AVAILABLE IN AUSTRALIA ONLY

23.1 GENERAL INFORMATION

PERFORMANCE RELATED	INSTALLATION RELATED
	

Product

ChemSet™ Reo 502™ is a extra heavy duty pure epoxy anchoring adhesive.

Benefits, Advantages and Features

Approved for Rail Sleeper Repair

- Repeated load tested for a total of 3 million cycles as per AS1085.19-2003 table A1

Greater productivity:

- Shorter 500 MPa bar development lengths from high bond strength – faster installation.
- Anchors in dry, damp, wet or flooded holes – no weather delays.
- Fast 3 hour cure time (REO502J)

Greater security:

- **AS3600 - 2009** 500 MPa bar development lengths tested to **AS/NZS4671 - 2001**
- Specially formulated for **AS/NZS4671 - 2001** Grade 500 reinforcing bars
- Long 20 minute working time to allow full bar insertion

Versatile:

- Anchors in dry, damp, wet and flooded holes
- Anchors in carbide drilled and diamond cored holes
- For tropical and temperate climates
- Oversized holes up to 2.25 x d_b
- Electrical Insulator
- Easy flow version for easy cold dispensing (REO502™EF)

Greater safety:

- Low odour
- VOC Compliant
- Non-flammable for transport and storage
- Rated for Sustained Loading ASTM E 1512-01 (2007)

Australian Made

Principal Applications

- Grade 500 reinforcing bars
- Starter bars
- Deformed bars
- Road Stitching
- Rail Gantries

Installation temperature limits:

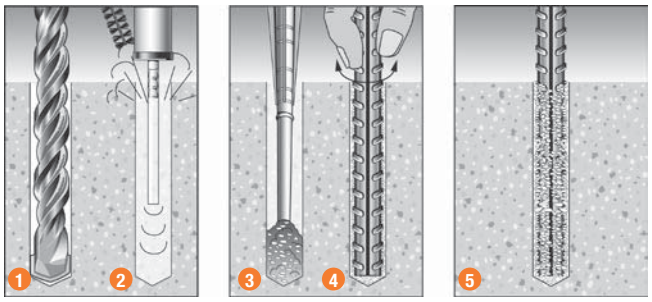
REO502™	REO502™EF
• Substrate: 5°C to 40°C.	• Substrate: 5°C to 30°C.
• Adhesive: 20°C to 40°C.	• Adhesive: 5°C to 40°C.

Load should not be applied to anchor until the chemical has sufficiently cured as specified.

Service temperature limits:

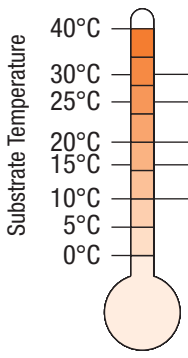
-40°C to 80°C.

Installation



1. Drill recommended diameter and depth hole.
2. **Important:** Use **Ramset™** Dustless Drilling System to ensure holes are clean. Alternatively, clean dust and debris from hole with stiff wire or nylon brush and blower in the following sequence: blow x 4, brush x 3, blow x 4, brush x 3, blow x 4.
3. Insert mixing nozzle to bottom of hole. Fill hole to 3/4 the hole depth slowly, ensuring no air pockets form.
4. Insert Grade 500 reinforcing bar to bottom of hole while turning.
5. Allow ChemSet™ Reo 502™ to cure as per setting times.

Setting Times



	Reo 502™		Reo 502™EF	
	Working Time (mins)	Cure Time (hrs)	Working Time (mins)	Cure Time (hrs)
30°C	8.5	2	8.5	6
25°C	12	2.5		
20°C	20	3	13	12
15°C	23	5	17	22
10°C	27	8	22	48
5°C			32	96

Note: Cartridge temperature minimum 20°C.

Note: Cure time is extended in flooded conditions. Refer to Technical Data Sheet.

23.2 DESCRIPTION AND PART NUMBERS

Description	Cartridge Size	Part No.	Working Time at 20°C	Cure Time at 20°C
ChemSet™ Reo 502™	750 ml	Reo502J	20 minutes	3 hours
ChemSet™ Reo 502™EF	750 ml	Reo502JEF	13 minutes	12 hours

24.1 GENERAL INFORMATION

PERFORMANCE RELATED	INSTALLATION RELATED
	

Product

EPCON™ C8 is a High Performance Pure Epoxy Anchoring adhesive for use in Cracked and Non-Cracked concrete. For structures subject to external exposure , permanently damp or aggressive conditions .

Benefits, Advantages and Features

European Technical Approval option1 for use in cracked and non cracked concrete – ETA-10/0309:

- Highest level of European approval for chemical anchors
- 100 Year design life
- Approved for flooded holes
- Approved for floor, wall & overhead applications
- Data for Sustained Loading

Greater productivity:

- Anchors in dry, damp, wet or flooded holes
- No weather delays
- Fast ,easy dispensing with high flow (pneumatic) mixer

Greater security:

- Highest performance in cracked concrete

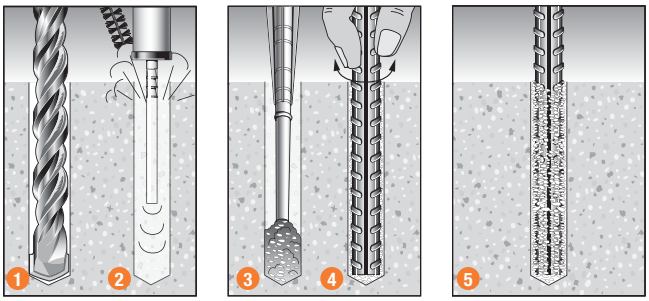
Versatile

- Anchors all stud & bar diameters in all directions
- Oversized holes
- Anchors in carbide drilled and diamond cored holes
- For tropical and Cold weather conditions

Greater safety:

- Low odour
- Non-flammable

Fire Rated : Refer Fire rated anchoring section



Installation

1. Drill recommended diameter and depth hole.
2. **Important:** Use **Ramset™** Dustless Drilling System to ensure holes are clean. Alternatively, clean dust and debris from hole with stiff wire or nylon brush and blower in the following sequence: blow x 4, brush x 3, blow x 4, brush x 3, blow x 4.
3. Insert mixing nozzle to bottom of hole.
   Fill hole to 3/4 the hole depth slowly, ensuring no air pockets form.
4. Insert rebar to bottom of hole while turning.
5. Allow Ramset EPCON™ C8 to cure as per setting times.

Principal Applications

- Anchoring into cracked & non cracked concrete
- Road barrier hold down bolts
- Bridge refurbishment
- Road & Rail tunnel construction
- Reinforcing bar from 8 to 32mm
- Starter Bars
- Threaded studs from M8 to M30
- Threaded Stud material : Zn ,A4 316, HCR steels
- Threaded Stud material : 5.8, 8.8 , 10.9 grade

Installation temperature limits:

- Substrate: 5°C to 40°C
- Adhesive: 5°C to 40°C

Load should not be applied to anchor until the chemical has sufficiently cured as specified.

Service temperature limits:

-40°C to 80°C

Setting Times EPCON™ C8

Temperature of base material	Gel Time	Curing time in dry concrete	Curing time in wet concrete
5°C - 9°C	20 min	30 h	60 h
10°C - 19°C	14 min	23 h	46 h
20°C - 24°C	11 min	16 h	32 h
25°C - 29°C	8 min	12 h	24 h
30°C - 39°C	5 min	8 h	16 h
40°C	5 min	6 h	12 h

25.1 Strength Limit State Design

Design Case 1 For Single Bar Remote from an Edge ($e > 4\ d_b$)

For designs intended to comply with AS3600-2009, refer to Design cases 2, 3 and 4

Concrete Splitting Factors

k_1	1.0
k_2	1.0
k_3	1.0

Table 1 Nominal steel yield development length $L_{sy.t\ (nom)}$, of Grade 500 reinforcing bar in tension post-installed in 32 MPa concrete with ChemSet™ Reo 502™ or EPCON™ C8

Rebar size	10	12	16	20	24	25	28	32	36	40
Minimum Cover, e (mm)	40	48	64	80	96	100	112	128	144	160
Min. Clear Spacing, a (mm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Adhesive reduced ultimate tensile bond capacity $\emptyset N_{ub}$, (kN), $\emptyset_c = 0.6$	39.3	56.5	100.5	157.0	226.0	245.5	308.0	402.0	510.0	630.0
Nominal development length of bar in tension, $L_{sy.t\ (nom)}$	**105**	**140**	**205**	**265**	**335**	**360**	**400**	**470**	**540**	**615**
Effective length, L_{st} (mm)	Stress developed in steel, $\sigma_{st\ (nom)}$ (MPa)									
50	238									
60	286									
70	333	250								
80	381	286								
90	429	321								
100	476	357	244							
105	500	375	256							
120		429	293	226						
140		500	341	264	209					
160			390	302	239	222				
190			463	358	284	264	238			
205			500	387	306	285	256			
220				415	328	306	275	234		
230				434	343	319	288	245	213	
265				500	396	368	331	282	245	
300					448	417	375	319	278	
335					500	465	419	356	310	272
360						500	450	383	333	293
380							475	404	352	309
400							500	426	370	325
430								457	398	350
450								479	417	366
470								500	435	382
540									500	439
615										500

$\sigma_{st} < f_{sy}$

$\sigma_{st} > f_{sy}$

500 Denotes adhesive tensile bond stress at Grade 500 steel yield development length, $L_{sy.t}$
Interpolation permitted. Do not extrapolate.

Checkpoint 1a

Table 1a Concrete compressive strength effect on development length, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	1.26	1.13	1.00	0.89	0.80

Design reinforcing bar steel development length, $L_{sy.t}$ (mm)

$$L_{sy.t} = L_{sy.t}\ (nom) * X_{nc}$$

If there is insufficient concrete depth to install bar to $L_{sy.t}$ go to Checkpoint 1b

Note: Effect of water in hole, multiply $L_{sy.t}$ by 1.4.

Checkpoint 1b

Table 1b Concrete compressive strength effect on steel stress, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	0.79	0.88	1.00	1.12	1.25

Design tensile steel stress, σ_{st} (MPa)

$$\sigma_{st} = \sigma_{st}\ (nom) * X_{nc}$$

Note: Effect of water in hole, multiply σ_{st} by 0.7.

25.1 Strength Limit State Design

Design Case 2 **Multiple Bars in Concrete Elements (Large clear anchor spacing)**

Steel yield development length, $L_{sy.t}$ (AS3600 - 2009, clause 13.1.2.2)

Table 2 Nominal steel yield development length $L_{sy.t\ (nom)}$, of Grade 500 reinforcing bar in tension post-installed in 32 MPa concrete with ChemSet™ Reo 502™ or EPCON™ C8

Rebar size	10	12	16	20	24	25	28	32	36	40
Concrete Splitting Factor, k_1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Concrete Splitting Factor, k_2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9
Concrete Splitting Factor, k_3	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Minimum Cover, e (mm)	40	40	45	60	75	75	95	110	130	150
Min. Clear Spacing, a (mm)	80	80	90	125	150	150	190	220	260	300
Adhesive reduced ultimate tensile bond capacity $\emptyset N_{ub}$, (kN), $\emptyset_c$ = 0.6	39.3	56.5	100.5	157.0	226.0	245.5.0	308.0	402.0	510.0	630.0
Nominal development length of bar in tension, $L_{sy.t\ (nom)}$	**210**	**275**	**410**	**530**	**655**	**685**	**810**	**990**	**1160**	**1345**

Effective length, L_{st} (mm)	Stress developed in steel, $\sigma_{st\ (nom)}$ (MPa)									
140	334									
160	381									
180	429	328								
195	465	355								
210	500	382	256							
235		428	287							
255		464	311							
275		500	335	259						
330			402	311						
380			463	359						
410			500	387	313	299				
455				429	347	332	281			
490				462	374	358	302	247		
530				500	404	387	327	268	228	
565					431	412	349	285	244	
610					465	445	376	308	263	227
655					500	478	405	331	282	244
685						500	423	346	295	255
750							463	379	323	279
810							500	409	349	301
850								429	366	316
915								462	394	340
990								500	427	368
1160									500	431
1345										500

$\sigma_{st} < f_{sy}$

$\sigma_{st} > f_{sy}$

500 Denotes adhesive tensile bond stress at Grade 500 steel yield development length, $L_{sy.t}$
Interpolation permitted. Do not extrapolate.

Checkpoint 2a

Table 2a Concrete compressive strength effect on development length, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	1.26	1.13	1.00	0.89	0.80

Design reinforcing bar steel development length, $L_{sy.t}$ (mm)

$$L_{sy.t} = L_{sy.t\ (nom)} * X_{nc}$$

If there is insufficient concrete depth to install bar to $L_{sy.t}$ go to Checkpoint 2b

Note: Effect of water in hole, multiply $L_{sy.t}$ by 1.4.

Checkpoint 2b

Table 2b Concrete compressive strength effect on steel stress, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	0.79	0.88	1.00	1.12	1.25

Design tensile steel stress, σ_{st} (MPa)

$$\sigma_{st} = \sigma_{st\ (nom)} * X_{nc}$$

Note: Effect of water in hole, multiply σ_{st} by 0.7.

25.1 Strength Limit State Design

Design Case 3 **Multiple Bars in Concrete Elements (Medium clear anchor spacing)**

Steel yield development length, $L_{sy.t}$ (AS3600 - 2009, clause 13.1.2.2)

Table 3 Nominal steel yield development length $L_{sy.t\ (nom)}$, of Grade 500 reinforcing bar in tension post-installed in 32 MPa concrete with ChemSet™ Reo 502™ or EPCON™ C8

Rebar size	10	12	16	20	24	25	28	32	36	40
Concrete Splitting Factor, k_1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Concrete Splitting Factor, k_2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9
Concrete Splitting Factor, k_3	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Minimum Cover, e (mm)	30	30	32	40	48	50	56	64	72	80
Min. Clear Spacing, a (mm)	60	60	70	80	100	100	120	130	150	150
Adhesive reduced ultimate tensile bond capacity $\emptyset N_{ub}$, (kN), $\emptyset_c$ = 0.6	39.3	56.5	100.5	157.0	226.0	245.5	308.0	402.0	510.0	630.0
Nominal development length of bar in tension, $L_{sy.t\ (nom)}$	**270**	**350**	**480**	**645**	**835**	**880**	**1015**	**1205**	**1410**	**1670**
Effective length, L_{st} (mm)	Stress developed in steel, $\sigma_{st\ (nom)}$ (MPa)									
120	222									
180	334									
200	371	286								
250	463	357								
270	500	385	281							
300		429	312							
330		471	344							
350		500	365	271						
400			417	310						
445			463	345						
480			500	372	288	273				
500				387	299	284	246			
595				461	356	338	293	247		
645				500	387	367	318	268	229	
700					419	398	345	290	248	
775					464	440	382	322	275	232
835					500	474	411	346	296	250
880						500	433	365	312	263
945							465	392	335	283
1015							500	421	360	304
1050								436	372	314
1120								465	397	335
1205								500	427	361
1410									500	422
1670										500

$\sigma_{st} < f_{sy}$

$\sigma_{st} > f_{sy}$

500 Denotes adhesive tensile bond stress at Grade 500 steel yield development length, $L_{sy.t}$
Interpolation permitted. Do not extrapolate.

Checkpoint 3a

Table 3a Concrete compressive strength effect on development length, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	1.26	1.13	1.00	0.89	0.80

Design reinforcing bar steel development length, $L_{sy.t}$ (mm)

$$L_{sy.t} = L_{sy.t}\ (nom) * X_{nc}$$

If there is insufficient concrete depth to install bar to $L_{sy.t}$ go to Checkpoint 3b

Note: Effect of water in hole, multiply $L_{sy.t}$ by 1.4.

Checkpoint 3b

Table 3b Concrete compressive strength effect on steel stress, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	0.79	0.88	1.00	1.12	1.25

Design tensile steel stress, σ_{st} (MPa)

$$\sigma_{st} = \sigma_{st}\ (nom) * X_{nc}$$

Note: Effect of water in hole, multiply σ_{st} by 0.7.

25.1 Strength Limit State Design

Design Case 4 **Multiple Bars in Concrete Elements (Minimum clear anchor spacing)**

Steel yield development length, $L_{sy.t}$ (AS3600 - 2009, clause 13.1.2.2)

Table 4 Nominal steel yield development length $L_{sy.t\ (nom)}$, of Grade 500 reinforcing bar in tension post-installed in 32 MPa concrete with ChemSet™ Reo 502™ or EPCON™ C8

Rebar size	10	12	16	20	24	25	28	32	36	40
Concrete Splitting Factor, k_1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Concrete Splitting Factor, k_2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9
Concrete Splitting Factor, k_3	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Minimum Cover, e (mm)	30	30	32	40	48	50	56	64	72	80
Min. Clear Spacing, a (mm)	30	36	48	60	72	75	84	96	108	120
Adhesive reduced ultimate tensile bond capacity $\emptyset N_{ub}$, (kN), $\emptyset_c$ = 0.6	39.3	56.5	100.5	157.0	226.0	245.5	308.0	402.0	510.0	630.0
Nominal development length of bar in tension, $L_{sy.t\ (nom)}$	**310**	**410**	**520**	**700**	**910**	**955**	**1105**	**1310**	**1535**	**1780**
Effective length, L_{st} (mm)	Stress developed in steel, $\sigma_{st\ (nom)}$ (MPa)									
150	242									
200	322									
250	403	305								
290	467	354								
310	500	379	298							
350		427	336							
390		476	375							
410		500	394	293						
450			433	321						
480			461	343						
520			500	372	286	272				
560				400	308	293	253			
650				464	357	340	294	248		
700				500	384	367	317	267	228	
750					412	393	339	286	244	
850					467	445	385	324	277	239
910					500	477	412	347	297	256
955						500	432	364	311	268
1030							466	393	336	289
1105							500	422	360	310
1200								458	391	337
1250								477	407	351
1310								500	427	368
1535									500	431
1780										500

$\sigma_{st} < f_{sy}$

$\sigma_{st} > f_{sy}$

500 Denotes adhesive tensile bond stress at Grade 500 steel yield development length, $L_{sy.t}$
Interpolation permitted. Do not extrapolate.

Checkpoint 4a

Table 4a Concrete compressive strength effect on development length, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	1.26	1.13	1.00	0.89	0.80

Design reinforcing bar steel development length, $L_{sy.t}$ (mm)

$$L_{sy.t} = L_{sy.t}\ (nom) * X_{nc}$$

If there is insufficient concrete depth to install bar to $L_{sy.t}$ go to Checkpoint 4b

Note: Effect of water in hole, multiply $L_{sy.t}$ by 1.4.

Checkpoint 4b

Table 4b Concrete compressive strength effect on steel stress, tension, X_{nc}

f'_c (MPa)	20	25	32	40	50
X_{nc}	0.79	0.88	1.00	1.12	1.25

Design tensile steel stress, σ_{st} (MPa)

$$\sigma_{st} = \sigma_{st}\ (nom) * X_{nc}$$

Note: Effect of water in hole, multiply σ_{st} by 0.7.