Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-22/6107 of 01/06/2022
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	R-KER / RV200 injection mortar
Product family to which the construction product belongs:	Area Code 33, Post-installed rebar connections with R-KER / RV200 mortar
Manufacturer:	RAWLPLUG S.A. ul. Kwidzyńska 6, 51-416 Wrocław, Poland
Manufacturing plant(s):	Manufacturing Plant No. 3
This UK Technical Assessment contains:	20 pages including 3 annexes which form an integral part of this assessment
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 330087-00-0601 *Systems for post-installed rebar connections with mortar*

1 Technical description of the product

R-KER/RV2000 injection mortar is used in accordance with the regulations (see Annex A) for reinforced concrete construction in anchoring or overlap connection joint of steel reinforcing bars in existing structures manufactured from normal weight concrete.

R-KER / RV200 injection mortar are used to secure post-installed rebar connections. The reinforcing bars are manufactured from steel with diameter from 8 mm to 32 mm and The steel element is placed into a drilled hole filled with the injection mortar and is anchored by the bond between embedded element, injection mortar and concrete.

An illustration and the description of the products are given in Annex A.

2 Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

The performances given in Section 3 are only valid if the post-installed connections are used in compliance with the specifications and conditions given in Annex B.

The performances given in this UK Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body 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)

The essential characteristics are detailed in the Annex C.

3.2 Safety in case of fire (BWR 2)

Not relevant.

3.3 Health, hygiene and the environment (BWR 3)

Not relevant.

3.4 Safety and accessibility in use (BWR 4)

Not relevant.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1 System of assessment and verification of constancy of performance

According to UKAD No. 330087-00-0601 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1 applies.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1 UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance
- UKTA number.

On behalf of the British Board of Agrément 	
Date of Issue: 1 June 2022	**Hardy Giesler** Chief Executive

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WD25 9BA

ANNEX A : R-KER / RV200 injection mortar – product use

This annex applies to the product described in the main body of the UK Technical Assessment.

Figure A1 : Product installation

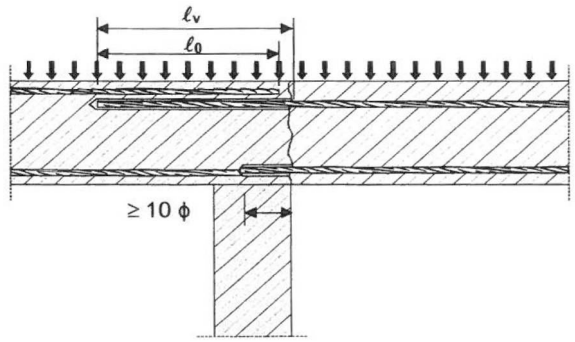


Figure A1 Overlap joint for rebar connections of slabs and beams

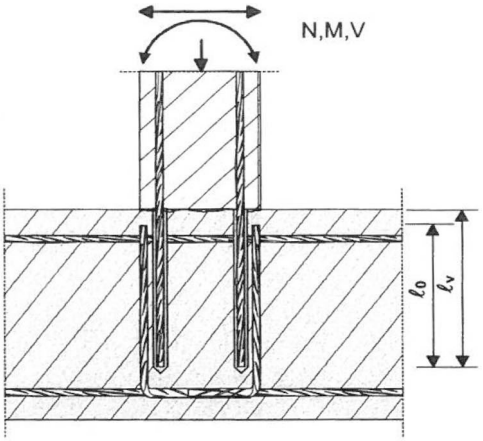


Figure A2 Overlap joint at a foundation of a column or wall where the rebar is stressed in tension

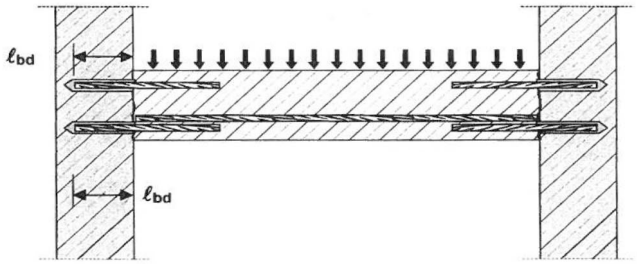


Figure A3 End anchoring of slabs or beams, designed as simply supported

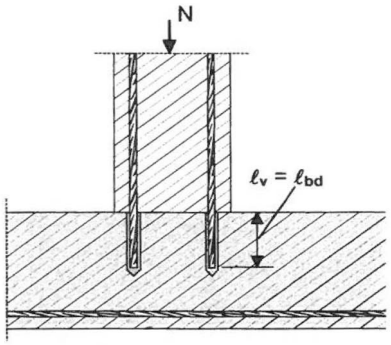
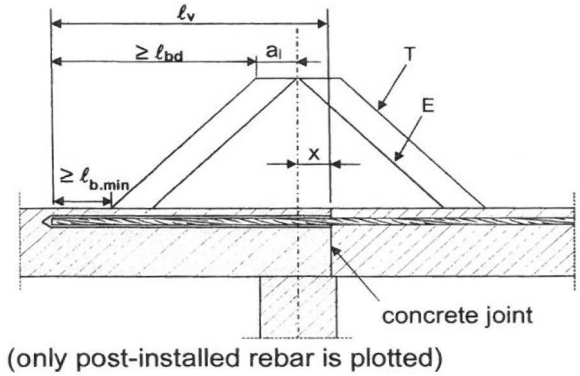


Figure A4 rebar connection for components stressed primarily in compression; rebar is stressed in compression



(only post-installed rebar is plotted)

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

Key to Figure A5

T acting tensile force

E envelope of $M_{ed}/z + N_{ed}$ (see EN 1992-1-1, Figure 9.2)

x distance between the theoretical point of support and concrete joint

Note to Figure A1 to A5

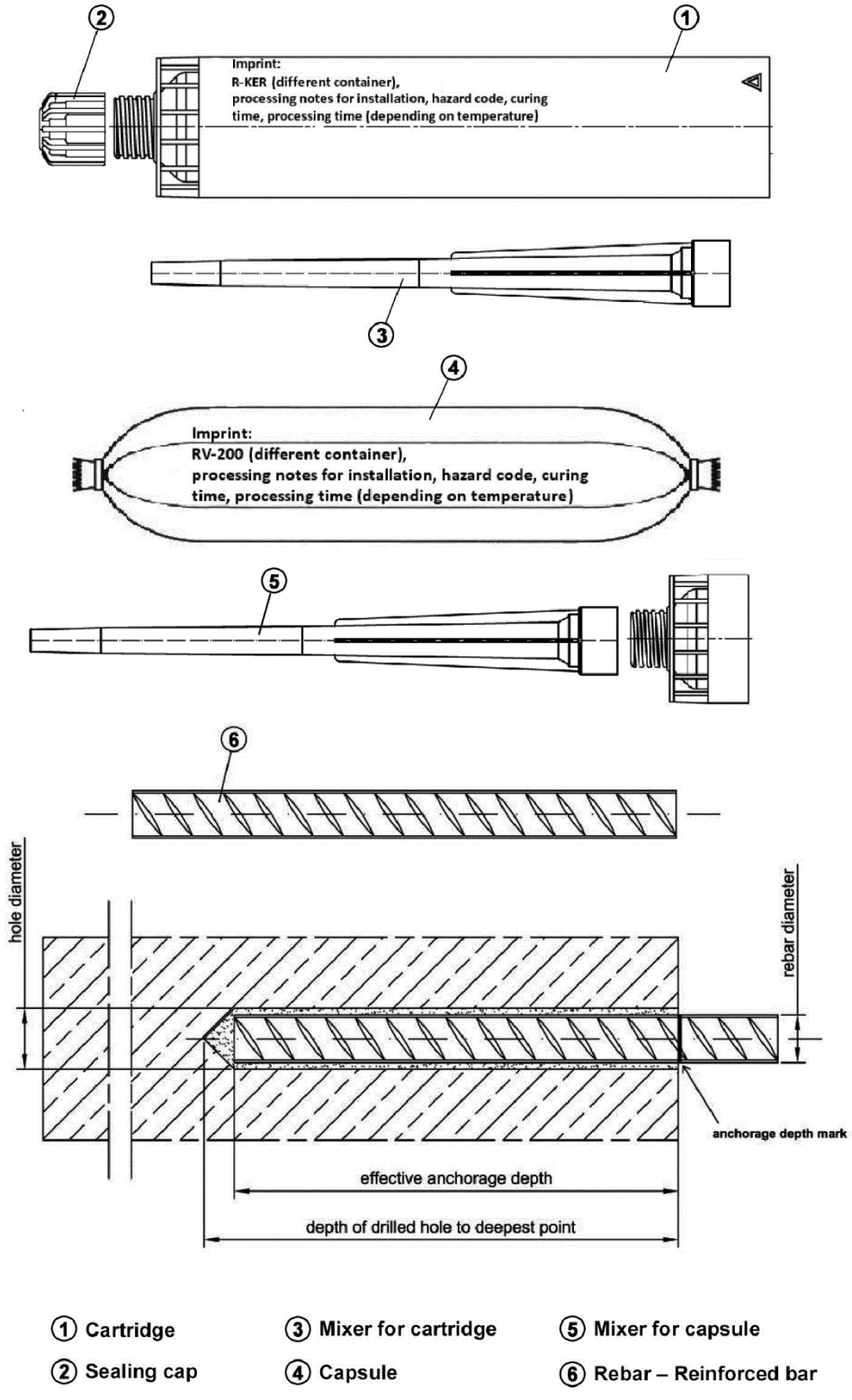
In the Figures no transverse reinforcement is plotted, the transverse reinforcement as required by EN 1992-1-1 shall be present.

The shear transfer between old and new concrete shall be designed according to EN 1992-1-1.

Injection system R-KER / RV200 for rebar connections	Annex A 1
Product description Use of the product	

ANNEX A : R-KER / RV200 injection mortar – product use (continued)

Figure A2 : Cartridge installation



① Cartridge ② Sealing cap ③ Mixer for cartridge ④ Capsule ⑤ Mixer for capsule ⑥ Rebar – Reinforced bar

Injection system R-KER / RV200 for rebar connections	Annex A 2
Product description	

ANNEX A : R-KER / RV200 injection mortar – product use (continued)

Table A1: Rebars

Designation	Rebars
Rebars according to EN 1992-1-1, Annex C, Table C.1 and C.2N	Bars and de-coiled rods Class B or C Minimum relative rib area, $f_{R,min}$, according to EN 1992-1-1 The rib height h: $h \leq 0.07 \cdot Ø$

Table A2: Injection mortar

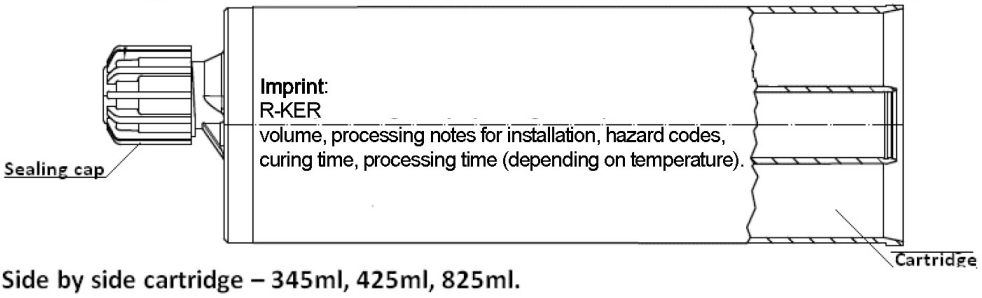
Designation	Composition
R-KER / RV200 (two component injection mortar)	Bonding agent: vinyl ester resin styrene free Hardener: dibenzoyl peroxide Additive: quartz

Injection system R-KER / RV200 for rebar connections	Annex A 3
Product description Materials	

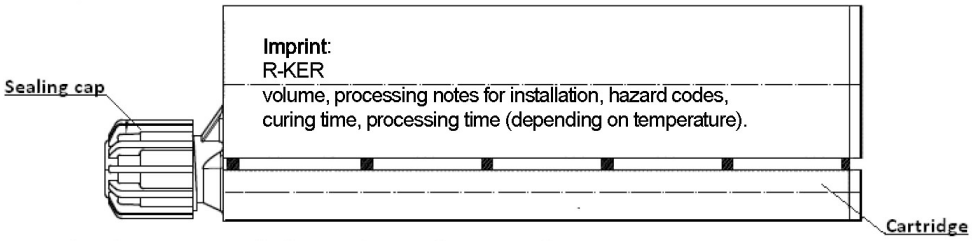
ANNEX A : R-KER / RV200 injection mortar – product use (continued)

Figure A3 : Cartridge types and sizes

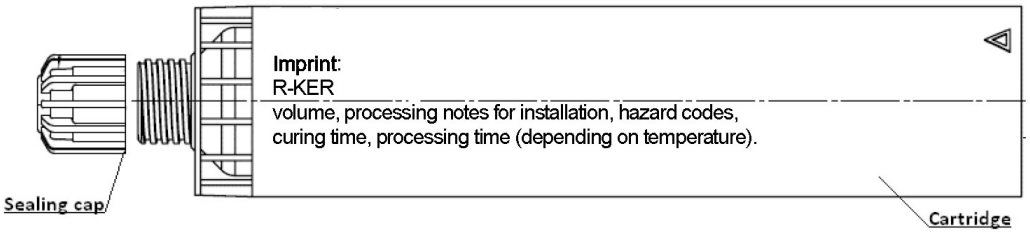
Coaxial cartridge – 150ml, 280ml, 300ml, 310ml, 330ml, 380ml, 400ml, 410ml, 420ml.



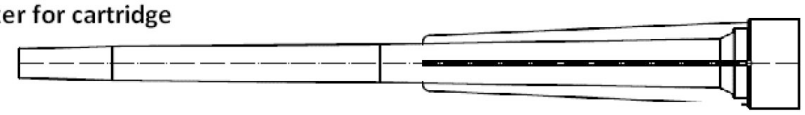
Side by side cartridge – 345ml, 425ml, 825ml.



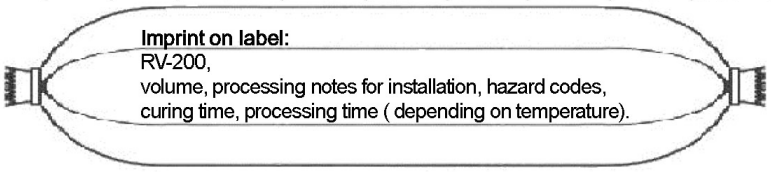
Cartridge for two part foil capsules within a single components – 150ml, 175ml, 280ml, 300ml, 310ml, 380ml, 400ml, 550ml, 600ml.



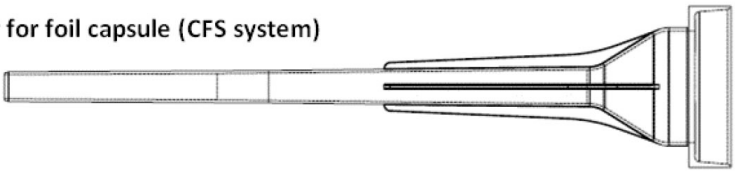
Mixer for cartridge



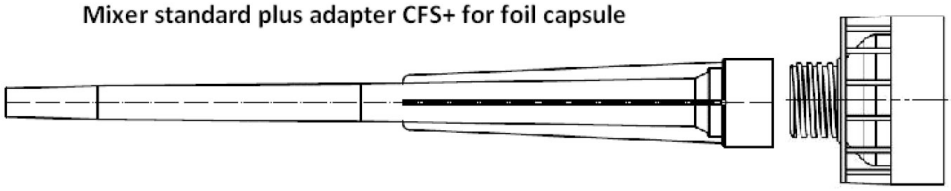
Foil capsule (CFS system) – 150ml, 175ml, 280ml, 300ml, 310ml, 400ml, 550ml, 600ml.



Mixer for foil capsule (CFS system)



Mixer standard plus adapter CFS+ for foil capsule



Injection system R-KER / RV200 for rebar connections	
Product description Cartridge types and size	Annex A 4

ANNEX B : Specification of use intended

B1: Intended use - specifications

Anchorages subject to:

Static and quasi-static loads.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C12/15 at minimum to C50/60 at maximum according to EN 206.
- Maximum chloride content of 0.40% (Cl 0.40) related to the cement content according to EN 206.
- Non-carbonated concrete.

Note: In case of a carbonated surface of the existing concrete structure the carbonate layer shall be removed in the area of the post-installed rebar connection with a diameter of d_s + 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 according to EN 1992-1-1.

The above may be neglected if building components are new and not carbonated and if building components are in dry conditions.

Temperature in the base material:

At installation:

- -5°C to +40°C.

In service:

- -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C).

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.
- Structures subject to external atmospheric exposure including industrial and marine environment.
- Structures subject to permanently damp internal conditions, if no particular aggressive conditions exist.

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared, taking into account of the forces to be transmitted.
- Design according to EN 1992-1-1 and Annex B2.
- The actual position of the reinforcement in the existing structure shall be determined by the construction documentation and taken into account when designing.

Installation:

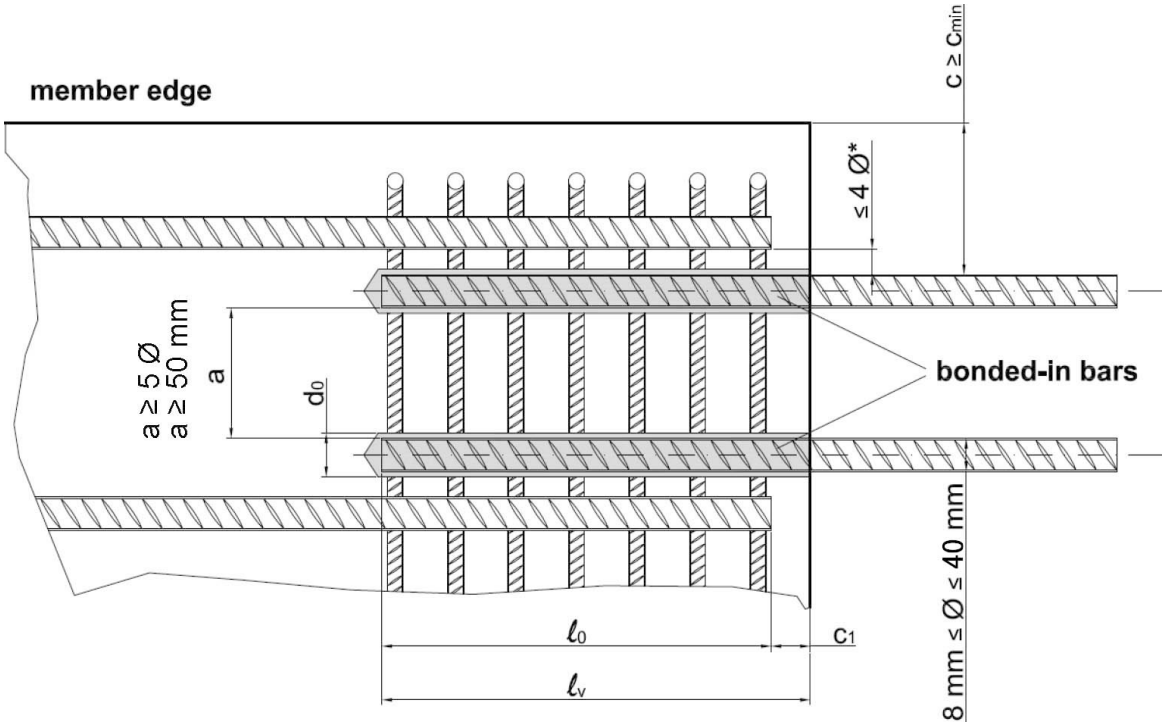
- Dry or wet concrete (use category 1).
- It must not be installed in flooded holes.
- Overhead installation is permissible.
- Hole drilling by hammer drilling.
- Installation of the post-installed rebar shall be done only by suitable trained installer and under supervision on the site.
- Check the position of the existing rebar (if the position of existing rebars is not known it shall be determined using a rebar detector suitable for this purpose as well as the construction documentation and then marked on the building component for the overlap joint).

Injection system R-KER / RV200 for rebar connections	Annex B 1
Intended use Specification	

ANNEX B : Specification of use intended (continued)

B2: General design rules of construction for post-installed rebar

- Only tension forces in the axis of the rebar may be transmitted.
- The transfer of shear forces between new concrete and existing structure shall be designed additionally according to EN 1992-1-1.
- The joints for concreting must be roughened to at least such an extended that aggregate protrude.



* If the clear distance between overlapping rebar is greater than 4·Ø the overlap length shall be enlarged by the difference between the clear distance and 4·Ø.

l_0 – lap length acc. to EN 1992-1-1, clause 8.7.3
l_v – effective embedment depth; $l_v \geq l_0 + c_1$
c – concrete cover of post-installed rebar
c_{min} – minimum concrete cover acc. to Annex B3 and EN 1992-1-1, clause 4.4.1.2
c_1 – concrete cover at end-face of existing rebar
d_0 – nominal drill bit diameter acc. to Annex B3
Ø – rebar diameter (d_s)

Injection system R-KER / RV200 for rebar connections	Annex B 2
Intended use General design rules of construction for post-installed rebars	

ANNEX B : Specification of use intended (continued)

Table B1: Installation data – hammer drilling

Rebar diameter [mm]	**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø30**	**Ø32**
Drill bit diameter [mm]	12	14	16	18	20	25	30	35	35	40
Brush diameter [mm]	14	16	18	20	22	27	32	37	37	42
Minimum anchorage length $l_{b,min}$ [mm]	115	145	170	200	230	285	355	400	420	455
Minimum anchorage length $l_{o,min}$ - overlap joint [mm]	200	215	255	300	340	430	540	600	640	690
Maximum embedment depth $l_{v,max}$ [mm]	400	500	600	700	800	1000	1000	1000	1000	1000

Note:
$l_{b,min}$ (or $l_{v,min}$) = α_{lb} x max {0.3 x $l_{b,rqd}$; 10Ø; 100 mm} for Ø8 to Ø32
$l_{o,min}$ (or $l_{v,min}$) = α_{lb} x max {0.3 x α_6 x $l_{b,rqd}$; 15Ø; 200 mm} for Ø8 to Ø32
with: yield stress for rebar 500 N/mm^2; γ_M = 1.15; α_6 = 1.5; concrete C20/25 and f_{bd} = 2.3 N/mm^2 (good bond conditions)

Minimum concrete cover (see Annex B2):

c_{min} = 30 mm + 0,06 · l_v ≥ 2Ø for Ø < 25 mm
c_{min} = 40 mm + 0,06 · l_v ≥ 2Ø for Ø ≥ 25 mm
The minimum concrete cover according to EN 1992-1-1 shall be observed.

Minimum clear spacing between two post-installed rebar:

a ≥ 50 mm
a ≥ 5Ø

Injection system R-KER / RV200 for rebar connections	Annex B 3
Intended use Installation data – hammer drilling	

ANNEX B : Specification of use intended (continued)

Table B2: Processing time and minimum curing time

R-KER / RV200 (standard version)			
Temperature of resin [°C]	**Temperature of substrate [°C]**	**Processing time [min.]**	**Minimum curing time[1)] [min.]**
+5	-5	40	1440
+5	0	30	180
+5	+5	15	90
+10	+10	8	60
+15	+15	5	60
+20	+20	2.5	45
+25	+25	2	45
+25	+30	2	45
+25	+35	1.5	30
+25	+40	1.5	30

[1)] The minimum time from the end of the mixing to the time when the rebar may be loaded.
Minimum resin temperature for installation +5°C. Maximum resin temperature for installation +25°C.
For wet conditions the curing time must be doubled.

Injection system R-KER / RV200 for rebar connections	Annex B 4
Intended use Processing time and minimum curing time	

ANNEX B : Specification of use intended (continued)

Figure B1: Tools for installation

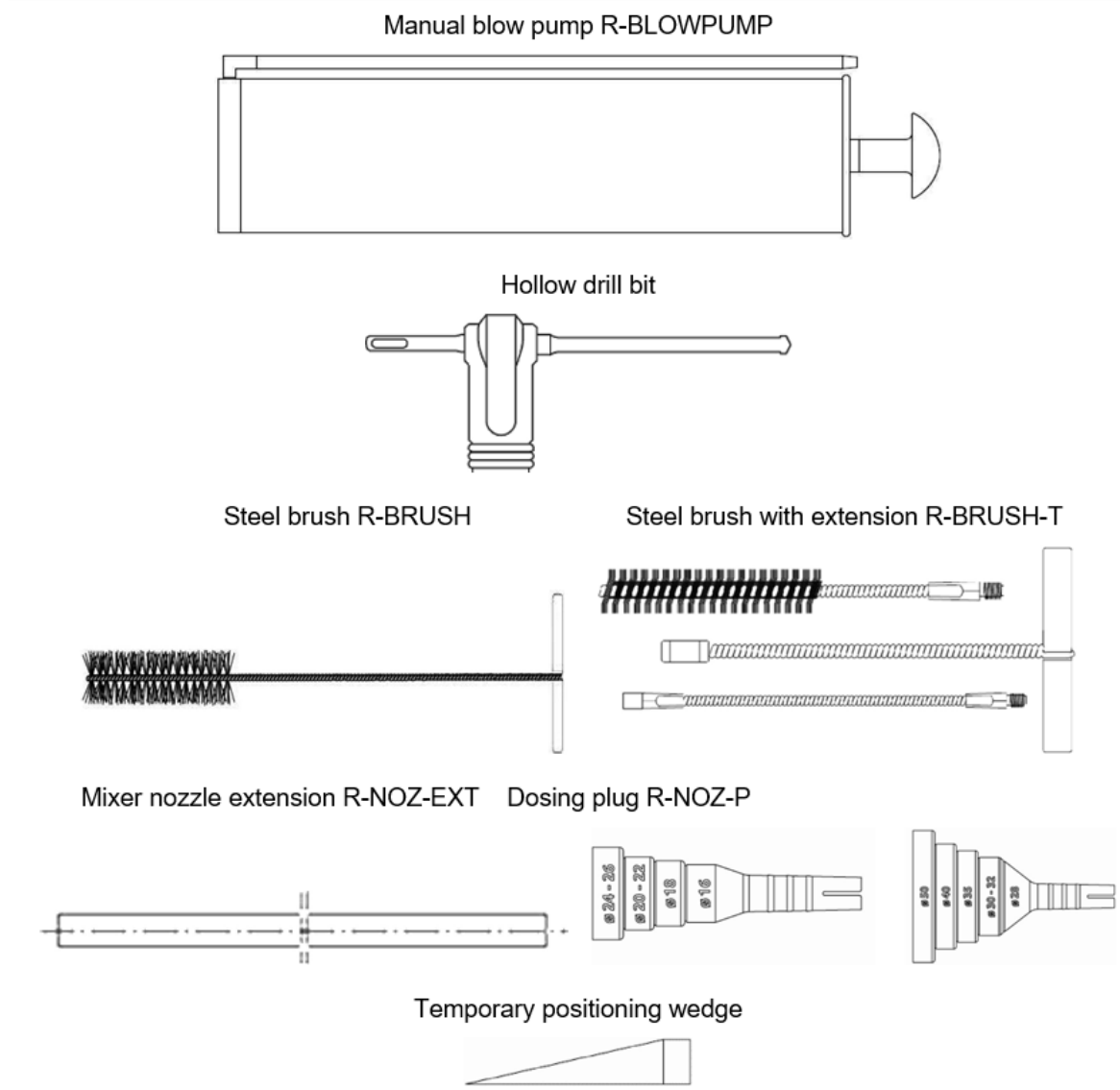


Table B3: Brushes for cleaning the drilled holes

Rebar diameter [mm]		**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø30**	**Ø32**
Type of the brush		with steel wires									
Brush head diameter	[mm]	14	16	18	20	22	27	32	37	37	42
Brush head length	[mm]	80						100			

Injection system R-KER / RV200 for rebar connections	Annex B 5
Intended use Tools for installation (1)	

ANNEX B : Specification of use intended (continued)

Figure B2: Tools for installation

Dispensers	Cartridge or foil capsule size
 Manual gun for coaxial cartridges	380, 400, 410 and 420 ml
 Manual gun for side-by-side cartridges	345 ml
 Manual gun for foil capsule and coaxial cartridges	150, 175, 280, 300 and 310 ml
 Manual gun for foil capsules	300 to 600 ml
 Cordless dispenser gun for coaxial cartridges	380, 400, 410 and 420 ml
 Cordless dispenser gun for foil capsules	300 to 600 ml
 Pneumatic gun for coaxial cartridges	380, 400, 410 and 420 ml

Injection system R-KER / RV200 for rebar connections	Annex B 6
Intended use Tools for installation (2)	

Figure B3 Installation instruction

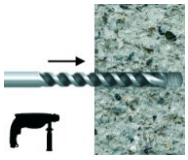
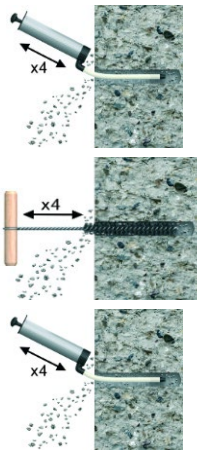
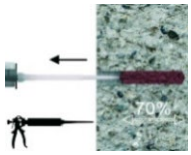
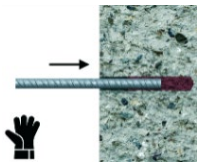
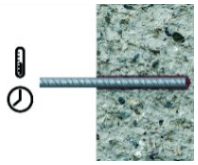
	1. Drill hole to the required diameter and depth using a rotary percussive machine
	2. Hole cleaning. Cleaning hole with brush and hand pump: – starting from the drill hole bottom blow the hole at least 4 times using the hand pump – using the specified brush, mechanically brush out the hole at least 4 times – starting from the drill hole bottom, blow at least 4 times with the hand pump.
	3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min.10 cm).
	4. Insert the mixing nozzle to the far end of the hole and inject resin, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	5. Immediately insert the rebar, slowly and with slight twisting motion. Remove any excess resin around the hole before it sets.
	6. Leave the fixing undisturbed until the curing time elapses.

Figure B3 Installation instruction – overhead installation

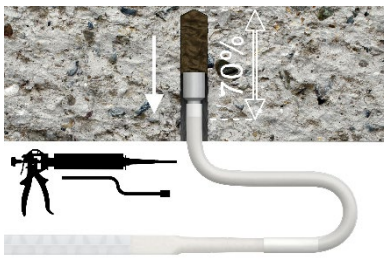
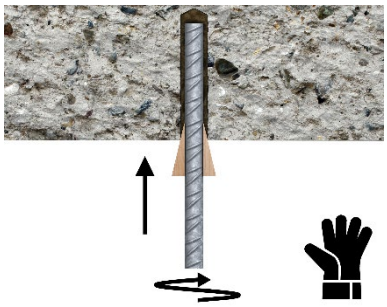
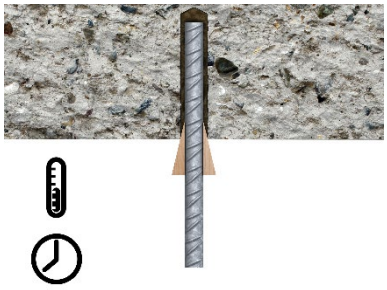
	1. Inject from the bottom of the hole. Inject the product about 2/3 of the hole depth. For best performance use extension (SP-CE-ED-1M / R-NOZ-EXT) and appropriately sized piston plug R-NOZ-P assembled on the mixer.
	2. Drive the rebar immediately into the hole. Use temporary interlocking element e.g wedges.
	3. Leave the fixing undisturbed until the curing time elapses. To avoid the slipping of the rebar during the open time of the product (due to the rebar own weight) use a temporary interlocking element.

Table B4: Piston plug R-NOZ-P size

Hole diameter [mm]	16	18	20	25	30	35	40
Piston plug R-NOZ-P description	Ø16	Ø18	Ø20	Ø24 – Ø26	Ø30	Ø35	Ø40

Injection system R-KER / RV200 for rebar connections	Annex B 8
Intended use Installation instruction (2) – overhead installation	

ANNEX C : Performances

Table C1: Amplification factor α_{lb}

The minimum anchorage length $l_{b.min}$ and the minimum lap length $l_{o.min}$ according to EN 1992-1-1 shall be multiplied by the relevant amplification factor α_{lb} in table C1.

Rebar diameter [mm]	Concrete strength class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Ø8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05
Ø25	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.07	1.07
Ø28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13	1.13
Ø30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø32	1.00	1.00	1.00	1.00	1.00	1.08	1.08	1.08	1.08

Injection system R-KER / RV200 for rebar connections	Annex C 1
Performances Amplification factor α_{lb}	

ANNEX C : Performances (continued)

Table C2: Bond efficiency value k_b

Bar diameter [mm]	Concrete strength class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Ø8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ø16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93
Ø20	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.84	0.86
Ø25	1.00	1.00	1.00	1.00	0.88	0.80	0.82	0.76	0.71
Ø28	1.00	1.00	1.00	1.00	0.88	0.80	0.73	0.76	0.71
Ø30	1.00	1.00	1.00	0.86	0.76	0.80	0.73	0.67	0.63
Ø32	1.00	1.00	1.00	0.86	0.76	0.80	0.73	0.67	0.63

ANNEX C : Performances (continued)

Table C3: Design values of the ultimate bond resistance f_{bd}(1) in N·mm^{-2}

Rebar diameter [mm]	Concrete strength class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Ø8	1.60	2.00	2.30	2.70	3.00	3.40	3.70	4.00	4.30
Ø10	1.60	2.00	2.30	2.70	3.00	3.40	3.70	4.00	4.30
Ø12	1.60	2.00	2.30	2.70	3.00	3.40	3.70	4.00	4.30
Ø14	1.60	2.00	2.30	2.70	3.00	3.40	3.70	4.00	4.30
Ø16	1.60	2.00	2.30	2.70	3.00	3.40	3.70	4.00	4.00
Ø20	1.60	2.00	2.30	2.70	3.00	3.40	3.40	3.40	3.70
Ø25	1.60	2.00	2.30	2.70	2.70	2.70	3.00	3.00	3.00
Ø28	1.60	2.00	2.30	2.70	2.70	2.70	2.70	3.00	3.00
Ø30	1.60	2.00	2.30	2.30	2.30	2.70	2.70	2.70	2.70
Ø32	1.60	2.00	2.30	2.30	2.30	2.70	2.70	2.70	2.70

1) According to EN 1992-1-1 for good bond conditions.
For all other bond conditions multiply the value by 0.7.

Injection system R-KER / RV200 for rebar connections	Annex C 3
Performances Design values of the ultimate bond resistance f_{bd}	

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