Compliant

High performance anchoring epoxy for concrete
Approved for cracked concrete & seismic zones

Fast Cure!

Same day loading
Higher Productivity

EPCON™ Pure Epoxy G5 PRO

MULTI DIRECTIONAL APPLICATION

100 YEAR WORKING LIFE | ETA

Product Advantages

- ETA approved for cracked concrete and seismic zones
- High performance pure epoxy with 100 years working life
- Fast cure for same day loading (2 hours at 35°C)
- All weather conditions
- Fast, low fatigue dispensing
- Non shrink epoxy – suitable for cored and oversized holes.
- Sag resistant – suitable for overhead applications.
- Low VOC & odourless, can be used indoors.
- Re-sealable tip

Applications

- Post-installed system for bond anchor e.g. starter bars and structural steel connections
- Post-installed system for rebar connection e.g dowel bars for reinforce concrete walls, columns, slab and beams

Substrates

- Solid Concrete
- Cracked Concrete
- Stone
- Masonry block and brick

TECHNICAL DATA SHEET

RFM CONSTRUCTION PRODUCTS (M) SDN. BHD.
(Reg. No. 201001042300)

EPCON™ G5 PRO

CHEMICAL INJECTION - NON-CRACKED & CRACKED CONCRETE

GENERAL INFORMATION

Performance Related	Material Specification	Installation Related

PRODUCT

EPCON™ G5 PRO is a heavy duty pure Epoxy for anchoring threaded studs and reinforcing bar into cracked and uncracked concrete.

COMPLIANCE

European Technical Assessment (option 1) - ETA-18/0675

Design according to:

- EN1992-4 (formerly ETAG001 Annex C, E & TR045)

BENEFITS, ADVANTAGES AND FEATURES

- 100 year working life

Greater productivity:

- Anchors in dry, damp, wet or flooded holes
- Easy dispensing even in cold weather

Greater security:

- Strong bond
- Rated for sustained loading

Versatile:

- Anchors in carbide drilled and diamond drilled holes*
- Cold and temperate climates

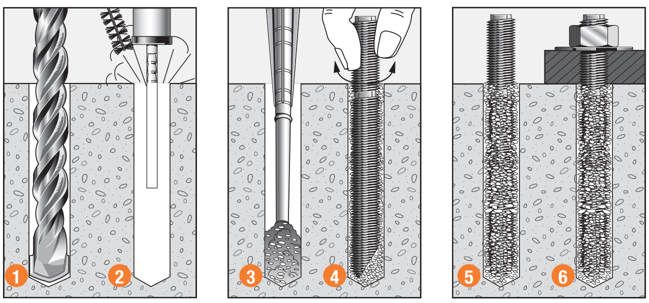
Greater safety:

- Low odour
- VOC Compliant

Principal Applications

- Threaded Studs
- Starter Bars
- Threaded Inserts
- Over-head installation
- Steel Columns
- Hand Rails
- Road Stitching

Installation



1. Drill recommended diameter and depth hole.
2. **Important:** Use **Ramset™** Dustless Drilling System to ensure holes are clean. Alternativly 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, brush x 2, blow x 2.
3. Dispense adhesive to waste until colour is uniform light grey (2-3 trigger pulls). Insert mixing nozzle to bottom of hole. Fill hole to 3/4 the hole depth slowly, ensuring no air pockets form.
4. Insert **Ramset™** ChemSet™ Anchor Stud/rebar to bottom of hole while turning.
5. Allow EPCON™ G5 PRO to cure as per setting times.
6. Attach fixture.

RECOMMENDED INSTALLATION TEMPERATURES

	Minimum	Maximum
Substrate	5°C	40°C
Adhesive	10°C	40°C

SERVICE TEMPERATURE LIMITS

-40°C to 70°C

SETTING TIMES

Temperature of base material	Cartridge Temperature	Gel Time	Curing time in dry and wet concrete
5°C	Minimum 10°C	300 min	24 h
10°C	10°C	150 min	18 h
15°C	15°C	40 min	12 h
20°C	20°C	25 min	8 h
25°C	25°C	18 min	6 h
30°C	30°C	12 min	4 h
40°C	40°C	6 min	2 h
Note: Cartrdige temperatue minimum +10°C			

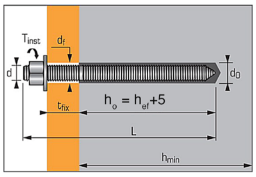
Note

*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.

EPCON™ G5 PRO

CHEMSET ANCHOR STUD APPLICATION

HIGH STRENGTH EPOXY



Technical data

Anchor Stud Size (mm)	Nominal Anchor depth (mm)	Minimum Thickness of Member (mm)	Standard Drill depth (mm)	Min Spacing (mm)	Min Edge distance (mm)	Nominal drill hole diameter (mm)	Clearance diameter (mm)	Torque moment (Nm)
d	h_{ef}	h_{min}	h_o	S_{min}	C_{min}	$ød_o$	d_f	T_{inst}
M8	80	h_0+30mm ≥ 100mm	h_{ef}+5	40	40	10	9	10
M10	90	h_0+ 30mm ≥ 100mm	h_{ef}+5	40	40	12	12	20
M12	110	h_0+30mm ≥ 100mm	h_{ef}+5	40	40	14	14	40
M16	125	h_0+2d	h_{ef}+5	40	40	18	18	80
M20	170	h_0+2d	h_{ef}+5	50	50	22	22	120
M24	210	h_0+2d	h_{ef}+5	50	50	26	26	160
M30	280	h_0+2d	h_{ef}+5	60	60	35	33	200

* Values refer to ETA

Anchor Stud Mechanical Properties

Chemset™ Anchor Studs Grade 5.8	M8	M10	M12	M16
Min. Tensile Strength, f_{uk} (N/mm² or MPa)	540	540	540	540
Yield Strength, f_{yk} (N/mm² or MPa)	430	430	430	430
Nominal Stressed Area, $A_{s,nom}$ (mm²)	36.6	58.0	84.3	157.0
Chemset™ Anchor Studs Grade 5.8	**M20**	**M24**	**M30**	
Min. Tensile Strength, f_{uk} (N/mm² or MPa)	520	520	520	
Yield Strength, f_{yk} (N/mm² or Mpa)	420	420	420	
Nominal Stressed Area, $A_{s,nom}$ (mm²)	245.0	353.0	561.0	

Chemset™ Anchor Studs Stainless Steel A4	M8	M10	M12	M16
Min. Tensile Strength, f_{uk} (N/mm² or MPa)	700	700	700	700
Yield Strength, f_{yk} (N/mm² or MPa)	350	350	350	350
Nominal Stressed Area, $A_{s,nom}$ (mm2)	36.6	58.0	84.3	157.0
Chemset™ Anchor Studs Stainless Steel A4	**M20**	**M24**	**M30**	
Min. Tensile Strength, f_{uk} (N/mm² or MPa)	700	700	-	
Yield Strength, f_{yk} (N/mm² or MPa)	350	350	-	
Nominal Stressed Area, $A_{s,nom}$ (mm²)	245.0	353.0	-	

EPCON™ G5 PRO

CHEMSET ANCHOR STUD

HIGH STRENGTH EPOXY

The loads specified on this page allow judging the product performances.
The data given in the RAMSET CC Method have to be applied (refer to pages 4 to 5)

Stud diameter	8	10	12	16	20	24	30
Drilling ø (mm)	10	12	14	18	22	26	35
Drilling depth (mm)	80	90	110	125	170	210	280
Consumption per hole (ml)	3.9	5.8	9.0	14.0	26.1	42.9	135.4
EPCON G5 Pro (600ml)	153	103	67	43	23	14	4

CHARACTERISTIC LOADS (N_{Rk}, V_{Rk}) in kN

Characteristic loads are statistically determined from test results in admissible service conditions
(Based on minimum of Characteristic Pullout and Concrete Cone resistance)

TENSILE							
Anchor size	M8	M10	M12	M16	M20	M24	M30
Non-cracked concrete							
h_{ef} (mm)	80	90	110	125	170	210	280
N_{Rk} (kN)	34.2	42.0	56.8	68.8	109.0	149.7	230.5
Cracked concrete							
h_{ef} (mm)	80	90	110	125	170	210	280
N_{Rk} (kN)	20.1	28.3	39.7	48.1	76.3	104.8	158.4

SHEAR							
Anchor size	M8	M10	M12	M16	M20	M24	M30
V_{Rk} (kN)	9.0	15.0	21.0	39.0	61.0	88.0	140.0

Note: V_{Rk} is based on 5.8 Grade ChemSet Anchor Stud

DESIGN LOADS (N_{Rd}, V_{Rd}) FOR ONE ANCHOR WITHOUT EDGE OR SPACING INFLUENCE IN kN

$$N_{Rd} = \frac{N_{Rk}^*}{\gamma_{Mc}}$$

$$V_{Rd} = \frac{V_{Rk}^*}{\gamma_{Ms}}$$

TENSILE							
Anchor size	M8	M10	M12	M16	M20	M24	M30
Non-cracked concrete							
h_{ef} (mm)	80	90	110	125	170	210	280
N_{Rd} (kN)	22.8	28.0	37.8	45.8	72.7	99.8	153.7
Cracked concrete							
h_{ef} (mm)	80	90	110	125	170	210	280
N_{Rd} (kN)	13.4	18.8	26.5	32.1	50.9	69.9	105.6

γ_{Mc} = 1.5

SHEAR							
Anchor size	M8	M10	M12	M16	M20	M24	M30
V_{Rd} (kN)	7.2	12.0	16.8	31.2	48.8	70.4	112.0

γ_{Ms} = 1.25

Note: V_{Rd} is based on 5.8 Grade ChemSet Anchor Stud

RECOMMENDED LOADS (N_{Rec}, V_{Rec}) FOR ONE ANCHOR WITHOUT EDGE OR SPACING INFLUENCE IN kN

$$N_{Rec} = \frac{N_{Rk}^*}{\gamma_M \times \gamma_F}$$

$$V_{Rec} = \frac{V_{Rk}^*}{\gamma_M \times \gamma_F}$$

TENSILE							
Anchor size	M8	M10	M12	M16	M20	M24	M30
Non-cracked concrete							
h_{ef} (mm)	80	90	110	125	170	210	280
N_{Rec} (kN)	16.3	20.0	27.0	32.7	51.9	71.3	109.8
Cracked concrete							
h_{ef} (mm)	80	90	110	125	170	210	280
N_{Rec} (kN)	9.6	13.5	18.9	22.9	36.3	49.9	75.4

γ_F = 1.4

SHEAR							
Anchor size	M8	M10	M12	M16	M20	M24	M30
V_{Rec} (kN)	5.1	8.6	12.0	22.3	34.9	50.3	80.0

γ_F = 1.4

Note: V_{Rec} is based on 5.8 Grade ChemSet Anchor Stud

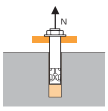
* Derived from test result assessed in ETA 18/0675

EPCON™ G5 PRO

CHEMSET ANCHOR STUD ZINC PLATED & STAINLESS STEEL STUDS

RAMSET CC-METHOD

TENSILE in kN

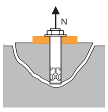


Characteristic Pull-Out Resistance
C20/25 - for dry, wet concrete and flooded hole

$N_{Rd,p} = N^0_{Rd,p} \cdot f_B$

$N^0_{Rd,p}$ Design pull-out resistance							
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
h_{ef} (mm)	80	90	110	125	170	210	280
Un-cracked concrete	22.8	28.3	41.5	50.3	85.5	126.7	167.1
Cracked concrete	13.4	18.8	27.6	39.8	64.1	95.0	105.6

$\gamma_{Mc} = 1.5$

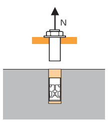


Characteristic Concrete Cone Resistance
C20/25 - for dry,wet concrete and flooded hole

$N_{Rd,c} = N^0_{Rd,c} \cdot f_B \cdot \Psi_s \cdot \Psi_{c,N}$

$N^0_{Rd,c}$ Design cone resistance							
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
h_{ef} (mm)	80	90	110	125	170	210	280
Un-cracked concrete	23.5	28.0	37.8	45.8	72.7	99.8	153.7
Cracked concrete	16.4	19.6	26.5	32.1	50.9	69.9	107.6

$\gamma_{Mc} = 1.5$

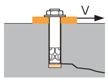


Steel tensile resistance

$N_{Rd,s}$ Steel design tensile resistance							
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
ChemSet - A4 (SS)	13.9	21.9	31.6	58.8	92.0	132.1	-
Stud grade 5.8	12.0	19.3	28.0	52.7	82.0	118.0	187.3
Stud grade 8.8	19.3	30.7	44.7	84.0	130.7	188.0	299.3
Stud grade 10.9	27.8	43.6	63.2	118.0	184.2	265.4	421.8

Chemset A4: $\gamma_{Ms} = 1.87$
Stud grade 5.8 & 8.8: $\gamma_{Ms} = 1.50$
Stud grade 10.9: $\gamma_{Ms} = 1.33$
*Special grade available on request.

SHEAR in kN

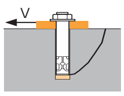


Characteristic Concrete Edge Resistance C20/25

$V_{Rd,c} = V^0_{Rd,c} \cdot f_B \cdot f_{\beta,V} \cdot \Psi_{s-c,V}$

$V^0_{Rd,c}$ Design concrete edge resistance at minimum edge distance (Cmin)							
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
h_{ef} (mm)	80	90	110	125	170	210	280
c_{min}	40	40	40	40	50	50	60
s_{min}	40	40	40	40	50	50	60
Un-cracked concrete	3.3	3.6	4.0	4.4	6.7	7.7	11.3
Cracked concrete	2.4	2.5	2.8	3.1	4.8	5.5	8.0

$\gamma_{Mc} = 1.5$

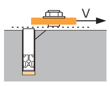


Concrete Pry-Out Failure C20/25

$V_{Rd,cp} = V^0_{Rd,cp} \cdot f_B \cdot \Psi_s \cdot \Psi_{c,N}$
where $V_{Rk,cp} = K8 \cdot \mathrm{Min}\,(N^{\circ}_{RK,c}\,;\,N^{\circ}_{RK,p})$

$V^0_{Rd,cp}$ Design pryout resistance							
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
Un-cracked concrete	45.6	56.0	75.7	91.7	145.4	199.6	307.3
Cracked concrete	26.8	37.7	53.0	64.2	101.8	139.7	211.1

$\gamma_{Mc} = 1.5$



Steel shear resistance

$V_{Rd,s}$ Steel design shear resistance							
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
ChemSet - A4 (SS)	8.3	12.8	19.2	35.3	55.1	79.5	-
Stud grade 5.8	7.2	12.0	16.8	31.2	48.8	70.4	112.0
Stud grade 8.8	12.0	18.4	27.2	50.4	78.4	112.8	179.2
Stud grade 10.9	12.0	19.3	28.0	52.7	82.0	118.0	187.3

Chemset A4: $\gamma_{Ms} = 1.56$
Stud grade 5.8 & 8.8: $\gamma_{Ms} = 1.25$
Stud grade 10.9: $\gamma_{Ms} = 1.50$
*Special grade available on request.

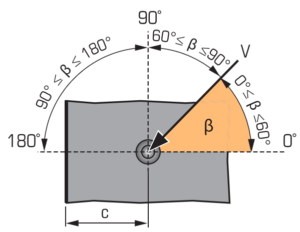
$$N_{Rd} = \min(N_{Rd,p}\,;\,N_{Rd,c}\,;\,N_{Rds})$$
$$\beta N = N_{Sd} / N_{Rd} \leq 1$$

$$V_{Rd} = \min(V_{Rd,c}\,;\,V_{Rd,s}\,;\,V_{Rd,cp})$$
$$\beta V = V_{Sd} / V_{Rd} \leq 1,$$

$$\beta N = \beta V \leq 1.2$$

f_B INFLUENCE OF CONCRETE	
Concrete Class	f_B
C25/30	1.02
C30/37	1.04
C35/45	1.06
C40/50	1.07
C45/55	1.08
C50/60	1.09

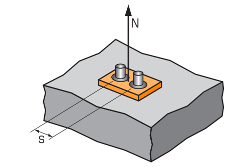
$f_{\beta V}$ INFLUENCE OF SHEAR LOADING DIRECTION	
Angle ββ[°]	$f_{\beta V}$
0 ~ 50	1.0
60	1.1
70	1.2
80	1.5
90 ~ 180	2.0



EPCON™ G5 PRO

CHEMSET ANCHOR STUD ZINC PLATED & STAINLESS STEEL STUDS

RAMSET CC-METHOD - STANDARD EMBEDMENT



$\Psi_s = 0.5 + \frac{s}{6.h_{ef}}$

$s_{min} < s < s_{cr,N}$

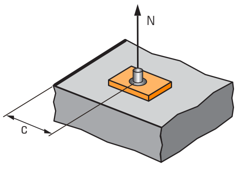
$s_{cr,N} = 3.h_{ef}$

Ψ_s must be used for each spacing influenced the anchors group

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD

SPACING s	Reduction factor Ψ_s Cracked & Non-cracked concrete			
Anchor Size	M8	M10	M12	M16
40	0.58	0.57	0.56	0.55
50	0.60	0.59	0.58	0.57
60	0.63	0.61	0.59	0.58
80	0.67	0.65	0.62	0.61
100	0.71	0.69	0.65	0.63
150	0.81	0.78	0.73	0.70
200	0.92	0.87	0.80	0.77
250	1.00	0.96	0.88	0.83
300		1.00	0.95	0.90
330			1.00	0.94
375				1.00

SPACING s	Reduction factor Ψ_s Cracked & Non-cracked concrete		
Anchor Size	M20	M24	M30
50	0.55	0.54	
60	0.56	0.55	0.54
100	0.60	0.58	0.56
180	0.68	0.64	0.61
200	0.70	0.66	0.62
250	0.75	0.70	0.65
350	0.84	0.78	0.71
450	0.94	0.86	0.77
510	1.00	0.90	0.80
630		1.00	0.88
750			0.95
840			1.00



$\Psi_{c,N} = 0.25 + 0.5.\frac{c}{h_{ef}}$

$c_{min} < c < c_{cr,N}$

$c_{min} = 1.5.h_{ef}$

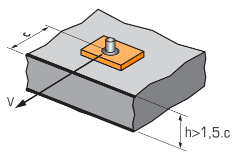
$\Psi_{c,N}$ must be used for each spacing influenced the anchors group

$\Psi_{c,N}$ INFLUENCE OF EDGE FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD

EDGE c	Reduction factor $\Psi_{c,N}$ Cracked & Non-cracked concrete			
Anchor Size	M8	M10	M12	M16
40	0.50	0.47	0.43	0.41
50	0.56	0.53	0.48	0.45
60	0.63	0.58	0.52	0.49
80	0.75	0.69	0.61	0.57
120	1.00	0.92	0.80	0.73
135		1.00	0.86	0.79
165			1.00	0.91
190				1.00

EDGE c	Reduction factor $\Psi_{c,N}$ Cracked & Non-cracked concrete		
Anchor Size	M20	M24	M30
50	0.40	0.37	
60	0.43	0.39	0.36
100	0.54	0.49	0.43
180	0.78	0.68	0.57
200	0.84	0.73	0.61
255	1.00	0.86	0.71
315		1.00	0.81
420			1.00

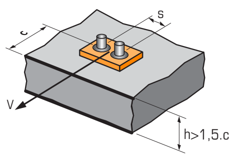
$\Psi_{s\text{-}c,V}$ INFLUENCED OF SPACING AND EDGE DISTANCE FOR CONCRETE EDGE RESISTANCE IN SHEAR LOAD



$\Psi_{s\text{-}c,V} = \frac{c}{c_{min}} . \sqrt{\frac{c}{c_{min}}}$

For single anchor fastening — Factor $\Psi_{s\text{-}c,V}$ Cracked & Non-cracked concrete

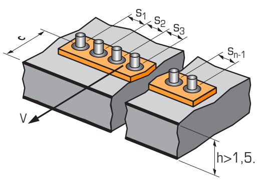
$\frac{C}{C_{min}}$	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
$\Psi_{s\text{-}c,V}$	1.00	1.31	1.66	2.02	2.41	2.83	3.26	3.72	4.19	4.69	5.20	5.72



$\Psi_{s\text{-}c,V} = \frac{3.c + s}{6.c_{min}} . \sqrt{\frac{c}{c_{min}}}$

For 2 anchors fastening — Factor $\Psi_{s\text{-}c,V}$ Cracked & Non-cracked concrete

$\frac{S}{C_{min}}$ \ $\frac{C}{C_{min}}$	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
1.0	0.67	0.84	1.03	1.22	1.43	1.65	1.88	2.12	2.36	2.62	2.89	3.16
1.5	0.75	0.93	1.12	1.33	1.54	1.77	2.00	2.25	2.50	2.76	3.03	3.31
2.0	0.83	1.02	1.22	1.43	1.65	1.89	2.12	2.38	2.63	2.90	3.18	3.46
2.5	0.92	1.11	1.32	1.54	1.77	2.00	2.25	2.50	2.77	3.04	3.32	3.61
3.0	1.00	1.20	1.42	1.64	1.88	2.12	2.37	2.63	2.90	3.18	3.46	3.76
3.5		1.30	1.52	1.75	1.99	2.24	2.50	2.76	3.04	3.32	3.61	3.91
4.0			1.62	1.86	2.10	2.36	2.62	2.89	3.17	3.46	3.75	4.05
4.5				1.96	2.21	2.47	2.74	3.02	3.31	3.60	3.90	4.20
5.0					2.33	2.59	2.87	3.15	3.44	3.74	4.04	4.35
5.5						2.71	2.99	3.28	3.57	3.88	4.19	4.50
6.0						2.83	3.11	3.41	3.71	4.02	4.33	4.65



For other case of fastenings

$$\Psi_{s\text{-}c,V} = \frac{3.c + s_1 + s_2 + s_3 + \ldots + s_{n-1}}{3.n.c_{min}} . \sqrt{\frac{c}{c_{min}}}$$

EPCON G5 PRO FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 Bond Strength Method)

Concrete Compressive Strength: $f_{ck,cube}$ = 25 N/mm^2

Rebar Size, d_s	**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ32**
Design Steel Resistance, $N_{Rd,s}$ [kN]	31.4	45.2	80.4	125.7	196.4	321.7
Design Bond Stress, τ_{Rd} [N/mm^2]	8.7	8.7	8.0	8.0	8.0	5.3
Drilled Hole Diameter, d_o [mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42
Bar Spacing, s [mm]	50	65	80	100	125	160
Edge Distance, c [mm]	40	40	40	50	65	80
$L_{b,rqd}$ / Rebar ϕ	12	12	12	13	13	19
Anchorage Length, L_b [mm]	Design Tensile Bonding Capacity, N_{Rd} [kN]					
100	27.2					
115	**31.4**					
120		39.2				
140		**45.2**				
160			64.3			
170			68.4			
200			**80.4**	100.5		
230				115.6		
250				**125.7**	157.1	
280					176.0	
320					**196.4**	171.6
350						187.7
400						214.5
420						225.2
550						294.9
600						**321.7**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]	**115**	**138**	**200**	**250**	**313**	**600**

"Minimum depth to develop full steel shear"

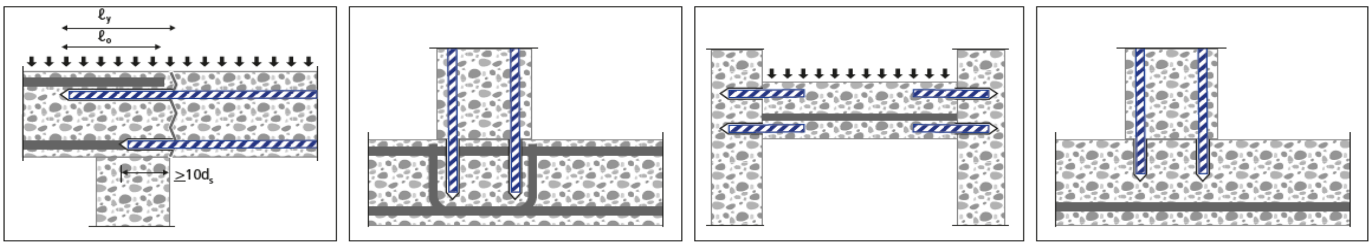
Design Criterias:

1) Safety Factor for Design Tensile Steel Resistance: $\gamma_{Ms,N}$ = 1.15 (based on steel yield strength of 460 N/mm^2).
2) Safety factor for Design Tensile Concrete Pull-Out Resistance: $\gamma_{Mp,N}$ = 1.5.
3) Loading applicable to Non-Cracked Concrete with design comply in accordance to BS8110.
4) Loading data conformed to ETA-18/0675 ETAG 001 Part 1 & Part 5 Option 1
5) Safety factor for Design Tensile Concrete Cone Resistance: $\gamma_{Mc,N}$ = 1.5
6) Minimum spacing shall be 4d_s bar to bar or 5d_s centre-to-centre.
7) Minimum edge distance shall be 2d_s bar to bar or 2.5d_s centre-to-centre.

APPROVAL LISTING

Seismic | 100 YEAR WORKING LIFE | Cracked Concrete | ETA | Fire Rated

SUGGESTED APPLICATIONS



Overlap Joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

EPCON G5 PRO FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 Bond Strength Method)

Concrete Compressive Strength: $f_{ck,cube}$ = 30 N/mm^2

Rebar Size, d_s	**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ32**
Design Steel Resistance, $N_{Rd,s}$ [kN]	31.4	45.2	80.4	125.7	196.4	321.7
Design Bond Stress, τ_{Rd} [N/mm^2]	8.8	8.8	8.2	8.2	8.2	5.4
Drilled Hole Diameter, d_o [mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42
Bar Spacing, s [mm]	50	65	80	100	125	160
Edge Distance, c [mm]	40	40	40	50	65	80
$L_{b,rqd}$ / Rebar ϕ	11	11	12	12	12	18
Anchorage Length, L_b [mm]	Design Tensile Bonding Capacity, N_{Rd} [kN]					
100	27.8					
115	**31.4**					
120		40.0			*"Minimum depth to develop full steel shear"*	
140		**45.2**				
160			65.6			
170			69.7			
200			**80.4**	102.6		
230				117.9		
250				**125.7**	160.2	
280					179.5	
310					**196.4**	
320						175.0
350						191.4
400						218.8
420						229.7
550						300.8
600						**321.7**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]	**113**	**136**	**196**	**245**	**306**	**588**

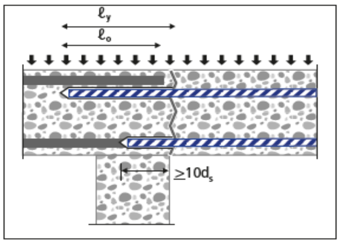
Design Criterias:

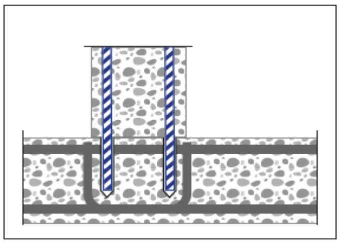
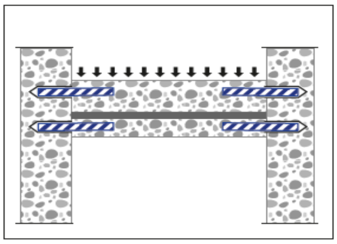
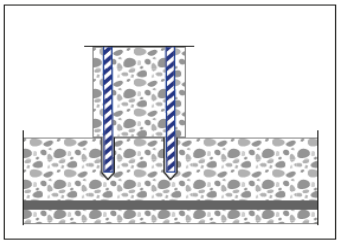
1) Safety Factor for Design Tensile Steel Resistance: $\gamma_{Ms,N}$ = 1.15 (based on steel yield strength of 460 N/mm^2).
2) Safety factor for Design Tensile Concrete Pull-Out Resistance: $\gamma_{Mp,N}$ = 1.5.
3) Loading applicable to Non-Cracked Concrete with design comply in accordance to BS8110.
4) Loading data conformed to ETA-18/0675 ETAG 001 Part 1 & Part 5 Option 1
5) Safety factor for Design Tensile Concrete Cone Resistance: $\gamma_{Mc,N}$ = 1.5
6) Minimum spacing shall be 4d_s bar to bar or 5d_s centre-to-centre.
7) Minimum edge distance shall be 2d_s bar to bar or 2.5d_s centre-to-centre.

APPROVAL LISTING

Seismic | 100 YEAR WORKING LIFE | Cracked Concrete | ETA | Fire Rated

SUGGESTED APPLICATIONS



Overlap Joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

EPCON™ G5 Pro
CHEMICAL INJECTION - NON-CRACKED & CRACKED CONCRETE

Ramset™

EPCON G5 PRO FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 Bond Strength Method)

Concrete Compressive Strength: $f_{ck,cube}$ = 35 N/mm^2

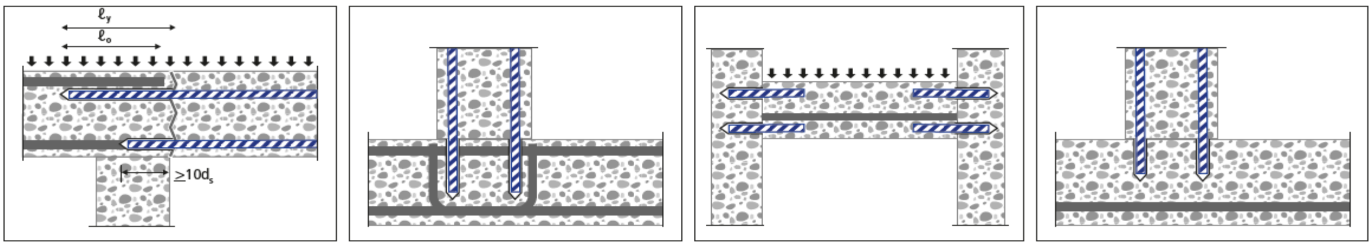
Rebar Size, d_s		**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ32**
Design Steel Resistance, $N_{Rd,s}$	[kN]	31.4	45.2	80.4	125.7	196.4	321.7
Design Bond Stress, τ_{Rd}	[N/mm^2]	9.0	9.0	8.3	8.3	8.3	5.5
Drilled Hole Diameter, d_o	[mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42
Bar Spacing, s	[mm]	50	65	80	100	125	160
Edge Distance, c	[mm]	40	40	40	50	65	80
$L_{b,rqd}$ / Rebar ϕ		11	11	12	12	12	18
Anchorage Length, L_b [mm]		Design Tensile Bonding Capacity, N_{Rd} [kN]					
100		28.3					
115		**31.4**					
120			40.8				
140			**45.2**			*"Minimum depth to develop full steel shear"*	
160				66.9			
170				71.1			
200				**80.4**	104.6		
230					120.3		
250					**125.7**	163.4	
280						183.0	
310						**196.4**	
320							178.5
350							195.2
400							223.1
420							234.2
550							306.7
580							**321.7**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]		**111**	**133**	**192**	**240**	**301**	**577**

Design Criterias:

1) Safety Factor for Design Tensile Steel Resistance: $\gamma_{Ms,N}$ = 1.15 (based on steel yield strength of 460 N/mm^2).
2) Safety factor for Design Tensile Concrete Pull-Out Resistance: $\gamma_{Mp,N}$ = 1.5.
3) Loading applicable to Non-Cracked Concrete with design comply in accordance to BS8110.
4) Loading data conformed to ETA-18/0675 ETAG 001 Part 1 & Part 5 Option 1
5) Safety factor for Design Tensile Concrete Cone Resistance: $\gamma_{Mc,N}$ = 1.5
6) Minimum spacing shall be 4d_s bar to bar or 5d_s centre-to-centre.
7) Minimum edge distance shall be 2d_s bar to bar or 2.5d_s centre-to-centre.

APPROVAL LISTING

SUGGESTED APPLICATIONS



Overlap Joints for slabs and beams or foundation column or wall; rebar connection for simply supported slabs or beams; shear connector or compression component joints.

Important note: Architect or design engineer must conduct final checked with the actual site condition for any variations against tabulated data.

EPCON™ G5 Pro
CHEMICAL INJECTION - NON-CRACKED & CRACKED CONCRETE

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EPCON G5 PRO FOR POST-INSTALLED REBAR APPLICATIONS

(Design Load Approach with BS8110 Bond Strength Method)

Concrete Compressive Strength: $f_{ck,cube}$ = 40 N/mm^2

Rebar Size, d_s		**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ32**
Design Steel Resistance, $N_{Rd,s}$	[kN]	31.4	45.2	80.4	125.7	196.4	321.7
Design Bond Stress, τ_{Rd}	[N/mm^2]	9.1	9.1	8.4	8.4	8.4	5.6
Drilled Hole Diameter, d_o	[mm]	13 ~ 14	15 ~ 16	20 ~ 22	25 ~ 28	30 ~ 32	40 ~ 42
Bar Spacing, s	[mm]	50	65	80	100	125	160
Edge Distance, c	[mm]	40	40	40	50	65	80
$L_{b,rqd}$ / Rebar ϕ		11	11	12	12	12	18
Anchorage Length, L_b [mm]		Design Tensile Bonding Capacity, N_{Rd} [kN]					
100		28.6					
115		**31.4**					
120			41.2				
140			**45.2**				
160				67.6			
170				71.8			
200				**80.4**	105.6		
230					121.4		
250					**125.7**	165.0	
280						184.7	
300						**196.4**	
320							180.2
350							197.1
400							225.2
420							236.5
550							309.7
580							**321.7**
Length to Develop Steel Yield, $L_{b,rqd}$ [mm]		**110**	**132**	**190**	**238**	**298**	**571**

"Minimum depth to develop full steel shear"

<u>Design Criterias:</u>

1) Safety Factor for Design Tensile Steel Resistance: $\gamma_{Ms,N}$ = 1.15 (based on steel yield strength of 460 N/mm^2).
2) Safety factor for Design Tensile Concrete Pull-Out Resistance: $\gamma_{Mp,N}$ = 1.5.
3) Loading applicable to Non-Cracked Concrete with design comply in accordance to BS8110.
4) Loading data conformed to ETA-18/0675 ETAG 001 Part 1 & Part 5 Option 1
5) Safety factor for Design Tensile Concrete Cone Resistance: $\gamma_{Mc,N}$ = 1.5
6) Minimum spacing shall be 4d_s bar to bar or 5d_s centre-to-centre.
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APPROVAL LISTING

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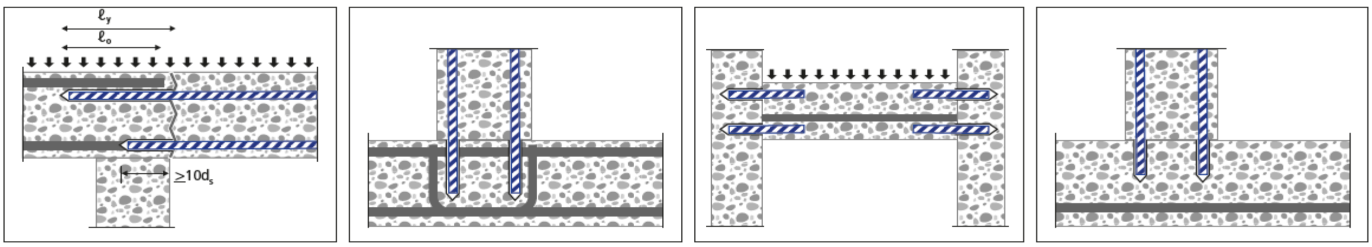
SUGGESTED APPLICATIONS



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