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Authorised and notified according to Article 10 of the Council Directive 89/106/EC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products

MEMBER OF EOTA

European Technical Approval ETA-13/0780

(English language translation, the original version is in Czech language)

Obchodní název *Trade name*	**MOEPSE, MOEPSES pro spojení výztuží** ***MOEPSE, MOEPSES for rebar connection***
Držitel schválení *Holder of approval*	Index Técnicas Expansivas, S.L. P.I. La Portalada II C. Segador 13 26006 Logroño Spain
Typ a použití výrobku *Generic type and use of construction product*	Dodatečné spojení výztuže velikosti od 8 do 25 mm s injektážní maltou MOEPSE, MOEPSES *Post installed rebar connections of the sizes 8 to 25 mm with MOEPSE, MOEPSES injection mortar.*
Platnost od *Validity from* do *to*	25.06.2013 24.05.2018
Výrobna *Manufacturing plant*	Plant 1
Toto evropské technické schválení obsahuje *This European Technical Approval contains*	21 stran včetně 12 příloh, které tvoří nedílnou součást dokumentu *21 pages including 12 Annexes which form an integral part of the document*

I. LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Technical and Test Institute for Construction Prague (Technický a zkušební ústav stavební Praha, s.p.) in accordance with:

   - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by the Council Directive 93/68/EEC[2]; and Regulation (EC) No.1882/2003 of the European Parliament and of the Council[3]
   - the Government Decree No. 190/2002 Collection of Laws [4], as amended
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC[5];
   - Guideline for European Technical Approval of „Metal Anchors for use in Concrete“, ETAG 001, Part 1 ´Anchors in general´, Part 5 ´Bonded anchors´ and Technical Report for Post Installed Rebar Connections TR 023.

2. Technický a zkušební ústav stavební Praha, s.p. is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.

4. This European Technical Approval may be withdrawn by the Technical and Test Institute for Construction Prague in particular pursuant to information by the Commission according to Article 5.1 of the Council Directive 89/106/EEC.

5. Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of the Technical and Test Institute for Construction Prague. In this case, partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

6. The European Technical Approval is issued by the approval body in its official language. This version corresponds to the version circulated within EOTA. Translations into other languages have to be designated as such.

[1] Official Journal of the European Communities N° L 40, 11.02.1989, p. 12
[2] Official Journal of the European Communities N° L 220, 30.08.1993, p. 1
[3] Official Journal of the European Union no. L 284, 31.10.2003, p. 1
[4] Collection of Law of the Czech Republic Vol.79 No190 , 21.5.2002
[5] Official Journal of the European Communities N° L 17, 20.01.1994, p. 34

II. SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

The MOEPSE and MOEPSES (extended curing time) injection system 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.

Reinforcing bars made of steel according to EN 1992-1-1, Annex C, classes B or C with a diameter d from 8 to 25 mm and MOEPSE, MOEPSES 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.

1.2 Intended use

The rebar connection may be used in non-carbonated normal weight concrete of grade C12/15 to C50/60 according to EN 206-1 only. Rebar connection may only be carried out with cast-in straight reinforcing bars according to EN 1992-1-1, e.g. those in the following applications:

- Overlapping joints with existing reinforcement in a building component, Figure 1 and 2 in Annex 2.
- Anchoring of the reinforcement at a slab or beam support, end support/bearing of a slab designed as simply supported as well as its reinforcement for restraint forces, Figure 3 in Annex 2.
- Anchoring of reinforcement of building components stressed primarily in compression, Figure 4 in Annex 2.
- Anchoring of reinforcement to cover the line of acting tensile force, Figure 5 in Annex 2.

The post installed rebar connections may be used in the temperature ranges:
-40°C to +80°C (max long term temperature +50°C,
max short term temperature +80°C)

This European Technical Approval covers in bore holes made with hammer drilling or compressed air drilling.

The rebars must be used only in building components dry surrounding or permanently wet surrounding according to exposure class X0 or XC1 according to EN 1992-1-1.

The post-installed rebar connection may be installed in dry or wet concrete. It must not be installed in flooded holes.

The rebars may be installed overhead.

The rebar connection may be used for predominantly static loads.

The fire resistance of post-installed rebar connections is not covered by this ETA.

Fatigue, dynamic or seismic loading of post-installed rebar connections are not covered by this ETA.

The provisions made in this European Technical Approval 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.

2 Characteristics of the product and methods of verification

2.1 Characteristics of the product

The post-installed rebar connection correspond to the drawings and information give in Annexes 1 and 4. The characteristic material values, dimensions and tolerances of the post-installed rebar connection not indicated in Annexes 1 and 4 shall correspond to the respective values laid down in the technical documentation[6] of this European Technical Approval.

The two components of the MOEPSE, MOEPSES injection mortar could be delivered in unmixed condition in mortar cartridges in sizes of 150 ml, 380ml, 400 ml, 410 ml in case of coaxial cartridges (CC), 350 ml, 825 ml in case of side by side cartridges (SBS), 150 ml, 170 ml, 300 ml, 550 ml and 850 ml in case of two part foil capsule within in a single component cartridge (FCC) and 280 ml in case of peeler (PLR) according Annex 2.

2.2 Methods of verification

The assessment of the fitness of the post-installed rebar connection for the intended use in relation to the requirements for safety in use in the sense of Essential Requirement 1 and 4 has been made in compliance with the Guideline for European Technical Approval of “Metal anchors for use in concrete “, ETAG 001, Part 1 “Anchors in general”, Part 5 “Bonded anchors” and Technical Report TR 023 “Assessment of post installed rebar connections”.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the UE Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 Evaluation of conformity of the product and CE marking

3.1 System of attestation of conformity

The system of attestation of conformity 2 (i) (allocated to system 1) according to Council Directive 89/106/EEC Annex III provides:

(a) Tasks of the manufacturer:
  (1) factory production control,
  (2) testing of samples taken at the factory by the manufacturer in accordance with a prescribed control plan.

(b) Tasks of the approved body:
  (3) initial type-testing of the product,
  (4) initial inspection of factory and of factory production control,
  (5) continuous surveillance, assessment and approval of factory production control.

3.2 Responsibility

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

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 insure that the product is in conformity with this European Technical Approval.

[6] The technical documentation of this European Technical Approval is deposited at the Technický a zkušební ústav stavební Praha, s.p, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity producer, is handed over to the approved bodies.

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

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Approval. 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.[7].

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

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

3.2.2 Tasks of the approved body

The approved body shall perform the:

- initial type-testing of the product
- initial inspection of factory and of factory production control
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

The approved 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 approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the factory production control of this European Technical Approval.

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

3.3 CE marking

The CE-marking[8] shall be affixed on each packaging of the anchor. The symbol "CE" shall be accompanied by the following information:

- name or identifying mark of producer and manufacturing plant;
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity;
- number of the European Technical Approval;

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7 The control plan is a confidential part of the documentation of the European Technical Approval, but not published together with the ETA and only handed over to the approved body involved in the procedure of attestation of conformity.
See section 3.2.2.

8 Notes on the CE marking are stated in Guidance Paper D „CE marking under the Construction Products Directive", Brussels, 01 August 2002

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European Technical Approval is issued for the product on the basis of agreed data/information, deposited with Technický a zkušební ústav stavební Praha, s.p., which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Technický a zkušební ústav stavební Praha, s.p. before the changes are introduced. Technický a zkušební ústav stavební Praha, s.p. will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Drafting

Rebar connections must be designed in keeping with good engineering practice. Considering the loads to be anchored, design calculations and design drawings must be produced which can be checked. At least the following items must be stated in the design drawings:

- Concrete strength
- Diameter, drilling technique, concrete cover, spacing and embedment depth of the rebars
- Length for markings ℓ_m and ℓ_v on the injection extension according to Annex 9
- Kind of preparation of the joint between building component being connected

4.3 Design

4.3.1 General

The actual position of the reinforcement in the existing building component must be determined on the basis of the construction documentation and allowed for when drafting.

The transfer of internal section forces in the joint must be verified in accordance to EN 1992-1-1 when a new building component is being connected. The transfer of shear forces between new and old concrete shall be designed according to EN 1992-1-1. The joints for concreting must be roughened to at least such an extent that aggregate protrude.

The design of rebar connections and determination of the internal section forces to be transferred in the construction joint shall be in keeping with the EN 1992-1-1.

Verification of immediate local force transfer to the concrete has been provided.

Verification of the transfer of the loads to be anchored to the building component must be provided.

The spacing between post installed rebars shall be greater than the maximum of $5d_s$ and 50 mm (according to Annex 4).

4.3.2 Determination of anchorage depth

The anchorage depths and overlap lengths must not be less than the minimum values given in Annex 5. The maximum permissible anchorage depth is given in Annex 5.

4.3.3 Calculation of the basic anchorage length

The required basic anchorage length $\ell_{b,rqd}$ shall be determined in accordance with EN 1992-1-1, Section 8.4.3.

$\ell_{b,rqd} = (d_s / 4)(\sigma_{sd} / f_{bd})$

d_s - diameter of the rebar
σ_{sd} - calculated design stress of the rebar
f_{bd} - design value of bond strength according to Annex 5, Table 4

$f_{bd} = 2{,}25\ \eta_1\ \eta_2\ f_{ctd,}$ (according to EN 1992-1-1)

f_{ctd} - $\alpha_{ct}\ f_{ctk,0.05} / \gamma_c$
$\alpha_{ct} = 1$
$\gamma_c = 1{,}5$
η_1 coefficient relative to the quality of the bond condition and position of the rebar during concreting
$\eta_1 = 1{,}0$ (“good” bond conditions)
$\eta_1 = 1{,}0$ (all other conditions)
$\eta_2 = 1{,}0$ (for Ø ≤ 32 mm)

4.3.4 Calculation of the design anchorage length

The required design anchorage length ℓ_{bd} shall be determined in accordance with EN 1992-1-1, Section 8.4.4:

$\ell_{bd} = \alpha_1 \bullet \alpha_2 \bullet \alpha_3 \bullet \alpha_4 \bullet \alpha_5 \bullet \ell_{b,rqd} \geq \ell_{b,min}$

$\ell_{b,rqd}$ – according to section 4.3.3
$\alpha_1 = 1{,}0$ for straight bars
$\alpha_2 = 0{,}7 \leq \alpha_2 \leq 1{,}0$ calculated according to EN 1992-1-1, Table 8.2
$\alpha_3 = 1{,}0$ because of no transverse reinforcement
$\alpha_4 = 1{,}0$ because of no welded transverse reinforcement
$\alpha_5 = 0{,}7 \leq \alpha_5 \leq 1{,}0$ for influence of transverse pressure according to EN 1992-1-1, Table 8.2
$\ell_{b,min}$ – minimum anchorage length according to EN 1992-1-1
= max {0,3 $\ell_{b,rqd}$; 10d_s ; 100 mm} under tension
= max {0,6 $\ell_{b,rqd}$; 10d_s ; 100 mm} under compression

4.3.5 Overlap joints

The required design lap length ℓ_0 shall be determined in accordance with EN 1992-1-1, Section 8.7.3:

$\ell_0 = \alpha_1 \bullet \alpha_2 \bullet \alpha_3 \bullet \alpha_5 \bullet \alpha_6 \bullet \ell_{b,rqd} \geq \ell_{0,min}$

$\ell_{b,rqd}$ – according to section 4.3.3
$\alpha_1 = 1{,}0$ for straight bars
$\alpha_2 = 0{,}7 \leq \alpha_2 \leq 1{,}0$ calculated according to EN 1992-1-1, Table 8.2
$\alpha_3 = 1{,}0$ because of no transverse reinforcement
$\alpha_5 = 0{,}7 \leq \alpha_5 \leq 1{,}0$ for influence of transverse pressure according to EN 1992-1-1, Table 8.2
$\alpha_6 = 1{,}0 \leq \alpha_6 \leq 1{,}5$ for influence of percentage of lapped bars relative to the total cross-section area according to EN 1992-1-1, Table 8.3
$\ell_{0,min}$ – minimum anchorage length according to EN 1992-1-1
= max (0,3 $\alpha_6 \bullet \ell_{b,rqd}$; 15d_s ; 200 mm)

The maximum permissible anchorage depth is given in Annex 6 in relation to the bar diameter to be used.

4.3.6 Embedment depth for overlap joints

For calclulation of the effective embedment depth of overlap joints the concrete cover at end-face of bonded-in rebar c_1 shall be considered (Annex 4):

$\ell_v \geq \ell_0 + c_1$

ℓ_0 – required lap length according to Section 4.3.5 and to EN 1992-1-1
c_1 – concrete cover at end-face of bonded-in rebar (Annex 4)

If the clear distance between the overlapping rebars is greater than $4d_s$ the lap length shall be enlarged by the difference between the clear distance and $4d_s$.

4.3.7 Concrete cover

The concrete cover required for bonded-in rebars is shown in Annex 5, Table 2, in relation to the drilling method and the hole tolerance. Futhermore the minimum concrete cover given in EN 1992-1-1, Section 4.4.1.2 shall be observed.

4.3.8 Transverse reinforcement

The transverse reinforcement required in the zone of the rebar connection must fulfill the requirement of EN 1992-1-1, section 8.7.4.

4.3.9 Connection joint

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 bar.

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

4.4 Installation

The fitness for use of the anchor can only be assumed if the following conditions of installation are met:

- 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;
- use of the injection system only as supplied by the manufacturer without exchanging any components of the system;
- installation in accordance with the manufacturer's specifications and drawings using the tools indicated in this European Technical Approval;
- checks before placing the rebar to ensure that the strength class of the concrete in which the anchor is to be placed is in the range;
- check of the concrete being well compacted, e.g. without significant voids;
- keeping the anchorage depth specified in the design drawings;
- keeping of concrete cover and spacing specified in the design drawings;
- placing drill holes without damaging the reinforcement;
- in case of aborted drill hole, the drill hole shall be filled with mortar;
- the hole shall not be filled with water;
- the drilling and cleaning the drill hole and the installation shall be performed only with the equipment specified by the manufacturer (see Annexes 6-10), it shall be ensured that this equipment is available on site and it is used;
- rebar installation ensuring the specified embedment depth, that is the appropriate depth marking of the anchor not exceeding the concrete surface;
- MOEPSE: during curing of the injection mortar the temperature of the concrete must not fall below +5°C;
- MOEPSES: during curing of the injection mortar the temperature of the concrete must not fall below +15°C;

4.4.1 Responsibility of the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to (1) and (2) including Annexes referred to 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition, all installation data shall be shown clearly on the packaging and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required for manual are:

- drill bit diameter,
- rebar diameter,
- admissible installation temperature range,
- curing time of the bonding material depending on the installation temperature,
- information on the installation procedure, including cleaning of the hole,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

5 Recommendations for the manufacturer

5.1 Recommendations on packaging, transportation and storage

The mortar cartridges shall be protected against sun radiation and shall be stored according to the manufacturer's instructions in dry conditions.

MOEPSE shall be stored at temperatures of at least +5°C to not more than +20°C.

MOEPSES shall be stored at temperatures of at least +5°C to not more than +20°C.

Mortar cartridges with expired shelf life must no longer be used.

The original Czech version is signed by
Ing. Jozef Pôbiš
Head of the Approval Body

Product description and intended use

The post installed rebar connection consists of injection mortar MOEPSE, MOEPSES and an embedded straight deformed bar with properties of class B and C according to Annex C of EN 1992-1-1.

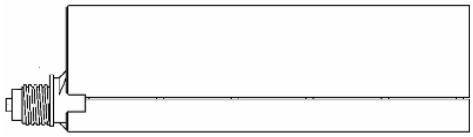
Mortar cartridges

Coaxial cartridge (CC)

MOEPSE, MOEPSES	150 ml
MOEPSE, MOEPSES	380 ml
MOEPSE, MOEPSES	400 ml
MOEPSE, MOEPSES	410 ml

Side by side cartridge (SBS)

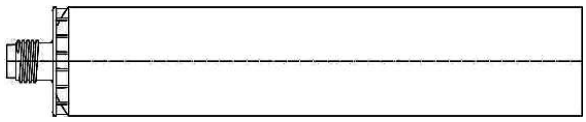
MOEPSE, MOEPSES	350 ml
MOEPSE, MOEPSES	825 ml



Two part foil capsule within in a single component cartridge (FCC)

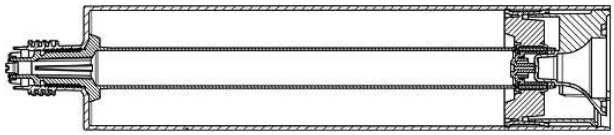
MOEPSE, MOEPSES	150 ml
MOEPSE, MOEPSES	170 ml
MOEPSE, MOEPSES	300 ml
MOEPSE, MOEPSES	550 ml

MOEPSE, MOEPSES	850 ml



Peeler cartridge (PLR)

MOEPSE, MOEPSES	280 ml



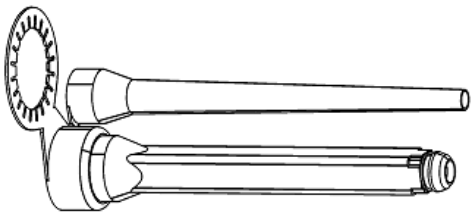
Mixing nozzle

KW

TB

Mixing nozzle TB is recommended for holes depth greater than 400 mm.

RM



- Installation in dry or wet concrete, it must not be installed in flooded holes.
- Overhead installation is permissible.
- Use only in dry surrounding or permanently wet surrounding according to exposure class X0 or XC1 of EN 1992-1-1.
- Temperature range: -40°C to +80°C (max short term temperature +80°C
  max long term temperature +50°C)

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 1**
Product and intended use	of European Technical Approval ETA–13/0780

Figure 1: Overlap joint for rebar connections of slabs and beams

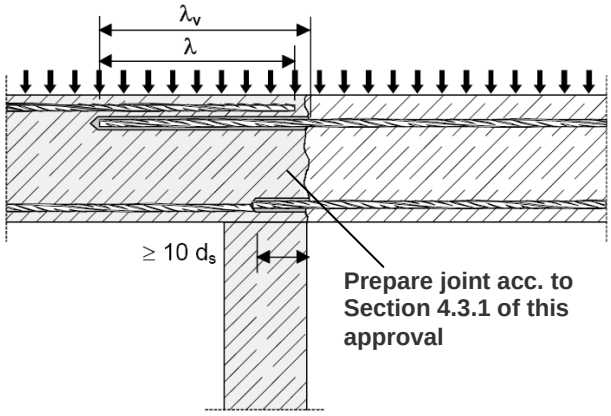


Figure 2: Overlap joint at a foundation of a column or wall where the rebars are stressed in tension

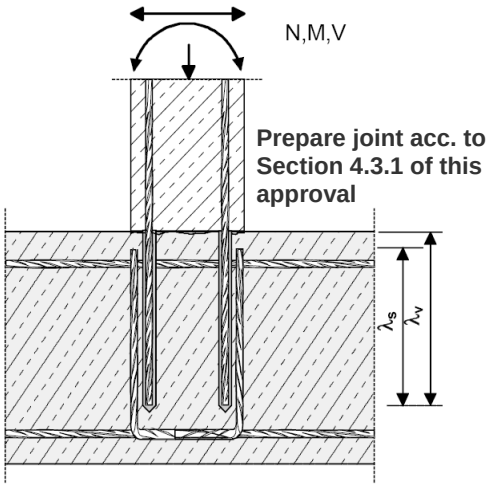


Figure 3: End anchoring of slabs or beams, designed as simply supported

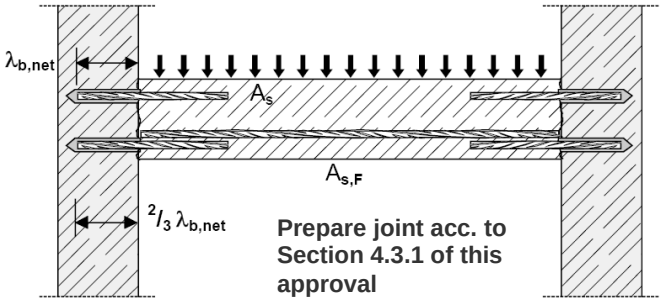


Figure 4: Rebar connection for components stressed primarily in compression.
The rebars are stressed in compression.

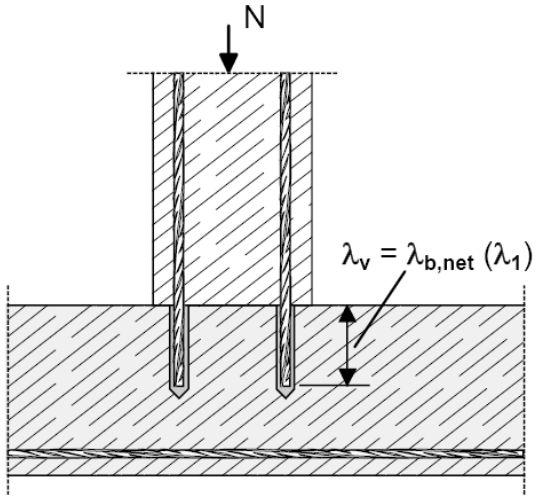
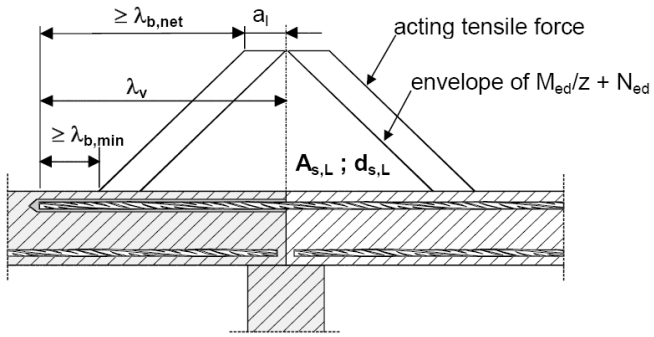


Figure 5: Anchoring of reinforcement to cover the line of acting tensile force



Note to Figure 1 to 5:

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.

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 2** of European Technical Approval ETA–13/0780
Examples of use for rebars	

Figure 6: Reinforcing bar "rebar" according to EN 1992-1-1 and TR 023

Refer to TR 023:

This Technical Report covers post-installed rebar connections in non-carbonated concrete under the assumption only that the design of post-installed rebar connections is done in accordance with EN 1992-1-1.

Covered are rebar anchoring systems consisting of bonding material and an embedded straight deformed reinforcing bar with properties according to Annex C of EN 1992-1-1; the classes B and C of the rebar are recommended.

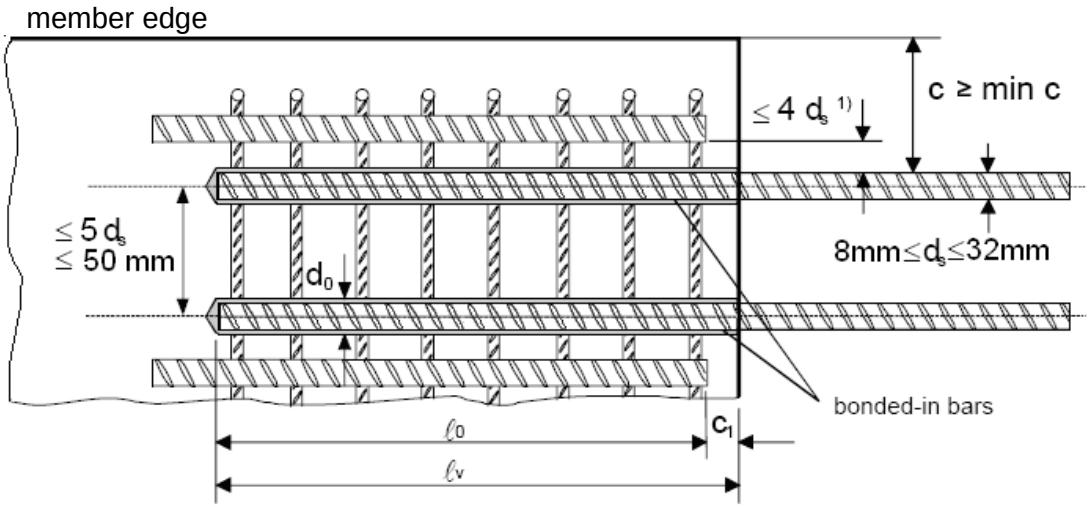
Refer to EN 1992-1-1 Annex C Table C.1 and C.2N Properties of reinforcement:

Table 1: Rebar Properties

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 $k = (f_t / f_y)_k$		≥ 1,08	≥ 1,15 < 1,35
Characteristic strain at maximum force ε_{uk} (%)		≥ 5,0	≥ 7,5
Bendability		Bend / Rebend test	
Maximum deviation from nominal mass (individual bar) (%)	Nominal bar size (mm) ≤ 8 > 8	 ± 6,0 ± 4,5	
Bond: Minimum relative rib area, $f_{R,min}$	Nominal bar size (mm) 8 to 12 > 12	 0,040 0,056	

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 3**
Reinforcing bar according to EN 1992-1-1	of European Technical Approval ETA–13/0780

Figure 7: General design rules of construction for bonded-in rebars



[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 $4d_s$

The provision of sufficient transverse reinforcement according to section 4.3.8 of this approval must be verified.

ℓ_v or ℓ_0 are in accordance with section 4.3.6 respective 4.3.7 of this approval

c	concrete cover of bonded-in bar
c_1	concrete cover at end-face of bonded-in bar
min c	minimum concrete cover acc. Annex 5 of this approval
d_s	diameter of bonded-in bar
ℓ_0	lap length
ℓ_v	effective embedment depth
d_0	nominal drill bit diameter, see Annex 6

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 4**
General design rules of construction, spacing and edge distance for bonded-in rebars	of European Technical Approval ETA–13/0780

Table 2: Minimum concrete cover min c of the bonded-in rebar depending on drilling method

Drilling method	Without drilling aid
Hammer drilling	30mm + 0,06 $\ell_v \geq 2\ d_s$
Compressed air drilling	50 mm + 0,08 ℓ_v

Table 3: Minimum anchorage length[1)] and lap lengths for C20/25 and maximum installation length l_{max} for good bond conditions.

Rebar		$\ell_{b,min}$	$\ell_{0,min}$	ℓ_{max}
Ød_s [mm]	$f_{y,k}$ [N/mm^2]	[mm]	[mm]	[mm]
8	500	114	200	400
10	500	142	200	500
12	500	171	200	600
14	500	199	210	700
16	500	227	240	800
20	500	284	300	1000
25	500	355	375	1000

[1)] 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 $\sigma_{sd} = 435$ N/mm^2 for rebar B500-B and $\gamma_M = 1,15$ and maximum installation length.

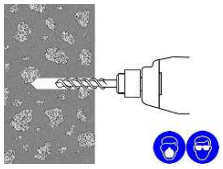
Table 4: Design values of the ultimate bond resistance f_{bd}[1)] in N/mm^2 for all drilling methods for good bond conditions

Rebar Ø 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 16	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
20								3,7	
25						3,0			

[1)] 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.

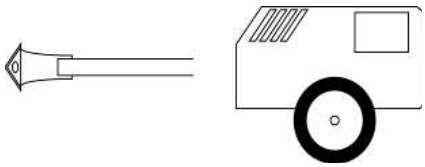
Injection System MOEPSE, MOEPSES for rebar connection	**Annex 5**
Minimum concrete cover min c, Design values of the ultimate bond resistance	of European Technical Approval ETA–13/0780

Drilling the hole



Drill hole to the required embedment depth using a hammer-drill with carbide drill bit set in rotation hammer mode, or a compressed air drill.

Rotary hammer drilling



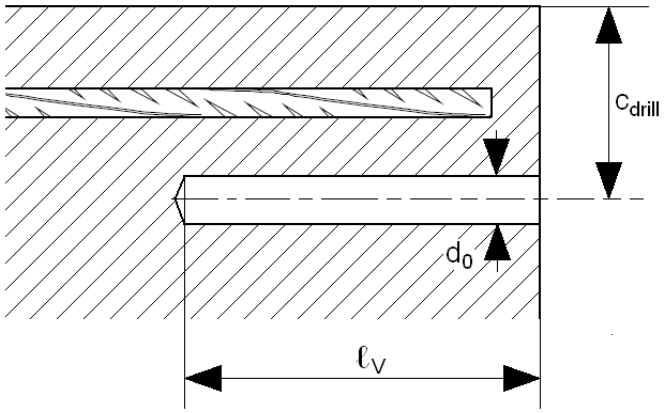
Compressed air drill

Before drilling remove carbonized concrete.

Table 5: Drilling diameter and maximum anchorage depth

Rebar diameter d_{nom} [1)]	Nominal drilling diameter d_{cut}	Max permissible embedment depth ℓ_v
[mm]	[mm]	[mm]
8	12 (10)	400
10	14 (12)	500
12	16	600
14	18	700
16	20	800
20	25	1000
25	32	1000

[1)] The maximum outer rebar diameter over the ribs shall be: nominal diameter of the bar d_{nom} + 0,20 d_{nom}

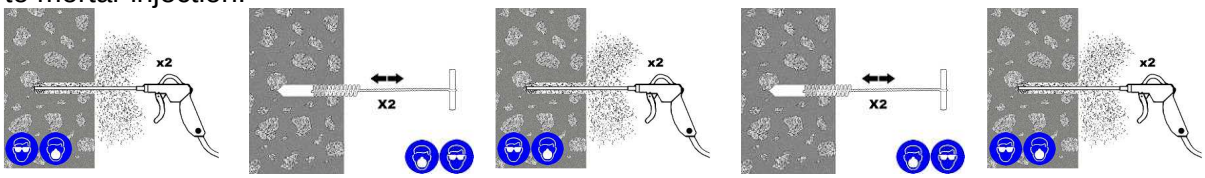


- Observe concrete coverage c, as per setting plan and table 2
- Drill parallel to the edge and to existing rebar

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 6** of European Technical Approval ETA–13/0780
Installation instruction I Drilling the hole	

Cleaning the hole

The borehole must be free of dust, debris, water, ice, oil, grease and other contaminants prior to mortar injection.

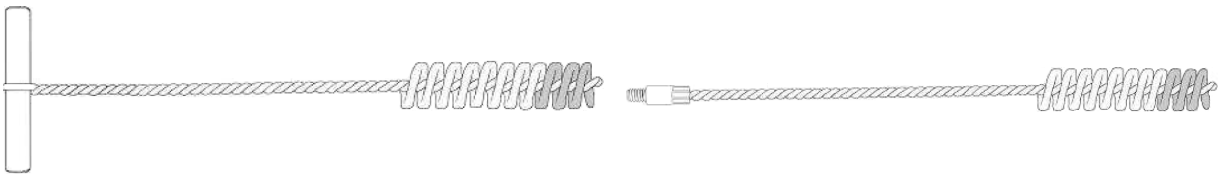


- Blowing 2 time from the back of the hole with oil-free compressed air (min. 6 bar) until return air stream is free of noticed dust.
- Brushing 2 time with the special brush size (brush Ø ≥ borehole Ø) by inserting the brush to the back of the hole in a twisting motion. The brush shall produce natural resistance as it enters the anchor hole. If this is not the case, please use a new brush or a brush with a larger diameter.
- Repeat operation 1 and 2.
- Blowing 1 time again with compressed air until return air stream is free of noticeable dust.

Sizes		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Drill hole diameter d_0	[mm]	12(10)	14(12)	16	18	20	25	32
Brushes head diameter	[mm]	14	14	19	22	22	29	40
Brushes head length	[mm]	75						

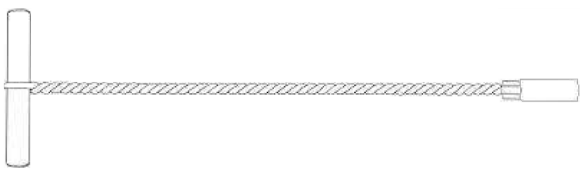
If required use additional accessories and extension for air nozzle and brush to reach back of hole.

Max. hole depth	Brush / extension configuration	Part
250 mm	Standard brush	(a)
550 mm	Brush head unit + handle unit	(b)+(c)
850 mm	Brush head unit + extension piece + handle unit	(b)+(d)+(c)
1150 mm	Brush head unit + 2x extension piece + handle unit	(b)+(d)+(d)+(c)



Part (a)

Part (b)

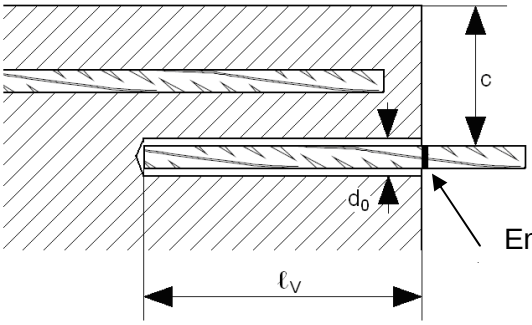


Part (c)

Part (d)

Mortar injection

If the hole collects water after initial cleaning,
this water must be removed before injecting the resin.



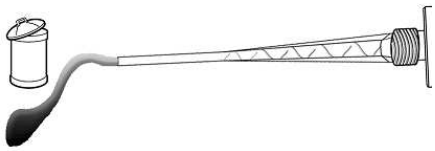
Before use, make sure the rebar is dry and free of oil or other residue.

Mark embedment depth on the rebar (e.g. with tape) ℓ_v

Insert rebar in borehole, to verify hole and setting depth ℓ_v

- Check expiration date: See imprint on cartridge. Do not use an expired product
- Foil pack temperature:
  Must be between +5°C and +40°C when in use
- Base material temperature at time of installation:
  Must be between +5°C and +40°C
- Instructions for transport and storage:
  Keep in a cool, dry and dark place at +5°C to +20°C achieve maximum shelf life

Select the appropriate static mixer nozzle for the installation, open the cartridge/foil and screw onto the mouth of the cartridge. Insert the cartridge into the correct applicator gun.

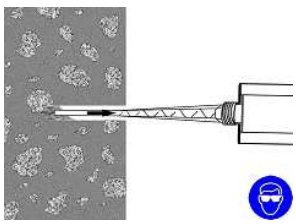


Extrude the first part of the cartridge to waste until an even colour has been achieved without streaking in the resin

If necessary, cut the extension tube to the depth of the hole and push onto the end of the mixer nozzle, and (for rebars 16 mm dia. or more) fit the correct resin stopper to the other end. Attach extension tubing and resin stopper.

Extension hose for deep holes

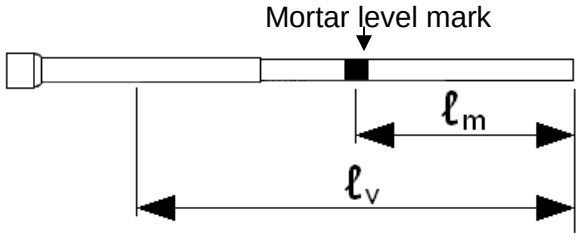
Sizes		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Hole diameter	[mm]	10	12	16	18	20	25	32
Extension hose	[mm]	9		14				
Resin stopper	[mm]	-	-	-	-	18	22	30



Insert the mixer nozzle (resin stopper / extension tube if applicable) to the bottom of the hole. Begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the hole to approximately ½ to ¾ full and remove the mixer nozzle completely.

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 8**
Installation instruction III Mortar injection	of European Technical Approval ETA–13/0780

Inserting the rebar

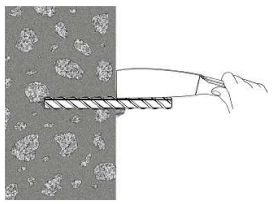


Mark the required mortar level ℓ_m and embedment depth ℓ_v with tape or marker on the injection extension.

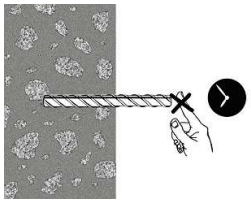
Quick estimation: $\ell_m = 1/2 \cdot \ell_v$

Continue injection until the mortar level mark ℓ_m becomes visible.

Insert the rebar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time.



Any excess resin should be expelled from the hole evenly around the steel element showing that the hole is full.
This excess resin should be removed from around the mouth of the hole before it sets.



Leave the anchor to cure.

Do not disturb the anchor until the appropriate loading/curing time has elapsed depending on the substrate conditions and ambient temperature.

MOEPSE		
Application temperature	**Processing time**	**Load time**
+5 to +10°C	10 mins	145 mins
+10 to +15°C	8 mins	85 mins
+15 to +20°C	6 mins	75 mins
+20 to +25°C	5 mins	50 mins
+25 to +30°C	4 mins	40 mins

Processing time refers to the highest temperature in the range.
Load time refers to the lowest temperature in the range.
Cartridge must be conditioned to a minimum +5°C.

MOEPSES		
Application temperature	**Processing time**	**Load time**
+15 to +20°C	15 mins	5 hours
+20 to +25°C	10 mins	145 mins
+25 to +30°C	7.5 mins	85 mins
+30 to +35°C	5 mins	50 mins
+35 to +40°C	3.5 mins	40 mins

Processing time refers to the highest temperature in the range.
Load time refers to the lowest temperature in the range.
Cartridge must be conditioned to a minimum +15°C.

Applicator gun

Applicator gun		Cartridge	Applicator gun		Cartridge
A		Coaxial 380 ml 400 ml 410 ml	B		Side by side 350 ml
C		Foil capsule 150 ml 170 ml 300 ml 550 ml	D		Foil capsule 150 ml 170 ml 300 ml Peeler 280 ml
E		Coaxial 150 ml	F		Side by side 825 ml
G		Foil capsule 850 ml	H		Side by side 825 ml

Values for pre-calculation of anchoring with MOEPSE, MOEPSES injection system
Examples for C20/25 (f_{bd} = 2,3 N/mm^2), good bond conditions, rebars ($f_{y,k}$ = 500 N/mm^2)

Rebar Ø	$\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 1{,}0$			α_2 or $\alpha_5 = 0{,}7$ $\alpha_1 = \alpha_3 = \alpha_4 = 1{,}0$		
[mm]	Anchorage length ℓ_{bd} [mm]	Tension load [kN]	Mortar volume V [ml]	Anchorage length ℓ_{bd} [mm]	Tension load [kN]	Mortar Volume V [ml]
8	114	6,6	9	114	9,4	9
	170	9,8	13	170	14,0	13
	270	15,6	21	210	17,3	16
	320	18,5	25	240	19,8	19
	378	21,9	29	265	21,9	20
10	142	10,3	13	142	14,7	13
	270	19,5	25	240	24,8	22
	340	24,6	31	270	27,9	25
	400	28,9	37	300	31,0	28
	473	34,2	43	331	34,2	30
12	171	14,8	18	171	21,2	18
	330	28,6	35	290	35,9	31
	410	35,6	44	320	39,6	34
	480	41,6	51	360	44,6	38
	567	49,2	60	397	49,2	42
14	199	20,1	24	199	28,8	24
	298	30,1	36	298	43,1	36
	470	47,5	57	380	54,9	46
	570	57,7	69	420	60,7	51
	662	67,0	80	463	66,9	56
16	227	26,2	31	227	37,5	31
	340	39,3	47	340	56,2	47
	540	62,4	74	430	71,0	59
	650	75,1	89	480	79,3	66
	756	87,4	103	529	87,4	72
20	284	41,0	61	284	58,6	61
	425	61,4	91	425	87,7	91
	680	98,3	145	540	111,5	115
	810	117,1	172	600	123,9	128
	945	136,6	201	662	136,7	141
25	355	64,1	134	355	91,6	134
	532	96,1	201	532	137,3	201
	760	137,3	286	670	172,9	252
	880	159,0	331	750	193,5	283
	1000	180,6	377	827	213,4	311

The tension load is valid for good bond conditions according EN 1992-1-1. For all other conditions multiply by the value 0,7.
The mortar volume V can be estimated using the equation $V = 1{,}2 \cdot \ell_{bd} \cdot \pi(d_0^2 - d_s^2) / 4$

Injection System MOEPSE, MOEPSES for rebar connection

Pre-calculated values for the anchorage length
Example for rebar ($f_{y,k}$ = 500 N/mm^2) in C20/25 (f_{bd} = 2,3 N/mm^2)

Annex 11
of European Technical Approval ETA–13/0780

Values for pre-calculation of lap splice lengths with MOEPSE, MOEPSES injection system
Examples for C20/25 (f_{bd} = 2,3 N/mm^2), good bond conditions, rebars ($f_{y,k}$ = 500 N/mm^2)

Rebar Ø	$\alpha_1 = \alpha_2 = \alpha_3 = \alpha_5 = \alpha_6 = 1{,}0$			α_2 or α_5 = 0,7 $\alpha_1 = \alpha_3 = \alpha_6 = 1{,}0$		
	Lap splice length ℓ_0	Tension load	Mortar volume V	Lap splice length ℓ_0	Tension load	Mortar volume
[mm]	[mm]	[kN]	[ml]	[mm]	[kN]	[ml]
8	200	11,6	16	200	16,5	16
	250	14,5	19	250	20,6	19
	330	19,1	25	300	24,8	23
	350	20,2	27			
	378	21,9	29			
10	200	14,5	19	200	20,6	19
	300	21,7	28	250	25,8	23
	380	27,5	35	300	31,0	28
	420	30,3	38	331	34,2	30
	473	34,2	43			
12	200	17,3	22	200	24,8	22
	300	26,0	32	300	37,2	32
	430	37,3	46	340	42,1	36
	500	43,4	53	370	45,8	40
	567	49,2	60	397	49,2	42
14	210	21,2	26	210	30,3	26
	315	31,9	38	315	45,5	38
	480	48,6	58	380	54,9	46
	570	57,7	69	420	60,7	51
	662	67,0	80	463	66,9	56
16	240	27,7	33	240	39,6	33
	360	41,6	49	360	59,5	49
	550	63,6	75	440	72,7	60
	650	75,1	83	480	79,3	66
	756	87,4	103	529	87,4	72
20	300	43,4	64	300	61,9	64
	450	65,0	96	450	92,9	96
	690	99,7	147	550	113,5	117
	820	118,5	174	600	123,9	128
	945	136,6	201	662	136,7	141
25	375	67,7	142	375	96,8	142
	563	101,7	212	563	145,3	212
	780	140,9	294	690	178,1	260
	890	160,8	335	760	196,1	286
	1000	180,6	377	827	213,4	311

The tension load is valid for good bond conditions according EN 1992-1-1. For all other conditions multiply by the value 0,7.
The mortar volume V can be estimated using the equation $V = 1{,}2 \cdot \ell_{bd} \cdot \pi(d_0^2 - d_s^2) / 4$

Injection System MOEPSE, MOEPSES for rebar connection	**Annex 12**
Pre-calculated values for lap splice length Example for rebar ($f_{y,k}$ = 500 N/mm^2) in C20/25 (f_{bd} = 2,3 N/mm^2)	of European Technical Approval ETA–13/0780