

# Megapoxy<sup>®</sup>

## Application Guide For Civil Engineers



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## Application Guide For Civil Engineers

This application guide is intended to give Civil Engineers a broad outline of the scope of work and materials necessary for some of the more frequently encountered situations where Megapoxy can assist in saving labour and time or simplify design.

Please consult individual product bulletins for detailed performance data and application procedures. Should further information be required, contact Vivacity Engineering Pty Ltd.

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## Bonding

### **Bonding Steel to Concrete Megapoxy P1 or PM**

Grit blast steel to white metal finish and degrease by flooding with Megapoxy Thinners. Scabble or grit blast concrete to expose firmly held aggregate. Premix Megapoxy and apply by putty knife to all surfaces to be bonded. Assemble and allow to cure.

### **Bonding Rubber to Steel or Concrete Megapoxy PM or 69**

Cover the rubber surface with concentrated sulphuric acid for 15 minutes. Wash acid thoroughly off with water and dry. Flex the rubber to produce a finely cracked surface. Steel and concrete must be grit blasted. Premix Megapoxy and apply to surfaces to be bonded. Assemble and allow curing.

### **Bonding Concrete to Concrete (Narrow Gap Joints) Megapoxy P1, PM or PF**

Scabble back weak concrete and grit blast to expose firmly held aggregate. Premix Megapoxy P1 or PM and apply by putty knife to surfaces to be bonded. Assemble and allow curing. Where rapid bonding is required use Megapoxy PF in place of Megapoxy P1 or PM and allow to cure 1 hour, but preferably for 4 hours.

### **Bonding Concrete to Concrete (Wide Gap Joints) Megapoxy H**

Scabble back weak concrete and grit blast to expose firmly held aggregate. Premix Megapoxy H and apply by brush to prime surfaces to be joined. If concrete is damp, prime with Megapoxy H. To prepare Megapoxy mortar add 3 parts by volume Silica 50N (epoxy quality sand ) to 1 part by volume of premixed Megapoxy H and mix thoroughly in a plastic bucket. Place Megapoxy mortar into the gap using a ramming rod, trowel or putty knife. Allow curing for 48 hours. Where rapid cure is required use Megapoxy H/315 in place of Megapoxy H and allow to cure for at least 1 hour but preferably 4 hours.

### **Bonding New Concrete to Old Concrete or Steel Megapoxy H**

Steel should be grit blasted to white metal finish. Scabble back weak or weathered concrete and grit blast. Pre mix Megapoxy and apply with a stiff brush at the rate of 1 litre per 1.5 square metre of old concrete surface. Place freshly mixed concrete before Megapoxy H sets (i.e within 15 minutes of brush application). Cure new concrete with plastic sheet against rapid loss of water.

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## Bonding Cont.

### **Anchoring Steel into Rock or Concrete Megapoxy H or HT**

Using masonry drill make a hole with a diameter 15mm larger than the diameter of the steel to be anchored. Blow loose concrete and dust from the hole. Grit blast steel to white metal finish. Using a plastic funnel pour calculated quantity of premixed Megapoxy H into the hole. Insert the steel rod/bar and use a tape or wire tie to hold in position until Megapoxy hardens.

### **Bonding Ceramic Tiles Megapoxy P1, PM or 69**

Clean bottom surface of tiles by wiping with a clean cotton cloth soaked in Megapoxy Thinners. Concrete and steel substrates should be sandblasted. Wooden surfaces must be sanded to obtain a clean and sound timber base. Apply premixed Megapoxy to both substrate and tiles using a notched trowel and assemble. Allow curing for 24 hours before opening to traffic. Full cure takes 7 days.

### **Bonding Stainless Steel Megapoxy PM or 69**

Degrease stainless steel using Megapoxy Thinners and immerse for 10 minutes in a solution containing 9 parts water, 4 parts concentrated sulphuric acid and a small amount of a dish washing detergent. Rinse in tap water and dry in an oven at 90°C. Wear clean cotton gloves when handling stainless steel. Proceed with bonding as soon as treatment is complete. Premix Megapoxy and apply to surfaces to be joined using a putty knife. Assemble and allow curing for 48 hours.

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## Concrete, Stone, Timber Repairs and Restorations

### **Repair of Cracked Concrete Megapoxy H or HX**

Fix the base of the Injection Balloon onto the concrete at suitable intervals using Megapoxy PM or PF Paste Adhesive at 25cm apart (suggested as a guide), also seal over the balloon bases and the exposed crack. Premix Megapoxy H and inject through the nipples using a clean grease gun. For fine cracks use Megapoxy HX in place of Megapoxy H.

### **Repairs and Restoration of Sandstone Megapoxy P1 or PM**

Chip out loose and cracked sandstone and blow out all loose stone and dust. Pre mix Megapoxy and apply by trowel. Allow to cure.

### **Timber Repair & Restoration Megapoxy 69**

Chip out or cut out all weak, rotten or weathered wood until a sound timber surface is obtained. Mix Megapoxy and apply with a putty knife to restore original shape.

### **Galvanised Iron Repairs Megapoxy PM or 69**

Clean by flooding with Megapoxy Thinners and abrade with carborundum paper. Premix Megapoxy and apply with putty knife to form 1.5mm thick layer over or on the area surrounding the repair. Press an open weave fibreglass cloth into the Megapoxy and overcoat with a further layer of Megapoxy.

### **Underwater and Splash Zone Repairs Megapoxy H, HT**

Prepare concrete by scabbling, grit blast steel and chip out or cut out all weak or rotten timber. To one volume of pre mixed Megapoxy H, add three parts by volume silica 50N sand and mix thoroughly. Place the mixed mortar into a plastic bucket and take underwater to repair location. To apply, place and press mortar with a steel trowel against surface to be repaired and work to displace water from bond area interface. Use formwork to ensure correct contour of repair. If this is not possible, the diver must continue shaping the mortar with the trowel until setting commences. (approximately 30 minutes). The repair must be protected from tidal disturbance by wrapping with plastic sheeting until hardening occurs.

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## Non-Skid Coatings, Membranes and Waterproofing of Concrete

### **Non - Skid Coating for Steel Plates**

### **Megapoxy H**

Grit blast steel to white metal finish and degrease by flooding with Megapoxy Thinners. Premix Megapoxy H and apply by brush or lambswool applicator. Immediately broadcast sand or carborundum grit over the wet resin surface. Allow to cure for a minimum three hours and remove excess sand or grit.

### **Non skid coating for Asphaltic Concrete, Portland Cement, Concrete and Timber Traffic Areas** **Megapoxy H**

Scrub surface to be coated with strong detergent solution. Rinse off thoroughly and allow to dry completely. Premix Megapoxy H and spread with a rubber squeegee over the dry, dust free prepared area at the rate of one litre per square metre. Immediately broadcast 5mm diameter crushed stone or calcined bauxite over the Megapoxy H layer. Note : It is essential that the aggregate is applied within 15 minutes after spreading Megapoxy H to ensure adhesion and good wear resistance. Allow to cure for 12 hours, remove excess aggregate and open to traffic.

### **Dielectric Membrane for Concrete**

### **Megapoxy H**

Grit blast concrete and apply two coats of premixed Megapoxy H by spray gun or lambswool applicator to a minimum thickness of 0.25mm.

The second coat should be applied 6 - 12 hours after the first coat to ensure complete intercoat adhesion.

### **Waterproofing Concrete**

### **Megapoxy H**

Prepare concrete surface by grit blasting. Apply premixed Megapoxy H by brush, squeegee or roller. Broadcast Silica 50N over the wet Megapoxy H and allow curing for 24 hours. Sweep the excess Silica from the surface and apply the second coat of Megapoxy H. For Wear Resistant Floor Surface repeat the above 3 times, or until the desired thickness is built up.

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## Non-Skid Coatings, Membranes and Waterproofing of Concrete

### **Non - Skid Coating for Steel Plates**

### **Megapoxy H**

Grit blast steel to white metal finish and degrease by flooding with Megapoxy Thinners. Premix Megapoxy H and apply by brush or lambswool applicator. Immediately broadcast sand or carborundum grit over the wet resin surface. Allow to cure for a minimum three hours and remove excess sand or grit.

### **Non skid coating for Asphaltic Concrete, Portland Cement, Concrete and Timber Traffic Areas** **Megapoxy H**

Scrub surface to be coated with strong detergent solution. Rinse off thoroughly and allow to dry completely. Premix Megapoxy CT and spread with a rubber squeegee over the dry, dust free prepared area at the rate of one litre per square metre. Immediately broadcast 5mm diameter crushed stone or calcined bauxite over the Megapoxy CT layer. Note : It is essential that the aggregate is applied within 3 minutes after spreading Megapoxy CT to ensure adhesion and good wear resistance. Allow to cure for two hours, remove excess aggregate and open to traffic.

### **Dielectric Membrane for Concrete**

### **Megapoxy H**

Grit blast concrete and apply two coats of premixed Megapoxy H by spray gun or lambswool applicator to a minimum thickness of 0.25mm.

The second coat should be applied 6 - 12 hours after the first coat to ensure complete intercoat adhesion.

### **Waterproofing Concrete**

### **Megapoxy H**

Prepare concrete surface by grit blasting. Apply premixed Megapoxy H by brush, squeegee or roller. Broadcast Silica 50N over the wet Megapoxy H and allow curing for 24 hours. Sweep the excess Silica from the surface and apply the second coat of Megapoxy H. For Wear Resistant Floor Surface repeat the above 3 times, or until the desired thickness is built up.



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## Methods of Surface Preparation

### **Solvent Degreasing**

This method is used to remove oil, grease, wax, tar and other solvent soluble contaminants from the surface of non-porous materials. Large quantities of contamination must be removed by hand or power tools prior to solvent cleaning.

Suitable solvent is Megapoxy Thinners.

### **General Surfaces may be cleaned with solvent using several techniques :**

- Immersion in the solvent
- Spraying with the solvent
- Swabbing with rags or cloths

Repeated cleaning using fresh solvent is needed for a completely clean surface.

After cleaning, the surface should be dried and promptly coated with the adhesive before contamination can occur.

This method of surface preparation is a minimum requirement. Generally the other preparation methods given in this application will give superior results when long term strength is required.

For Further safety information please refer to Material Safety Data Sheets from Supplier.

### **Abrasive Blast Cleaning**

This is the best method of surface preparation because all surface contaminants can be completely removed. A texture surface is formed which provides an excellent key for adhesives. This form of surface preparation is commonly applied to steel but may be used on galvanised steel, concrete, plastics and ceramics.

There are various suitable abrasives such as iron or steel shots, carborundum, ilmenite and sand.

Before abrasive blasting a surface, heavy rust, weld splatter or major irregularities which would interfere with close contact between mating surfaces should be removed by mechanical means. Heavy deposits of oil, grease, wax or tar should be removed by solvent cleaning before abrasive blast cleaning.

For Further safety information please refer to Material Safety Data Sheets from Supplier

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## Methods of Surface Preparation Cont.

### **Ferric Chloride Etching**

This method is used to prepare copper, brass and bronze. These metals are subject to rapid surface tarnishing and should be coated with a coating immediately after preparation. Abrasive blasting provides a roughness which gives improved adhesion.

The surfaces should firstly be degreased by solvent washing.

For Further safety information please refer to Material Safety Data Sheets from Supplier.

Ferric Chloride solution is made from :-

1. Ferric Chloride 300 g
2. Distilled Water 1000 g ( 1 litre )
3. 70% Nitric Acid 200 g (140 ml )

**Important - Dissolve the ferric chloride in the water and then add the nitric acid while stirring. Use a glass or glazed earthenware container to hold the solution.**

Immerse the surface to be etched in the bath at 25°C for 1 to 2 minutes. Wash thoroughly with clean water and finally rinse with distilled water.

For Further safety information please refer to Material Safety Data Sheets from Supplier.

### **Chromic Acid Etching**

This method is used to prepare aluminium surfaces, which have a tightly adherent film of inert aluminum oxide, which must be removed to make a successful adhesive joint.

The aluminum should firstly be degreased by solvent washing, followed by the chromic acid etching.

Use glass or earthenware containers to hold the chromic acid solution. Wear eye protection and protective clothing.

The chromic acid solution is made from :-

1. Water 7500 g (7.5 litres )
2. Sodium dichromate 500 g
3. 98% Sulphuric Acid 5000 g ( 2.25 litres )

**Important - Dissolve the sodium dichromate in the water and then add the sulphuric acid slowly while stirring. Do not add water to sulphuric acid as a violent reaction will result.**

Immerse the surface to be etched in the solution at 65°C for 10 to 15 minutes. Temperatures above 70°C are detrimental to the subsequent bond. Wash thoroughly with clear water and finally rinse in distilled water. After cleaning the surfaces, application should be promptly coated with the coating before contamination can occur.

For Further safety information please refer to Material Safety Data Sheets from Supplier.

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## Methods of Surface Preparation Cont.

### **Hydrochloric Acid Cleaning**

This method is used to clean sound concrete surfaces which have not been penetrated by contaminants. If the concrete has been contaminated by oil, grease, paint, tar etc. other cleaning methods must be adopted. Silicone mould oils or curing oils are difficult to remove and will impair adhesion.

The hydrochloric acid solution should be made up in a rubber, glass, glazed earthenware or plastic container. Suitable eye protection and protective clothing must be worn while making this solution.

1. Commercial Hydrochloric Acid 1 volume
2. Water 2 volumes
3. **Add the acid to the water while stirring constantly.**

Use a hair or plastic brush to swab the surface of the concrete at the rate of 1 litre per square meter. When frothing ceases wash the surface with water using a high-pressure hose. If thorough hosing is not possible the surface should be neutralised by washing with a weak solution of ammonia.

Because this method can be hazardous to personnel, Method B is preferred for the preparation of most concrete surfaces.

For Further safety information please refer to Material Safety Data Sheets from Supplier.

### **Hydrochloric Acid Etching**

The hydrochloric acid solution should be made up in a rubber, glass, glazed earthenware or plastic container. Suitable eye protection and protective clothing must be worn while making this solution.

1. Commercial Hydrochloric Acid 1 volume
2. Water 4 volumes
3. **Add the acid to the water while stirring constantly.**

Immerse the surface to be etched in the acid at 25°C for 2 to 4 minutes. Wash thoroughly with clean tap water. Rinse with distilled water. Dry thoroughly

For Further safety information please refer to Material Safety Data Sheets from Supplier.



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## Methods of Surface Preparation Cont.

### **Preparation of Rubber Surfaces**

This method is used to prepare rubber and neoprene surfaces.

Remove oil and bloom from the surface with xylene to produce a uniform jet-black appearance. Buff with 80 grit emery paper or cloth to give a matt finish. Remove all dust and apply the adhesive in a uniform layer.

For Further safety information please refer to Material Safety Data Sheets from Supplier.

### **Preparation of Timber Surfaces**

The surfaces to be joined must be dry, sound and free from contamination by oil, grease, tar or old paint. Timber should preferably be naturally dried to its equilibrium moisture content. Forced drying can be achieved by the careful use of blow torches, taking care not to char the surface.

Surface contamination a roughness should be removed by planing. The surfaces should then be lightly sanded and all dust removed.

## Requirements for Successful Epoxy Bonding

### **General**

All work with epoxy materials should be carried out in dry conditions with surface and air temperatures above 10°C and below 35°C.

The hardening cycle of all epoxy resins commences when the hardener is mixed with them. They should attain design strength in seven days when cured. Approximately 75% of this strength is attained in 24 hours.

Heating the fillers (aggregates) or the surface to which the epoxy is to be applied may accelerate the curing cycle. The most common method is by indirect heating of the epoxy resin after placing by using an electric plate. The use of an acetylene torch shall be disallowed. Maximum accelerated cure temperature will vary with the selected epoxy resin system.

It is essential that the correct mixing ratio be used and that the Part "A" and Part "B" are thoroughly mixed together before use. Inaccuracies and poor mixing will result in lower physical properties of the cured system and if the error is sufficiently large, the system may not cure satisfactorily and discolour on aging.

The surfaces to be bonded should be reasonably smooth and free of irregularities. A thin even adhesive layer is most effective and where necessary, should be achieved by using a Megapoxy paste to make good any irregularities in the surface to be bonded.

The Megapoxy adhesive must flow over the whole surface and be capable of penetrating and filling all small cavities. The excess epoxy should be squeezed out. Avoid prolonged contact with skin and use cotton or latex gloves. Wash affected areas with soap and warm water. For further information refer to Material Safety data sheet.

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## Methods of Surface Preparation Cont.

### **Treatment of Cracks**

The treatment of cracks in concrete not expected to undergo further movement should be carried out by one of the following methods :-

- **Heat Treatment**

The temperature of the concrete surrounding the crack is slowly raised to 82°C and Megapoxy H Low Viscosity is applied over the crack as paint.

- **Capillary Action**

Methylated spirits or acetone is applied to the crack before applying Megapoxy H.

- **Pressure Injection**

Cast grease nipples into the crack at the required spacing - usually 150mm centres and seal the remainder of the crack surface with Megapoxy PM or PF. Commence at the lowest nipple using a high pressure gun to pressure inject Megapoxy into the crack. Remove the top of the adjacent nipples to provide a breather and to indicate epoxy resin penetration. Progressively work along the crack.

The information given in this application guide for civil engineers is based on many years experience and is correct to the best of our knowledge at time of printing. However, the user is reminded that the data is subject to change without notice and is requested to read the full current technical data sheet available. This is not a specification and all information is given in good faith. Since the use of our products in accordance with the instructions given and their success in application is dependant on a number of factors, Vivacity Engineering Pty Ltd cannot assume any responsibility. Should any doubt arise about specification or application, our technical department should be contacted. As the information given herein is of general nature, we cannot assume any responsibility and are liable to only the value of goods sold. We also refer to our standard conditions of sale.



