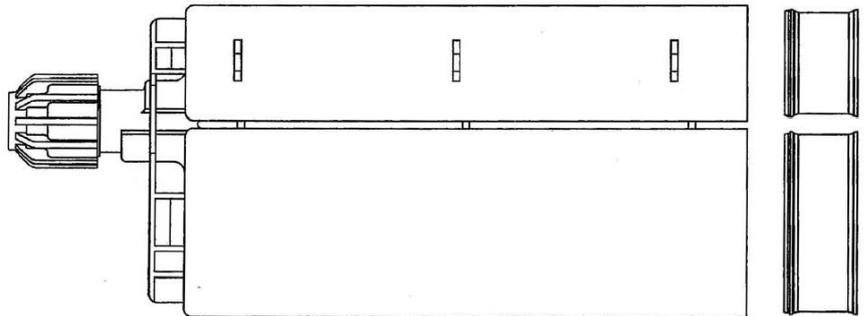
**Annex A 1**

## G&B Fissagi Gebofix EPO PLUS RE:

### Injection mortar: G&B Fissagi Gebofix EPO PLUS RE

Side-by-side cartridge  
385ml and 585ml

Cartridge label: EPO PLUS RE, processing notes, charge-code, shelf life, hazard-code, curing- and processing time (depending on the temperature), with as well as without travel scale.

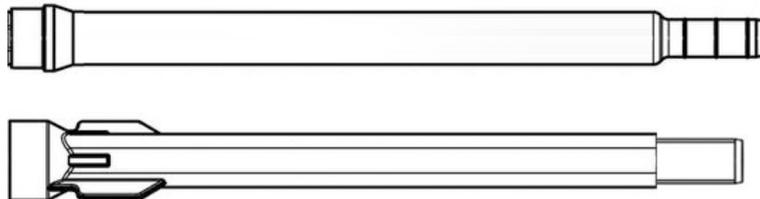


### Static Mixer

Standard Mixer



High Flow Mixer



### Reinforcing Bar (rebar) Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32, Ø40



Minimum value of related rib area  $f_{R,min}$  according to EN 1992-1-1:2004.

- The maximum outer rebar diameter over the ribs shall be:  
Nominal diameter of the rib  $d + 2 \cdot h$  ( $h \leq 0,07 \cdot d$ )  
(d: nominal diameter of the bar; h: rib height of the bar)

**Table A1: Materials**

Product form		Bars and de-coiled rods	
Class		B	C
Characteristic yield strength $f_{yk}$ or $f_{0,2k}$ (MPa)		400 to 600	
Minimum value of $k = (f_t / f_y)_k$		$\geq 1,08$	$\geq 1,15$ < 1,35
Characteristic strain at maximum force $\epsilon_{uk}$ (%)		$\geq 5,0$	$\geq 7,5$
Bendability		Bend / Rebend test	
Maximum deviation from nominal mass (individual bar) (%)	Nominal bar size (mm) $\leq 8$	$\pm 6,0$	
	$> 8$	$\pm 4,5$	
Bond: Minimum relative rib area, $f_{R,min}$	Nominal bar size (mm) 8 to 12	0,040	
	$> 12$	0,056	

### G&B Fissagi Gebofix EPO PLUS RE

#### Product description

Injection mortar / Static mixer / Rebar  
Materials

**Annex A 2**

## Specifications of intended use

### Anchorage subject to:

- Static and quasi-static load.

### Base materials

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000-12
- Strength classes C12/15 to C50/60 according to EN 206-1:2000-12.
- Maximum chloride concrete of 0,40% (CL 0.40) related to the cement content according to EN 206-1:2000-12.
- Non-carbonated concrete.

Note: In case of a carbonated surface of the existing concrete structure the carbonated layer shall be removed in the area of the post installed rebar connection (with a diameter  $d_s + 60$  mm) prior to the installation of the new rebar. The depth of concrete to be removed shall correspond to at least minimum concrete cover in accordance with EN 1992-1-1:2004.

The foregoing may be neglected if building components are new and not carbonated.

### Temperature range:

- $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  (max. short. term temperature  $+80^{\circ}\text{C}$  and max. long term temperature  $+50^{\circ}\text{C}$ )

### Use conditions (Environmental conditions)

- The rebars may be installed in dry or wet concrete.

### Design:

- The anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the forces to be transmitted.
- Design according to EN 1992-1-1:2004
- The position of the reinforcement in the existing structure shall be determined on the basis of the construction documentation and taken into account when designing.

### Installation:

- Dry or wet concrete.
- It must not be installed in flooded holes.
- Hole drilling by hammer drill, compressed air drill mode or diamond core drilling.
- The installation of post-installed rebars shall be done only by suitable trained installer and under supervision on site. The conditions under which an installer may be considered as suitable trained and the conditions for supervision on site are up to the Member States in which the installation is done.
- Check the position of the existing rebars

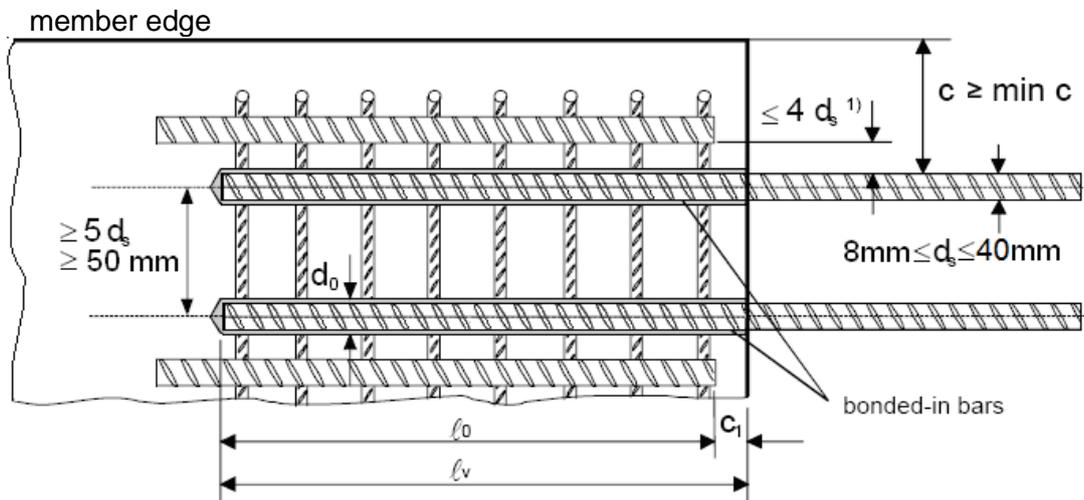
**G&B Fissagi Gebofix EPO PLUS RE**

**Intended use  
Specifications**

**Annex B 1**

**Figure B1:** General design rules of construction for bonded-in rebars

- Only tension forces in the axis of the rebar may be transmitted
- The transfer of shear forces between new concrete and existing structure shall be designed additionally according to EN 1992-1-1.
- The joints for concreting must be roughened to at least such an extent that aggregate protrude.



1) If the clear distance between lapped bars exceeds  $4d_s$  then the lap length shall be increased by the difference between the clear bar distance and  $4d_s$

- c concrete cover of bonded-in bar
- $c_1$  concrete cover at end-face of bonded-in bar
- min c minimum concrete cover acc. Table B1 of this assessment
- $d_s$  diameter of bonded-in bar
- $l_0$  lap length acc. to EN 1992-1-1:2004
- $l_v$  effective embedment depth  $\geq l_0 + c_1$
- $d_0$  nominal drill bit diameter, see Table B3

**G&B Fissagi Gebofix EPO PLUS RE**

**Intended use**  
General design rules of construction

**Annex B 2**

**Table B1:** Minimum concrete cover  $\min c^{1)}$  of the bonded-in rebar depending on drilling method

Drilling method	
Hammer drilling	$30\text{mm} + 0,06 \ell_v \geq 2 d_s$
Compressed air drilling	$50 \text{ mm} + 0,08 \ell_v$
Diamond core drilling	$50 \text{ mm} + 0,08 \ell_v$

<sup>1)</sup>see Annexes B2, Figures B1

**Table B2:** Minimum anchorage length<sup>1)</sup> and lap lengths for C20/25 and maximum installation length  $\ell_{\max}$  for good bond conditions.

Rebar		$\ell_{b,\min}$ [mm]	$\ell_{0,\min}$ [mm]	$\ell_{\max}$ [mm]
$\varnothing d_s$ [mm]	$f_{y,k}$ [N/mm <sup>2</sup> ]			
8	500	113	200	400
10	500	142	200	500
12	500	170	200	600
14	500	198	210	700
16	500	227	240	800
20	500	284	300	1000
25	500	354	375	1000
28	500	397	420	1000
32	500	454	480	1000
40	500	851	900	1000

<sup>1)</sup> According to EN 1992-1-1:  $\ell_{b,\min}$  (8.6) and  $\ell_{0,\min}$  (8.11) for good bond conditions and  $\alpha_6 = 1,0$  with maximum yield stress  $\sigma_{sd} = 435 \text{ N/mm}^2$  for rebar B500-B and  $\gamma_M = 1,15$  and maximum installation length.

**Table B3:** Base material temperature, gelling time and curing time

Base material temperature	Gel time (working time)	Minimum curing time in dry concrete	Minimum curing time in wet concrete
+5°C to +9°C	120 min	50 h	100 h
+10°C to +14°C	45 min	30 h	60 h
+15°C to +19°C	25 min	18 h	36 h
+20°C to +29°C	12 min	10 h	20 h
+30°C to +39°C	6 min	6 h	12 h
+40°C	5 min	4 h	8 h

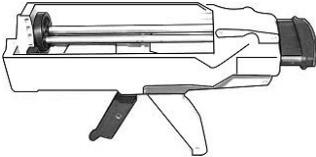
**G&B Fissagi Gebofix EPO PLUS RE**

**Intended use**

Minimum concrete cover / Maximum installation depth  
Working time and curing times

**Annex B 3**

**Table B4: Dispensing tools**

Cartridge type/size	Hand tool		Pneumatic tool
Side-by-side cartridge 385ml			
Side-by-side cartridge 585ml			-

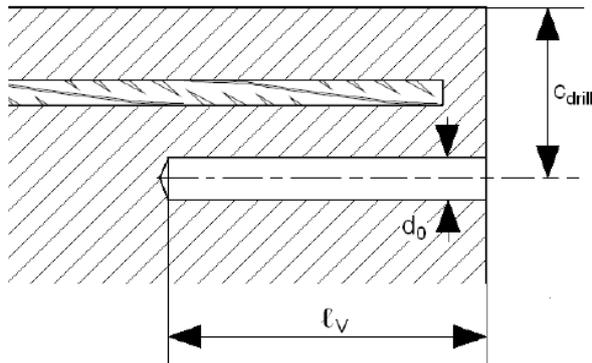
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**Intended use**  
Dispensing tools

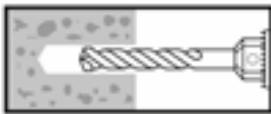
**Annex B 4**

### A) Bore hole drilling

Before drilling remove carbonized concrete. In case of aborted drill hole the drill hole shall be filled with mortar.



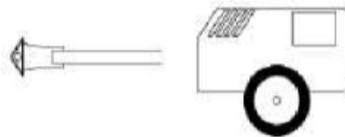
- Observe concrete cover  $c$ , as per setting plan and Table B1
- Drill parallel to the edge and to existing rebar.



1. Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected reinforcing bar with carbide hammer drill or a compressed air drill or diamond core drill.



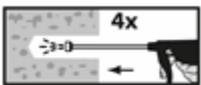
Hammer drill (HD)



Compressed air drill (CD)

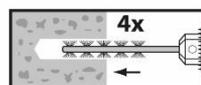
Rebar - $\phi$	Drill - $\phi$	Max. Embedment
[mm]	[mm]	[mm]
8	12	400
10	14	500
12	16	600
14	18	700
16	20	800
20	25	1000
25	32	1000
28	35	1000
32	40	1000
40	55	1000

### B) Bore hole cleaning

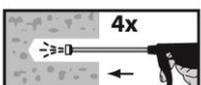


**Attention! Standing water in the bore hole must be removed before cleaning.**

- 2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) minimum of four times. If the bore hole ground is not reached an extension shall be used.



- 2b. Check brush diameter and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush  $> d_{b,min}$  a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used.



- 2c. Finally blow the hole clean again with compressed air a minimum of four times. If the bore hole ground is not reached an extension shall be used.

**G&B Fissagi Gebofix EPO PLUS RE**

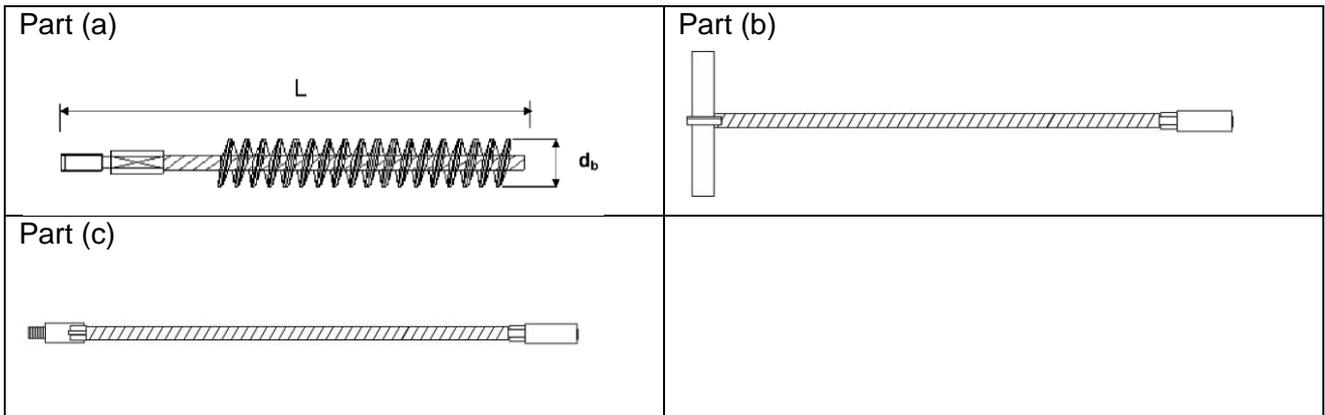
#### Intended use

Installation instruction: Bore hole drilling and Bore hole cleaning

**Annex B 5**

**Table B5: Cleaning tools**

**Brush**

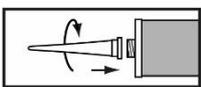


If required, use additional accessories and extension for air nozzle and brush to reach back of hole.

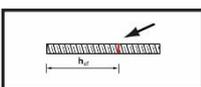
Max. hole depth	Brush / extension configuration	Part
375 mm	Brush head + handle	(a) + (b)
675 mm	Brush head + extension + handle	(a) + (b) + (c)
975 mm	Brush head + 2x extensions + handle	(a) + (b) + (b) + (c)

Rebar - $\varnothing$	$d_0$ Drill bit - $\varnothing$	$d_b$ Brush - $\varnothing$
[mm]	[mm]	[mm]
8	12	13
10	14	15
12	16	18
14	18	22
16	20	22
20	25	27
25	32	35
28	35	38
32	40	43
40	55	58

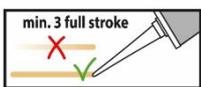
**C) Preparation of bar and cartridge**



3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For foil tube cartridges, cut off the foil tube clip before use. For every working interruption longer than the recommended working time as well as for new cartridges, a new static-mixer shall be used.



4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods



5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.

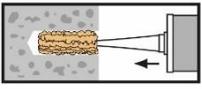
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**Intended use**

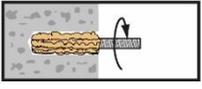
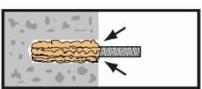
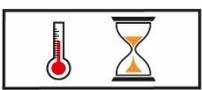
Installation instruction: Cleaning tools and Preparation of cartridge

**Annex B 6**

### D) Filling the bore hole

	<p>6. Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment larger than 190 mm an extension nozzle shall be used.</p>
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### E) Inserting the rebar

	<p>7. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.</p> <p>The anchor should be free of dirt, grease, oil or other foreign material.</p>
	<p>8. Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed.</p>
	<p>9. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured.</p>

**G&B Fissagi Gebofix EPO PLUS RE**

**Intended use**

Installation instruction: Filling the hole  
Inserting the rebar

**Annex B 7**

**Table C1:** Design values of the ultimate bond resistance  $f_{bd}^{1)}$  in N/mm<sup>2</sup> for hammer drilling methods for good bond conditions

Size $d_s$ [mm]	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 to 25	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
32								3,7	
40	1,5	1,8	2,1						

<sup>1)</sup> Tabulated values  $f_{bd}$  are valid for good bond conditions according to EN 1992-1-1. For all other bond conditions multiply the values for  $f_{bd}$  by 0,7.

**Table C2:** Design values of the ultimate bond resistance  $f_{bd}^{1)}$  in N/mm<sup>2</sup> for diamond core drilling methods for good bond conditions

Size $d_s$ [mm]	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 to 25	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,0
32							3,4		
40	1,5	1,8	2,1						

<sup>1)</sup> Tabulated values  $f_{bd}$  are valid for good bond conditions according to EN 1992-1-1. For all other bond conditions multiply the values for  $f_{bd}$  by 0,7.

**G&B Fissagi Gebofix EPO PLUS RE**

**Performances**  
Design values of the ultimate bond resistance

**Annex C 1**