

**Centre Scientifique et  
Technique du  
Bâtiment**

84 avenue Jean Jaurès  
CHAMPS-SUR-MARNE  
F-77447 Marne-la-Vallée Cedex 2

Tél. : (33) 01 64 68 82 82

Fax : (33) 01 60 05 70 37

**European Technical  
Assessment**

**ETA-18/0074  
of 19/03/2018**

*English translation prepared by CSTB - Original version in French language*

**General Part**

Nom commercial  
*Trade name*

**FASTFIX-IT - FX-E400**

Famille de produit  
*Product family*

Scellement d'armatures rapportées, diamètres 12mm à 40mm, avec  
Système d'injection FASTFIX-IT - FX-E400.

*Post installed rebar connections diameter 12mm to 40 mm made with  
FASTFIX-IT - FX-E400 mortar.*

Titulaire  
*Manufacturer*

FASTFIX-IT ENTERPRISE CO., LTD  
No. 47-1, Lane 199, Renxin Road,  
Renwu District, Kaohsiung City 814,  
Taiwan R.O.C.

Usine de fabrication  
*Manufacturing plants*

FastFix-it plant

Cette évaluation contient:  
*This assessment contains*

14 pages incluant 11 pages d'annexes qui font partie intégrante de  
cette évaluation  
*14 pages including 11 pages of annexes which form an integral part  
of this assessment*

Base de l'ETE  
*Basis of ETA*

DEE 330087-00-0601, Edition juillet 2015  
EAD 330087-00-0601, Version July 2015

Cette évaluation remplace:  
*This assessment replaces*

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## Specific Part

### 1 Technical description of the product

The FASTFIX-IT - FX-E400 is used for the connection, by anchoring or overlap joint, of reinforcing bars (rebars) in existing structures made of ordinary non-carbonated concrete C12/15 to C50/60. The design of the post-installed rebar connections is done in accordance with EN 1992-1-1 and EN 1992-1-2.

Covered are rebar anchoring systems consisting of FASTFIX-IT - FX-E400 bonding material and an embedded straight deformed reinforcing bar diameter, from 12 mm to 40 mm with properties according to Annex C of EN 1992-1-1 and EN 10080. The classes B and C of the rebar are recommended. The illustration and the description of the product are given in Annexes A.

### 2 Specification of the intended use

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annexes 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 right products in relation to the expected economically reasonable working life of the works.

### 3 Performance of the product

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

Essential characteristic	Performance
Characteristic tension resistance in case of static and quasi-static loading	See Annex

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

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	See Annex C2

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

Regarding dangerous substances contained in this European technical approval, 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 Construction Products Directive, 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 Protection against noise (BWR 5)

Not relevant.

#### 3.6 Energy economy and heat retention (BWR 6)

Not relevant.

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

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

### 3.8 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

## 4 Assessment and verification of constancy of performance (AVCP)

According to the Decision 96/582/EC of the European Commission<sup>1</sup>, as amended, the system of assessment and 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 to concrete, structural elements (which contributes to the stability of the works) or heavy units	—	1

## 5 Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

Issued in Marne La Vallée on 19/03/2018 by  
Charles Baloché  
Directeur technique

*The original French version is signed*

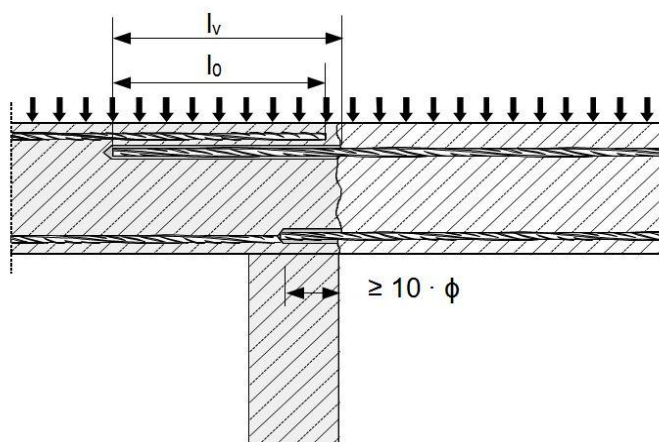
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<sup>1</sup> Official Journal of the European Communities L 254 of 08.10.1996

## Installed condition:

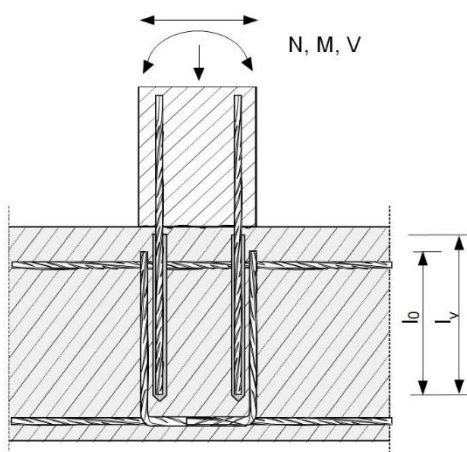
**Figure A1:**

Overlap joint with existing reinforcement for rebar connections of slabs and beams



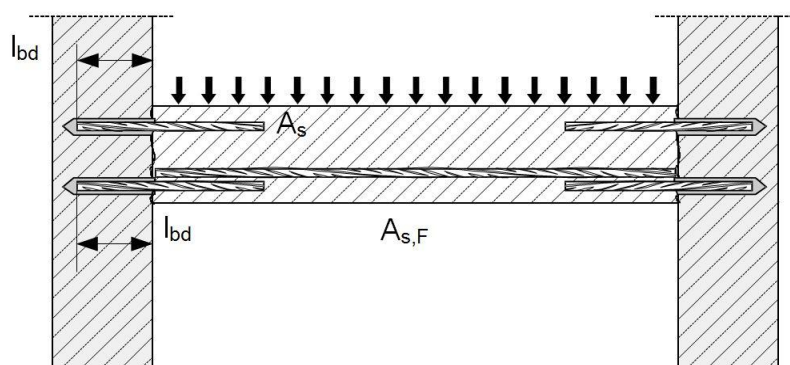
**Figure A2:**

Overlap joint with existing reinforcement at a foundation of a column or wall where the rebars are stressed in tension



**Figure A3:**

End anchoring of slabs or beams



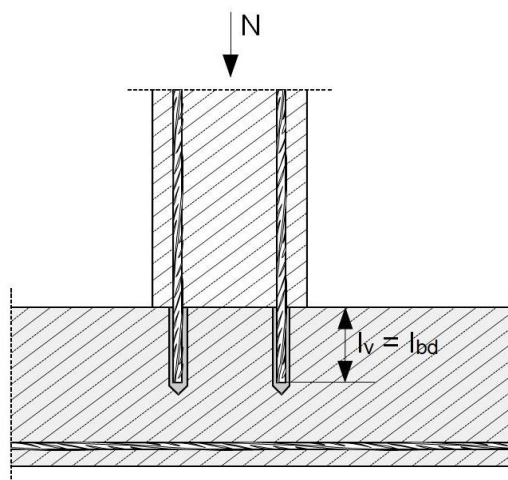
FASTFIX-IT - FX-E400

Product description  
 Installed condition

Annex A1  
 of European  
 Technical Assessment  
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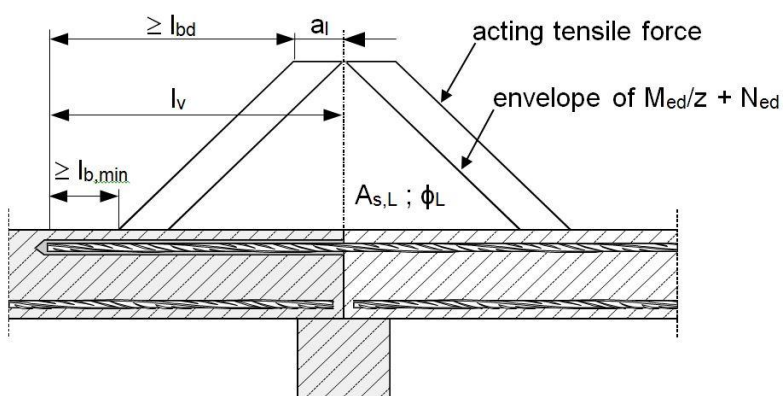
**Figure A4:**

Rebar connection for components stressed primarily in compression



**Figure A5:**

Anchoring of reinforcement to cover the enveloped line of acting tensile force in the bending member



**Note to** Erreur ! Source du renvoi introuvable. **to Figure A5:**

- In the Figures no transverse reinforcement is plotted, the transverse reinforcement as required by EN 1992-1-1 shall be present.
- The shear transfer between existing and new concrete shall be designed according to EN 1992-1-1.
- Preparing of joints according to Annex B2.

FASTFIX-IT - FX-E400

**Product description**

Installed condition: application examples of post-installed rebars.

Annex A2  
of European  
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## Product description: Injection mortar and steel elements

Injection mortar FASTFIX-IT - FX-E400: epoxy resin system 400 ml

### Marking:

FASTFIX Injection Anchor FX-E400

Instruction note;

hazard-code;

website;

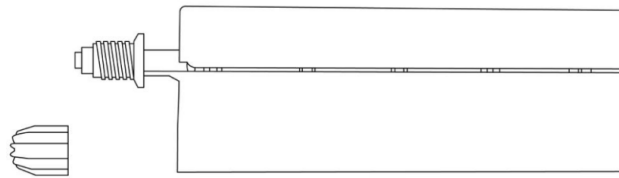
processing time table;

regulatory information;

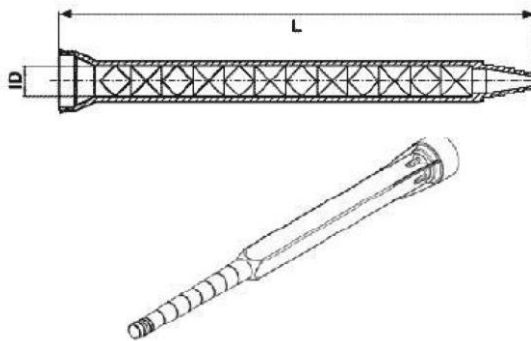
manufacturing date (MFG yyyy/dd);

Place of origin.

INJECTION ANCHO FX-E400 (400ML 3:1)



### Static mixer MGQ 10-19A



### Steel elements



### Reinforcing bar (rebar): $\phi$ 12 to $\phi$ 40

- Materials and mechanical properties according to Table A1.
- Minimum value of related rib area  $f_R$  according to EN 1992-1-1.
- Rib height of the bar  $h_{rib}$  shall be in the range:  
 $0,05 \cdot \phi \leq h_{rib} \leq 0,07 \cdot \phi$
- The maximum outer rebar diameter over the ribs shall be:  
 $\phi + 2 \cdot 0,07 \cdot \phi = 1,14 \cdot \phi$   
( $\phi$ : Nominal diameter of the bar;  $h_{rib}$ : Rib height of the bar)

FASTFIX-IT - FX-E400

Product description  
Steel elements

Annex A3  
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**Table A1: Materials**

Designation	Material
<b>Reinforcing bars (rebars)</b>	
Rebar EN 1992-1-1	Bars and de-coiled rods class B or C with $f_{yk}$ and $k$ according to NDP or NCL of EN 1992-1-1 $f_{uk} = f_{tk} = k \cdot f_{yk}$

**FASTFIX-IT - FX-E400**

**Product description**  
Steel elements

**Annex A4  
of European  
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## Specifications of intended use

### Anchorage subject to:

- Static and quasi-static loading.
- Fire exposure.

### Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206.
- Strength classes C12/15 to C50/60 according to EN 206.
- Maximum chloride content of 0,40 % (CL 0.40) related to the cement content according to EN 206-1.
- 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 of  $\phi + 60$  mm prior to the installation of the new rebar. The depth of concrete to be removed shall correspond to at least the minimum concrete cover in accordance with EN 1992-1-1. The foregoing may be neglected if building components are new and not carbonated and if building components are in dry conditions.

### Temperature in the base material:

- **at installation**  
+10 °C to +45 °C
- **in-service**  
+10 °C to +40 °C (max. long term temperature +20 °C and max. short term temperature +40 °C)

### Design:

- 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 under static or quasi-static loading in accordance with EN 1992-1-1, Annex B2 and Annex B4.
- The actual 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:

- Use category: dry or wet concrete (not in flooded holes).
- Drilling technique: hammer drilling
- Overhead installation is not allowed.
- Rebar installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Check the position of the existing rebars (if the position of existing rebars is not known, it shall be determined using a rebar detector suitable for this purpose as well as on the basis of the construction documentation and then marked on the building component for the overlap joint).
- In case of aborted hole the drill hole is filled with low shrinkage mortar of higher strength than the nominal concrete strength.

**FASTFIX-IT - FX-E400**

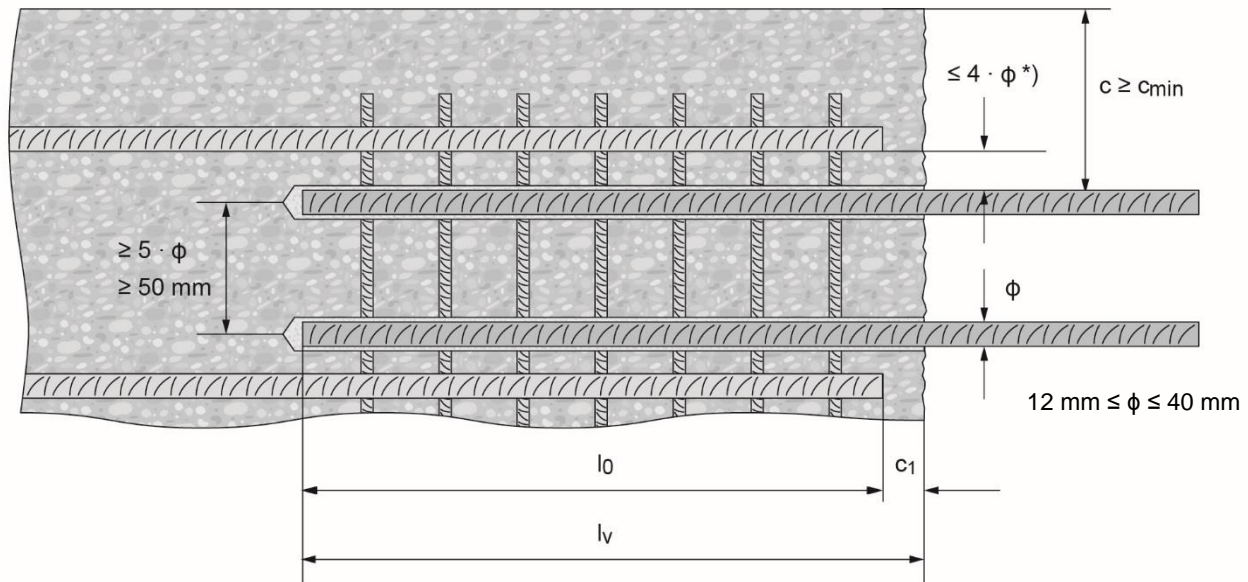
**Intended use**  
Specifications

**Annex B1**  
**of European**  
**Technical Assessment**  
**ETA- 18/0074**



### Figure B1: General construction rules for post-installed rebars

- Post-installed rebar may be designed for tension forces only.
- 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 protrudes.



\*) If the clear distance between lapped bars exceeds  $4 \cdot \phi$ , then the lap length shall be increased by the difference between the clear bar distance and  $4 \cdot \phi$ .

- $c$  concrete cover of post-installed rebar  
 $c_1$  concrete cover at end-face of existing rebar  
 $c_{min}$  minimum concrete cover according to table B1 and to EN 1992-1-1  
 $\phi$  diameter of reinforcement bar  
 $l_0$  lap length, according to EN 1992-1-1  
 $l_v$  effective embedment depth  $\geq l_0 + c_1$   
 $d_0$  nominal drill bit diameter, see Annex B4

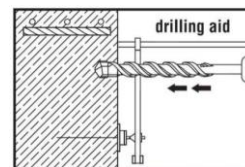
FASTFIX-IT - FX-E400

Intended use  
Installation parameters

Annex B2  
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**Table B1: Minimum concrete cover  $c_{min}^{1)}$  of the post-installed rebar depending on drilling method and drilling tolerance**

Drilling method	Rebar diameter [mm]	Minimum concrete cover $c_{min}^{1)}$ [mm]	
		Without drilling aid	With drilling aid
Hammer drilling	$\phi < 25$	$30 + 0,06 \cdot l_v \geq 2 \cdot \phi$	$30 + 0,02 \cdot l_v \geq 2 \cdot \phi$
	$\phi \geq 25$	$40 + 0,06 \cdot l_v \geq 2 \cdot \phi$	$40 + 0,02 \cdot l_v \geq 2 \cdot \phi$



<sup>1)</sup> See Annex B2, Figure B1.

Comments: The minimum concrete cover acc. EN 1992-1-1.

**Table B2: Maximum embedment depth  $l_{v,max}$  depending on bar diameter**

Elements	Dispensing tool
rebar	FX-GUN400
size	$l_{v,max}$ [mm]
$\phi 16$	1000
$\phi 20$	1000
$\phi 32$	1000
$\phi 40$	1000

**Table B3: Gel time and loading time<sup>1)</sup>**

Application temperature	Gel time	Loading time
40	4 min.	3 hours
30	7 min.	5 hours
20	15 min.	7 hours
10	60 min.	12 hours

<sup>1)</sup> The curing time data are valid for dry base material only.  
In wet base material the curing times must be doubled.





**FASTFIX-IT - FX-E400**

**Product description**

Minimum concrete cover  
Maximum embedment depth  
Gel time and loading time

**Annex B4  
of European  
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**Table B4: Parameters of drilling, cleaning and setting tools, Hammer Drilling**

Elements	Drill and clean				Installation
Rebar	Hammer drilling	Brush Steel wire	Brush extension SDS Plus Adapter	Extension for air nozzle	Maximum embedment depth
			-		-
size	d <sub>0</sub> [mm]	[inch]	[mm]	[mm]	l <sub>v,max</sub> [mm]
φ 12	16	5/8"	1000	PP tubes: 7,5*1,5*10,5*1000	1000
φ 20	25	1"	1000		1000
φ 32	40	1 5/8"	1000		1000
φ 40	55	2 1/4"	1000		1000

**Table B5: Cleaning alternatives for hammer drilling**

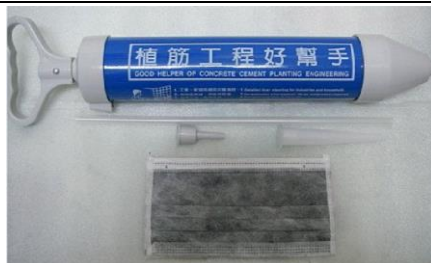
**Compressed Air Cleaning (CAC):**

air nozzle with an orifice opening of minimum 3,5 mm in diameter  
+ brushing



**Manual Cleaning (MC):**

Hand pump (volume 750mL)  
+ brushing



for cleaning of drilled holes with diameters d<sub>0</sub> ≤ 35 mm and drill hole depths h<sub>0</sub> ≤ 200 mm.



**FASTFIX-IT - FX-E400**

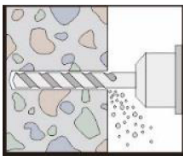
**Product description**

Setting tools for hammer drilling  
Cleaning alternatives.

**Annex B5  
of European  
Technical Assessment  
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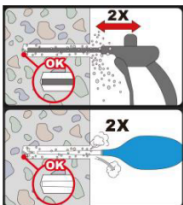
## Installation instruction

### 1. Bore hole drilling



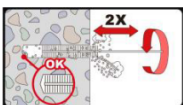
Drilling of hole with an electric drill to the diameter and depth required by the selected reinforcing bar. Drill hole diameter must be in accordance with anchor size.

### 2. Bore hole cleaning

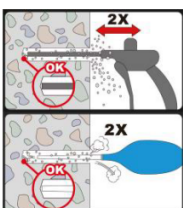


Start from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 30 seconds) or a hand pump a minimum of two times. If the bore hole ground is not reached an extension shall be used.

For bore holes deeper than 200 mm, or bore hole diameter bigger ( $\geq$ ) than 35 mm, compressed air (min. 30 seconds) must be used.



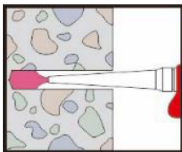
Brush the hole with an appropriate sized wire brush a minimum of two times. If the bore hole ground is not reached with the brush, a brush extension shall be used. The diameter of wire brush is equal to the hole diameter.



Finally blow the hole clean again with compressed air (min. 30 seconds) or a hand pump a minimum of two times. If the bore hole ground is not reached an extension shall be used.

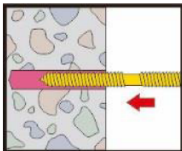
For bore holes deeper than 200 mm, or bore hole diameter bigger ( $\geq$ ) than 35 mm, compressed air (min. 30 seconds) must be used.

### 3. Bore hole filling



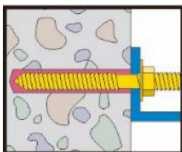
Prior to dispensing into the anchor hole, squeeze out separately the mortar until it shows a consistent grey colour, and discard non-uniformly mixed adhesive components. Start from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets.

### 4. Rebar/anchor inserting



Insert the anchor with a rotary motion into the filled drill hole. Some adhesive must come out of the hole.

**\*\*Important:** the anchor must be placed within the open time.



During the resin hardening time the anchor must not be moved or loaded.

FASTFIX-IT - FX-E400

Product description  
Installation instruction

Annex B6  
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## Minimum anchorage length and minimum lap length

The minimum anchorage length  $l_{b,min}$  and the minimum lap length  $l_{0,min}$  according to EN 1992-1-1 shall be multiplied by the relevant amplification factor  $\alpha_{lb}$  given in Table C1.

**Table C1: Amplification factor  $\alpha_{lb}$**

Bar diameter	Units	Concrete class								
		C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
$\phi$ 12	[-]	1,5								
$\phi$ 20	[-]	1,5								
$\phi$ 32	[-]	1,5								
$\phi$ 40	[-]	1,5								

**Table C2: Bond efficiency value  $k_b$**

Bar diameter	Units	Concrete class								
		C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
$\phi$ 12	[-]	1,6	1,6	1,6	2,0	2,0	2,0	2,3	2,3	2,3
$\phi$ 20	[-]	1,6	1,6	2,0	2,0	2,0	2,3	2,3	2,3	2,3
$\phi$ 32	[-]	1,6	2,0	2,0	2,0	2,3	2,3	2,3	2,7	2,7
$\phi$ 40	[-]	1,6	2,0	2,0	2,3	2,3	2,3	2,7	2,7	2,7

**Table C3: Design values of the ultimate bond resistance  $f_{bd}$ <sup>1)</sup>**

Bar diameter	Units	Concrete class								
		C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
$\phi$ 12	[N/mm <sup>2</sup> ]	1,0	0,9	0,8	0,8	0,7	0,7	0,6	0,6	0,6
$\phi$ 20	[N/mm <sup>2</sup> ]	1,0	1,0	0,9	0,8	0,7	0,7	0,7	0,6	0,6
$\phi$ 32	[N/mm <sup>2</sup> ]	1,0	1,0	0,9	0,9	0,8	0,8	0,7	0,7	0,7
$\phi$ 40	[N/mm <sup>2</sup> ]	1,0	1,0	1,0	0,9	0,8	0,8	0,8	0,7	0,7

<sup>1)</sup> According to EN 1992-1-1 for good bond conditions. For all other bond conditions multiply the values by 0,7.

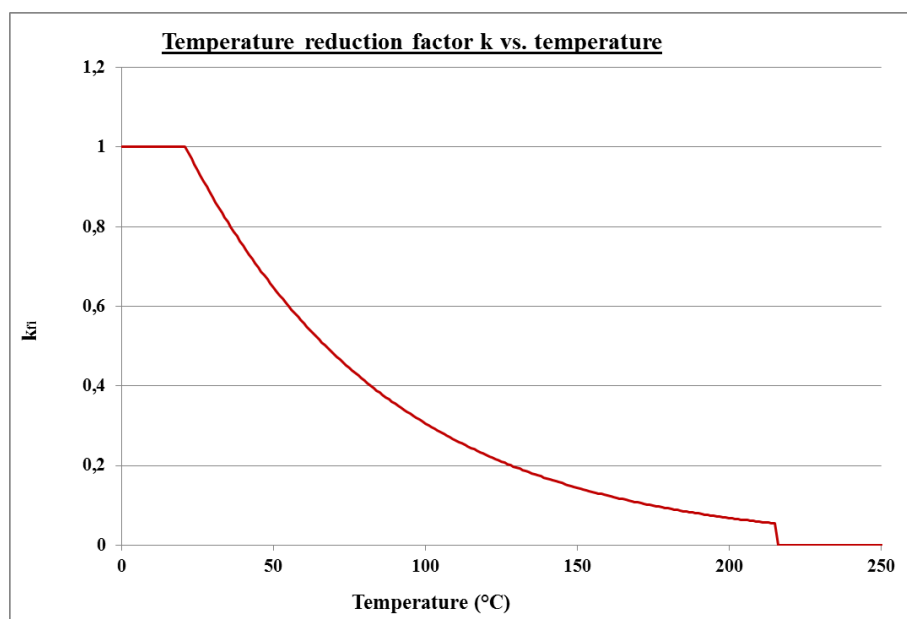
**FASTFIX-IT - FX-E400**

### Performance

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

**Annex C1  
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**Figure C1: Temperature reduction factor  $k_{fi}(\theta)$**



The analytic equation that describe the variation of  $k_{fi}(\theta)$  with temperature is given by the following function :

$$\text{If } 22^{\circ}\text{C} \leq \theta \leq 215^{\circ}\text{C} \quad : \quad k_{fi}(\theta) = \frac{f_{bm}(\theta)}{f_{bm,rqd,d}} \leq 1,0$$

$$\text{If } \theta < 22^{\circ}\text{C} \quad : \quad k_{fi}(\theta) = 1,0$$

$$\text{If } \theta > 215^{\circ}\text{C} \quad : \quad k_{fi}(\theta) = 0,0$$

With:

$$f_{bm}(\theta) = 13,713 \cdot \theta^{-0,015} \quad \theta \text{ in } ^{\circ}\text{C}$$

**FASTFIX-IT - FX-E400**

**Performance**

Temperature reduction factor  $k_{fi}(\theta)$ .

**Annex C2  
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