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European Technical Assessment

**ETA 16/0599
of 15/07/2016**

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

Trade name of the construction product

G&B Fissaggi Gebofix PRO VE-SF
for rebar connection

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

Product area code: 33
Post installed rebar connections
with G&B Fissaggi Gebofix PRO VE-SF
injection mortar

Manufacturer

G&B Fissaggi S.R.L.
C.so Savona 22
10029 Villastellone (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 subject of this European Technical Assessment is the post-installed connection, by anchoring or overlap connection joint, of reinforcing bars (rebars) in existing structures made of normal weight concrete, using the G&B Fissaggi Gebofix PRO VE-SF in accordance with the regulations for reinforced concrete construction.

Reinforcing bars made of steel with a diameter d from 8 to 32 mm and injection mortar G&B Fissaggi Gebofix PRO VE-SF 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 Commission¹ the system of assessment verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting 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 Technical and Test Institute for Construction Prague.² 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.

5.2 **Tasks of the notified bodies**

¹ Official Journal of the European Communities L 254 of 08.10.1996

² 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.

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 Technical and Test Institute for Construction Prague without delay.

Issued in Prague on 15.07.2016

By

Ing. Mária Schaan

Head of the Technical Assessment Body

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

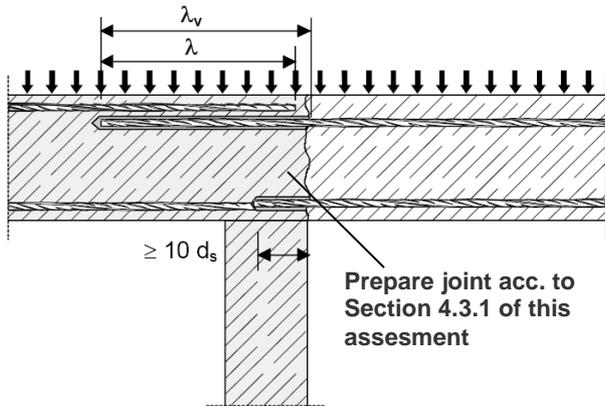


Figure A2: Overlap joint at a foundation of a column or wall where the rebars are stressed in tension

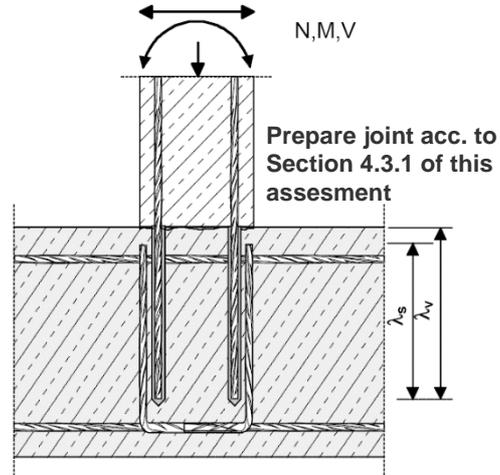


Figure A3: End anchoring of slabs or beams, designed as simply supported

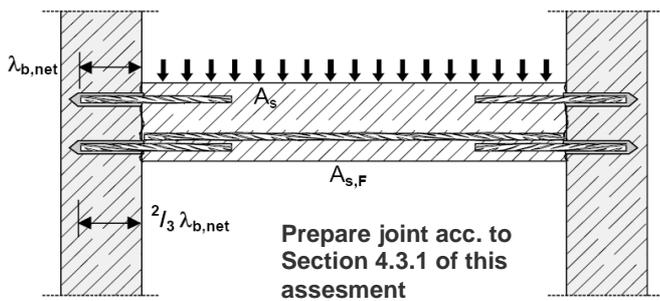


Figure A4: Rebar connection for components stressed primarily in compression. The rebars are stressed in compression.

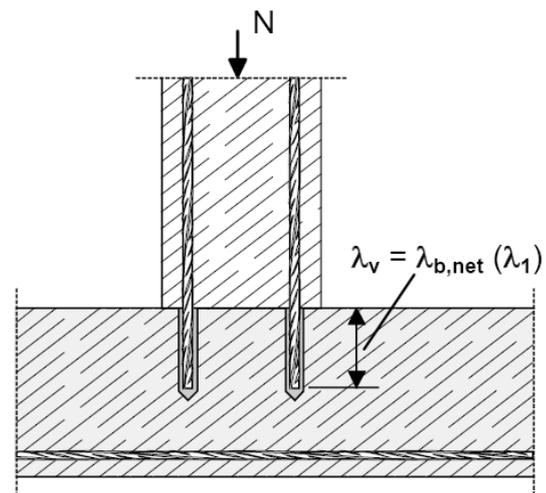
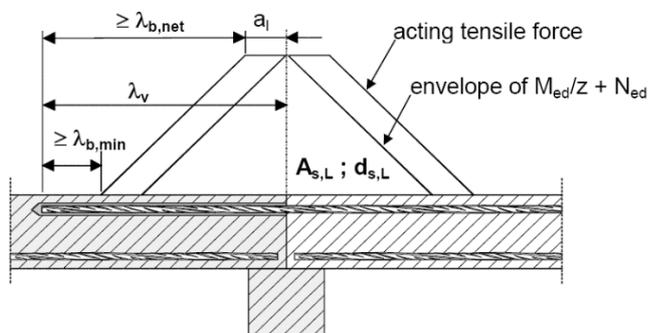


Figure A5: Anchoring of reinforcement to cover the line of acting tensile force



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 Fissaggi Gebofix PRO VE-SF

Product description

Installed condition and examples of use for rebars

Annex A 1

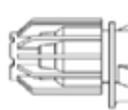
**Injection mortar
G&B Fissaggi Gebofix PRO VE-SF**

Type “coaxial”: 150 ml and 380 ml up to 420 ml cartridge



Imprint: G&B Fissaggi Gebofix PRO VE-SF processing notes, charge-code, shelf life, hazard-code, curing- and processing time (depending on the temperature), with as well as without travel scale

Type “side-by-side”: 345 ml and 825 ml cartridge



Imprint: G&B Fissaggi Gebofix PRO VE-SF 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

CRW 14W



Piston plug and Mixer extension



Reinforcing bar (rebar): Ø8, Ø10, Ø12, Ø 14, Ø16, Ø20, Ø25, Ø28, Ø32



- Minimum value of related rib area $f_{R,min}$ according to EN 1992-1-1:2004+AC:2010
- Rib height of the bar shall be in the range $0,05\phi \leq h \leq 0,07\phi$
(ϕ : Nominal diameter of the rebar; h : Rib height of the rebar)

Table A1: Materials

Designation	Material
Rebar EN 1992-1-1:2004+AC2010 Annex C	Bars and de-coiled rods class B or C f_{yk} and k according to NDP or NCL of EN 1992-1-1/NA:2013 $f_{uk} = f_{tk} = k \cdot f_{yk}$

G&B Fissaggi Gebofix PRO VE-SF

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

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 or compressed air drill mode.
- 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

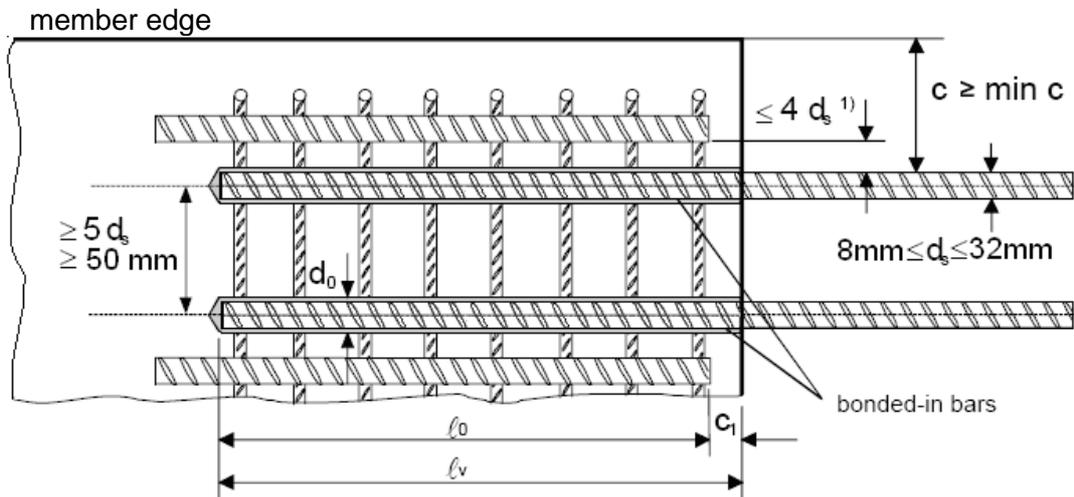
G&B Fissaggi Gebofix PRO VE-SF

Product description
Specifications

Annex B 1

Figure B1: General construction rules for post-installed 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 $4d_s$

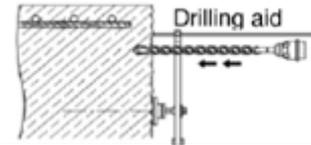
- c concrete cover of bonded-in bar
- c_1 concrete cover at end-face of bonded-in bar
- min c minimum concrete cover acc. Table B1 of this assessment
- d_s diameter of bonded-in bar
- ℓ_0 lap length acc. to EN 1992-1-1:2004
- ℓ_v effective embedment depth $\geq \ell_0 + c_1$
- d_0 nominal drill bit diameter, see Table B3

G&B Fissaggi Gebofix PRO VE-SF

Intended use
General construction rules for post-installed rebars

Annex B 2

Table B1: Minimum concrete cover min c¹⁾ of post-installed rebar depending of drilling method



Drilling method	Rebar diameter	Without drilling aid	With drilling aid
Hammer drilling (HD)	< 25 mm	30 mm + 0.06 * l _v ≥ 2 φ	30 mm + 0.02 * l _v ≥ 2 φ
	≥ 25 mm	40 mm + 0.06 * l _v ≥ 2 φ	40 mm + 0.02 * l _v ≥ 2 φ
Compressed air drilling (CD)	< 25 mm	50 mm + 0.08 * l _v	50 mm + 0.02 * l _v
	≥ 25 mm	60 mm + 0.08 * l _v	60 mm + 0.02 * l _v

¹⁾ see Annexes B2, Figures B1

Comments: The minimum concrete cover acc. EN 1992-1-1:2004+AC:2010 must be observed

Table B2: Maximum embedment depth l_{v,max}

Rebar Øφ	l _{v,max} [mm]
8 mm	400
10 mm	500
12 mm	600
14 mm	700
16 mm	800
20 mm	1000
25 mm	1000
28 mm	1000
32 mm	1000

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

Concrete temperature	Gelling-/ working time ¹⁾	Minimum curing time in dry concrete ⁴⁾
	t _{gel}	t _{cure,dry}
+5°C to +9°C	10 min ²⁾	145 min
+10°C to +19°C	6 min ²⁾	85 min
+20°C to +29°C	4 min ²⁾	50 min
+30°C	4 min ³⁾	40 min

¹⁾t_{gel}: maximum time from starting of mortar injection to completing of rebar setting.

²⁾Cartridge temperature **must** be between +5°C to +25°C

³⁾Cartridge temperature **must** be below +20°C

⁴⁾In wet concrete the curing time t_{cure,dry} has to be doubled up

G&B Fissaggi Gebofix PRO VE-SF

Intended use

Minimum concrete cover

Maximum embedment depth / working time and curing times

Annex B 3

Table B4: Dispensing tools

Cartridge type/size	Hand tool		Pneumatic tool
Coaxial cartridges 150 ml	 e.g. Type H297 or H244C		 e.g. Type TS 492 X
Coaxial cartridges 380 up to 420 ml	 e.g. Type CCM 380/10	 e.g. Type H 285 or H244C	 e.g. Type TS 485 LX
Side-by-side cartridges 345 ml	 e.g. Type CBM 330A	 e.g. Type H 260	 e.g. Type TS 477 LX
Side-by-side cartridge 825 ml	-	-	 e.g. Type TS 498X

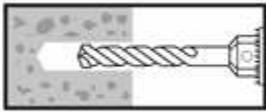
All cartridges could also be extruded by a battery tool.

G&B Fissaggi Gebofix PRO VE-SF

Intended use
Dispensing tools

Annex B 4

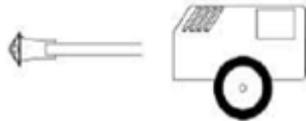
A) Bore hole drilling



1. Drill a hole to the size and embedment depth required by the selected reinforcing bar with carbide hammer drill (HD) or a compressed air drill (CD). In case of aborted drill hole: the drill hole shall be filled with mortar.



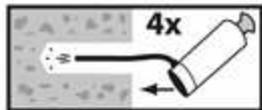
Hammer drill (HD)



Compressed air drill (CD)

Rebar - ϕ	Drill - ϕ [mm]
8 mm	12
10 mm	14
12 mm	16
14 mm	18
16 mm	20
20 mm	25
25 mm	32
28 mm	35
32 mm	40

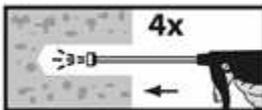
B) Bore hole cleaning



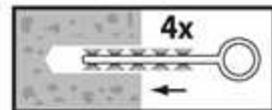
or

2a.

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

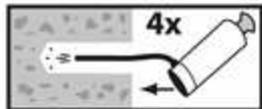


For bore holes deeper than 240 mm, compressed air (min. 6 bar) **must** be used.



2b.

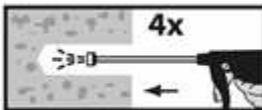
Check brush diameter (Table B5) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush $> d_{bmin}$ (Table B5) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used.



or

2c.

Finally blow the hole clean again with compressed air (min. 6 bar) or a hand pump a minimum of four times. If the bore hole ground is not reached an extension shall be used.



For bore holes deeper than 240 mm, compressed air (min. 6 bar) **must** be used.

G&B Fissaggi Gebofix PRO VE-SF

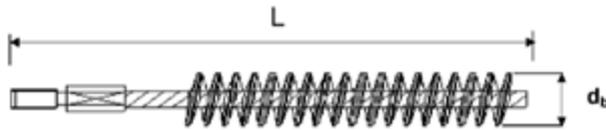
Intended use

Installation instruction: Bore hole drilling and bore hole cleaning

Annex B 5

Table B5: Cleaning tools

Brush:



SDS Plus Adapter:



Brush extension:



ϕ Rebar - ϕ	d_0 Drill - ϕ	d_b Brush - ϕ	$d_{b,min}$ min. Brush - ϕ
(mm)	(mm)	(mm)	(mm)
8	12	13	12.5
10	14	15	14.5
12	16	18	16.5
14	18	22	18.5
16	20	22	20.5
20	25	27	25.5
25	32	35	32.5
28	35	38	35.5
32	40	43	40.5

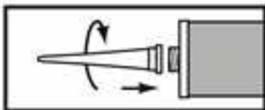


Hand pump (volume 750 ml)

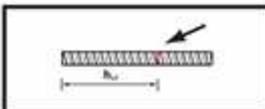


**Rec. compressed air tool
Hand slide valve (min 6 bar)**

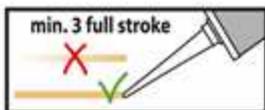
C) Preparation of bar and cartridge



- Attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool.
For every working interruption longer than the recommended working time (Table B3) as well as for every new cartridge, a new static-mixer shall be used.



- Prior to inserting the reinforcing bar into the filled bore hole, the position of the embedment depth shall be marked (e.g. with tape) on the reinforcing bar and insert bar in empty hole to verify depth l_v .
The reinforcing bar should be free of dirt, grease, oil or other foreign material.



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

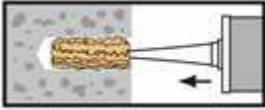
G&B Fissaggi Gebofix PRO VE-SF

Intended use

Installation instruction: Cleaning tools and Preparation of bar and cartridge

Annex B 6

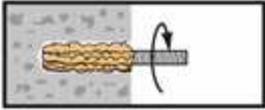
D) Filling the bore hole



6. Starting from the bottom or back of the cleaned anchor hole fill up 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. For overhead and horizontal installation and bore holes deeper than 240 mm a piston plug and the appropriate mixer extension must be used.

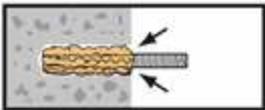
Observe the gel-/ working times given in Table B3.

E) Inserting the rebar



7. Push the reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.

The bar should be free of dirt, grease, oil or other foreign material.



8. Be sure that the bar is inserted in the bore hole until the embedment mark is at the concrete surface and that excess mortar is visible at the top end of the hole. If these requirements are not maintained, the application has to be renewed. For overhead installation fix the embedded part (e.g. wedges).



9. Observe the gelling time t_{gel} . Attend that the gelling time can vary according to the base material temperature (see Table B3). It is not allowed to move the bar after gelling time t_{gel} has elapsed. Allow the adhesive to cure to the specified time prior to applying any load. Do not move or load the bar until it is fully cured (attend Table B3). After full curing time t_{cure} has elapsed, the add-on part can be installed.

G&B Fissaggi Gebofix PRO VE-SF

Intended use

Installation instruction: Filling the bore hole
Inserting the rebar

Annex B 7

Minimum anchorage length and minimum lap length

The minimum anchorage length $l_{b,min}$ and the minimum lap length $l_{o,min}$ according to

EN 1992-1-1:2004+AC2010 ($l_{b,min}$ acc to Eq. 8.6 and EQ. 8.7 and $l_{o,min}$ acc. to Eq. 8.11) shall be multiply be a factor according to Table C1.

Table C1: Factor related to concrete class and drilling method

Concrete class	Drilling method	Factor
C12/15 to C50/60	Hammer drilling and compressed air drilling	1.0

Table C2: Design values of the ultimate bond resistance f_{bd} in N/mm² for all drilling methods for good conditions

according to EN 1992-1-1:2004+AC:2010 for good bond conditions

(for all other conditions multiply the values by 0.7)

Rebar - ϕ	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 to 25 mm	1.6	2.0	2.3	2.7	3.0	3.0	3.0	3.0	3.0
28 to 32 mm	1.6	2.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3

G&B Fissaggi Gebofix PRO VE-SF

Intended use

Minimum anchorage length and minimum lap length
Design values of the ultimate bond resistance f_{bd}

Annex B 8