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**European Technical Assessment Body  
for construction products**



## European Technical Assessment

**ETA-20/1286  
of 19 May 2026**

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Injection system PURE500+  
for rebar connection

Product family  
to which the construction product belongs

Systems for post-installed  
rebar connections with mortar

Manufacturer

Stanley Black & Decker Deutschland GmbH  
Richard-Klinger-Straße 11  
65510 Idstein  
GERMANY

Manufacturing plant

Plant 1

This European Technical Assessment  
contains

20 pages including 3 annexes which form an integral part  
of this assessment

This European Technical Assessment is  
issued in accordance with Article 95(4) of  
Regulation (EU) 2024/3110, on the basis of

EAD 330087-01-0601

This version replaces

ETA-20/1286 issued on 1 October 2021

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## Specific Part

### 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 "Injection system PURE500+ for rebar connection" in accordance with the regulations for reinforced concrete construction.

Reinforcing bars made of steel with a diameter  $\phi$  from 8 to 40 mm according to Annex A and injection mortar PURE500+ are used for rebar connections. The rebar is placed into a drilled hole filled with injection mortar and is anchored via the bond between rebar, injection mortar and concrete.

The product description is given in Annex A.

### 2 Specification of the intended use in accordance with the applicable European assessment Document

The performances given in Section 3 are only valid if the rebar connection is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the rebar connections of at least 50 and/or 100 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 and references to the methods used for its assessment

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

| Essential characteristic                                        | Performance           |
|-----------------------------------------------------------------|-----------------------|
| Characteristic resistance under static and quasi-static loading | See Annex C 1         |
| Characteristic resistance under seismic loading                 | See Annex B 3 and C 2 |

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

| Essential characteristic | Performance   |
|--------------------------|---------------|
| Reaction to fire         | Class A1      |
| Resistance to fire       | See Annex C 3 |

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

In accordance with European Assessment Document EAD No. 330087-01-0601, the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

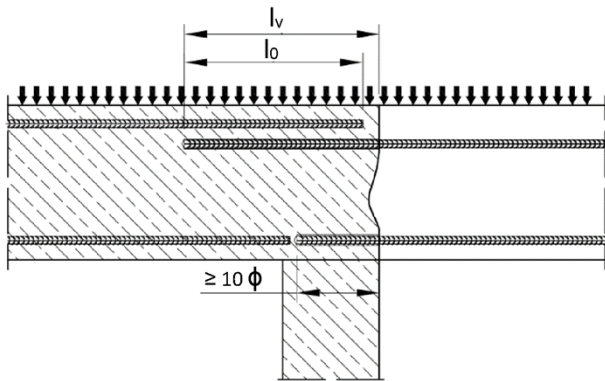
Issued in Berlin on 19 May 2026 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock  
Head of Section

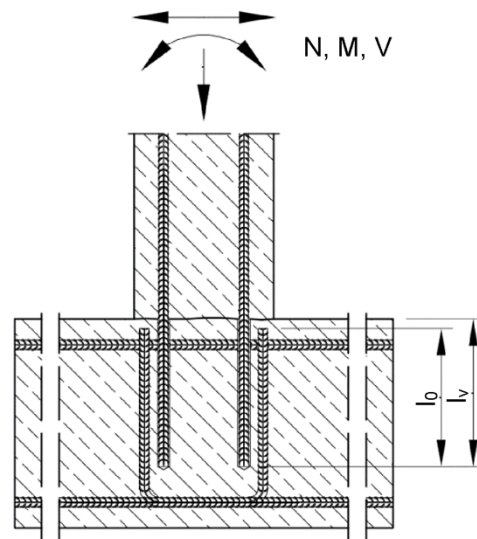
*beglaubigt:*  
Badeschneider

Installation post installed rebar

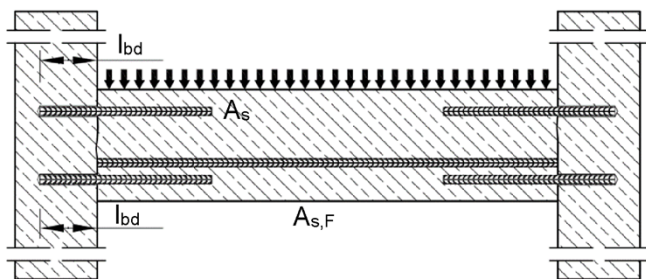
**Figure A1:** Overlapping joint for rebar connections of slabs and beams



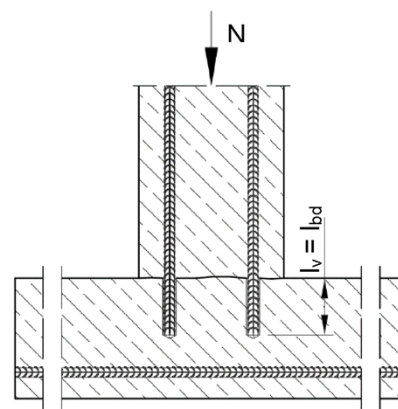
**Figure A2:** Overlapping joint at a foundation of a wall or column where the rebars are stressed in tension



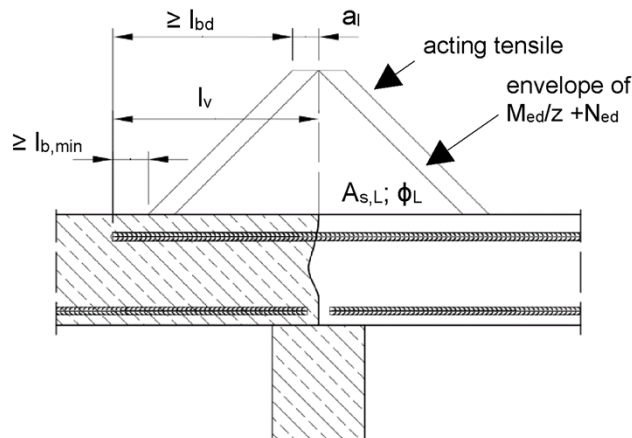
**Figure A3:** End anchoring of slabs or beams (e.g. designed as simply supported)



**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 shall comply with EN 1992-1-1:2004 + AC:2010.

Preparing of joints according to Annex B 2

Injection system PURE500+ for rebar connection

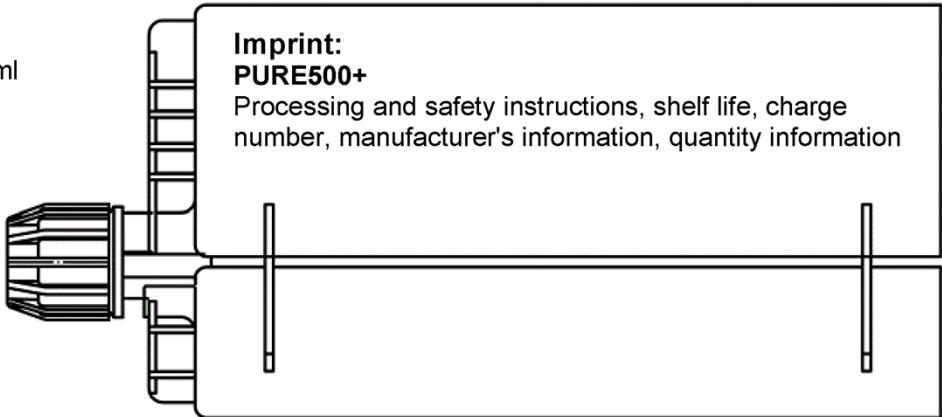
**Product description**

Installed condition and examples of use for rebars

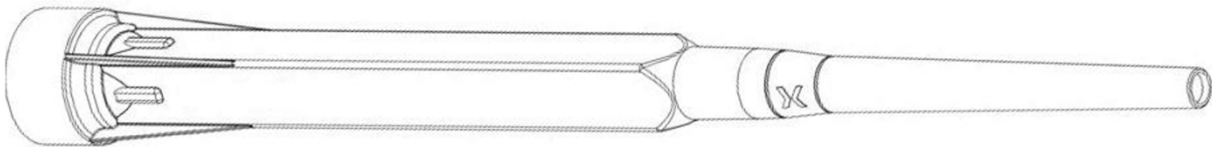
**Annex A 1**

Cartridge system

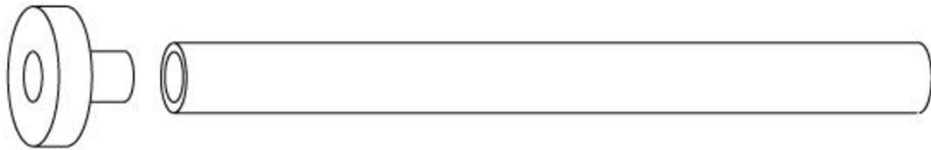
**Side-by-Side Cartridge:**  
440 ml, 500 ml up to 540 ml, 585 ml  
and 1400 ml



Static mixer PM-19E



Piston plug VS and mixer extension VL

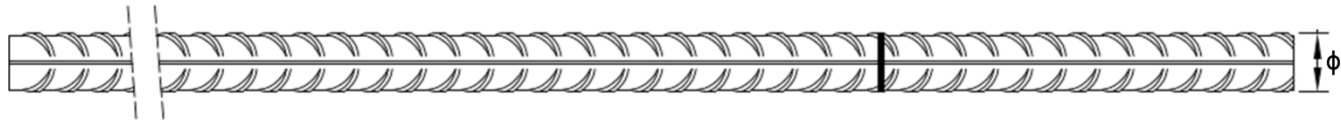


Injection system PURE500+ for rebar connection

**Product description**  
Injection system

**Annex A 2**

Reinforcing bar (rebar):  $\varnothing 8$  up to  $\varnothing 40$



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

Table A1: Materials Rebar

| Designation                               | Material                                                                                                                                 |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Rebar EN 1992-1-1:2004 + AC:2010, Annex C | Bars and de-coiled rods class B or C<br>$f_{yk}$ and $k$ according to NDP or NCL of EN 1992-1-1/NA<br>$f_{uk} = f_{tk} = k \cdot f_{yk}$ |

Injection system PURE500+ for rebar connection

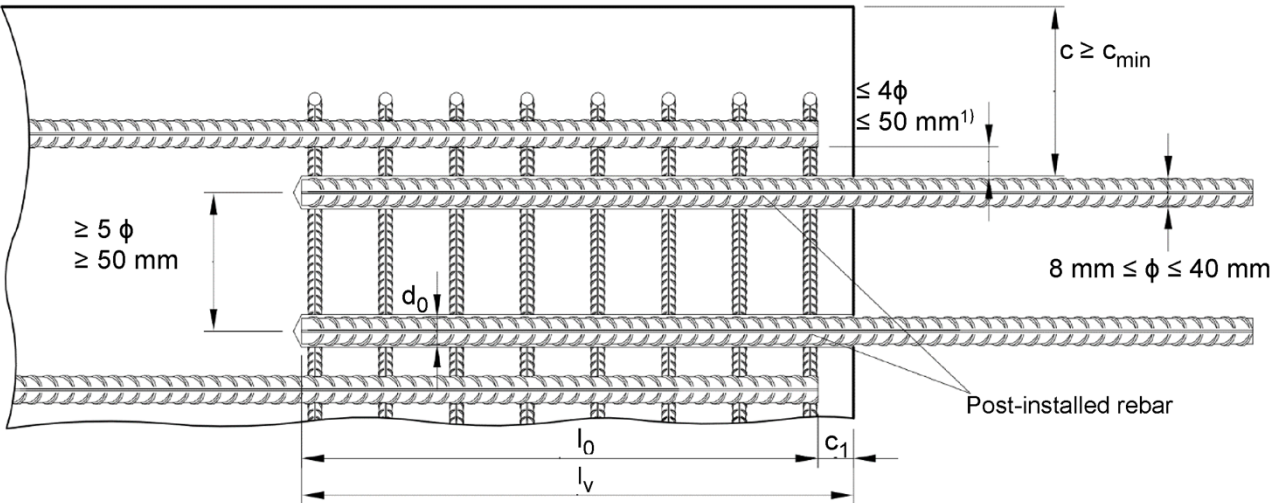
Product description  
Specifications Rebar

Annex A 3

| Specification of the intended use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                             |                       |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------|------------------------|
| Anchorages subject to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                             | Working life 50 years | Working life 100 years |
| HD: Hammer drilling<br>HDB: Hammer drilling with hollow drill bit<br>CD: Compressed air drilling<br>DD: Diamond drilling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | static and quasi-static loads                                                               | Ø8 to Ø40             | Ø8 to Ø40              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | seismic action                                                                              | Ø10 to Ø40            | Ø10 to Ø40             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | fire exposure                                                                               | Ø8 to Ø40             | Ø8 to Ø40              |
| Temperature Range:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | - 40°C to +80°C<br>(max long-term temperature +50 °C and max short-term temperature +80 °C) |                       |                        |
| <b>Base materials:</b> <ul style="list-style-type: none"><li>- Reinforced or unreinforced normal weight concrete according to EN 206:2013 + A1:2016.</li><li>- Strength classes C12/15 to C50/60 according to EN 206:2013 + A1:2016.</li><li>- Maximum chloride content of 0,40% (CL 0.40) related to the cement content according to EN 206:2013 + A1:2016.</li><li>- Non-carbonated concrete.</li></ul> <p>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 <math>\phi + 60</math> mm prior to the installation of the new rebar.</p> <p>The depth of concrete to be removed shall correspond to at least the minimum concrete cover in accordance with EN 1992-1-1:2004 + AC:2010. The foregoing may be neglected if building components are new and not carbonated and if building components are in dry conditions.</p> <b>Design:</b> <ul style="list-style-type: none"><li>- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.</li><li>- Verifiable calculation notes and drawings are prepared taking account of the forces to be transmitted.</li><li>- Design according to EN 1992-1-1:2004 + AC:2010, EN 1992-1-2:2004 + AC:2008 and Annex B 2 and B 3.</li><li>- 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.</li></ul> <b>Installation:</b> <ul style="list-style-type: none"><li>- Dry or wet concrete. It must not be installed in flooded holes.</li><li>- Overhead installation allowed.</li><li>- Hole drilling by hammer drill (HD), hollow drill (HDB), diamond drill (DD) or compressed air drill mode (CD).</li><li>- The installation of post-installed rebar resp. tension anchors 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.</li><li>- 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).</li></ul> |                                                                                             |                       |                        |
| Injection system PURE500+ for rebar connection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                             |                       | Annex B 1              |
| Intended use Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                             |                       |                        |

**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 1992-1-1:2004 + AC:2010.
- 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  $4\phi$  or 50 mm, then the lap length shall be increased by the difference between the clear bar distance and the smaller of  $4\phi$  or 50 mm.

The following applies to Figure B1:

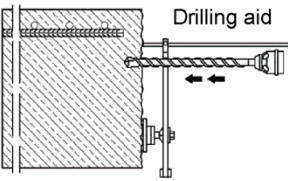
|                  |                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| c                | concrete cover of post-installed rebar                                                                                                                          |
| c <sub>1</sub>   | concrete cover at end-face of existing rebar                                                                                                                    |
| c <sub>min</sub> | minimum concrete cover according to Table B1 and to EN 1992-1-1:2004 + AC:2010, Section 4.4.1.2                                                                 |
| φ                | diameter of post-installed rebar                                                                                                                                |
| l <sub>0</sub>   | Lap length, according to EN 1992-1-1:2004 + AC:2010, section 8.7.3 for static loading and according to EN 1998-1:2004+AC:2009, section 5.6.3 for seismic action |
| l <sub>v</sub>   | effective embedment depth, $\geq l_0 + c_1$                                                                                                                     |
| d <sub>0</sub>   | nominal drill bit diameter, see Annex B 5                                                                                                                       |

Injection system PURE500+ for rebar connection

Intended use  
General construction rules for post-installed rebars

Annex B 2

**Table B1: Minimum concrete cover  $c_{\min}^{1)}$  of post-installed rebar and tie rod depending of drilling method**

| Drilling method                                                   | Rebar diameter       | Without drilling aid                         | With drilling aid                            |  |
|-------------------------------------------------------------------|----------------------|----------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------|
| HD: Hammer drilling<br>HDB: Hammer drilling with hollow drill bit | < 25 mm              | $30 \text{ mm} + 0,06 \cdot l_v \geq 2 \phi$ | $30 \text{ mm} + 0,02 \cdot l_v \geq 2 \phi$ |                                                                                     |
|                                                                   | $\geq 25 \text{ mm}$ | $40 \text{ mm} + 0,06 \cdot l_v \geq 2 \phi$ | $40 \text{ mm} + 0,02 \cdot l_v \geq 2 \phi$ |                                                                                     |
| DD: Diamond drilling                                              | < 25 mm              | Drill rig used as drilling aid               | $30 \text{ mm} + 0,02 \cdot l_v \geq 2 \phi$ |                                                                                     |
|                                                                   | $\geq 25 \text{ mm}$ |                                              | $40 \text{ mm} + 0,02 \cdot l_v \geq 2 \phi$ |                                                                                     |
| CD: Compressed air drilling                                       | < 25 mm              | $50 \text{ mm} + 0,08 \cdot l_v$             | $50 \text{ mm} + 0,02 \cdot l_v$             |                                                                                     |
|                                                                   | $\geq 25 \text{ mm}$ | $60 \text{ mm} + 0,08 \cdot l_v \geq 2 \phi$ | $60 \text{ mm} + 0,02 \cdot l_v \geq 2 \phi$ |                                                                                     |

1) see Annex B 2, Figure B1 and Annex B 3, Figure B2

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

For the minimum concrete cover  $c_{\min, \text{seis}}$  in case of a seismic action, see Table B2.

**Table B2: Minimum concrete cover  $\min c_{\min, \text{seis}}$**

| Drilling method                                                                                  | Design conditions | Distance to 1st edge | Distance to 2nd edge |
|--------------------------------------------------------------------------------------------------|-------------------|----------------------|----------------------|
| HD: Hammer drilling<br>HDB: Hammer drilling with hollow drill bit<br>CD: Compressed air drilling | Edge              | $\geq 2 \phi$        | $\geq 2 \phi$        |
|                                                                                                  | Corner            | $\geq 2 \phi$        | $\geq 2 \phi$        |
| DD: Diamond drilling                                                                             | Edge              | $\geq 4 \phi$        | $\geq 8 \phi$        |
|                                                                                                  | Corner            | $\geq 6 \phi$        | $\geq 6 \phi$        |

**Table B3: Dispensing tools**

| Cartridge type/size                                               | Hand tool                                                                                              |                                                                                                           | Pneumatic tool                                                                                               |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Side-by-side cartridges<br>440 ml, 500 ml up to<br>540 ml, 585 ml | <br>e.g. SA 296C585 | <br>e.g. Type H 244 C | <br>e.g. Type TS 444 KX |
| Side-by-side cartridges<br>1400 ml                                | -                                                                                                      | -                                                                                                         | <br>e.g. Type TS 471    |

All cartridges could also be extruded by a battery tool.

**Injection system PURE500+ for rebar connection**

**Intended use**  
Minimum concrete cover  
Dispensing tools

**Annex B 3**

**Table B4: Brushes, piston plugs, max anchorage depth and mixer extension, hammer (HD), diamond (DD) and compressed air (CD) drilling**

| Bar size<br><br>φ | Drill bit - Ø |      |      | d <sub>b</sub><br>Brush - Ø | d <sub>b,min</sub><br>min. Brush - Ø | Piston plug | Cartridge: 440, 500-540 or 585 ml |                          |                    |                          | Cartridge: 1400 ml       |                             |      |
|-------------------|---------------|------|------|-----------------------------|--------------------------------------|-------------|-----------------------------------|--------------------------|--------------------|--------------------------|--------------------------|-----------------------------|------|
|                   | HD            | DD   | CD   |                             |                                      |             | Hand or battery tool              |                          | Pneumatic tool     |                          | Pneumatic tool           |                             |      |
|                   |               |      |      |                             |                                      |             | l <sub>v,max</sub>                | Mixer extension          | l <sub>v,max</sub> | Mixer extension          | l <sub>v,max</sub>       | Mixer extension             |      |
| [mm]              | [mm]          |      |      |                             | [mm]                                 | [mm]        |                                   | [mm]                     |                    | [mm]                     |                          |                             |      |
| 8                 | 10            | -    | RB10 | 11,5                        | 10,5                                 | -           | 250                               | VL10/0,75 or<br>VL16/1,8 | 250                | VL10/0,75 or<br>VL16/1,8 | 250                      | VL10/0,75<br>or<br>VL16/1,8 |      |
|                   |               |      | RB12 | 13,5                        | 12,5                                 | -           | 700                               |                          | 800                |                          | 800                      |                             |      |
| 10                | 12            | -    | RB14 | 15,5                        | 14,5                                 | VS14        | 250                               |                          | 250                |                          | 250                      |                             |      |
|                   |               |      |      |                             |                                      |             | 700                               |                          | 1000               |                          | 1000                     |                             |      |
| 12                | 14            | -    |      |                             |                                      |             | 250                               |                          | 250                |                          | 250                      |                             |      |
|                   |               |      | 16   | RB16                        | 17,5                                 | 16,5        | VS16                              |                          | 700                |                          | 1300                     | VL10/0,75 or<br>VL16/1,8    | 1200 |
| 14                | 18            | RB18 | 20,0 | 18,5                        | VS18                                 | 1400        |                                   |                          |                    |                          |                          |                             |      |
| 16                | 20            | RB20 | 22,0 | 20,5                        | VS20                                 | 1600        |                                   |                          |                    |                          |                          |                             |      |
| 20                | 25            | -    | RB25 | 27,0                        | 25,5                                 | VS25        | 500                               |                          | 1000               |                          | VL10/0,75 or<br>VL16/1,8 | 2000                        |      |
|                   | -             | 26   | RB26 | 28,0                        | 26,5                                 | VS25        |                                   |                          |                    |                          |                          |                             |      |
| 22                | 28            | RB28 | 30,0 | 28,5                        | VS28                                 |             |                                   |                          |                    |                          |                          |                             |      |
| 24/25             | 30            | RB30 | 32,0 | 30,5                        | VS30                                 |             |                                   |                          |                    |                          |                          |                             |      |
|                   | 32            | RB32 | 34,0 | 32,5                        | VS32                                 |             |                                   |                          |                    |                          |                          |                             |      |
| 28                | 35            | RB35 | 37,0 | 35,5                        | VS35                                 |             |                                   |                          |                    |                          |                          |                             |      |
| 32/34             | 40            | RB40 | 43,5 | 40,5                        | VS40                                 |             |                                   |                          |                    |                          |                          |                             |      |
| 36                | 45            | RB45 | 47,0 | 45,5                        | VS45                                 | -           | -                                 |                          |                    |                          |                          |                             |      |
| 40                | -             | 52   | 52   | RB52                        | 54,0                                 |             |                                   |                          |                    |                          |                          | 52,5                        | VS52 |
|                   | 55            | -    | 55   | RB55                        | 58,0                                 |             |                                   |                          |                    |                          |                          | 55,5                        | VS55 |

**Table B5: Brushes, piston plugs, max anchorage depth and mixer extension, hammer drilling with hollow drill bit system (HDB)**

| Bar size<br><br>φ | Drill bit - Ø | d <sub>b</sub><br>Brush - Ø | d <sub>b,min</sub><br>min. Brush - Ø | Piston plug | Cartridge: 440, 500-540 or 585 ml |                          |                    |                          | Cartridge: 1400 ml       |                          |
|-------------------|---------------|-----------------------------|--------------------------------------|-------------|-----------------------------------|--------------------------|--------------------|--------------------------|--------------------------|--------------------------|
|                   | HDB           |                             |                                      |             | Hand or battery tool              |                          | Pneumatic tool     |                          | Pneumatic tool           |                          |
|                   |               |                             |                                      |             | l <sub>v,max</sub>                | Mixer extension          | l <sub>v,max</sub> | Mixer extension          | l <sub>v,max</sub>       | Mixer extension          |
| [mm]              | [mm]          | No cleaning required        |                                      |             | [mm]                              |                          | [mm]               |                          | [mm]                     |                          |
| 8                 | 10            |                             |                                      | -           | 250                               | VL10/0,75 or<br>VL16/1,8 | 250                | VL10/0,75 or<br>VL16/1,8 | 250                      | VL10/0,75 or<br>VL16/1,8 |
|                   | 12            |                             |                                      | -           | 700                               |                          | 800                |                          | 800                      |                          |
| 10                |               |                             |                                      | 250         | 250                               |                          | 250                |                          |                          |                          |
|                   | 14            |                             |                                      | VS14        | 700                               |                          | 1000               |                          | 1000                     |                          |
| 16                |               |                             |                                      | 250         | 250                               |                          | 250                |                          |                          |                          |
| 12                | 16            |                             |                                      | VS16        | 700                               |                          | 1000               |                          | VL10/0,75 or<br>VL16/1,8 |                          |
| 14                | 18            |                             |                                      | VS18        |                                   |                          |                    |                          |                          |                          |
| 16                | 20            |                             |                                      | VS20        |                                   |                          |                    |                          |                          |                          |
| 20                | 25            |                             |                                      | VS25        | 500                               |                          |                    |                          |                          |                          |
| 22                | 28            |                             |                                      | VS28        |                                   |                          |                    |                          |                          |                          |
| 24/25             | 30            |                             |                                      | VS30        |                                   |                          |                    |                          |                          |                          |
|                   | 32            |                             |                                      | VS32        |                                   |                          |                    |                          |                          |                          |
| 28                | 35            |                             |                                      | VS35        |                                   |                          |                    |                          |                          |                          |
| 32/34             | 40            |                             |                                      | VS40        |                                   |                          |                    |                          |                          |                          |

Injection system PURE500+ for rebar connection

Intended use

Parameter brushes, piston plugs, max anchorage depth and mixer extension

**Annex B 4**

Cleaning and installation tools

HDB – Hollow drill bit system



The hollow drill system consists of DEWALT Hollow drill bit or a hollow drill bit with equivalent performance and a class M vacuum cleaner with a minimum negative pressure of 253 hPa and a flow rate of minimum 150 m³/h (42 l/s).

Hand pump  
(Volume 750 ml,  $h_0 \leq 10$  d<sub>s</sub>, d<sub>0</sub> ≤ 20mm)



Manual slide valve  
(min 6 bar)



Brush RB



Piston Plug VS



Brush extension RBL



Table B6: Working time and curing time

| Temperature in base material |       |         | Maximum working time | Initial curing time <sup>1)</sup> | Minimum curing time <sup>2)</sup> |
|------------------------------|-------|---------|----------------------|-----------------------------------|-----------------------------------|
| T                            |       |         | t <sub>work</sub>    | t <sub>cure,ini</sub>             | t <sub>cure</sub>                 |
| 0 °C                         | up to | + 4 °C  | 80 min               | 30 h                              | 144 h                             |
| + 5 °C                       | up to | + 9 °C  | 80 min               | 20 h                              | 48 h                              |
| + 10 °C                      | up to | + 14 °C | 60 min               | 15 h                              | 28 h                              |
| + 15 °C                      | up to | + 19 °C | 40 min               | 9 h                               | 18 h                              |
| + 20 °C                      | up to | + 24 °C | 30 min               | 6 h                               | 12 h                              |
| + 25 °C                      | up to | + 34 °C | 12 min               | 4 h                               | 9 h                               |
| + 35 °C                      | up to | + 39 °C | 8 min                | 3 h                               | 6 h                               |
| +40 °C                       |       |         | 8 min                | 1,5 h                             | 4 h                               |
| Cartridge temperature        |       |         | +5 °C up to +40 °C   |                                   |                                   |

- 1) After Initial curing time has elapsed, the installation of the connecting reinforcement and the construction of the formwork can be continued
- 2) The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.

Injection system PURE500+ for rebar connection

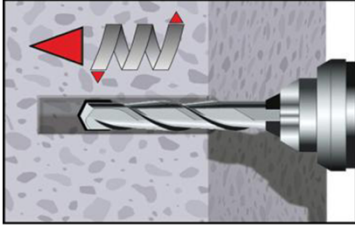
Intended use  
Cleaning and installation tools  
Working time and curing time

Annex B 5

## Installation instructions

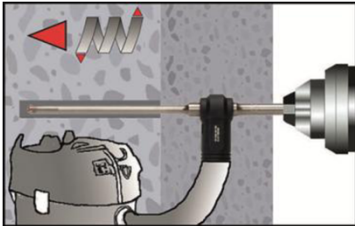
**Attention: Before drilling, remove carbonated concrete and clean contact areas (see Annex B1)**  
**In case of aborted drill hole: the drill hole shall be filled with mortar.**

### Drilling of the bore hole



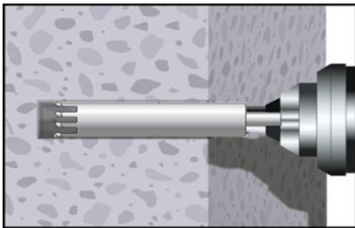
#### 1a. Hammer drilling (HD) / Compressed air drilling (CD)

Drill a hole to the required embedment depth.  
Drill bit diameter according to Table B4.  
Proceed with Step 2 (MAC or CAC).



#### 1b. Hollow drill bit system (HDB) (see Annex B 6)

Drill a hole to the required embedment depth.  
Drill bit diameter according to Table B5.  
The hollow drilling system removes the dust and cleans the bore hole.  
Proceed with Step 3.



#### 1c. Diamond drilling (DD)

Drill a hole to the required embedment depth.  
Drill bit diameter according to Table B4.  
Proceed with Step 2 (SPCAC).

Injection system PURE500+ for rebar connection

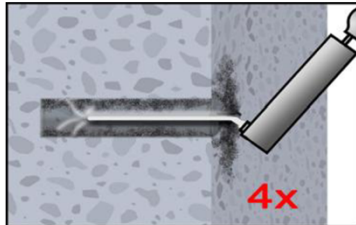
Intended use  
Installation instruction

Annex B 6

## Installation instructions (continuation)

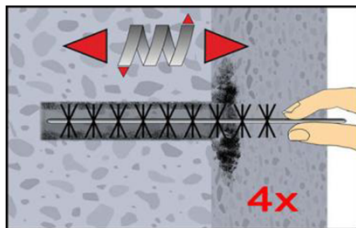
### Manual Air Cleaning (MAC)

for drill hole diameter  $d_0 \leq 20\text{mm}$  and drill hole depth  $h_0 \leq 10\phi$  with drilling method HD/CD

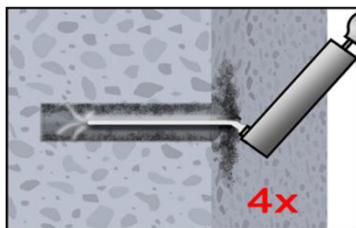


**Attention! Standing water in the bore hole must be removed before cleaning.**

2a. Blow the bore hole clean minimum 4x from the bottom or back by hand pump (Annex B 6).



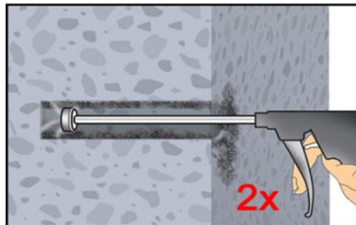
2b. Brush the bore hole minimum 4x with brush RB according to Table B4 over the entire embedment depth in a twisting motion (If necessary, a brush extension RBL shall be used.)



2c. Finally blow the bore hole clean minimum 4x from the bottom or back by hand pump (Annex B 6).

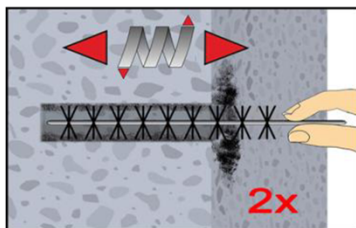
### Compressed Air Cleaning (CAC):

All diameter with drilling method HD/CD

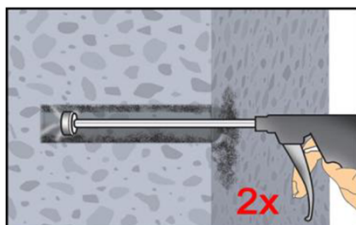


**Attention! Standing water in the bore hole must be removed before cleaning.**

2a. Blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 6) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)



2b. Brush the bore hole minimum 2x with brush RB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension RBL shall be used.)



2c. Finally blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 6) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

**Protect cleaned bore hole against re-contamination in an appropriate way. If necessary, repeat cleaning process directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.**

Injection system PURE500+ for rebar connection

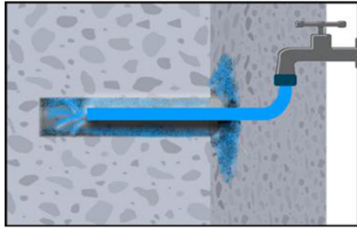
**Intended use**  
Installation instructions (continuation)

**Annex B 7**

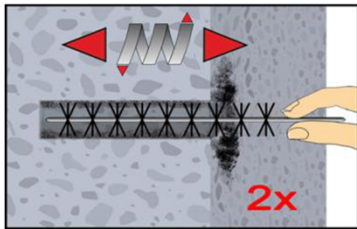
## Installation instructions (continuation)

### Flush & Compressed Air Cleaning (SPCAC):

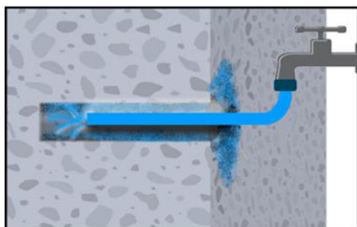
All diameter with drilling method DD



2a. Flushing with water until clear water comes out.

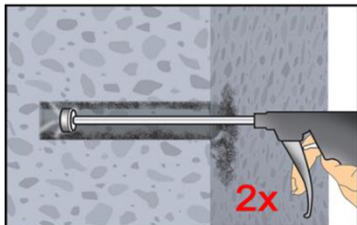


2b. Brush the bore hole minimum 2x with brush RB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension RBL shall be used.)

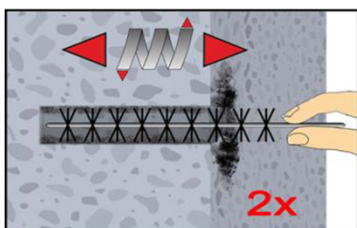


2c. Flushing again with water until clear water comes out.

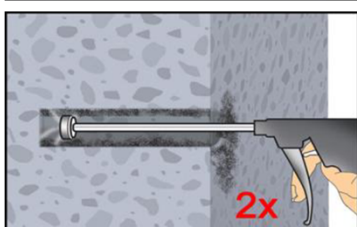
**Attention! Standing water in the bore hole must be removed before proceeding.**



2d. Blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 6) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)



2e. Brush the bore hole minimum 2x with brush RB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension RBL shall be used.)



2f. Finally blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 6) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

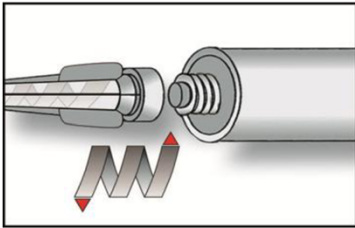
**Protect cleaned bore hole against re-contamination in an appropriate way. If necessary, repeat cleaning process directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.**

Injection system PURE500+ for rebar connection

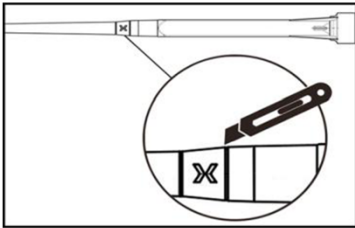
Intended use  
Installation instructions (continuation)

**Annex B 8**

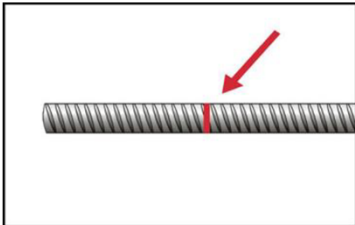
# Installation instructions (continuation)



3. Screw on static-mixing nozzle PM-19E, and load the cartridge into an appropriate dispensing tool.  
For every working interruption longer than the maximum working time  $t_{work}$  (Annex B 6) as well as for new cartridges, a new static-mixer shall be used.

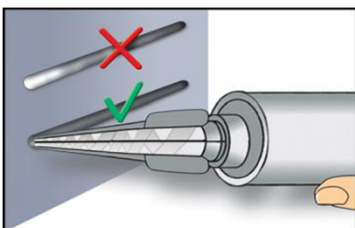
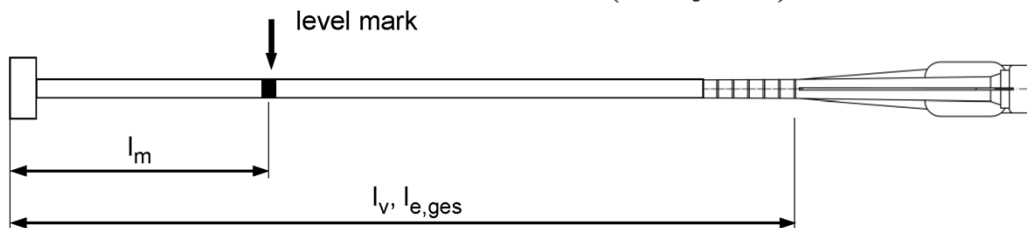


- 3a. In case of using the mixer extension VL16/1,8, cut off the tip of the mixer nozzle at position „X“.

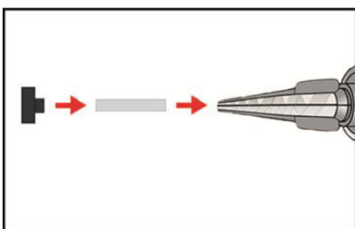


4. Mark embedment depth on the reinforcing bar .  
The reinforcing bar shall be free of dirt, grease, oil or other foreign material.

5. Mark mixer nozzle and extension with mortar level mark  $l_m$  and anchorage depth  $l_v$  resp.  $l_{e,ges}$   
Quick estimation:  $l_m = 1/3 \cdot l_v$   
Optimum mortar volume:  $l_m = l_v \text{ resp. } l_{e,ges} \cdot \left( 1,2 \cdot \frac{\phi^2}{d_0^2} - 0,2 \right)$



6. Not proper mixed mortar is not sufficient for fastening.  
Dispense and discard mortar until an uniform grey or red colour is shown (at least 3 full strokes).



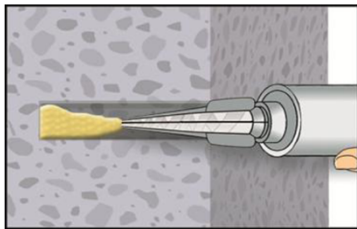
7. Piston plugs VS and mixer nozzle extensions VL shall be used according to Table B4 or B5.  
Assemble mixing nozzle, mixer extension and piston plug before injecting mortar.

Injection system PURE500+ for rebar connection

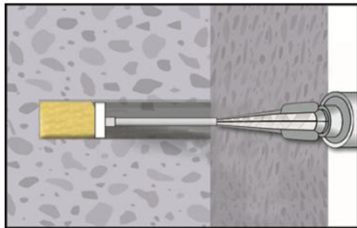
Intended use  
Installation instructions (continuation)

Annex B 9

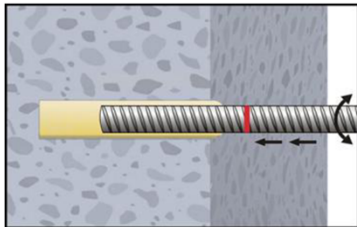
# Installation instructions (continuation)



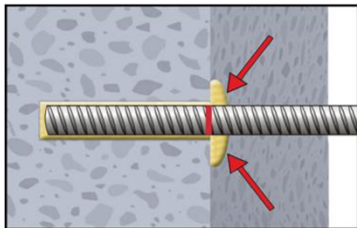
- 8a. Injecting mortar without piston plug VS:**  
Starting at bottom of the hole and fill the hole with adhesive until the mortar level mark is visible. (If necessary, a mixer nozzle extension shall be used.) Slowly withdraw of the static mixing nozzle avoid creating air pockets. Observe the temperature related working time  $t_{work}$  (Annex B 6).



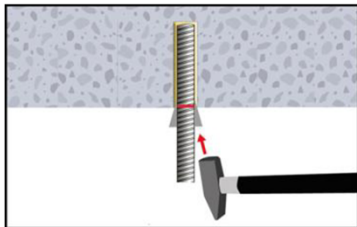
- 8b. Injecting mortar with piston plug VS:**  
Insert piston plug to bottom of the hole and fill the hole with mortar until mortar level mark  $l_m$  is visible. (If necessary, a mixer nozzle extension shall be used.) During injection the piston plug is pushed out of the bore hole by the back pressure of the mortar. Observe the temperature related working time  $t_{work}$  (Annex B 6).



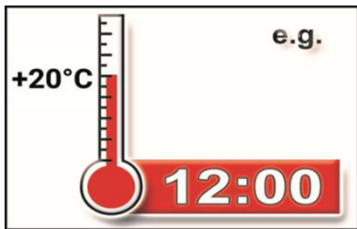
- 9.** Insert the reinforcing bar while turning slightly up to the embedment mark.



- 10.** Annular gap between reinforcing bar and base material must be completely filled with mortar. Otherwise, the installation must be repeated starting from step 8 before the maximum working time  $t_{work}$  has expired.



- 11.** For application in vertical upwards direction the reinforcing bar shall be fixed (e.g. wedges).



- 12.** Temperature related curing time  $t_{cure}$  (Annex B 6) must be observed. After initial curing time  $t_{cure,ini}$  has elapsed, the installation of the connecting reinforcement and the formwork can be continued. The full load to the reinforcing bar may be applied after the full curing time  $t_{cure}$  has elapsed.

Injection system PURE500+ for rebar connection

Intended use  
Installation instructions (continuation)

Annex B 10

### Minimum anchorage length and minimum lap length under static or quasi-static loading

The minimum anchorage length  $l_{b,min}$  and the minimum lap length  $l_{0,min}$  according to EN 1992-1-1:2004 + AC:2010 ( $l_{b,min}$  acc. to Eq. 8.6 and Eq. 8.7 and  $l_{0,min}$  acc. to Eq. 8.11) shall be multiply by the amplification factor  $\alpha_{lb} = \alpha_{lb,100y}$  according to Table C2.

**Table C1: Amplification factor  $\alpha_{lb} = \alpha_{lb,100y}$  related to concrete class and drilling method; working life 50 and 100 years**

| Concrete class   | Drilling method      | Bar size                      | Amplification factor<br>$\alpha_{lb} = \alpha_{lb,100y}$ |
|------------------|----------------------|-------------------------------|----------------------------------------------------------|
| C12/15 to C50/60 | all drilling methods | 8 mm to 40 mm<br>-M12 to -M24 | 1,0                                                      |

**Table C2: Reduction factor  $k_b = k_{b,100y}$  for all drilling methods; working life 50 and 100 years**

| Rebar      | Concrete class |        |        |        |        |        |        |        |        |
|------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| $\phi$     | C12/15         | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
| 8 to 40 mm | 1,0            |        |        |        |        |        |        |        |        |

**Table C3: Design values of the ultimate bond stress  $f_{bd,PIR}$  and  $f_{bd,PIR,100y}$  in N/mm<sup>2</sup> for all drilling methods and for good conditions; working life 50 and 100 years**

$$f_{bd,PIR} = k_b \cdot f_{bd}$$

$$f_{bd,PIR,100y} = k_{b,100y} \cdot f_{bd}$$

with

$f_{bd}$ : Design value of the ultimate bond stress in N/mm<sup>2</sup> considering the concrete classes, the rebar diameter, the drilling method for good bond condition (for all other bond conditions multiply the values by  $\eta_1 = 0.7$ ) and recommended partial factor  $\gamma_c = 1.5$  according to EN 1992-1-1:2004 + AC:2010.

$k_b, k_{b,100y}$ : Reduction factor according to Table C3

| Rebar      | Concrete class |        |        |        |        |        |        |        |        |
|------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| $\phi$     | C12/15         | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
| 8 to 32 mm | 1,6            | 2,0    | 2,3    | 2,7    | 3,0    | 3,4    | 3,7    | 4,0    | 4,3    |
| 34 mm      | 1,6            | 2,0    | 2,3    | 2,6    | 2,9    | 3,3    | 3,6    | 3,9    | 4,2    |
| 36 mm      | 1,5            | 1,9    | 2,2    | 2,6    | 2,9    | 3,3    | 3,6    | 3,8    | 4,1    |
| 40 mm      | 1,5            | 1,8    | 2,1    | 2,5    | 2,8    | 3,1    | 3,4    | 3,7    | 4,0    |

Injection system PURE500+ for rebar connection

#### Performances

Minimum anchorage length and minimum lap length, Amplification factor, Reduction factor and Design values of ultimate bond resistance

**Annex C 1**

### Minimum anchorage length and minimum lap length under seismic action

The minimum anchorage length  $l_{b,min}$  and the minimum lap length  $l_{0,min}$  according to EN 1992-1-1:2004 + AC:2010 ( $l_{b,min}$  acc. to Eq. 8.6 and Eq. 8.7 and  $l_{0,min}$  acc. to Eq. 8.11) shall be multiply by the amplification factor  $\alpha_{lb,seis} = \alpha_{lb,seis,100y}$  according to Table C5.

**Table C4: Amplification factor  $\alpha_{lb,seis} = \alpha_{lb,seis,100y}$  related to concrete class and drilling method; working life 50 and 100 years**

| Concrete class   | Drilling method      | Bar size       | Amplification factor<br>$\alpha_{lb,seis} = \alpha_{lb,seis,100y}$ |
|------------------|----------------------|----------------|--------------------------------------------------------------------|
| C16/20 to C50/60 | all drilling methods | 10 mm to 40 mm | 1,0                                                                |

**Table C5: Reduction factor  $k_{b,seis} = k_{b,seis,100y}$  for all drilling methods; working life 50 and 100 years**

| Rebar       | Concrete classes        |        |        |        |        |        |        |        |        |
|-------------|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| $\phi$      | C12/15                  | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
| 10 to 40 mm | No performance assessed | 1,0    |        |        |        |        |        |        |        |

**Table C6: Design values of the ultimate bond stress  $f_{bd,PIR,seis}$  and  $f_{bd,PIR,seis,100y}$  in N/mm<sup>2</sup> for all drilling methods and for good conditions; working life 50 and 100 years**

$$f_{bd,PIR,seis} = k_{b,seis} \cdot f_{bd}$$

$$f_{bd,PIR,seis,100y} = k_{b,seis,100y} \cdot f_{bd}$$

with

$f_{bd}$ : Design value of the ultimate bond stress in N/mm<sup>2</sup> considering the concrete classes, the rebar diameter, the drilling method for good bond condition (for all other bond conditions multiply the values by  $\eta_1 = 0.7$ ) and recommended partial factor  $\gamma_c = 1.5$  according to EN 1992-1-1:2004 + AC:2010.

$k_{b,seis}$ ,  $k_{b,seis,100y}$ : Reduction factor according to Table C6

| Rebar       | Concrete classes        |        |        |        |        |        |        |        |        |
|-------------|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| $\phi$      | C12/15                  | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
| 10 to 32 mm | No performance assessed | 2,0    | 2,3    | 2,7    | 3,0    | 3,4    | 3,7    | 4,0    | 4,3    |
| 34 mm       |                         | 2,0    | 2,3    | 2,6    | 2,9    | 3,3    | 3,6    | 3,9    | 4,2    |
| 36 mm       |                         | 1,9    | 2,2    | 2,6    | 2,9    | 3,3    | 3,6    | 3,8    | 4,1    |
| 40 mm       |                         | 1,8    | 2,1    | 2,5    | 2,8    | 3,1    | 3,4    | 3,7    | 4,0    |

Injection system PURE500+ for rebar connection

### Performances

Minimum anchorage length and minimum lap length, Amplification factor, Reduction factor and Design values of ultimate bond stress under seismic action

**Annex C 2**

**Design value of the ultimate bond stress  $f_{bd,fi}$ ,  $f_{bd,fi,100y}$  at increased temperature for concrete classes C12/15 to C50/60, (all drilling methods); working life 50 and 100 years:**

The design value of the bond stress  $f_{bd,fi}$  at increased temperature has to be calculated by the following equation:

For working life 50 years:  $f_{bd,fi} = k_{fi}(\theta) \cdot f_{bd,PIR} \cdot \gamma_c / \gamma_{M,fi}$

with:  $\theta \leq 278^\circ\text{C}$ :  $k_{fi}(\theta) = 4673,8 \cdot \theta^{-1,598} / (f_{bd,PIR} \cdot 4,3) \leq 1,0$

$\theta > 278^\circ\text{C}$ :  $k_{fi}(\theta) = 0$

For working life 100 years:  $f_{bd,fi,100y} = k_{fi,100y}(\theta) \cdot f_{bd,PIR,100y} \cdot \gamma_c / \gamma_{M,fi}$

with:  $\theta \leq 278^\circ\text{C}$ :  $k_{fi,100y}(\theta) = 4673,8 \cdot \theta^{-1,598} / (f_{bd,PIR,100y} \cdot 4,3) \leq 1,0$

$\theta > 278^\circ\text{C}$ :  $k_{fi,100y}(\theta) = 0$

$f_{bd,fi}$ ,  $f_{bd,fi,100y}$  Design value of the ultimate bond stress at increased temperature in N/mm<sup>2</sup>

$\theta$  Temperature in °C in the mortar layer.

$k_{fi}(\theta)$ ,  $k_{fi,100y}(\theta)$  Reduction factor at increased temperature.

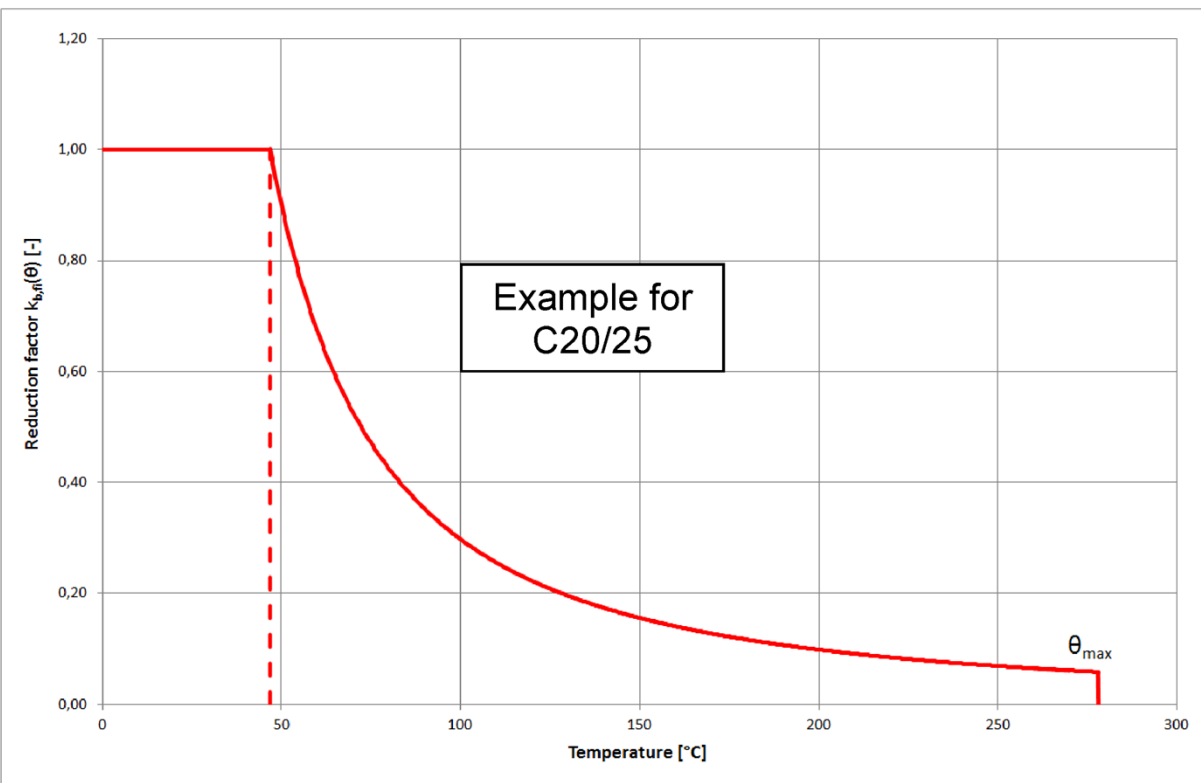
$f_{bd,PIR}$ ,  $f_{bd,PIR,100y}$  Design value of the bond stress  $f_{bd,PIR} = f_{bd,PIR,100y}$  in N/mm<sup>2</sup> in cold condition according to Table C4 considering the concrete classes, the rebar diameter, the drilling method and the bond conditions according to EN 1992-1-1:2004 + AC:2010.

$\gamma_c$  = 1,5, recommended partial factor according to EN 1992-1-1:2004 + AC:2010

$\gamma_{M,fi}$  = 1,0, recommended partial factor according to EN 1992-1-2:2004 + AC:2008

For evidence at increased temperature the anchorage length shall be calculated according to EN 1992-1-1:2004 + AC:2010 Equation 8.3 using the temperature-dependent design value of ultimate bond stress  $f_{bd,fi}$ ,  $f_{bd,fi,100y}$ .

**Example graph of Reduction factor  $k_{fi}(\theta)$ ,  $k_{fi,100y}(\theta)$  for concrete classes C20/25 for good bond conditions:**



Injection system PURE500+ for rebar connection

**Performances**

Design value of ultimate bond stress at increased temperature

**Annex C 3**