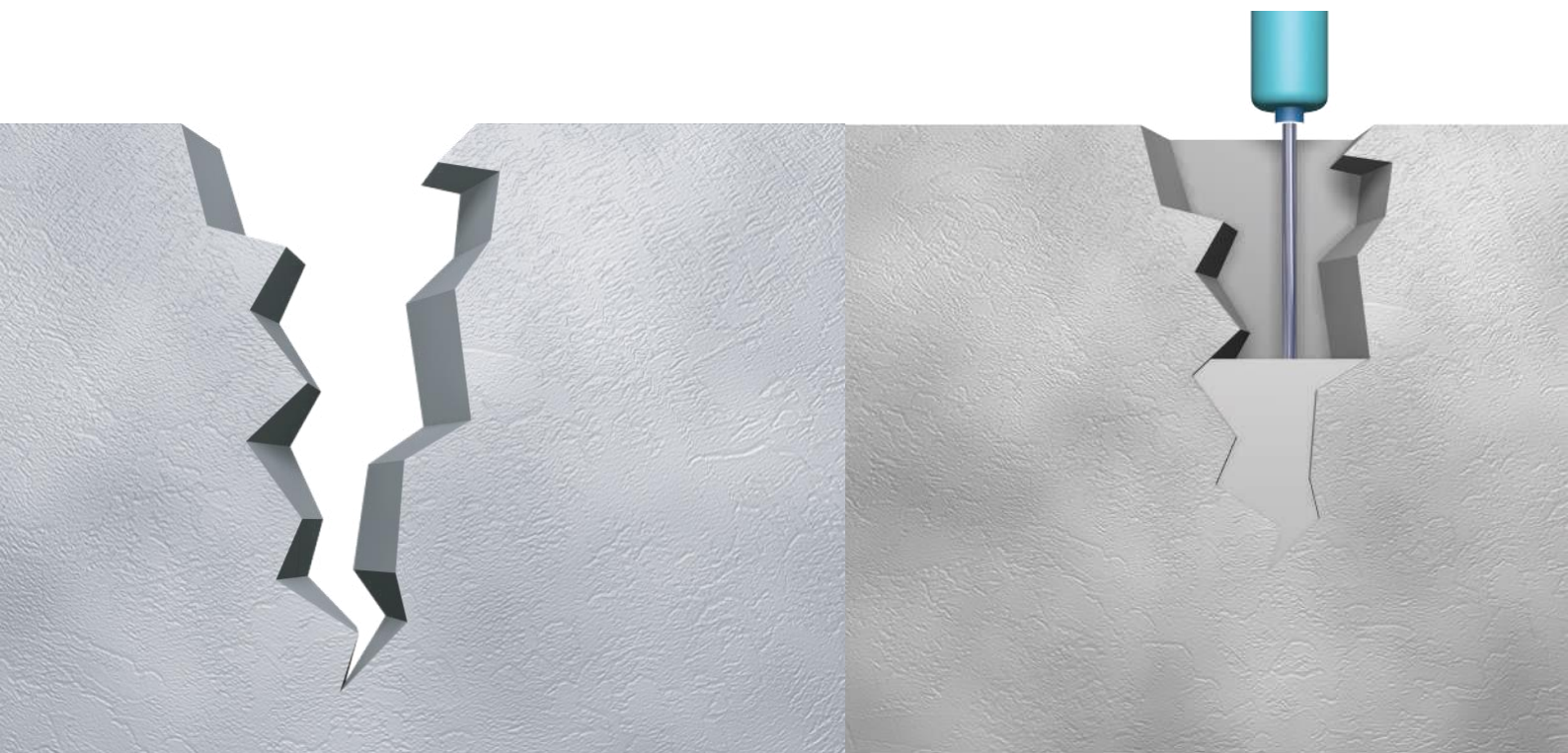
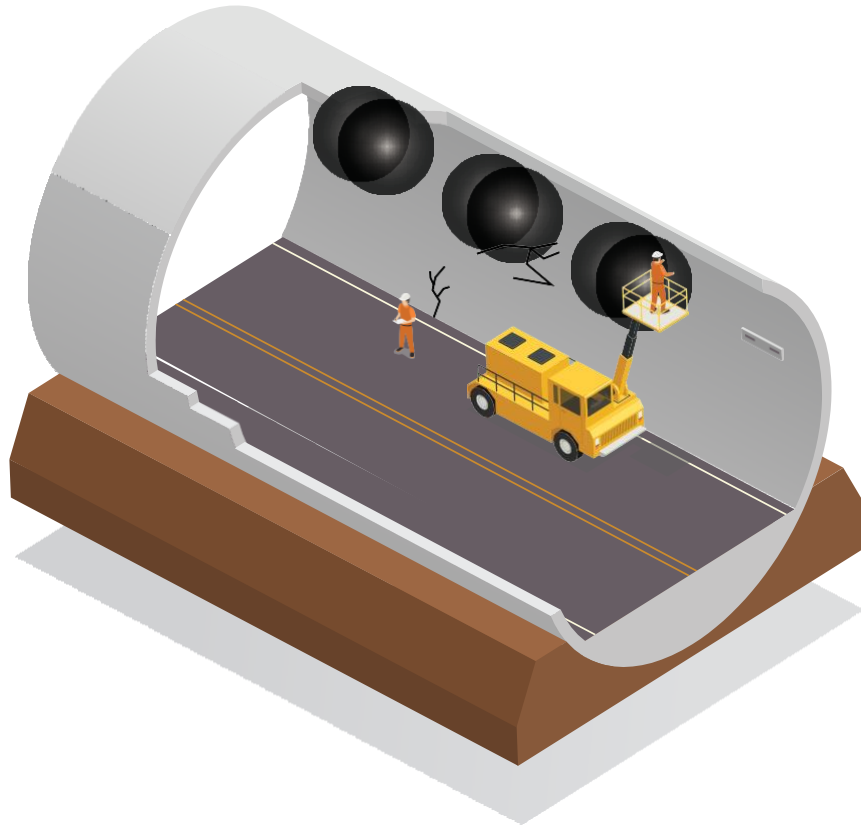


Polyurethane Injection Systems



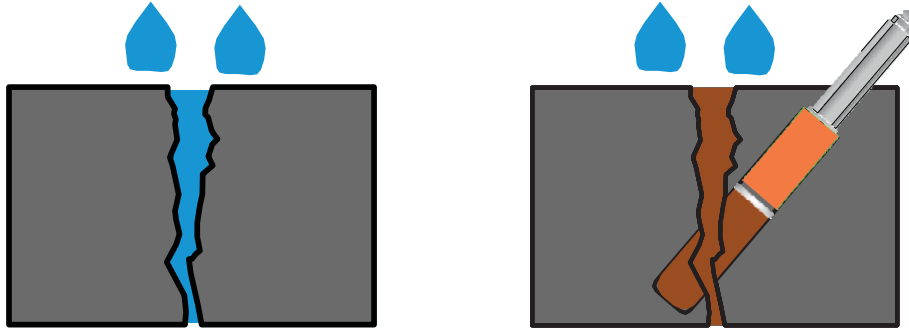
ECMAS PU Injection Systems for Concrete

ECMAS offers one of the most extensive and efficient product range to seal joints in concrete, screed or masonry as well as water-bearing cracks. ECMAS uses the Polyurethane Injection technique for restoring various mineral structural elements at different crack widths, moisture conditions, and application temperatures. The product range varies from a convenient one-component resin for small water sealing jobs to specialist robust multi-component systems to effectively stop massive water ingress problems.



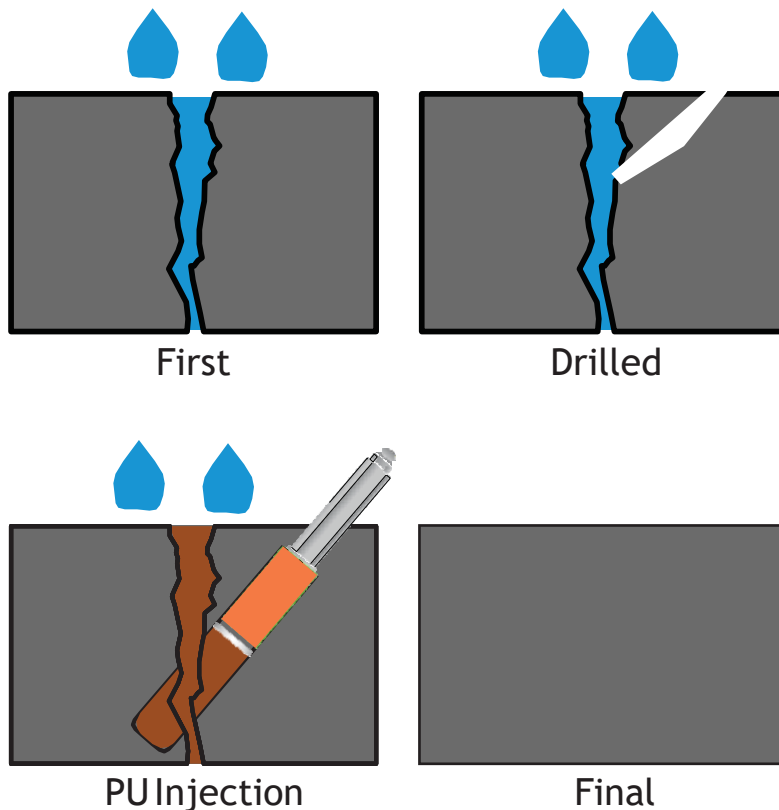
What is PU Injection

PU injection, also polyurethane grouting or injection, is a waterproofing technique that uses expanding injected polyurethane to prevent water flowing through and voids or cracks typically in concrete. This is effective in solving water leakage issues, especially when applied on the underside of the seepage area or the lower floor ceiling where the leak occurs.



Process

A hole will first have to be drilled on the underside of the ceiling, allowing polyurethane foam to be injected using a pressure machine. The pressure causes the polyurethane to ascend into any crack or voids caused by water damage, which will be filled up when it expands. PU injection is a recommended method to be applied to actively leak cases involving concrete slabs.

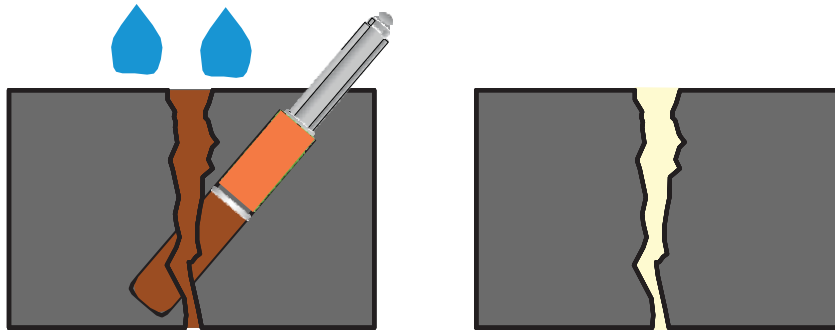


Properties of PU (Polyurethane)

- It is a fluid resin that undergoes a chemical transformation from a liquid to a solid
- It has a short curing time, ideal for sealing active leaks
- It has a low viscosity to comfortably seal tiny cracks after curing on moisture
- It cures and retains the flexibility that allows for subsequent movement in the structure while keeping the voids sealed

PU Injection To Repair Cracks

After PU injection undergoes an expansion process with water, any cracks that are filled in will have a blend of water and the polymer foam type PU grout. The mixture will then expand until there is no more space to fill, successfully sealing off any pathways the water enters through the material.



Residential Properties

PU injections are a cost-efficient method to repair leaks coming into your house, especially water coming in from the exterior. PU can also be injected into the roof to prevent further roof leak and damage to property and articles.



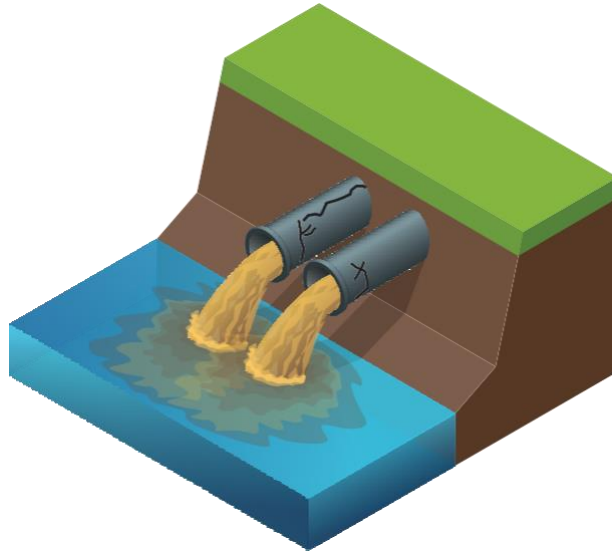
Industrial Properties

PU injection is also commonly used to repair factory or warehouse flooring, which can be damaged after prolonged and repetitive use of heavy machinery such as forklifts. PU grouting can also be applied in many areas where there is a visible leak. It is commonly used in areas such as drainage, piping, and ceilings. Similar to its residential applications, you can use it to repair any damage to your properties caused by rain or leaking.

Typical Causes of Building Cracks

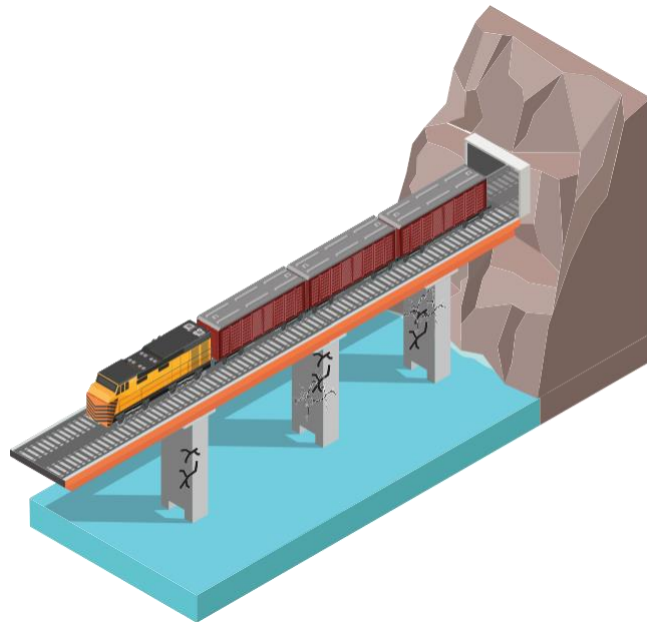
Bad Drainage

Dampness is the main cause of building cracks. Poor drainage can cause water seepages that create holes and wear away concrete and other building materials over time. Almost all properties are susceptible to damage from water, humidity, and dampness. The leaks and cracks that they might cause can be successfully treated with PU injection.



Heavy Load

Heavy loads due to the movement of machinery and vehicles such as forklift trucks and lorries on a regular basis will cause cracks on the floor over a prolonged period of time. Usually, cracks might be severe especially in areas of high traffic volume. As many warehouses with tin roofs can leak over time, water on the ground will cause holes and gaps through the cracks, which can be repaired with PU by filling them up.



Wear and Tear

Water remains the most common cause of cracks in buildings. As buildings age, cracks may appear due to wear and tear especially if there is an inadequate level of maintenance. This is especially important in areas such as roofs, balconies and wet areas exposed to water. Filling up these cracks with PU can help to prevent leaks without a major renovation.



PRODUCTS

FOAM (F)

ECMAGROUT PU F 200

ECMAGROUT PU F 240



Resins(R)

ECMAGROUT PU R 420

ECMAGROUT PU R 440

MULTI(M)

ECMAGROUT PU M 600

ECMAGROUT PU M 620

ECMAGROUT PU M 640



+



GEL (G)

ECMAGROUT PU G 800

PU Injection Foam Resins

PU injection foam resins (PU F) are designed for quickly and temporarily stopping water when repairing cracks. Injection foam resin is characterized especially by its strong increase in volume. It can also be used in case of highly pressing water often encountered in dam building, tunnel construction, bridge building, and special civil engineering. ECMAS PU foam resin is compatible with concrete, steel, masonry mortar, foil, and cable sheathing. ECMAS PU foam resins are also resistant to salts, lyes, and acids detrimental to the building structure in concentrations usually found in building structures. A secondary injection with PU injection resins is carried out to obtain a permanent sealing effect.

ECMAGROUT PU F 200

Single component, water reactive Polyurethane injection system. It will only react when it comes in contact with water. When in contact with water it will form a relatively stiff polyurethane foam and stops the leak.



Foam

ADVANTAGES

- Reacts with water to stop heavy leakages quickly
- Suitable for hot and cold climates
- Good adhesion to substrate
- Withstands high hydrostatic pressures
- Stable foam when cured
- Application with electric or pneumatic injection pumps
- Cured resin is non toxic
- Suitable for use in contact with potable water.

INTENDED USES/ APPLICATIONS

- Rapid sealing of leaking cracks in concrete structures as a temporary water stop
- To achieve a permanent seal, an after injection with ECMAGROUT PU R 400, 420 or 440 should be done

ECMAGROUT PU F 240

Two component, rapid setting, PU injection to stop water leakage & water tight sealing of cracks. When injected in water leak, a quick setting, rigid foam will be formed to quickly react away the water and seal the cracks.

ADVANTAGES

- Fast Reacting to stop quickly high volume & pressure water leaks
- No shrinkage, ensures complete surface contact and bond to dry or moist substrates.
- Cured material is impermeable to water, can withstand high hydrostatic pressures
- Application with electric or pneumatic injection pumps
- Cured resin is non-toxic, suitable for use in contact with potable water.

INTENDED USES/ APPLICATIONS

- Rapid sealing of leaking cracks in concrete structures to quickly stop water.
- Provides long lasting, non-porous, water tight seal
- Sealing and stabilizing of cracks & cavities in concrete & rocks
- Sealing of sheet pilings, Beams, slabs & columns, etc.
- Sealing joints in precast elements, concrete columns, etc.

PU Injection Resins

Classic PU resins (PU R) are characterized by their high elasticity and good adhesion. Cracks injected with PU material used for crack repair remain leak-proof also in case of limited crack width modifications and if exposed to dynamic stress. PU resin is also suitable for the restoration of gypsum-based masonry or building constructions (sealing, stabilization, and solidification). PU injection resins have a durable sealing effect also in case of high water load classes. An even, closed and therefore water-tight pore structure forms upon contact of the PU grout with or when mixed with water. The reaction time of PU grout can be reduced to compensate for long curing times at low temperatures or can be used as a two-component system.

ECMAGROUT PU R 420

Two component, Polyurethane injection Resin for Permanent & Elastic sealing of cracks. When mixed in the proportions supplied (2:1 in volume) it reacts to form a tough, flexible resin.

ADVANTAGES

- Low viscosity allows full penetration in fine cracks and voids.
- Good adhesion to dry or moist substrate
- Strong & tough but flexible to withstand limited differential movement
- Cured resin is impermeable to water, can withstand high hydrostatic pressures
- Cured resin is non toxic
- Multi-functional - primary sealing of dry cracks and secondary sealing of pre-injected leaks
- Suitable for use in contact with potable and brackish water



Resin

INTENDED USES/ APPLICATIONS

- For injecting into cracks in concrete or masonry, either wet or dry to form an elastic seal. If crack is dry or moist, resin can be used directly into the crack.
- When used in conjunction with ECMAGROUT PUF 200 provides effective and permanent sealing of crack in flowing water conditions.
- Beams, slabs columns
- Liquid retaining structures
- Sewage treatment plants
- Substructure concrete construction
- Leaking construction joints

ECMAGROUT PU R 440

Two component, Polyurethane injection Resin for permanent & structural sealing of cracks. When mixed in 1:1 in volume ratio, it reacts to form a permanent seal and restores structural integrity to the injected element.

ADVANTAGES

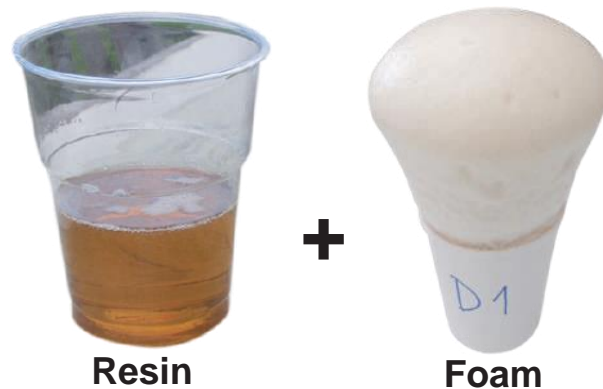
- Low viscosity allows deeper penetration in fine cracks and voids
- No shrinkage, ensures complete surface contact and bond to dry or moist substrates.
- Cured resin is impermeable to water, can withstand high hydrostatic pressures.
- Cured resin is non toxic
- High Mechanical properties like high compressive and tensile strength for structural strengthening and sealing of cracks in structural members

INTENDED USES/ APPLICATIONS

- Sealing and stabilizing of cracks & cavities in concrete, loose rock, mountain rocks or similar conditions.
- Sealing of sheet pilings, Diaphragm walls, Beams, slabs & columns, etc.
- Sealing joints in precast elements, concrete columns, etc.
- When used in conjunction with ECMAGROUT PU F 200, it provides an effective system for crack sealing in flowing water conditions

PU MULTI Injection Resins (PU M)

PU multi injection resin (PU M) is a PU hybrid product consisting of polyurethane foam resins (PU F) and polyurethane resins (PU R). This injection material stands out due to its fast foam formation upon contact with water and its permanent sealing effect. Besides, it also reacts without water contact forming a compound of constant volume. PU multi injection resin combines the positive properties of PU foam resins (PU F) and PU resins (PU R). It is suitable for specific application ranges such as crack injections and damp proof courses in case of large cavities and in-situ water (short working time). PU multi injection resin from ECMAS is compatible with concrete, steel, and masonry.



ECMAGROUT PU M 600

ECMAGROUT PU M 600 is a two-component, solvent and phthalate-free, low viscosity, polyurethane injection system for the elastic sealing of cracks in concrete structures with a dual performance:

1. Presence of water: Forms an elastic foam
2. Absence of water: Forms a flexible resin with permanent sealing properties

Due to the long pot life of ECMAGROUT PU M 600, it can also be used to permanently seal cracks using the same packers and using the same pump.

ECMAGROUT PU M 620

Dual Performance Polyurethane Injection Resin to stop water leaks & Permanent Elastic sealing of cracks by one product

- a. In case water is present, it will form an elastic foam
- b. In case there is no water or the water has been reacted away, the material will form a flexible resin with the performance of a Permanent & Elastic seal

ADVANTAGES

- Dual function in one material - stopping water leaks & permanent sealing of cracks.
- Can be pumped as one component premix or as two components.
- Suitable for use in hot and cold climates.
- Forms a flexible foam in contact with water.
- Forms an elastic seal in absence of water.
- Good adhesion to substrate.
- Can withstand high hydrostatic pressures.

INTENDED USES/ APPLICATIONS

- Suitable to stop flowing water & temporarily seal leaks in concrete structures and with a second injection of ECMAGROUT PU M 620 to permanently seal cracks and voids.
- For injecting into leaking cracks in concrete or masonry.
- Liquid retaining structures.
- Sewage treatment plants.
- Substructure concrete construction.
- Leaking construction joints

ECMAGROUT PU M 640

Dual Performance Polyurethane Injection Resin to stop water leaks and for Permanent & Structural sealing of cracks by one product

- a. When in contact with water it reacts to form a rapidly expanding, quick setting, rigid foam that stops water.
- b. In case there is no water or the water has been reacted away, the material will form a Permanent & Structural seal with high mechanical properties

ADVANTAGES

- Dual function in one product stopping water leaks & permanent sealing of cracks.
- High Mechanical properties like compressive and tensile strength restores structural integrity of structural members.
- Can be pumped as one component premix or as two components.
- No shrinkage, ensures complete surface contact and bond to dry or moist substrates.
- Can withstand high hydrostatic pressures.

INTENDED USES/ APPLICATIONS

- Quick foaming resin for stopping high volume & pressure water leaks
- Permanently seals and restores structural integrity to the injected element
- Sealing and stabilizing of cracks & cavities in concrete, loose rock, mountain rocks or similar conditions.
- Sealing of sheet pilings, Diaphragm walls, Beams, slabs & columns, etc.
- Sealing joints in precast elements, concrete columns, etc.

PU Injection GEL

ECMAS polyurethane gel (PU G) is an injection material characterized by its very low viscosity, an ideal solution for the sealing of structural elements with ground contact (gel injection). Low viscosity injection gel can also be used for sealing surfaces within overall open-pored structures against moisture penetration – including the installation of a post-construction damp proof course (DPC) against capillary rising moisture in masonry.



GEL

ECMAGROUT PU G 800

Single component, hydrophilic, Polyurethane to be used as water stop system producing an Elastomeric Gel. When injected in to leaking structures, it reacts with water in a controlled manner to form a flexible, hydrophilic gel that permanently stops water leaks and consolidates the ground behind and under concrete structures

ADVANTAGES

- Deeper penetration to fine cracks due to exceptionally low viscosity
- Flexible and Hydrophilic Gel
- Excellent adhesion to concrete
- Very good chemical resistance to most acids & alkalis.
- Can withstand high hydrostatic pressures.
- Water soluble in uncured state
- Suitable for the applications where fluctuating groundwater levels are encountered
- Non-toxic, suitable for use in contact with potable water

INTENDED USES/ APPLICATIONS

- A liquid but solidifying gel membrane applied to the positive side of a concrete structure from the negative side
- A vertical barrier to fill the voids/joints in masonry walls
- To stop water leakage into underground sumps, pits etc.
- Soil stabilization for foundations.
- To prevent water ingress, oozing from ground.
- Preventative or remedial waterproofing of structures.
- Shutting off heavy water leakages
- For sewer repair, manhole repair, soil stabilization, etc.
- Possesses excellent adhesiveness to soil particles and it is therefore can be useful in landslide prevention & Consolidation of loose or unstable ground.

Health & Safety

These products are for industrial use only by trained operatives. It is potentially hazardous if not used correctly. Please refer to the Material Safety Data Sheet (MSDS) prior to the purchase and use of this product.

A detailed safety meeting should be held with the entire injection crew for an overview of the procedure and data sheets and MSDS all of the products that will be used during the injection process to identify potential hazards and risks and necessary safety procedures to be followed.

In addition to the generally recommended safety instructions and equipment for works on construction sites, the following personal protective equipment (PPE) is essential for anyone working with PU injections or resin based chemical products, because handling or working with chemicals can cause irritation to the eyes, skin, nose and throat.

- Appropriate eye protection should be worn at all times while handling and mixing such products.
- Safety shoes, gloves and other appropriate skin protection, such as long-sleeved shirts, full face safety shield must be worn at all times.
- Ensure sufficient ventilation during application in closed or confined spaces. Additionally, a respiration breathing mask may be required or helpful in these situations.

Equipment's & Tools Required

1. Appropriate Airless Pumps
2. Injection packers
3. Face shields and safety glasses.
4. Safety Gloves.
5. Clean Plastic Buckets & Mugs - 5 each
6. Cleaning Agent for cleaning pumps.
7. Chemical Grouting material
8. Good quality heavy-duty drill.
9. Drill bits 12 -18 inches long corresponding with packer size.
10. Suitable material for surface sealing cracks.
11. Dual cartridge caulking gun.
12. Sealing Tape, Oakum, and rags.
13. Safety Helmets, Ear-plugs, and other necessary PPE.
14. TDS & MSDS for all products on site

Storage & Handling

PU injection materials should be stored 5°C and 25°C and less than 50% relative humidity and should be kept in a dry store in the original, unopened containers.

Once a pack has been opened use immediately. Purging a part pack with nitrogen is then essential. All opened drums should be purged with dry nitrogen and capped when not in use.

Do not discard unmixed or partially mixed material into the water system. If any doubts arise concerning temperature, application or substrate conditions, consult the local ECMAS office

INJECTION GROUTING PROCEDURE

Step 1: Prepare the crack surface:

Use a wire brush to physically remove mineral deposits and dirt and clean with water.

In case of wider cracks or cracks with high water flows, seal the surface of the crack with a surface sealing material

Step 2: Drilling holes:

PU injections are injected at an angle to intersect the crack at its mid-point, allowing for a complete penetration and watertight seal. To intersect a crack at its mid-point, drill packer holes at a 45° angle to the concrete surface at a distance of one half the thickness of the wall.

Diameter of drill hole = Diameter of packer + 2 mm.

Port spacing is determined by the width of the crack

Step 3: Install suitable injection ports or mechanical packers

Tighten the mechanical packers and secure in position so that they can withstand the maximum injection pressure.

Step 4: Prepare Injection Equipment

ECMAGROUT PU injection materials should be injected using a suitable injection equipment fitted with a static mixer & flushing pump and having adequate pressure and delivery rate. Inspect the pumping equipment to ensure proper operation and that the hoses that will be used for injection are not crimped, damaged or in need of repair. Flush the pump with ECMACLEAN to eliminate the moisture in the pump and hoses and lubricates the system.

Polyurethane injections are water sensitive materials so needs to be handled and used carefully. It is recommended to store the products before processing at working temperature for at least 12 hours.

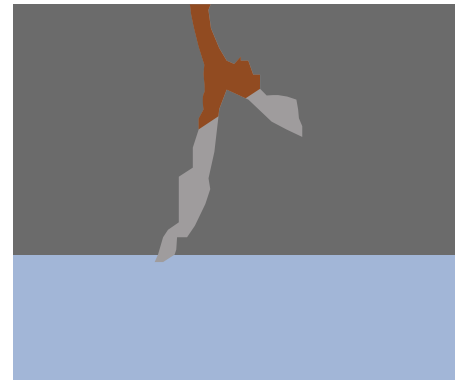
Step 5: Injection of Grouts

Depending on the nature of the crack, different polyurethane grouts can be injected. Please review the technical data for the proper selection of the grouting material and appropriate injection pump to be used. If using water reactive single component PU injections, ensure that crack is wet. In case of dry cracks, flush the crack with water to ensure that the crack is wet enough to react the grout when it is introduced into the crack.

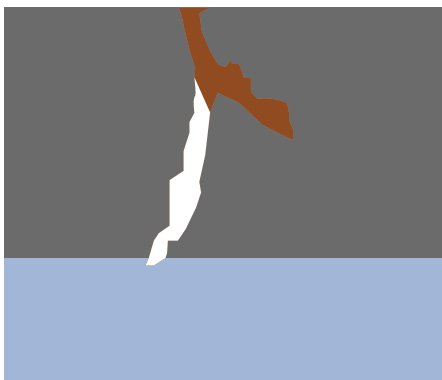
- Begin the injection at the lowest packer installed on a vertical crack, or at the first packer for a horizontal crack. During injection, you may notice that the Grout displaces water from the crack.
- Continue injecting until grout appears at the adjacent packer hole.
- Stop pumping and reinstall the packer in the adjacent hole, tighten and begin injecting on it.
- Continue this process until 3-4 packers have been grouted.
- Disconnect and go back to the first packer and inject all the ports for the second time. Some of the ports may take additional grout and further densify the material in the crack.
- This is more important when using Dual performance injection grouts like ECMAGROUT M 620 or ECMAGROUT M 640 which creates foam to stop water leakages and the same material needs to be injected again to form a permanent water-tight seal.
- Continue this process until the length of the prepared crack is injected.



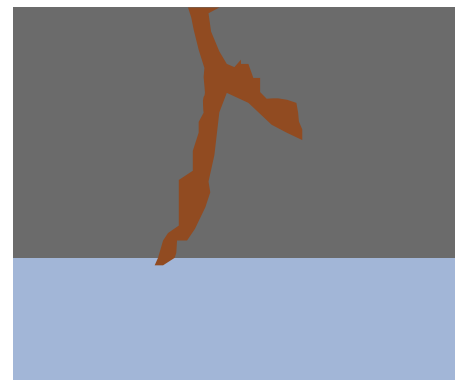
Cracked Wall



Injected



Converting to foam



Sealed

Note: Injection pressure will vary from 200 psi to 2500 psi depending on the width of the crack, thickness of concrete and condition of structure.

Step 6: Surface Cleaning and Repairing

Let grout fully cure inside injected areas. Cut packers flush with surface or remove packers completely. Scraper can be used to remove partially cured resin from the surface while fully cured resin can be removed through mechanical methods. Repair surface with appropriate material.

Step 7: Equipment Cleaning

- Flush grout pump immediately with Cleaning Agent until resin in line is displaced by cleaner. Resin should be washed out into a waste bucket.
- Circulate Cleaning Agent through pump for 10-15 minutes by connecting intake and outlet in an open bucket.
- Flush lines one last time with fresh Cleaning Agent to remove contaminants.
- Store pump & hoses safely with suitable lubricants.

Note: Please refer our product Technical Data Sheets & MSDS for more details like Technical characteristics, Application process, Handling & Storage, Safety & Precautions before use or call ECMAS team to discuss your specific problems & solutions.

Product Features

Products/ Properties	PU F 200	PU F 240	PU R 420	PU R 440	PU M 600	PU M 620	PU M 640	PU G 800
Suitable for hot & cold climates								
Adhesion to								
Substrate								
Withstands hydrostatic pressures								
Non-Toxic								
Suitable for Potable water								
Low Viscosity								
No shrinkage								
TDI, Phthalate, Solvent-free								
Impermeable to water								
High mechanical properties								

Product Applications

Products/ Applications	PU F 200	PU F 240	PU R 420	PU R 440	PU M 600	PU M 620	PU M 640	PU G 800
Cavities in concrete, loose & mountain rocks								
Sheet Pilings, Diaphragm Walls, Beams, Slabs, Columns								
Precast elements, concrete columns								
Cracks in Masonry								
Liquid								
Retaining Structures								
Sewage Treatment Plants								
Substructure Concrete								
Leaking construction joints								
High vol. Pressure water leaks								

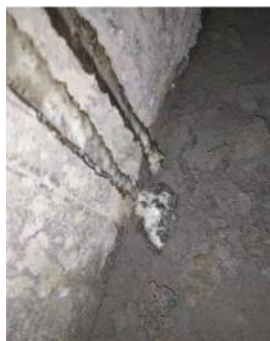
Installation Guidelines :

ECMAGROUT PU F, R, and M are normally carried out through packers installed in holes drilled at 45 degrees into the concrete. The holes should intersect the crack at the mid-point of the estimated crack depth.



Mixing :

Pour the contents of the (Part A) into a clean, DRY plastic bucket. Add the required quantity of catalyst (Part B), refer above table for cream time and gel time about the percentage of catalyst, and thoroughly mix manually, or with a slow speed (200 rpm or less) drill fitted with a stirrer for half a minute. Mixing should continue until the liquid is homogenous without streaks.





Injection Process :

ECMAGROUT PU F, R, and M should be injected using standard injection equipment having a pressure of 4 bar. Inject packers sequentially. Start injection at the lowest packer and continue to the next packer.

Cleaning :

Injection pumps should be flushed and tools cleaned immediately after use, before the resin sets, using ECMACLEAN. Once the resin has set, it can only be removed by mechanical means.



Precautions

- Resins are extremely water-sensitive
- Avoid skin contact
- Store the product before processing it for at least 12 hours at 5°C and 25°C and less than 50% relative humidity
- Visible surface leaks and cracks should be sealed with fast setting ECMAREP 504 (in case of ECMAGROUT PU G 800) or ECMAREP 502 (in other cases) to stop injection resin coming out of the crack
- Before injecting, the cracks could be flushed with clean water to remove salt, etc. from the crack
- Injection pumps should be flushed and tools cleaned immediately after use, before the resin sets. Use the ECMACLEAN name to be sure the part will be clean



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