

EPCON™ C8 Xtrem™

FIRE RATED CHEMICAL ANCHOR

GENERAL INFORMATION

Performance Related



Installation Related



Product

EPCON™ C8 Xtrem™ 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.



Compliance

European Technical Assessment (option 1) - ETA-10/0309

Design according to:

- AS5216 (formerly TS101)
- EN1992-4 (formerly ETAG001 Annex C, E & TR045)
- Use enclosed data for simplified calculation method
- NZS3101 (A3) Section 17 - Seismic Design C1 & C2

Use Ramset™ iExpert Anchor Software for optimised calculation or where a greater range of anchor layout detail is needed



Benefits, Advantages and Features

Fire tested to European Fire Standards

- CSTB Fire test Report no 26007642/b
- For Wall to Slab connection with reinforcement bar
- For Beam frame reinforcement

Greater productivity:

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

Greater security:

- Highest performance in cracked concrete
- Rated for sustained loading

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

Fire Rated : Refer Fire rated anchoring section

Principal Applications

- Anchoring into cracked & non cracked concrete
- Road barrier hold down bolts
- Bridge refurbishment
- Road & Rail tunnel construction
- Reinforcing bar from 10 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

Recommended Installation Temperatures

	Minimum	Maximum
Substrate	5°C	40°C
Adhesive	5°C	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

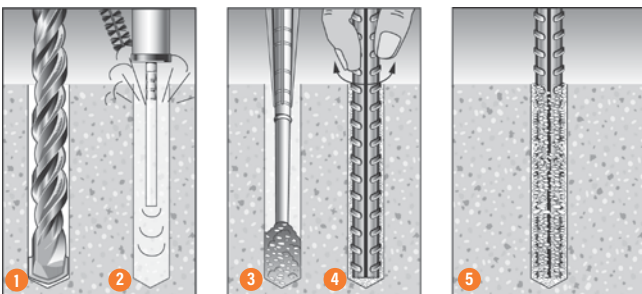
Setting Times EPCON™ C8 Xtrem™

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

Note

*Performance of cored & oversized holes was not included in the ETAG test program and therefore is based on testing conducted at Ramset™ Product Engineering Laboratory.

Installation



1. Drill or core hole to specified diameter and depth
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 2, brush x 2, blow x 2.
3. Screw mixing nozzle onto cartridge and dispense 2-3 trigger pulls of adhesive to waste until colour is grey with no streaks
4. Insert tip of nozzle to bottom of hole and dispense adhesive
5. Fill hole to about 2/3 full
6. Insert reinforcing bar with rotating motion to release trapped air
7. Wait until adhesive has fully cured before loading (see Working Time / Loading Time chart)
8. Clean up with Acetone

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Fire Rated Anchoring Systems

Installation Details

EPCON™ C8 Xtrem™ with Reinforcing Bar

Anchor size, d_b (mm)	Drilled hole diameter, d_h (mm)
10	12
12	15
16	20
20	25
24	30
25	30
32	40
40	50

DESCRIPTION AND PART NUMBERS

Description	Cartridge Size	Part No.
EPCON™ C8 Xtrem™	450 ml	C8-450

ENGINEERING PROPERTIES

Typical Engineering Properties of Grade 500 Reinforcing Bar

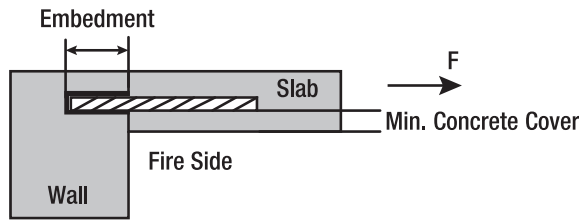
Rebar Size	10	12	16	20	24	25	32	40
Drilled Hole Dia, d_h (mm)	12	15	20	25	30	30	40	50
Stress Area, A_s (mm ²)	78.5	113	201	314	452	491	804	1260
Yield Stress, f_{sy} (MPa)	500	500	500	500	500	500	500	500
Tensile Steel Yield Capacity, N_{sy} (kN)	39.3	56.5	100.5	157.0	226.0	245.5	402.0	630

For further information refer to reinforcing bar manufacturer's published information and current revision of **AS/NZS 4671**

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Reinforcing Bar Anchored with EPCON™ C8 Xtrem™



Design Case

1

Fire resistance duration = 30 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 30 minutes (kN)													Rebar Max. Load (kN) in case of fire		
			120	160	180	190	200	220	240	250	290	315	320	340	360		400	
10	12	10	6.1	8.1	-	9.6												25.3
12	16	12	7.3	9.7	10.9	-	12.1											36.4
16	20	16		13.0	14.6	-	-	17.8	19.4									64.8
20	25	20		16.2	18.2	-	20.2	22.3	24.3	25.3								101.2
24	30	25								31.6	36.7	39.8						145.8
25	30	25								31.6	36.7	39.8						158.1
32	40	32											51.8	55.0	58.2			259
40	50	40															80.9	404.7
Embedment (mm)			120	160	180	190	200	220	240	250	290	315	320	340	360	400		

* Note: Minimum concrete cover according to Eurocode 2 part 1.2

Design Case

2

Fire resistance duration = 60 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 60 minutes (kN)													Rebar Max. Load (kN) in case of fire		
			120	160	180	220	240	250	300	305	320	360**	395	400	445		495	
10	12	20	3.0	8.1	-	11.1												25.3
12	16	20	3.2	9.4	10.9	13.4	14.6											36.4
16	20	20		10.5	14.6	17.8	19.4	-	24.3									64.8
20	25	20		16.2	18.2	22.3	24.3	25.3	-	30.9								101.2
24	30	25						31.6	-	-	-	44.2	50.0					145.8
25	30	25						31.6	-	-	-	44.2	50.0					158.1
32	40	32									51.8	58.2	-	-	72.0			259
40	50	40											80.9	-	100.2			404.7
Embedment (mm)			120	160	180	220	240	250	300	305	320	360**	395	400	445	495		

* Note: Minimum concrete cover according to Eurocode 2 part 1.2

** Note: Values for Rebar Size 24 are based on Embedment = 350 mm

Design method for resistance to fire according to Eurocode 2: Fire proof using design resistance: $R_{d,fi} \leq E_{d,fi}$

$R_{d,fi}$ Design resistance in the fire situation

$E_{d,fi}$ Design effect of actions in the fire situation. This value could be calculated from the calculation at normal temperature:

$$E_{d,fi} = \eta_{fi} \times F_{Rdu}$$

F_{Rdu} Design ultimate limit load at normal temperature for one rebar sealing at the anchorage depth (mm)

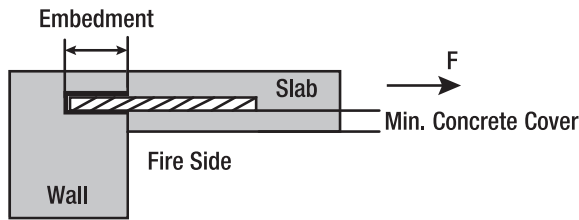
η_{fi} Reduction factor for design load level in the fire situation η_{fi} is equal to 0.7.

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Fire Rated Anchoring Systems

Reinforcing Bar Anchored with EPCON™ C8 Xtrem™



Design Case 3 Fire resistance duration = 90 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 90 minutes (kN)													Rebar Max. Load (kN) in case of fire	
			120	160	180	220	250	265	290**	320	335	340	400	440	500		555
10	12	25	1.7	5.4	-	11.1	-	13.4									25.3
12	16	25	2.1	5.5	8.6	13.4	-	-	17.0								36.4
16	20	25		5.8	8.9	17.8	-	-	22.7	25.9	27.1						64.8
20	25	25		13.4	18.2	22.3	25.3	-	28.4	-	-	34.4					101.2
24	30	25					30.6	-	36.7	-	-	-	-	55.7			145.8
25	30	25					30.6	-	36.7	-	-	-	-	55.7			158.1
32	40	32								51.8	-	55.0	-	71.2	81.1		259
40	50	40											80.9	-	-	112.3	404.7
Embedment (mm)			120	160	180	220	250	265	290**	320	335	340	400	440	500	555	

* Note: Minimum concrete cover according to Eurocode 2 part 1.2
 ** Note: Values for Rebar Sizes 12, 16 and 20 are based on Embedment = 280 mm

Design Case 4 Fire resistance duration = 120 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 120 minutes (kN)													Rebar Max. Load (kN) in case of fire		
			120	160	240	250	290	300	320	355	360	400	440**	460	500		605	
10	12	35	1.2	3.6	12.1	-	14.7										25.3	
12	16	35	1.7	3.5	14.6	-	18.2										36.4	
16	20	35		4.8	19.4	-	24.3	25.9	28.7								64.8	
20	25	35		10.7	24.3	25.3	-	-	-	-	36.4						101.2	
24	30	35				24.5	36.7	-	-	-	-	-	55.7	58.2			145.8	
25	30	35				24.5	36.7	-	-	-	-	-	55.7	58.2			158.1	
32	40	35								51.8	-	58.2	-	71.2	-	81.1	259	
40	50	40											80.9	87.0	-	-	122.4	404.7
Embedment (mm)			120	160	240	250	290	300	320	355	360	400	440**	460	500	605		

* Note: Minimum concrete cover according to Eurocode 2 part 1.2
 ** Note: Values for Rebar Size 40 are based on Embedment = 430 mm

Design method for resistance to fire according to Eurocode 2: Fire proof using design resistance: $R_{d,fi} \leq E_{d,fi}$

$R_{d,fi}$ Design resistance in the fire situation

$E_{d,fi}$ Design effect of actions in the fire situation. This value could be calculated from the calculation at normal temperature:

$$E_{d,fi} = \eta_{fi} \times F_{Rdu}$$

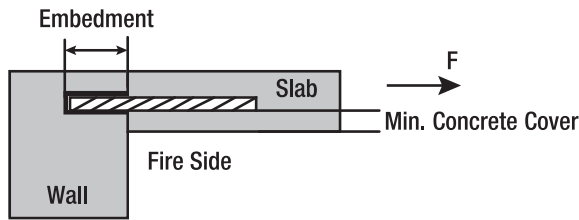
F_{Rdu} Design ultimate limit load at normal temperature for one rebar sealing at the anchorage depth (mm)

η_{fi} Reduction factor for design load level in the fire situation η_{fi} is equal to 0.7

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Design Case

5

Fire resistance duration = 180 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 180 minutes (kN)													Rebar Max. Load (kN) in case of fire		
			120	160	240	250	300	320	350	395	400	430	500	555	575		655	
10	12	50	1.0	1.9	9.6	-	15.2											25.3
12	16	50	1.5	2.4	10.8	-	18.2	19.4	21.2									36.4
16	20	50		3.6	12.8	-	24.3	25.9	-	32.0								64.8
20	25	50		7.9	24.3	25.3	-	-	-	-	40.5							101.2
24	30	50				17.7	-	-	44.2	50.0	-	-	63.2					145.8
25	30	50				17.7	-	-	44.2	50.0	-	-	63.2					158.1
32	40	50						44.5	-	-	-	-	81.1	-	93.1			259
40	50	50									80.9	87.0	-	112.3	-	132.5		404.7
Embedment (mm)			120	160	240	250	300	320	350	395	400	430	500	555	575	655		

* Note: Minimum concrete cover according to Eurocode 2 part 1.2

Design Case

6

Fire resistance duration = 240 minutes

For Reinforcing Bar Steel Grade - 500 MPa and Concrete cylinder compressive strength - 20 MPa

Rebar Size	Hole Diameter	*Min. Concrete Cover	Design resistance in accordance with Eurocode 2 for fire duration 240 minutes (kN)													Rebar Max. Load (kN) in case of fire		
			120	160	240	250	320	350	375	400	425	500	530	555	605		685	
10	12	70	0.9	1.7	7.8	-	-	17.7										25.3
12	16	70	1.4	2.0	8.0	-	19.4	21.2	22.8									36.4
16	20	70		3.4	9.7	-	25.9	-	-	-	34.4							64.8
20	25	70		6.9	20.1	21.4	-	-	-	40.5	43.0							101.2
24	30	70				15.1	-	44.2	-	-	-	63.2	67.0					145.8
25	30	70				15.1	-	44.2	-	-	-	63.2	67.0					158.1
32	40	70						37.3	-	-	-	-	81.1	-	-	97.9		259
40	50	70									80.9	-	-	-	112.3	122.4	138.6	404.7
Embedment (mm)			120	160	240	250	320	350	375	400	425	500	530	555	605	685		

* Note: Minimum concrete cover according to Eurocode 2 part 1.2

Design method for resistance to fire according to Eurocode 2: Fire proof using design resistance: $R_{d,fi} \leq E_{d,fi}$

$R_{d,fi}$ Design resistance in the fire situation

$E_{d,fi}$ Design effect of actions in the fire situation. This value could be calculated from the calculation at normal temperature:

$$E_{d,fi} = \eta_{fi} \times F_{Rdu}$$

F_{Rdu} Design ultimate limit load at normal temperature for one rebar sealing at the anchorage depth (mm)

η_{fi} Reduction factor for design load level in the fire situation η_{fi} is equal to 0.7