Declaration of Performance

Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for post-installed rebar

DoP No. CF-00-012-02

1. Unique identification code of the product-type: CF-00-012 - VECO, VECO Express, VECO Tropical
2. Intended use/es: Injection system for post-installed rebar connections

   Annex: B1 - B8
3. Manufacturer:
   Chemofast Anchoring GmbH
   Hanns-Martin-Schleyer-Str. 24
   47878 Willich, Deutschland
   Fon: +49 2154 81230
   Fax: +49 2154 8123333
4. Authorised representative: -
5. AVCP System/s: 1
6. European Assessment Document: EAD 330087-01-0601
   European Technical Assessment: ETA-19/0477 issued on 20.11.2024
   Technical Assessment Body: Technical and Test Institute for Construction Prague - TZUS
   Notified body/ies: IFSW - TU Darmstadt NB 2873
7. Declared performance/s:

Mechanical resistance and stability (BWR 1)	
Essential Characteristics	Performance
Characteristic resistance under static and quasi-static load	
for working life 50 years	Annex: C1
for working life 100 years	NPA
to steel failure of tension anchor	NPA
Characteristic resistance under seismic loading	
for working life 50 years	NPA
for working life 100 years	NPA
Safety in case of fire (BWR 2)	
Essential Characteristics	Performance
Reaction to fire	Fasterner satisfy requirements for Class A1
Resistance to fire	NPA
Hygiene, health and the environment (BWR 3)	
Essential Characteristics	Performance
Content, emission and/or release of dangerous substances	No performance assessed (NPA)

8. Appropriate Technical Documentation and/or Specific Technical Documentation: Not relevant

The performance of the product specified above is in conformity with the declared performance. In accordance with Regulation (EU) No. 305/2011, this declaration of performance is issued under the sole responsibility of the manufacturer named above.

Signed for and on behalf of the manufacturer by:

i.V. Philipp Strater
Head of Applications Engineering and Technology

i.V. Dr. Sven Mronga
Head of Quality Management

Willich 17.12.2024

Rev. 08.00 - EN

Installation post installed rebar

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

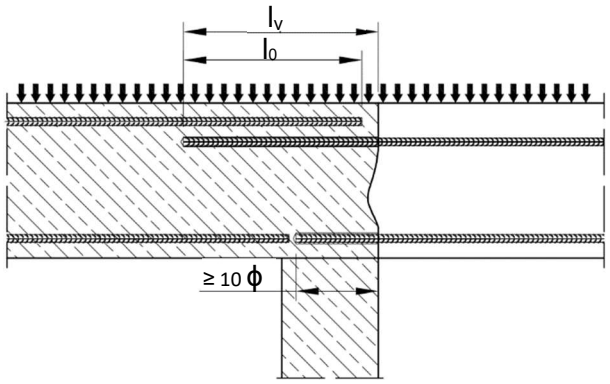


Figure A2: Overlapping joint at a foundation of a wall or column where the rebars are stressed in tension

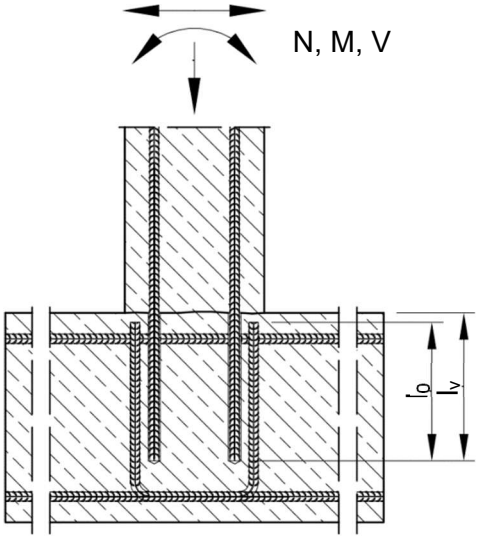


Figure A3: End anchoring of slabs or beams (e.g. designed as simply supported)

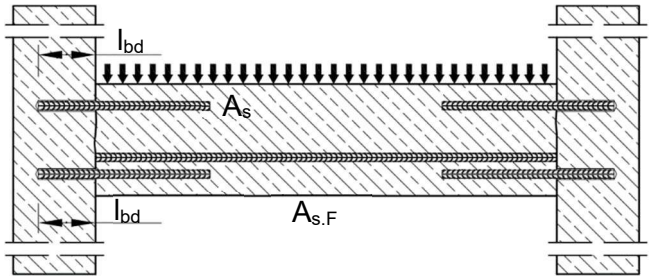


Figure A4: Rebar connection for components stressed primarily in compression. The rebars are stressed in compression.

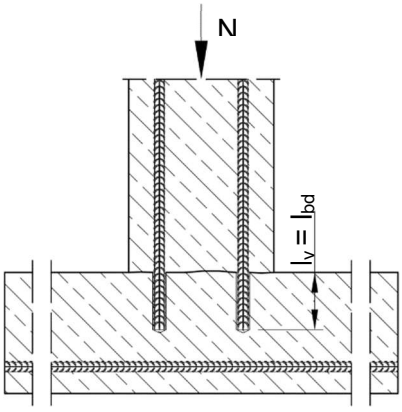
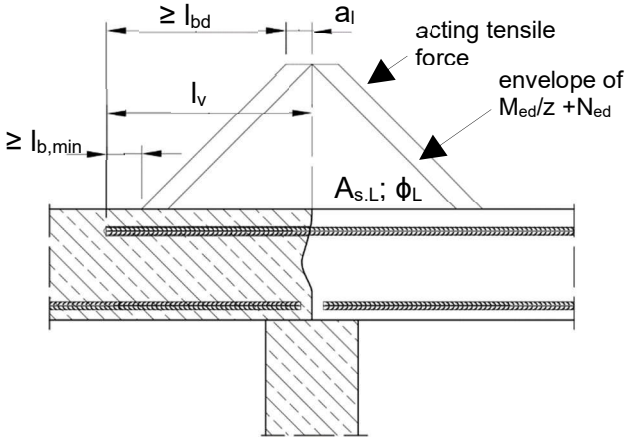


Figure A5: Anchoring of reinforcement to cover the line of acting tensile force



Note to Figure A1 to A5:

In the Figures no transverse reinforcement is plotted, the transverse reinforcement shall comply with EN 1992-1-1:2011.

Preparing of joints according to Annex B 2

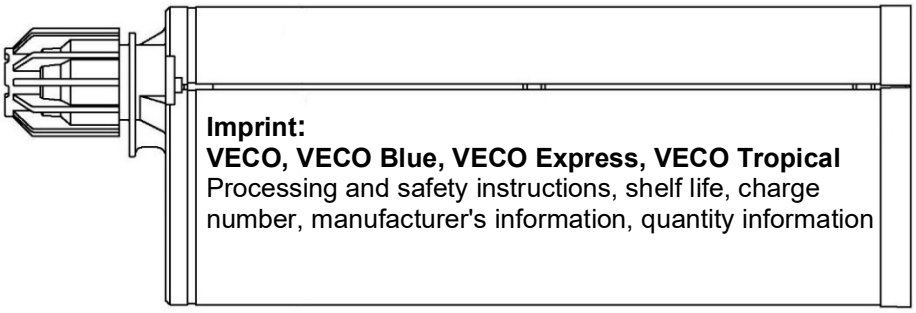
Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection	
Product description Installed condition and examples of use for rebars	**Annex A 1**

Cartridge system

Coaxial Cartridge:
150 ml, 160 ml, 280 ml, 300 ml up to 333 ml and 380 ml up to 420 ml

Imprint:
VECO, VECO Blue, VECO Express, VECO Tropical
Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Side-by-Side Cartridge:
235 ml, 345 ml up to 360 ml and 825 ml

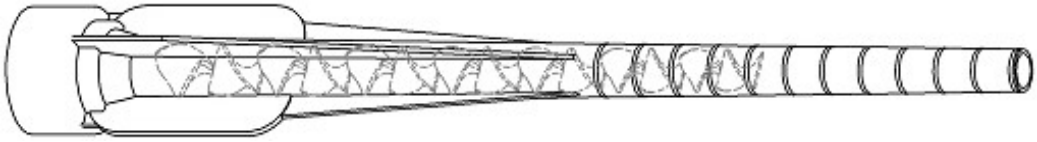


Imprint:
VECO, VECO Blue, VECO Express, VECO Tropical
Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Foil Tube Cartridge:
165 ml and 300 ml

Imprint:
VECO, VECO Blue, VECO Express, VECO Tropical
Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

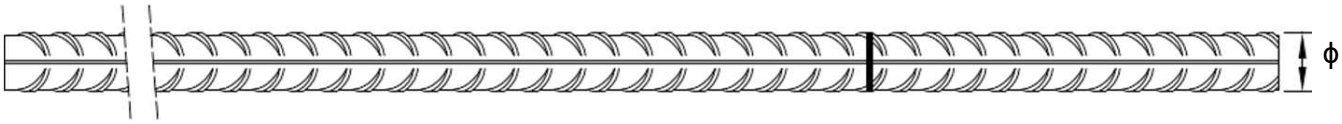
Static mixer SM-14W



Piston plug VS and Mixer extension VL

Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection	
Product description Injection system	**Annex A 2**

Reinforcing bar (rebar): ø8 up to ø25



- Minimum value of related rip area $f_{R,min}$ according to EN 1992-1-1:2011
- Rib height of the bar shall be in the range $0{,}05\phi \le h_{rib} \le 0{,}07\phi$
  (ϕ: Nominal diameter of the bar; h_{rib} : Rib height of the bar)

Table A1: Materials Rebar

Designation	Material
Rebar EN 1992-1-1:2011, Annex C	Bars and de-coiled rods class B or C f_{yk} and k according to NDP or NCL of EN 1992-1-1/NA $f_{uk} = f_{tk} = k \cdot f_{yk}$

Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection	**Annex A 3**
Product description Specifications Rebar	

Specifications of intended use

Anchorages subject to:		Working life 50 years	Working life 100 years
HD: Hammer drilling CD: Compressed air drilling	static and quasi-static loads	Ø8 to Ø25	No performance assessed
	seismic action	No performance assessed	No performance assessed
	fire exposure	No performance assessed	No performance assessed
Temperature Range:	- 40°C to +80°C (max long-term temperature +50 °C and max short-term temperature +80 °C)		

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013 + A1:2016.
- Strength classes C12/15 to C50/60 according to EN 206:2013 + A1:2016.
- Maximum chloride content of 0,40% (CL 0.40) related to the cement content according to EN 206:2013 + A1:2016.
- Non-carbonated concrete.

  Note: In case of a carbonated surface of the existing concrete structure the carbonated layer shall be removed in the area of the post-installed rebar connection with a diameter of ϕ + 60 mm prior to the installation of the new rebar.

  The depth of concrete to be removed shall correspond to at least the minimum concrete cover in accordance with EN 1992-1-1:2011. The foregoing may be neglected if building components are new and not carbonated and if building components are in dry conditions.

Design:

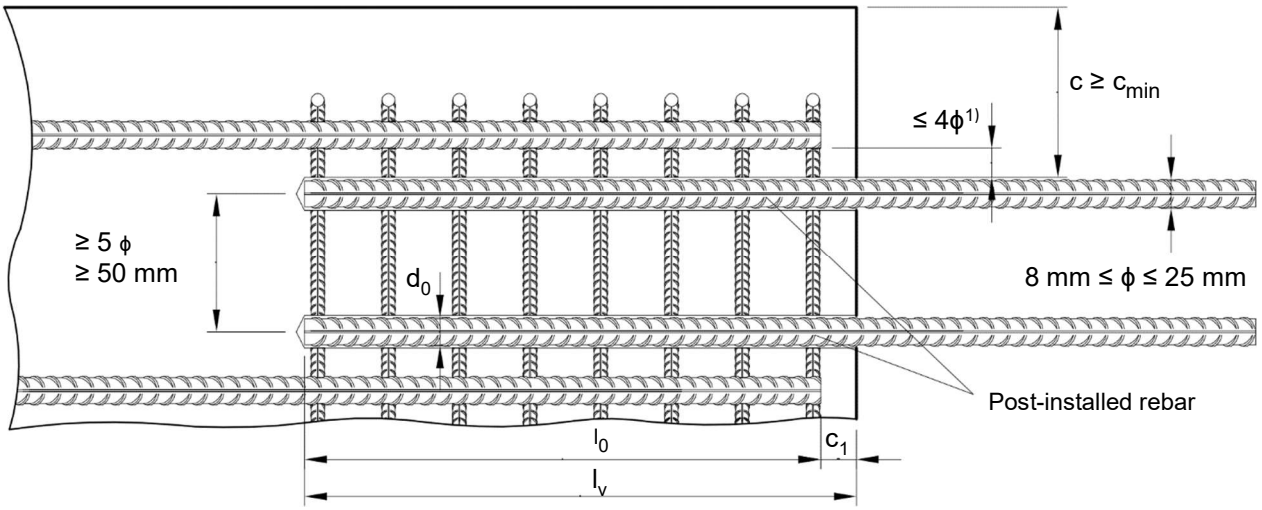
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the forces to be transmitted.
- Design according to EN 1992-1-1:2011, EN 1992-1-2:2004+AC:2008 and Annex B 2.
- The actual position of the reinforcement in the existing structure shall be determined on the basis of the construction documentation and taken into account when designing.

Installation:

- Dry or wet concrete. It must not be installed in flooded holes.
- Overhead installation allowed.
- Hole drilling by hammer drill (HD or compressed air drill mode (CD).
- 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.
- 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).

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 1992-1-1:2011.
- The joints for concreting must be roughened to at least such an extent that aggregate protrude.

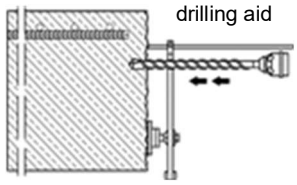


1) If the clear distance between lapped bars exceeds 4ϕ, then the lap length shall be increased by the difference between the clear bar distance and 4ϕ.

The following applies to Figure B1:

c	concrete cover of post-installed rebar
c_1	concrete cover at end-face of existing rebar
c_{min}	minimum concrete cover according to Table B1 and to EN 1992-1-1:2011, Section 4.4.1.2
ϕ	diameter of post-installed rebar
l_0	lap length, according to EN 1992-1-1:2011, Section 8.7.3
l_v	effective embedment depth, $\geq l_0 + c_1$
d_0	nominal drill bit diameter, see Annex B 4

Table B1: Minimum concrete cover min c[1)] of post-installed rebar and depending of drilling method

Drilling method	Rebar diameter	Without drilling aid	With drilling aid	
HD: Hammer drilling	< 25 mm	30 mm + 0,06 · ℓ_v ≥ 2 ϕ	30 mm + 0,02 · ℓ_v ≥ 2 ϕ	
	≥ 25 mm	40 mm + 0,06 · ℓ_v ≥ 2 ϕ	40 mm + 0,02 · ℓ_v ≥ 2 ϕ	
CD: Compressed air drilling	< 25 mm	50 mm + 0,08 · ℓ_v	50 mm + 0,02 · ℓ_v	
	≥ 25 mm	60 mm + 0,08 · ℓ_v ≥ 2 ϕ	60 mm + 0,02 · ℓ_v ≥ 2 ϕ	

[1)] see Annex B 2, Figure B1
Comments: The minimum concrete cover acc. EN 1992-1-1:2011 must be observed

Table B2: Dispensing tools

Cartridge type/size	Hand tool		Pneumatic tool
Coaxial cartridges 150, 160, 165, 280, 300 up to 333 ml	 e.g. type H297 / H244C		 e.g. type TS 492 X
Coaxial cartridges 380 up to 420 ml	 e.g. type CCM 380/10	 e.g. type H 285 or H244C	 e.g. type TS 485 LX
Side-by-side cartridges 235, 345 up to 360 ml	 e.g. type CBM 330A	 e.g. type H 260	 e.g. type TS 477 LX
Side-by-side cartridges 825 ml	-	-	 e.g. type TS 498X

All cartridges could also be extruded by a battery tool.

Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection

Intended use
Minimum concrete cover
Dispensing tools

Annex B 3

Table B3: Brushes, piston plugs, max anchorage depth and mixer extension, hammer (HD) and compressed air (CD) drilling

Bar size ϕ	Drill bit - ∅		d_b Brush - ∅		$d_{b,min}$ min. Brush - ∅	Piston plug	Cartridge: All sizes				Cartridge: 825 ml	
							Hand or battery tool		Pneumatic tool		Pneumatic tool	
	HD	CD					$l_{v,max}$	Mixer extension	$l_{v,max}$	Mixer extension	$l_{v,max}$	Mixer extension
[mm]	[mm]			[mm]	[mm]		[mm]		[mm]		[mm]	
8	12	-	RBT12	14	12,5	-	700	VL10/0,75	800	VL10/0,75	800	VL10/0,75
10	14	-	RBT14	16	14,5	VS14			1000		1000	
12	16		RBT16	18	16,5	VS16						
14	18		RBT18	20	18,5	VS18						
16	20		RBT20	22	20,5	VS20						
20	25	-	RBT25	27	25,5	VS25	500		700			
	-	26	RBT26	28	26,5	VS25						
25	32		RBT32	34	32,5	VS32						

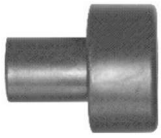
Cleaning and installation tools

Hand pump
(Volume 750 ml, $h_0 \geq 10\ d_s$, $d_0 \leq 20$mm)

Manual slide valve
(min 6 bar)

Brush RBT

Pistole Plug VS



Brush extension RBL

Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection	**Annex B 4**
Intended use Cleaning and installation tools	

Table B4: Working and curing time VECO, VECO Blue[1)]

Temperature in base material			Maximum working time	Minimum curing time
T			t_{work}	t_{cure}
- 5 °C	to	- 1 °C	90 min	6 h
+ 0 °C	to	+ 4 °C	45 min	3 h
+ 5 °C	to	+ 9 °C	25 min	2 h
+ 10 °C	to	+ 14 °C	20 min	100 min
+ 15 °C	to	+ 19 °C	15 min	80 min
+ 20 °C	to	+ 29 °C	6 min	45 min
+ 30 °C	to	+ 34 °C	4 min	25 min
+ 35 °C	to	+ 39 °C	2 min	20 min
Cartridge temperature			+5°C up to +40°C	

[1)] The VECO Blue injection mortar has a curing time proof by changing the color from blue to gray after curing minimum time. The curing time proof is only valid for the standard version of the mortar.

Table B5: Working and curing time VECO Express

Temperature in base material			Maximum working time	Minimum curing time
T			t_{work}	t_{cure}
- 10 °C	to	- 6 °C	60 min	4 h
- 5 °C	to	- 1 °C	45 min	2 h
+ 0 °C	to	+ 4 °C	25 min	80 min
+ 5 °C	to	+ 9 °C	10 min	45 min
+ 10 °C	to	+ 14 °C	4 min	25 min
+ 15 °C	to	+ 19 °C	3 min	20 min
+ 20 °C	to	+ 29 °C	2 min	15 min
Cartridge temperature			0°C up to +30°C	

Table B6: Working and curing time VECO Tropical

Temperature in base material			Maximum working time	Minimum curing time
T			t_{work}	t_{cure}
+ 10 °C	to	+ 14 °C	30 min	5 h
+ 15 °C	to	+ 19 °C	20 min	210 min
+ 20 °C	to	+ 29 °C	15 min	145 min
+ 30 °C	to	+ 34 °C	10 min	80 min
+ 35 °C	to	+ 39 °C	6 min	45 min
+ 40 °C	to	+ 44 °C	4 min	25 min
+45°C			2 min	20 min
Cartridge temperature			+5°C up to +45°C	

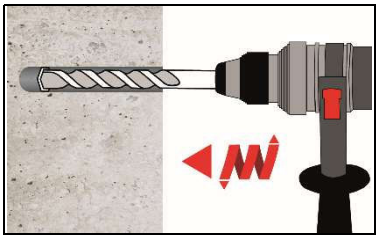
Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection

Intended use
Working and curing time

Annex B 5

Installation instructions

Drilling of the bore hole

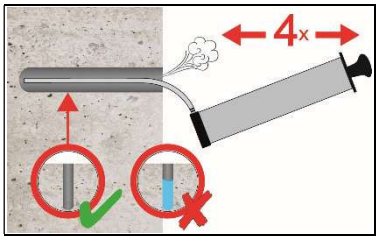


Attention: Before drilling, remove carbonated concrete and clean contact areas (see Annex B 1). Aborted drill holes shall be filled with mortar.

1. **Hammer drilling (HD) / Compressed air drilling (CD)**
   Drill a hole to the required embedment depth.
   Drill bit diameter according to Table B3.
   Proceed with Step 2 (MAC or CAC).

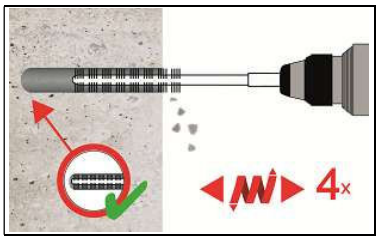
Manual Air Cleaning (MAC)

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

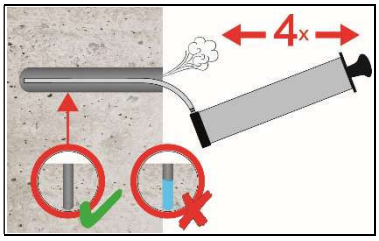


Attention! Standing water in the bore hole must be removed before cleaning.

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



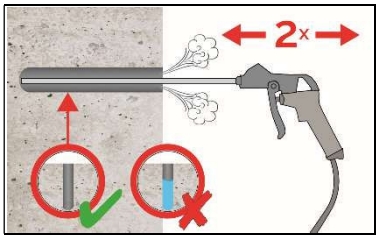
2b. Attach brush RBT according to Table B3 to a drilling machine or a cordless screwdriver. Brush the bore hole minimum 4x over the entire embedment depth in a twisting motion (if necessary, use a brush extension).



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

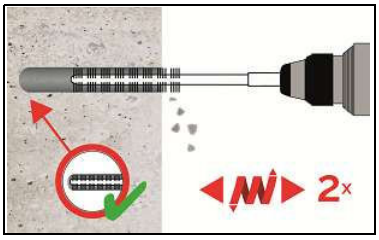
Compressed Air Cleaning (CAC):

All diameter with drilling method HD/CD



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

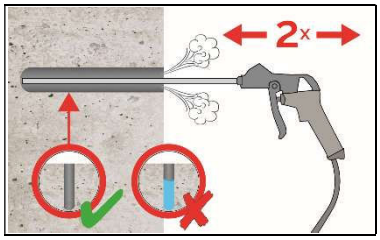
2a. Blow the bore hole clean minimum 2x with compressed air (min. 6 bar) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)



2b. Attach brush RBT according to Table B3 to a drilling machine or a cordless screwdriver. Brush the bore hole minimum 2x over the entire embedment depth in a twisting motion. (If necessary, a brush extension RBL shall be used.)

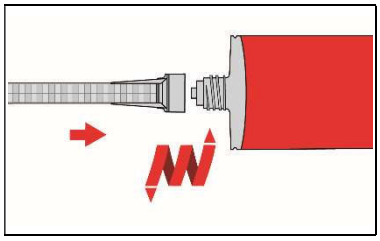
Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection	**Annex B 6**
Intended use Installation instructions	

Installation instructions (continuation)

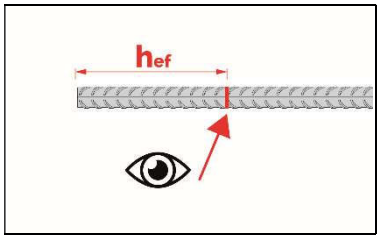


2c. Finally blow the bore hole clean minimum 2x with compressed air (min. 6 bar) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

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



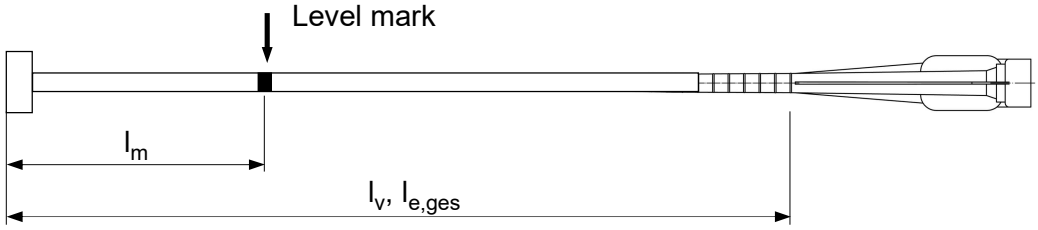
3. Screw on static-mixing nozzle SM-14W and load the cartridge into an appropriate dispensing tool.
If necessary, cut off the foil tube clip before use.
For every working interruption longer than the maximum working time t_{work} (Annex B 5) as well as for new cartridges, a new static-mixer shall be used.

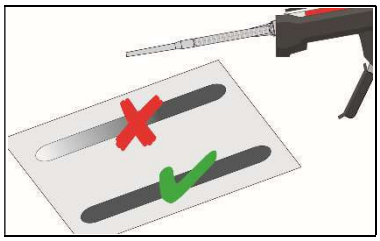


4. Mark embedment depth on the reinforcing bar .
The reinforcing bar shall be free of dirt, grease, oil or other foreign material.

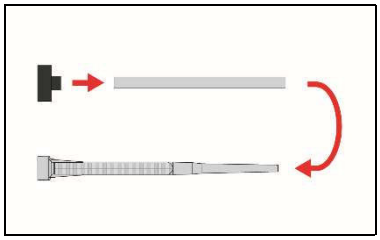
5. Mark mixer nozzle and extension with mortar level mark l_m and anchorage depth l_v resp. $l_{e,ges}$
Quick estimation: $l_m = 1/3 \cdot l_v$
Optimum mortar volume:

$$l_m = l_v \text{ resp. } l_{e,ges} \cdot \left(1{,}2 \cdot \frac{\phi^2}{d_0^2} - 0{,}2\right)$$



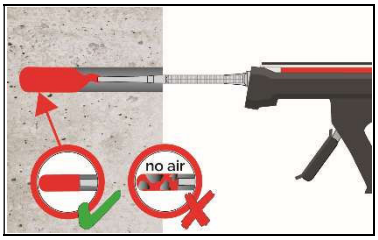


6. Not proper mixed mortar is not sufficient for fastening.
Dispense and discard mortar until an uniform grey or blue (VECO Blue) colour is shown (at least 3 full strokes; for foil tube cartridges min. 6 strokes).

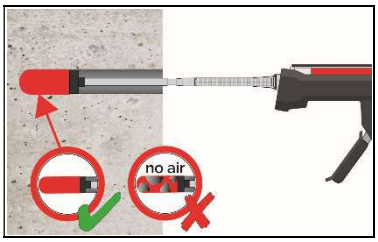


7. Piston plugs VS and mixer nozzle extensions VL shall be used according to Table B3.
Assemble mixing nozzle, mixer extension and piston plug before injecting mortar.

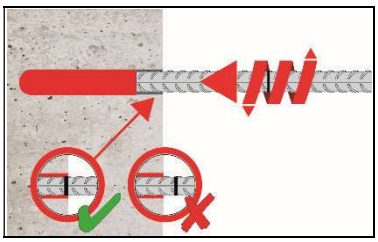
Installation instructions (continuation)



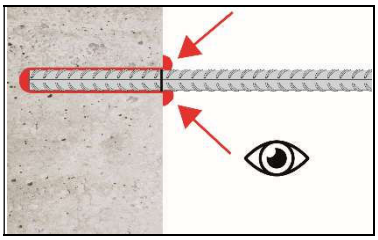
8a. **Injecting mortar without piston plug VS:**
Starting at bottom of the hole and fill the hole with adhesive until the mortar level mark l_m is visible. (If necessary, a mixer nozzle extension shall be used.)
Slowly withdraw of the static mixing nozzle avoid creating air pockets
Observe the temperature related working time t_{work} (Annex B 5).



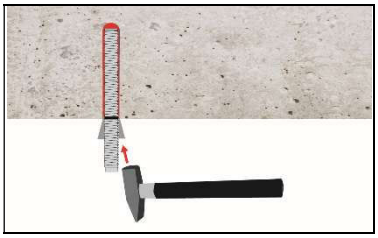
8b. **Injecting mortar with piston plug VS:**
Insert piston plug to bottom of the hole and fill the hole with mortar until mortar level mark l_m is visible. (If necessary, a mixer nozzle extension shall be used.)
During injection the piston plug is pushed out of the bore hole by the back pressure of the mortar.
Observe the temperature related working time t_{work} (Annex B 5).



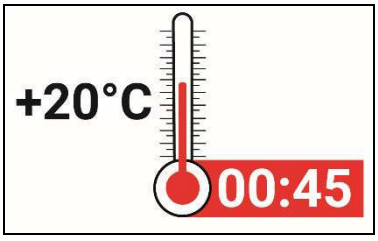
9. Insert the reinforcing bar while turning slightly up to the embedment mark.



10. Annular gap between reinforcing bar and base material must be completely filled with mortar. Otherwise, the installation must be repeated starting from step 7 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 5) must be observed.
The full load to the reinforcing bar may be applied after the full curing time t_{cure} has elapsed.

Chemofast Injection System VECO, VECO Blue, VECO Express, VECO Tropical for rebar connection	
Intended use Installation instructions (continuation)	**Annex B 8**

Minimum anchorage length and minimum lap length

The minimum anchorage length $l_{b,min}$ and the minimum lap length $l_{0,min}$ according to EN 1992-1-1:2011 ($l_{b,min}$ 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 α_{lb} according to Table C1.

Table C1: Amplification factor α_{lb} related to concrete class and drilling method

Concrete class	Drilling method	Bar size	Amplification factor α_{lb}
C12/15 to C50/60	All drilling method	8 mm to 25 mm	1,5

Table C2: Reduction factor k_b for all drilling methods

Rebar	Concrete class								
ϕ	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 mm to 20 mm	1,0								
25 mm	1,0								0,93

Table C3: Design values of the ultimate bond strength $f_{bd,PIR}$ in N/mm² for all drilling methods and for good conditions

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

with

f_{bd}: Design value of the ultimate bond stress in N/mm² considering the concrete classes, the rebar diameter, the drilling method for good bond condition (for all other bond conditions multiply the values by η_1 =0.7) and recommended partial factor γ_c = 1,5 according to EN 1992-1-1:2011.

k_b: Reduction factor according to Table C2

Rebar	Concrete class								
ϕ	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 mm to 20 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
25 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,0