

V12

high performance

fast cure

styrene free

fire rated

low VOC content

Green Star Compliant -

Office Design V2 IEQ-11

V3 IEQ-13

V1.1 IEQ-11



Powers offers the widest range of mechanical and adhesive fasteners in the market place. Powers products cover the full traditional anchoring range while specialising in innovative products that provide the architect, engineer and end user with aesthetic, high performance, labour saving fastening solutions.

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Powers adhesive systems

Support



PF PRO
Heavy duty
Odourless
Epoxy anchoring adhesive
Environmentally friendly



Training Facility
Melbourne



AC100e
Standard caulking gun
Easy to apply
Environmentally friendly



In-house Product &
Application Testing
Service
Melbourne



KF2
Economical
Easy to apply



National on Site
Anchor Testing
Service



AC100 PRO
High performance
Fast curing
Styrene free



National On Site
Service
Powers Training
Vehicles (PTV)

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V12



Introduction

V12 is a 2-component reaction resin mortar based on a vinyl ester styrene-free formulation. It is available in a 420ml (10:1 ratio) coaxial cartridge delivery system. This high performance anchoring adhesive can be dispensed using a variety of hand, battery or pneumatic dispensing tools via a proprietary static mixer nozzle.

The proprietary static mixer nozzle is specially designed for use with V12 and ensures efficient mixing of the 2-component resin with minimal waste.

V12 is especially designed for anchoring of threaded rod, reinforcing bar or internal threaded rod sleeves into concrete and masonry base materials. V12 is also suitable for use in overhead applications.

V12 is a fast curing, non-sag adhesive which makes it ideal for horizontal applications as well as vertical ones. Unlike other systems on the market, one formulation is used for both solid and hollow base material applications, reducing the chance of job site installation errors. The fast curing characteristics of the V12 formulation make it ideal for use in a broad range of weather applications.

V12 Selection guide

V12 Cartridge

PART NO	DESCRIPTION	QTY
V12	420ml Cartridge + 2 mixing nozzles	1

V12 is specially formulated to also work in hollow masonry base materials when used in combination with either plastic or mesh sleeves.

V12 is resistant to a variety of chemicals and can be used in applications such as swimming pool construction (chlorine) or in applications near the sea (salt).

V12 has the following International approvals and certifications;

- European approval for post installed rebar ETA-10/0332
- European approval for concrete ETA-10/0333
- German National approval in masonry Z-21.3-1756
- US-approval acc. to AC 308 in concrete (ICC-ES): ESR-2539
- Certificated for drinking water applications acc. to NSF Standard 61
- Fire resistance test report (Available on request)

Features and benefits of V12

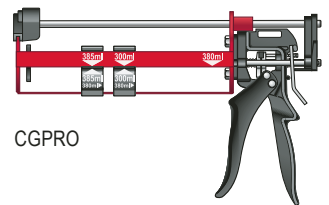
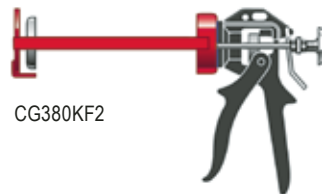
1. Suitable for reinforcing bar & threaded rod applications
2. Works in wet / water filled holes (Reductions apply - 30%)
3. Fire Rated
4. Potable
5. High chemical resistance
6. Fast Cure
7. Low VOC
8. Tested in concrete and masonry base materials
9. Premix-less waste
10. Soft Cap for easy opening of tube
11. High load adhesive
12. International approvals

Manual injection tools

The CG380KF2 manual injection tool is designed with a pump style drive mechanism which has a high pump ratio to provide fast dispensing. The base unit and the handle assembly is manufactured from a precision steel casting for long life. A specially designed wear compensation mechanism ensures consistent pumping over the life of the tool. The tool is designed for use with the 380ml and 420ml cartridge only.

The Multi-PRO (CG PRO-4) manual injection tool is designed with a pump style drive mechanism which has a high pump ratio to provide fast dispensing. The base unit is a unique design made from high quality engineered nylon which allows for the dispensing of different cartridge sizes consisting of different component ratios. The CG PRO-4 will dispense the 385ml (3:1) cartridge, the 585ml (3:1) cartridge, 380/420ml (10:1) cartridge, and 300ml (10:1) cartridge. CG PRO-4 is ideal for those who use the entire Powers adhesive range.

The CG PRO manual injection tool is designed with a pump style drive mechanism which has a high pump ratio to provide fast dispensing. The base unit and the handle assembly is manufactured from precision steel casting for long life. A especially designed wear compensation mechanism ensures consistent pumping over the life of the tool. Like the CG PRO-4 the CG PRO is designed for use with all Powers adhesives however at a budget price for low to medium volume users.



PART NO	DESCRIPTION	QTY
CG380KF2	Dispensing gun for 380ml and 420ml cartridge	1
CGPRO-4	Dispensing gun for all Powers adhesives	1
CGPRO	Dispensing gun for all Powers adhesives	1

Battery injection tool

The Battery Injection Tool is designed for large jobs. It consists of a reinforced steel sheet cradle and has a trigger system which provides instant pressure relief for the cartridge which reduces waste. Designed for the 380-420ml (10:1) coaxial cartridge, the Battery Injection Tool works on Lithium Ion technology providing long lasting consistent performance.



PART NO	DESCRIPTION	QUANTITY
CGB-420	Battery Injection Tool -420ml (2 x battery)	1

Charge time: 60 minutes *Drive system: 5000N (500kg)*
Extrusion rate: 120 – 240 ml / min. *Tool Weight: 2.4 kg*
Tool Length: 390mm

Cartridge system nozzle

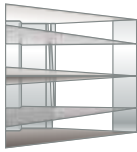
The proprietary nozzle design provides for efficient mixing of the 2 components with minimal waste. The design also allows one nozzle to be used with all anchor hole sizes. On small jobs, anchor holes as small as 10mm in diameter and 150mm in depth can be easily filled. For larger jobs, the V12 nozzle can be used in conjunction with the mixer nozzle extension for anchor holes larger than 18mm and depth of up to 1000mm. The V12 mixer nozzle cannot be used on other adhesive systems.



PART NO	DESCRIPTION	QTY
8482	Nozzle	1
AEXTN	Nozzle extension (1000mm)	10

Threaded rod retaining cap

For use in overhead applications (Ref. Design Manual page 19)



PART NO	DESCRIPTION	DRILL Ø mm	STUD Ø mm	QUANTITY
RC8	8mm Retaining Cap	10	8	10
RC10	10mm Retaining Cap	12	10	10
RC12	12mm Retaining Cap	14	12	10
RC16	16mm Retaining Cap	18	16	10
RC20	20mm Retaining Cap	24	20	10

V12 material properties

The V12 adhesive is a vinylester styrene free resin. The performance criteria for use as an anchoring system for threaded rods and reinforcing bars are described in the sections that follow.

Shelf life	18 month
Storage conditions	Store dry at 5° to 25° C.
Colour	Grey
Usable volume	420ml

V12 setting time

The setting times listed for the V12 adhesive vary according to the base material temperature. The working time is the maximum time during which the adhesive can be dispensed before it begins to set. The curing time is the minimum time required for the V12 adhesive to reach its published capacities.

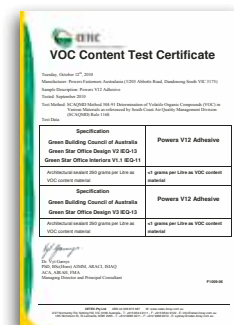
BASE MATERIAL TEMP. (°C)	WORKING TIME (Minutes)	CURING TIME (Minutes)
-10°C	90	1440
-5°C	90	840
0°C	45	420
5°C	25	120
10°C	15	80
20°C	6	45
30°C	4	25
35°C	2	20
40°C	1.5	15

NOTE: For wet concrete curing times must be doubled

VOC Content certification

Powers V12 Injection System has been tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in various materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

The VOC content of Powers V12 has been determined and the product conforms to the Green Building Council of Australia specification as outlined under Green Star Office Design V2 IEQ-13, V1.1 IEQ-11 And V3 IEQ-13. Copy of test certificate available on request.



Resistance of V12 adhesive to chemicals

CHEMICAL AGENT	CONCENTRATION	RESISTANT	NON RESISTANT
Accumulator acid		●	
Acetic Acid	40		◆
Acetic acid	10	●	
Acetone	10		◆
Ammonia, aqueous solution	5	●	
Aniline	100		◆
Beer		●	
Benzene (kp 100-140 °C)	100	●	
Benzol	100		◆
Boric acid, aqueous solution		●	
Calcium carbonate, suspended in water	All	●	
Calcium chloride, suspended in water		●	
Calcium hydroxide, suspended in water		●	
Carbon tetrachloride	100	●	
Caustic soda solution	10	●	
Citric acid	All	●	
Diesel oil	100	●	
Ethyl alcohol, aqueous solution	50		◆
Formic Acid	100		◆
Formaldehyde, aqueous solution	30	●	
Freon		●	
Fuel oil		●	
Gasoline (Premium Grade)	100	●	
Glycol (Ethylene Glycol)		●	
Hydraulic fluid	Conc.	●	
Hydrochloric acid (Muriatic Acid)	Conc.		◆
Hydrogen peroxide	30		◆
Isopropyl alcohol	100		◆
Lactic acid	All	●	
Linseed oil	100	●	
Lubricating oil	100	●	
Magnesium chloride, aqueous solution	All	●	
Methanol	100		◆
Motor Oil (SAE 20 W-50)	100	●	
Nitric acid	10		◆
Oleic acid	100	●	
Perchloroethylene	100	●	
Petroleum	100	●	
Phenol, aqueous solution	8		◆
Phosphoric acid	85	●	
Potash Lye (Potassium Hydroxide)	10	●	
Potassium carbonate, aqueous solution	All	●	
Potassium chlorite, aqueous solution	All	●	
Potassium nitrate, aqueous solution	All	●	
Sodium carbonate	All	●	
Sodium chloride, aqueous solution	All	●	
Sodium phosphate, aqueous solution	All	●	
Sodium silicate	All	●	
Standard benzene	100	●	
Sulfuric acid	10	●	
Sulfuric acid	70		◆
Tartaric acid	All	●	
Tetrachoroethylene	100	●	
Toluene			◆
Trichloroethylene	100		◆
Turpentine	100	●	

Results shown in the table are applicable to brief periods of chemical contact with full cured adhesive (e.g. temporary contact with adhesive during a spill).

Performance data

Working stress design

Allowable working loads are based on the lesser of the allowable bond strength and allowable steel strength.

Tension

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	TORQUE RANGE Nm	CONCRETE 32MPa		ALLOWABLE STEEL STRENGTH (kN)		
				ALLOWABLE BOND STRENGTH kN	CLASS 5.8	CLASS 8.8	316 SS	
					Zinc & Gal	Zinc & Gal	A4-50	
M8	10	80	10	7.0	7.6	11.7	8.1	
M10	12	90	20	11.9	12.1	18.6	12.8	
M12	14	110	40	17.4	17.5	27.0	18.6	
M16	18	125	80	26.3	32.7	50.0	34.5	
M20	24	170	120	44.8	51.0	81.2	53.9	
M24	28	210	160	60.8	73.4	117.2	77.9	
M30	35	270	180	80.0	116.7	186.4	123.4	

Shear

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	TORQUE RANGE Nm	CONCRETE 32MPa		ALLOWABLE STEEL STRENGTH (kN)		
				ALLOWABLE BOND STRENGTH kN	CLASS 5.8	CLASS 8.8	316 SS	
					Zinc & Gal	Zinc & Gal	A4-50	
M8	10	80	10	5.6	4.2	6.5	5.0	
M10	12	90	20	7.7	6.7	10.4	7.9	
M12	14	110	40	13.2	9.8	15.1	11.5	
M16	18	125	80	20.9	18.6	28.6	21.4	
M20	24	170	120	34.7	29.0	46.3	33.4	
M24	28	210	160	63.0	41.8	66.7	48.3	
M30	35	270	180	99.7	66.9	115.5	76.5	

Incorporated Safety Factors (tension and shear): Allowable bond strength (concrete) $f_{sc}=3$
Allowable steel strength $f_{ss}=2.5$

Limit state design

Anchor design capacities are based on the lesser of the design capacity concrete and design steel capacity

Anchor Design Tension Capacities

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	CONCRETE 32MPa		DESIGN STEEL CAPACITY (kN)		
			DESIGN CAPACITY ϕN_t (kN)	CLASS 5.8	CLASS 8.8	316 SS	
				ϕN_t (kN)	ϕN_t (kN)	A4-50 ϕN_t (kN)	
M8	10	80	12.6	15.2	23.4	16.2	
M10	12	90	21.3	24.1	37.1	25.6	
M12	14	110	31.3	35.1	53.9	37.2	
M16	18	125	47.4	65.3	100.0	69.0	
M20	24	170	80.6	101.9	162.4	107.8	
M24	28	210	109.5	146.8	234.4	155.8	
M30	35	270	144.0	233.4	372.8	246.8	

Anchor Design Shear Capacities

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	CONCRETE 32MPa		DESIGN STEEL CAPACITY (kN)		
			DESIGN CAPACITY ϕV_s (kN)	CLASS 5.8	CLASS 8.8	316 SS	
				ϕV_s (kN)	ϕV_s (kN)	A4-50 ϕV_s (kN)	
M8	10	80	10.1	8.5	13.0	10.1	
M10	12	90	13.9	13.5	20.8	15.9	
M12	14	110	23.8	19.7	30.2	23.1	
M16	18	125	37.6	37.1	57.1	42.8	
M20	24	170	62.5	58.0	92.6	66.8	
M24	28	210	113.4	83.6	133.4	96.6	
M30	35	270	179.5	133.9	231.0	153.0	

Design for strength limit state

Design is based on the lesser of the concrete and steel capacities.

$$\begin{aligned}
 N^* &\leq \phi N_{A,tf} && \text{Tension} \\
 V^* &\leq \phi V_{A,f} && \text{Shear} \\
 (N^*/\phi N_{A,tf})^{5/3} + (V^*/\phi V_{A,f})^{5/3} &\leq 1 && \text{Combined loading}
 \end{aligned}$$

Where:

$$\begin{aligned}
 N^* &= \text{Design tension force (kN)} \\
 V^* &= \text{Design shear force (kN)} \\
 \phi N_{A,tf} &= \text{Anchor design tension capacity (kN)} \\
 \phi V_{A,f} &= \text{Anchor design shear capacity (kN)} \\
 \text{Concrete:} \\
 N_A &= \text{Characteristic ultimate tension load capacity (kN)} \\
 V_A &= \text{Characteristic ultimate shear load capacity (kN)} \\
 \phi &= 0.6 \text{ [Strength reduction factor]– tension and shear} \\
 \text{Steel:} \\
 N_{tf} &= \text{Nominal tension capacity of steel (kN)} \\
 V_f &= \text{Nominal shear capacity of steel (kN)} \\
 \phi &= 0.8 \text{ [Capacity factor – tension and shear]}
 \end{aligned}$$

Reinforcing bar limit state design data

BAR Ø mm	DRILL Ø mm	ANCHOR DESIGN TENSION CAPACITIES (kN)														DEVELOPMENT LENGTH L_{syt} mm
		29.6	35.6	39.3	39.3											
N10	12	29.6	35.6	39.3	39.3											199
N12	15	35.6	42.7	49.8	56.5	56.5										238
N16	20	47.4	56.9	66.4	75.9	85.3	100.5	100.5								318
N20	25	59.3	71.1	83.0	94.8	106.7	138.3	157.0	157.0	157.0						397
N24	30	64.0	76.8	89.6	102.4	115.2	149.3	170.7	213.3	226.0	226.0					530
N28	35	66.4	79.6	92.9	106.2	119.5	154.9	177.0	221.2	265.5	308.0	308.0				696
N32	40	66.4	79.6	92.9	106.2	119.5	154.9	177.0	221.2	265.5	309.7	354.0	398.2	402.0	402.0	908
INSTALLED LENGTH L_{inst}		150	180	210	240	270	350	400	500	600	700	800	900	1000	1100	mm

Notes:

- 1 Capacities in **bold italic** indicate rebar development strength
- 2 Capacities incorporate a strength reduction factor $\phi=0.6$, in accordance with AS3600-2001
- 3 $f'_c=32\text{MPa}$ minimum
- 4 Capacities are based on Grade 500N rebar, in accordance with AS/NZS 4671:2001

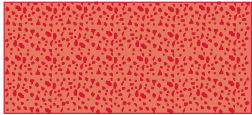
Splicing of reinforcement

Design requirements for the splicing of reinforcement shall be in accordance with AS 3600-2001, clause 13.2 (Splicing of reinforcement).

Characteristic ultimate load capacities in masonry walls

The strength of masonry varies widely, therefore, job site tests to develop load capacities are recommended. The allowable working loads in these tables should be used as guidelines only.

Characteristic ultimate load capacities in 20 MPa brick (Minimum)



ROD SIZE mm	HOLE SIZE mm	EMBEDMENT DEPTH mm	GUIDE TORQUE Nm	SOLID BRICK	
				TENSION kN	SHEAR kN
8	10	80	2.0	4.5	4.5
10	12	90	6.0	9.3	9.3
12	14	110	11.0	12.8	12.8
16	18	125	24.0	16.0	16.0

Characteristic ultimate load capacities in 7.0 MPa block (Minimum)



ROD SIZE mm	HOLE SIZE mm	EMBEDMENT DEPTH mm	GUIDE TORQUE Nm	SOLID BLOCK	
				TENSION kN	SHEAR kN
8	10	80	2.0	1.9	1.9
10	12	90	6.0	4.2	4.2
12	14	110	11.0	6.4	6.4
16	18	125	24.0	9.6	9.6

The characteristic ultimate load capacities listed are based on using Class 4.6 threaded rod

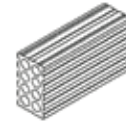
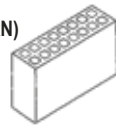
Note: Refer to page 10 of the Adhesive Anchoring System Design Manual for masonry design criteria

- Design guidelines:
- Working stress design**
Divide characteristic ultimate load capacities by a factor of safety of 3.
 - Limit state design**
Multiply characteristic ultimate load capacities by $\phi = 0.6$

Allowable working loads using V12 + Powers sieves in WA bricks

Tensile and shear strength (kN)

Brick dimensions:
305 x 90 x 162mm



STUD SIZE mm	METRO BRICK	MIDLAND	ARMACLAY	MIDLAND
M8	2.3	2.3	2.3	2.3
M10	3.0	3.0	2.8	2.5
M12	3.0	3.0	2.8	2.5
M16	3.0	3.0	3.0	3.0

NOTE: Drill depth and sieve embedment must not exceed 75mm

SPECIFICATION EXAMPLE: M8 x 75* threaded rod used in conjunction with Powers AC100 PRO injection system and plastic sieve Part No PSM850. Installation in accordance with Powers Fasteners installation instructions for hollow base material.

*To calculate length of rod, combine **SIEVE LENGTH + 16mm + FIXTURE THICKNESS**

Fire resistance

Fire resistance of V12 injection system in combination with anchor rods of sizes M8 to M30 in CLASS 5.8 galvanised steel and A4-70 Stainless Steel. Fire resistance relates to maximum allowable tension loads for various durations of time in solid reinforced concrete of minimum strength 25MPa.



Designation	Powers V12						
	Maximum tensile load* F (kN)						
Fire resistance time t_u (minutes)	M8	M10	M12	M16	M20	M24	M30
Minimum set depth (mm)	80	90	110	125	170	210	280
F30	1.65	2.60	3.35	6.25	9.75	14.04	18.26
F60	1.12	1.77	2.59	4.82	7.52	10.84	14.10
F90	0.59	0.94	1.82	3.40	5.30	7.64	9.94
F120	0.33	0.52	1.44	2.69	4.19	6.04	7.86

NOTE: For report details please contact Powers Fasteners Technical Department

Estimating guide

Refer to Powers website, www.powers.com.au, downloads section and under software you can download the latest **Powers Adhesive Volume Calculator**

Installation instructions

For installation instruction see pages 17 to 19 in the Adhesive Anchoring Systems Design Manual

Health and safety

Material safety data sheet available on request. (Ref. Chemwatch Report 23-7211 and 4747-36) or via the Powers website.

Suggested specification

V12 Injection System
Stud/Re-Bar Size + Length
Drill Size (mm)
Embedment Depth (mm)



VIC HQ:

TELEPHONE:
FACSIMILE:

03-8795 4600
03-8787 5899

NSW:

TELEPHONE:
FACSIMILE:

02-4634 7600
02-4648 3139

SA:

TELEPHONE:
FACSIMILE:

08-8346 5611
08-8346 5711

QLD:

TELEPHONE:
FACSIMILE:

07-3712 2600
07-3216 7216

FAR NORTH QLD:

TELEPHONE:

0439-083-646

NT:

TELEPHONE:

0439-083-930

WA :

TELEPHONE:
FACSIMILE:

08-9209 1211
08-9209 1055

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