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Authorised and notified according  
to Article 29 of the Regulation (EU)  
No 305/2011 of the European  
Parliament and of the Council of 9  
March 2011

MEMBER OF EOTA



## European Technical Assessment ETA-25/0646 of 2026/03/09

### I General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:** ETA-Danmark A/S

**Trade name of the construction product:**

Ramset ChemSet™ Reo 502 Xtrem™  
Ramset ChemSet™ Epcon G5 Xtrem™

**Product family to which the above construction product belongs:**

Post-installed reinforcing bar (rebar) connections with improved bond-splitting behaviour

**Manufacturer:**

ITW Construction Asia Pacific (Ramset)  
1 Ramset Drive  
Chirnside Park  
VIC 3116  
Australia

**Manufacturing plant:**

ITW Construction Asia Pacific (Ramset)  
1 Ramset Drive  
Chirnside Park  
VIC 3116  
Australia

**This European Technical Assessment contains:**

16 pages including 11 annexes which form an integral part of the document

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

EAD 332402-00-0601, Post-installed reinforcing bar (rebar) connections with improved bond-splitting behaviour

**This version replaces:**

The ETA with the same number issued on 2026-01-06

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## **II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of product**

The subject of this assessment are the post-installed connections, by anchoring or overlap connection joint consisting of steel reinforcing bars (rebars) in existing structures made of normal weight concrete C20/25 to C50/60, using injection mortar Ramset ChemSet™ Reo 502 Xtrem™ and Ramset ChemSet™ Epcon G5 Xtrem™ for rebar in accordance with the regulations for reinforced concrete construction. The design of the post-installed rebar connections is done in accordance with EOTA Technical Report TR 069.

Reinforcing bars with diameters from 10 to 40 mm and Ramset ChemSet™ Reo 502 Xtrem™ and Ramset ChemSet™ Epcon G5 Xtrem™ injection mortar according to Annex A are used for the post-installed rebar connections covered by this ETA. The steel element is placed into a drilled hole previously injected with a mortar and is anchored by the bond between embedded element, injection mortar and concrete.

The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation<sup>1</sup> of this European Technical Assessment.

The product description is given in Annex A.

### **2 Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)**

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 provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 50 years and 100 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or 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.

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<sup>1</sup> The technical documentation of this European Technical Assessment is deposited at ETA-Danmark and, as far as relevant for the tasks of the Notified bodies involved in the attestation of conformity procedure, is handed over to the notified bodies.

### 3 Performance of the product and references to the methods used for its assessment

#### 3.1 Characteristics of product

##### Mechanical resistance and stability (BWR1):

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	
Resistance to combined pull-out and concrete failure in uncracked concrete	See Annex C1
Resistance to concrete cone failure	See Annex C1
Robustness	See Annex C1
Resistance to bond-splitting failure	See Annex C2
Influence of cracked concrete on resistance to combined pull-out and concrete failure	See Annex C2
Characteristic resistance to tension-load (seismic loading)	
Resistance to bond-splitting failure under cycle loading	No performance assessed
Influence of increased crack width on resistance to pull-out failure	No performance assessed
Resistance to pull-out failure in uncracked concrete under cyclic loading	No performance assessed
Maximum embedment depth	See Annex B3

##### Safety in case of fire (BWR2):

Essential characteristic	Performance
Reaction to fire	Class A1

#### 3.2 Methods of assessment

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in case of fire in the sense of the Basic Requirements 1 and 2 has been made in accordance with the EAD 332402-00-0601, Post-installed reinforcing bar (rebar) connections with improved bond-splitting behaviour.

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

##### **4.1 AVCP system**

According to the decision 96/582/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

#### **5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2026-03-09 by



Thomas Bruun  
Manager, ETA-Danmark

**Injection mortar**

Epoxy adhesive two components

Ramset ChemSet™ Reo 502 Xtrem™

Ramset ChemSet™ Epcon G5 Xtrem™



**Marking**

Trade name

**ChemSet™ Reo 502 Xtrem™**

**ChemSet™ Epcon G5 Xtrem™**

Identifying mark of the producer **Ramset**

Expire date

Curing and processing time

Charge code number

**Static mixer**

**ISNE mixing nozzle**



**High flow mixing nozzle**



RAMSET Chemset™ Reo 502 Xtrem™  
RAMSET Chemset™ Epcon G5 Xtrem™

**Product description**  
Injection system

**Annex A1**

**Reinforcing bar (rebar ):  $\phi$  10 to  $\phi$  40**



Marking of setting depth applied on jobsite

**Properties of the reinforcing bar (rebar):**

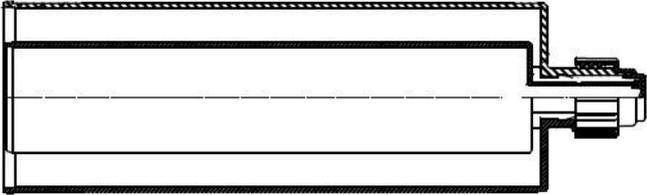
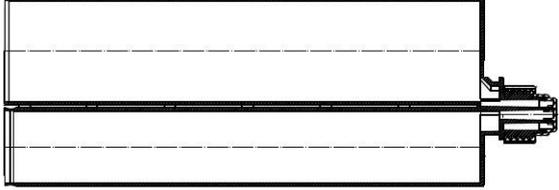
- Rebar according to EN 1992-1-1 Annex C
- Bars or de-coiled rods class B or C
- Nominal diameter  $\phi$ : 10 to 40 mm
- Rib height  $h_{rib}$  in the range of  $0,05 \phi \leq h_{rib} \leq 0,07 \phi$
- The maximum outer rebar diameter over the ribs shall be:  $\phi + 2 \cdot 0,07 \cdot \phi = 1,14 \cdot \phi$
- Yield strength  $f_{yk}$  and  $k$  according to NDP or NCL of EN 1992-1-1
- Ultimate strength  $f_{uk} = f_{tk} = k \cdot f_{yk}$

RAMSET Chemset™ Reo 502 Xtrem™  
RAMSET Chemset™ Epcon G5 Xtrem™

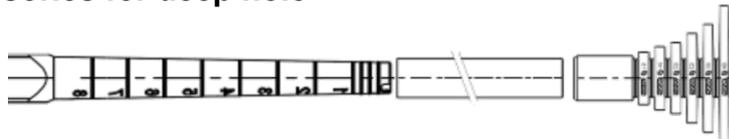
**Product description**  
Specification rebar

**Annex A2**

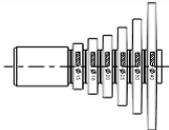
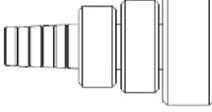
### Cartridges

600 ml coaxial cartridge	
450ml side by side cartridge	

### Injection accessories for deep hole



### Plastic extension and piston plug for hole deeper $h_0 > 250$ mm and for overhead installation

Cartridge volume	Mixing Nozzle	Extension for piston plug	Piston plug
All cartridges	ISNE mixing nozzle or High flow mixing nozzle	Ø13x1000	
			

RAMSET Chemset™ Reo 502 Xtrem™  
RAMSET Chemset™ Epcon G5 Xtrem™

**Product description**  
Cartridges  
Injection accessories for deep hole and overhead installation

**Annex A3**

## Specifications of intended use

### Anchorage subject to:

- Static and quasi static loading : rebar  $\varnothing 10$  to  $\varnothing 40$

### Base material:

- Compacted Reinforced or unreinforced normal weight concrete without fibres according to EN 206
- Strength classes C20/25 to C50/60 according to EN 206 for static and quasi static loading
- 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 carbonated layer shall be removed in the area of the post-installed rebar connection with a diameter of  $\phi + 60$  mm prior to the installation of the new rebar. The depth of concrete to be removed shall correspond to at least the minimum concrete cover in accordance with EN 1992-1-1. The foregoing may be neglected if building components are new and not carbonated and if building components are in dry conditions.

### Temperature range:

- At installation :  $0^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$
- In service :
  - Temperature range I :  $-40^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ,  
[max short term temperature  $+40^{\circ}\text{C}$ , max long term temperature  $+24^{\circ}\text{C}$ ]
  - Temperature range II :  $-40^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ ,  
[max short term temperature  $+60^{\circ}\text{C}$ , max long term temperature  $+36^{\circ}\text{C}$ ]
  - Temperature range III :  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$ ,  
[max short term temperature  $+75^{\circ}\text{C}$ , max long term temperature  $+45^{\circ}\text{C}$ ]

### Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the forces to be transmitted.
- Design under static or quasi-static loading in accordance with EOTA Technical Report TR 069.
- 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:

- Drilling technique:
  - Hammer drilling technique: sizes  $\phi 10$ -  $\phi 40$
  - Compressed air drilling: sizes  $\phi 10$ -  $\phi 40$
- Use category:
  - Dry or wet concrete for Hammer drilling and compressed air drilling technique : sizes  $\phi 10$ -  $\phi 40$
  - Flooded holes for Hammer drilling and compressed air drilling technique : sizes  $\phi 10$ -  $\phi 32$
  - Installation direction downwards, horizontal and overhead : sizes  $\phi 10$ -  $\phi 40$
- The installation of post-installed rebar 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).

RAMSET Chemset™ Reo 502 Xtrem™  
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**Intended Use**  
Specifications

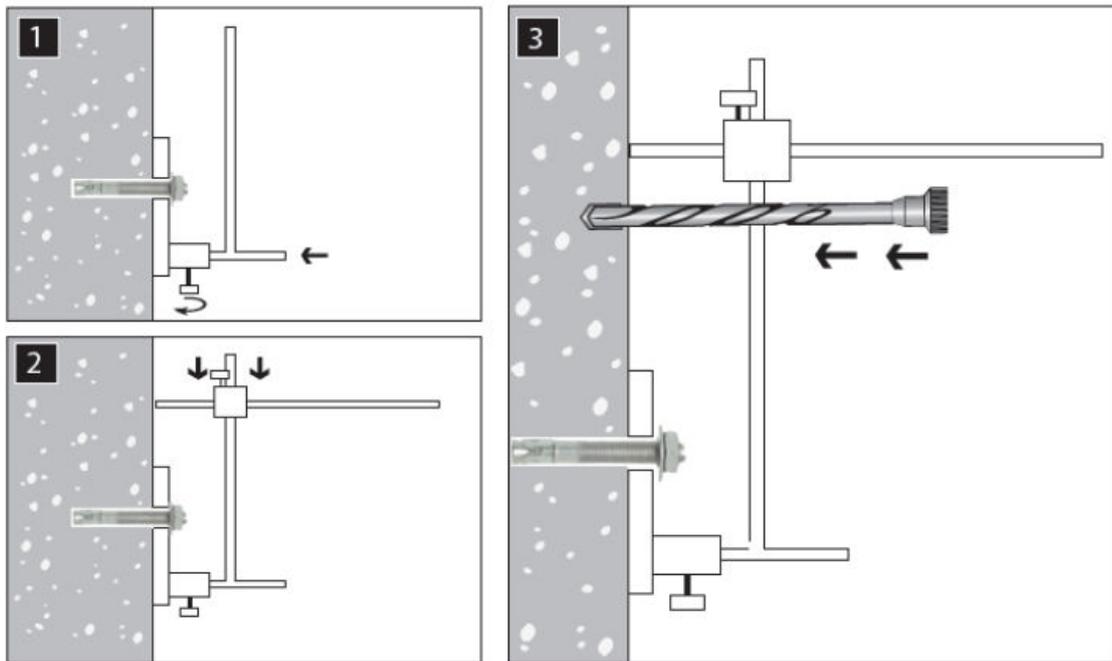
**Annex B1**

**Table B1: Minimum concrete cover  $c_{min}^{1)}$  of post-installed rebar**

Drilling method	Bar diameter $\phi$	Minimum concrete cover $c_{min}^{1)}$ [mm]	
		Without drilling aid	With drilling aid
Hammer drilling	< 25 mm	$30 + 0,06 l_v \geq 2\phi$	$30 + 0,02 l_v \geq 2\phi$
	$\geq 25$ mm	$40 + 0,06 l_v \geq 2\phi$	$40 + 0,02 l_v \geq 2\phi$
Compressed air drilling	< 25 mm	$50 + 0,08 l_v \geq 2\phi$	$50 + 0,02 l_v \geq 2\phi$
	$\geq 25$ mm	$60 + 0,08 l_v \geq 2\phi$	$60 + 0,02 l_v \geq 2\phi$

<sup>1)</sup> Note: The minimum concrete cover as specified in EN 1992-1-1

**Figure B2: Drilling aid system**



RAMSET Chemset™ Reo 502 Xtrem™  
 RAMSET Chemset™ Epcon G5 Xtrem™

**Intended used**  
 Minimum concrete cover  $c_{min}$

**Annex B2**

**Table B2: Maximum embedment depth  $l_{v,max}$** 

Rebar diameter $\phi$	Maximum embedment length $l_{v,max}$ [mm]	
	Manual applicator	Pneumatic applicator
	450 ml 600 ml	450 ml 600 ml
$\phi 10$ - $\phi 40$	750	1500

**Table B3: Installation parameters  
Dimensions of drill diameter and cleaning tools for reinforcing bars (rebars)**

Rebar diameter $\phi$ [mm]	Nominal drilling diameter $d_{cut}$ [mm]	$\emptyset$ Brush <sup>1)</sup> [mm]	$\emptyset$ Plastic extension for compressed air cleaning
$\phi 10$	12	13	9
$\phi 12$	15	16	9
$\phi 14$	18	20	13
$\phi 16$	20	22	13
$\phi 20$	25	26	13
$\phi 25$	30	32	13/20
$\phi 28$	35	37	13/20
$\phi 32$	40	42	13/20
$\phi 40$	50	55	13/20

<sup>1)</sup> The diameter of the round steel brush shall be checked before use. The minimum brush diameter has to be at least equal to the borehole diameter  $d_0$ . The round steel brush shall produce natural resistance as it enters the drill hole. If this is not the case, please use a new brush or a brush with a larger diameter.

RAMSET Chemset™ Reo 502 Xtrem™  
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**Intended used**Maximum embedment depth  $l_{v,max}$ 

Installation parameters

**Annex B3**

**Table B4: Gel time and curing time**

Temperature of base material	Working time	Curing time <sup>1)</sup>
5°C	75 min	30 h
10°C	45 min	22 h
15°C	35 min	14 h
20°C	22 min	7 h
25°C	14 min	5 h
30°C	8 min	4 h
35°C	6 min	3 h
40°C	4 min	2 h 45 min

<sup>1)</sup> For wet concrete and diamond core drilling method, the curing time must be doubled

RAMSET Chemset™ Reo 502 Xtrem™  
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**Product description**  
Minimum curing time and maximum working time

**Annex B4**

**Drilling the hole:**

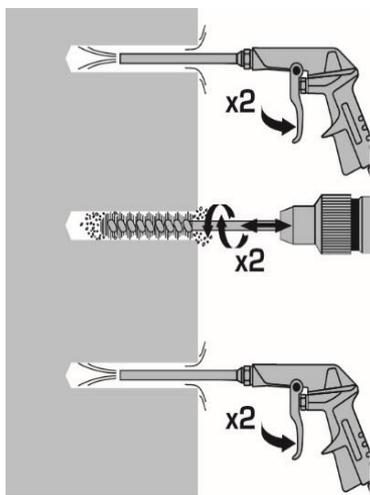
**Hammer drilling or compressed air drilling technique**



Drill hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit (See Table B6 / B7)

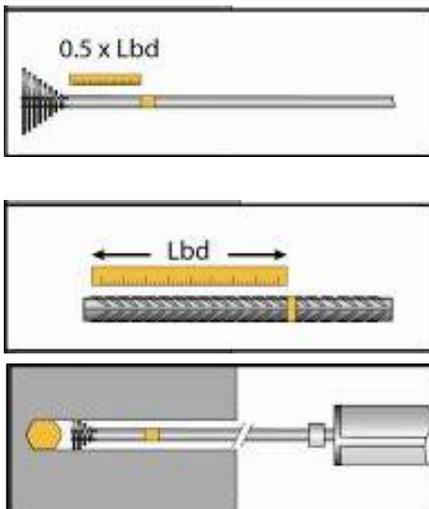
**Cleaning the hole:**

**Hammer drilling or compressed air drilling technique**



1. Using compress air cleaning (min 6 bars), use the appropriate plastic extension for compressed air cleaning, starting from the top of the hole blow out at least 2 times by moving downward to the bottom of the hole then moving upward to the top of the hole and until no dust is evacuated. (not less than 10s per each blowing).
2. Using the relevant brush and extension fitted on a Ramset drilling machine, starting from the top of the hole, move downward to the bottom of the hole then moving upward to the top of the hole. Repeat this operation.
3. Using compress air cleaning (min 6 bars), use the appropriate extension, starting from the top of the hole blow out at least 2 times by moving downward to the bottom of the hole then moving upward to the top of the hole and until no dust is evacuated. (not less than 10s per each blowing).

**Dispensing into the hole:**



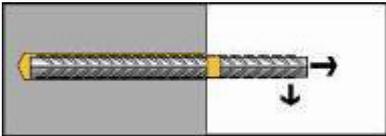
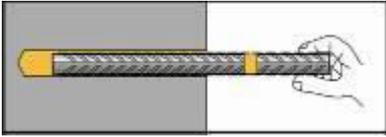
1. Dispense the first part to waste until an even colour is achieved ( $\approx 5$  cm).
2. For hole deeper  $h_0 > 250$  mm and also for overhead installations, the injection is only possible with the using of piston plug, and plastic extension.
3. Cut the piston plug at the relevant diameter. The volume of resin that needs to be injected in the hole must be indicated on the mixing nozzle or its extension. The marking must be placed at 0.5 times the anchorage depth
4. Insert the nozzle to the far end of the hole, and inject the resin, withdrawing the nozzle as the hole fills in order to avoid trapping air bubbles. Fill 50% of the drill hole to ensure enough adhesive volume between concrete and reinforcing bar. For pneumatic dispenser, the maximum pressure is 6 bars.

RAMSET Chemset™ Reo 502 Xtrem™  
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**Product description**  
Installation instructions

**Annex B5**

**Inserting the rebar:**



1. Immediately insert the rebar, slowly and with a slight twisting motion. Remove excess resin from around the mouth of the hole before it sets. Control the embedment depth during the working time (See Table B4) which varies according to temperature of base material.

2. Leave the rebar undisturbed until the curing time has elapsed. (See Table B4)

**Safety precaution:**

The safety data sheet must be read before using the product and the safety instructions followed.

- Storage temperature of cartridge +5°C to +35 °C
- Cartridge temperature at time of installation: Must be  $\geq +5^{\circ}\text{C}$
- Base material temperature at time of installation: Must be between 5°C and +40°C
- Check the date of expiry of the cartridge

RAMSET Chemset™ Reo 502 Xtrem™  
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**Product description**  
Installation instructions

**Annex B6**

**Table C1 : Essential characteristic for reinforcing bars (rebars)  
under tension load in concrete under static and quasi static loading**

Reinforcing bars (rebars)			Ø10	Ø12	Ø16	Ø20	Ø25	Ø32	Ø40	
<b>Installation factor</b>										
Dry and wet concrete	$\gamma_{inst}$	[-]	1,0							
Flooded concrete	$\gamma_{inst}$	[-]	1,0				1,4		- <sup>1)</sup>	
<b>Concrete cone failure</b>										
Factor for cracked concrete	$K_{cr,N}$	[-]	7,7							
Factor for uncracked concrete	$K_{ucr,N}$	[-]	11,0							
Edge distance	$C_{cr,N}$	[mm]	1,5 · $l_b$							
Spacing	$S_{cr,N}$	[mm]	3,0 · $l_b$							
<b>Combined pull-out and concrete cone failure for working life of 50 years and 100 years</b>										
<b>Characteristic bond resistance in uncracked concrete C20/25</b>										
<b>Dry and wet holes</b>										
Temperature range I: <b>24°C / 40°C</b>	$\tau_{RK,uncr}$ $\tau_{RK,100,uncr}$	[N/mm <sup>2</sup> ]	14,5	14,5	14,4	14,4	14,3	14,3	11,2	
Temperature range II: <b>36°C / 60°C</b>	$\tau_{RK,uncr}$ $\tau_{RK,100,uncr}$	[N/mm <sup>2</sup> ]	12,3	12,2	12,2	12,2	12,1	12,1	9,5	
Temperature range III: <b>45°C / 75°C</b>	$\tau_{RK,uncr}$ $\tau_{RK,100,uncr}$	[N/mm <sup>2</sup> ]	3,8	3,8	3,8	3,8	3,7	3,7	2,9	
<b>Flooded holes</b>										
Temperature range I: <b>24°C / 40°C</b>	$\tau_{RK,uncr}$ $\tau_{RK,100,uncr}$	[N/mm <sup>2</sup> ]	14,5	14,5	14,4	14,2	13,4	13,0	- <sup>1)</sup>	
Temperature range II: <b>36°C / 60°C</b>	$\tau_{RK,uncr}$ $\tau_{RK,100,uncr}$	[N/mm <sup>2</sup> ]	12,3	12,2	12,2	12,0	11,4	11,0	- <sup>1)</sup>	
Temperature range III: <b>45°C / 75°C</b>	$\tau_{RK,uncr}$ $\tau_{RK,100,uncr}$	[N/mm <sup>2</sup> ]	3,8	3,8	3,8	3,7	3,5	3,4	- <sup>1)</sup>	
<b>Influence of concrete factor on bond strength <math>\tau_{RK,uncr}</math> in non cracked concrete</b>										
Temperature range I, II and III $\Psi_C = (f_{ck}/20)^m$	m	[-]	0,00	0,05	0,05	0,05	0,10	0,10	0,10	
<b>Influence of sustained load</b>										
Temperature range I: <b>24°C / 40°C</b>	$\Psi_{sus,100}^0$	[-]	0,72							
Temperature range II: <b>36°C / 60°C</b>	$\Psi_{sus,100}^0$	[-]	0,72							
Temperature range III: <b>45°C / 75°C</b>	$\Psi_{sus,100}^0$	[-]	0,91							

1) <sup>1)</sup> Not assessed

RAMSET Chemset™ Reo 502 Xtrem™  
RAMSET Chemset™ Epcon G5 Xtrem™

**Annex C1**

**Performance**

Essential characteristics under static and quasi-static loading  
for a working life of 50 or 100 years

**Table C1 (Continued) : Essential characteristic for reinforcing bars (rebars)  
under tension load in concrete under static and quasi static loading**

Reinforcing bars (rebars)			Ø10	Ø12	Ø16	Ø20	Ø25	Ø32	Ø40
<b>Bond-splitting for working life of 50 years and 100 years</b>									
Product basic factor	$A_k$	[-]	4,48						
Exponent for influence of concrete compressive strength	sp1	[-]	0,19						
Exponent for influence of rebar diameter $\emptyset$	sp2	[-]	0,44						
Exponent for influence of concrete cover $c_d$	sp3	[-]	0,60						
Exponent for influence of side concrete cover ( $c_{max} / c_d$ )	sp4	[-]	0,33						
Exponent for influence of anchorage length $l_b$	lb1	[-]	0,55						
<b>Influence of cracked concrete on bond resistance <math>\tau_{RK,uncr}</math> for working life of 50 and 100 years</b>									
Factor for influence of cracked concrete	$\Omega_{cr,03}$	[-]	0,77	0,77	0,78	0,78	0,79	0,80	0,81

RAMSET Chemset™ Reo 502 Xtrem™  
RAMSET Chemset™ Epcon G5 Xtrem™

**Performance**

Essential characteristics under static and quasi-static loading  
for a working life of 50 or 100 years

**Annex C2**