GREEN MOUNTAIN INTERNATIONAL, LLC

ABOUT US

Green Mountain International is a leading supplier of polyurethane, epoxy and acrylate grouts for the concrete repair industry. Founded in 1987 outside of Chicago, Illinois, the company now has headquarters in Waynesville, NC (Asheville area). GMI has provided materials, equipment, and technical support for projects in over 40 countries and has been specified by engineers for thousands of projects in the U.S.A. Our product line includes polyurethane, epoxy and acrylate systems for water control, soil stabilization and structural concrete repair. The practical application of products is diverse from simple leak sealing of cracked concrete, failed joints, pipe penetrations, and separations to water control in mines and tunnels with volumes of water in excess of 3,000 gallons per minute.

Green Mountain provides the most innovative line of polyurethane grouts to stop water leaks and to stabilize soils. Our capabilities are as diverse as the conditions dictate. Formulations from one-half pound density to seventy pound density with reaction profiles from three seconds to many minutes are available. We also have a line of epoxy and polyurea coatings. Our professional technical staff is available to answer your questions concerning safety, handling, and application techniques by phone or in person if needed. Mountain Grout products are shipped as non-hazardous and non-flammable from three strategically located shipping points.

From Argentina to Alaska, Singapore to Sarasota, Mountain Grout materials and technical support have proven to be effective, cost efficient, and reliable in every way.

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DIVERSE APPLICATIONS FOR GROUTING SYSTEMS

TUNNELS|SOIL STABILIZATION|FOUNDATIONS|DAMS
CMU BLOCKS|MANHOLES|POOLS|WASTE TREATMENT
POTABLE WATER|VOID FILLING|SEAWALLS|MINING
ELEVATOR PITS|EXCAVATION|SLAB LIFTING
EROSION CONTROL

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CRACK INJECTION



Water can find its way through the tiniest of cracks and concrete patches simply do not stand the test of time. Polyurethane crack injection is the most common and most effective repair technique for sealing cracks and stopping water leaks, both in the United States and abroad. Whether it is a crack in a major city's subway system or in a residential basement, the method for pumping and sealing the crack is essentially the same.

Installers inject Mountain Grout polyurethane into cracks though packers via a high pressure pump to fill and seal the cracks and cease water infiltration. We offer a full line of chemical grouts, including hydrophobic and hydrophilic formulations, single and dual component blends, and a wide variety of viscosities (40 - 700+ cps) to address hairline cracks to larger cracks and joints. Our polyurethane foam bonds tenaciously to concrete and stands the test of time. Installations spanning decades are still as effective at stopping water infiltration as the very first day they were installed. Tunnels, basements, parking garages, water tanks, pools, dams, and elevator pits are all common locations for applications.



RCP REPAIR

The two most common problems with Reinforced Concrete Pipes (RCP) are broken joints and separated joints. Most often, these problems are caused by freeze thaw cycles, vibration, piping, weakened bedding, poor installation or decomposing filter cloths (frequently several of these problems at once). In the past, the pipes were typically dug up and replaced, but that method proved to be costly and time consuming, often causing road closures and delays. New technologies have created more options for structures with a 36" diameter and above at lower cost using a simple three step process:

1. Seal the joint from the inside with a combination of oakum rope and a highly adhesive, flexible polyurethane resin.

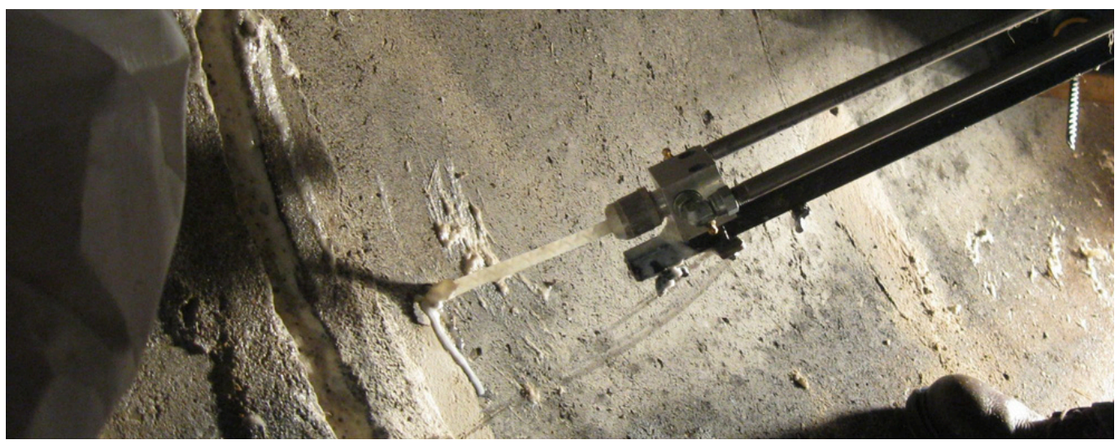
2. Seal the outside of the joint from the inside of the pipe with another flexible, adhesive, long-lasting polyurethane resin.

3. Replace lost soils and fill voids with another polyurethane resin product that is light weight, load bearing, and highly expansive.

Cost always matters, so pay close attention to temperatures. Cold temperatures can slow the reaction time of polyurethane resin and decrease its expansive properties. If installers are working in cold weather, heat the space if possible and always keep the polyurethane resin, hoses, and equipment in a temperature controlled environment (70°F and higher is ideal).







DAMS





Earthen and Concrete Dams - Water Control and Conservation
Stopping leakage through cracks in concrete dams is most often accomplished with the same basic crack injection procedures used for concrete walls and tanks. Bore holes are drilled to intersect the crack, packers are placed in the holes, and grout is pumped under pressure into the crack. In most cases, the injection holes are drilled deeper in dams than typical concrete structures due to the thickness of the concrete.

One important consideration in addressing leaks in dams is the pressure and volume of water flowing through the dam. A large leak of thousands of gallons per minute must be addressed differently than a simple seepage leak. While each dam repair may require modifications to the procedure, you typically need a grout with faster reactivity and a pump with higher output to address high volume leaks. Your Mountain Grout representative is ready to advise you on the correct product and pump to achieve the best results.

Several Notable Dam Projects at GMI
The Upper Stillwater Dam in Duchesne, Utah was the largest RCC dam in the world when it was constructed in 1983-1987. The height of the dam face was 230 feet. The leaks ranged from 2 to 2,770 gallons per minute. The leaks were sealed with Mountain Grout Ultra, a hydrophobic polyurethane grout with high elongation properties. A complete report is available from your Mountain Grout Representative.

Eagle Mountain Dam and Levee, in Fort Worth, Texas had seepage issues in a zone as far as one hundred feet below the surface, losing thousands of gallons of water in an area where water is becoming more and more precious. 57,000 gallons of HL-100 were pumped into the zone during 2012-2013 in order to form a solid, impermeable mass where only porous fill dirt had been. The job received ASDSO 2014 Project of the Year.

The reservoir dam at the Biltmore Estate in Asheville, North Carolina had developed small leaks through the masonry joints. These leaks were stopped with the injection of Mountain Grout Flexible in 2008.



WASTE WATER TREATMENT



Wherever there is concrete and water, there are cracks and leaks. Mountain Grout has been used to seal many leaking concrete tanks. Water treatment facilities are one of the primary beneficiaries of the performance of Mountain Grout. Mountain Grout Polyurethane Resins are injected into leaking wastewater treatment tanks to seal cracks and stop the leaks, saving thousands of gallons of water and thousands of dollars in infrastructure repairs over time.

Injecting Water Tanks with Polyurethane Resin
Installers grout vertically starting at the bottom of each crack and the foam follows the crack upward, sealing it as the foam cures. The foam fills the void and keeps the water where it is supposed to be – inside of the treatment tank. Mountain Grout can also be used on oil tanks and potable water tanks. If it is a potable water tank, Mountain Grout Flexible and HL-100 are UL Classified for use on NSF-61 jobs.



TUNNELS



Green Mountain International has provided grouting materials for some of the tunnelling industry's most prestigious projects. Our Mountain Grout Flexible, SLV, and HL-100 are commonly used to stop water intrusion through cracks and failed joints.

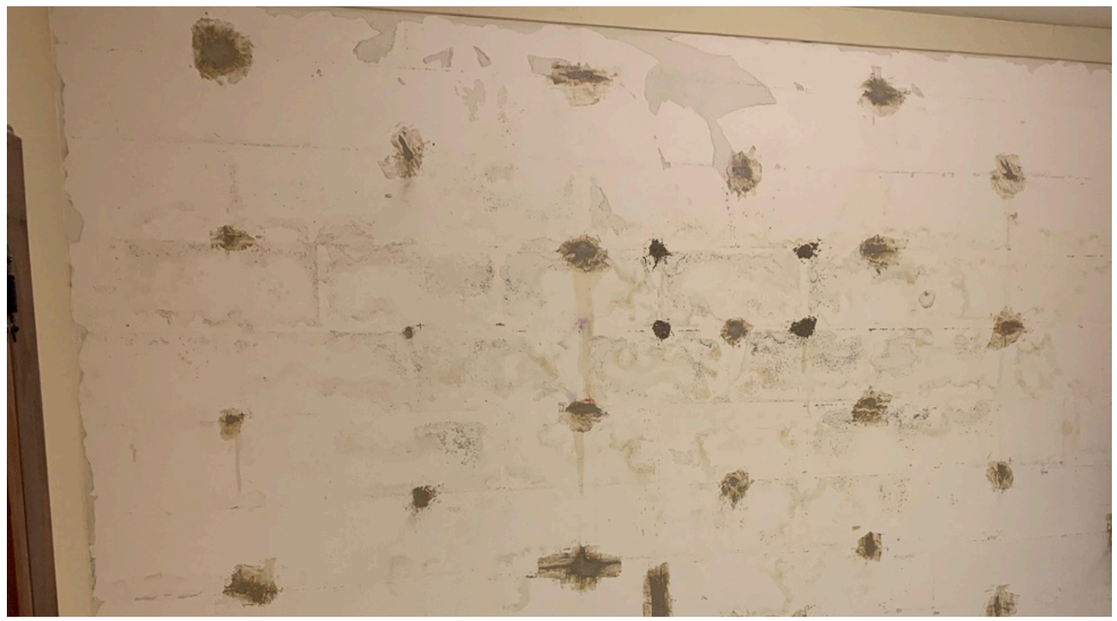
Green Mountain's Mountain Grout Soil Stabilizer is moisture cured polyurethane that is used when super low viscosity, 40 centipoise, is needed to penetrate soil particles and provide high compressive strength, 750+psi.

Polyurethane systems are sensitive to moisture so the available moisture in the ground causes the chemical grout to cure. Mountain Grout Accelerator may be added to the base resin to cause the resin to react faster than normal if there is water migrating through the soils. When water control is not the issue but super poor soils are present, our Mountain Grout Acrylate is recommended. This material is a 4 part system and when pumped 1:1, it has a viscosity of 4 to 10 centipoise. Water is one cps, motor oil is 600 cps, and ketchup is 50,000 cps so at 5 cps, if water will pass through the soils, so will the chemical grout. Mountain Grout Acrylate may be pumped at different ratios from 2:1 or 3:1 base with water to form a gel that does not have high strength, but does perform in leak sealing, curtain grouting, and even crack injection.

Both polyurethane and acrylate grouts are members of the chemical grout "family" and particularly in tunneling operations are used for both water control and stabilization in front of the advancing TBM.



CMU BLOCKS



Polyurethane Resins For CMU Wall Waterproofing
CMU (block) walls present a unique challenge compared to poured concrete walls. They often experience seeping leaks in small voids between the mortar and the block, but exhibit no obvious cracks. Additionally, waterproofing membranes installed at construction fail due to mechanical damage during backfill or due simply to age.

Finally, the blocks are most often hollow, making it even more difficult to inject resin into the specific void area without accidentally filling the void in the block and potentially causing damage to the CMU wall. Therefore, the most common application method using polyurethane resin is to create a waterproof membrane along the back side of the wall to stop leaks before moisture reaches the CMU wall.

Advantages of Curtain Grouting
The biggest advantage to the curtain grouting method is that no expensive excavation is necessary on the positive side of the wall. Grout curtains can be installed behind the wall whether or not a waterproofing membrane was installed during initial construction. Installers can drill through the mortar joint from the negative side and pump grout with low pressure through packers into the voids and soil on the positive side. The polyurethane resin reacts with the moisture present in the soil and void to react and form an impermeable barrier, keeping the water where it belongs and the subgrade wall dry.

It is important to remember that polyurethane doesn't make water go away. Grout curtains merely stop water from infiltrating voids in walls. Installers (and owners) should be prepared for the groundwater to build head pressure and find a new void if one exists. Therefore, a large grid pattern covering the greater area around a wet spot on the wall is recommended to avoid "chasing" the water for several installations.

If a grout curtain is properly installed, it should mean the end for damp walls, mold, and other common problems associated with subgrade CMU walls.

SOIL STABILIZATION



Poor soil conditions present challenges for geotechnical engineers and property owners. For example, the structure is settling, causing cracks in the foundation, below grade walls, floors and even above grade walls. Soil testing indicates that there are layers or zones of soil that will not support the weight of the building, so it's sinking. There may be water migration problems, as well.

Green Mountain International offers a range of solutions worthy of consideration.

Polyurethane: If high strength is needed, our Mountain Grout Soil Stabilizer or HL-100 polyurethane grout will penetrate the soil filling voids between particles and forming a mass within the soil that can provide compressive strength in excess of 1,000 psi. Mountain Grout Technical Representatives can recommend a polyurethane resin based on the specific soil conditions on site.

Acrylate: Mountain Grout Acrylate is another option that is used often for water control within the soils or for applications requiring less strength. Mountain Grout Acrylate is a four part system. When pumped one to one with water, it has a viscosity of 10 cps so it can be used in very compact soils. The compressive strength is much lower than the polyurethane resin option, but for water migration problems and very loose soils the Mountain Grout Acrylate provides a great solution.

Sodium Silicate: Sodium Silicate is another product used to stabilize soils. Green Mountain International offers the base silicate and a number of different catalysts commonly used by experienced technicians.

After the load bearing properties of the soil are restored, Green Mountain International offers polyurethane grout systems and epoxy products to address the restoration issues caused by the settlement.

MINING

Mining operations present multiple opportunities to use polyurethane systems. From "roof glue" used in coal mines for roof control to water control 1,200 feet below grade in limestone and other hard rock mines, Mountain Grout likely has a formulation to suit your needs.

Dual component polyurethane systems, like Mountain Grout ISP (Instant Set Polymer), are used often to shut off high volume of water flows. Its reaction profile (typically 4-6 seconds) enables the resulting foam to fill voids quickly and seal leaks before it washes away. Mountain Grout Flexible, which is UL classified for potable water applications, has been used extensively in stream remediation where mining below the creek has fractured bedrock, allowing the stream to flow underground. Mine airshafts and entries that are no longer in use are areas where Mountain Grout polyurethane systems have been used successfully to shut off water intrusion from 20 gallons per minute to 200 gallons per minute.

Polyurethane grouts react with water, so this makes leak sealing or water control problems a perfect application in mines. Degassing in coal mines is a procedure where Mountain Grout is pumped into fissures ahead of mining to seal off methane gas. Behind the long wall, two component urea-silicate grouts like Mountain Grout US Grout are used to consolidate rubble and fill voids that may trap methane gas. Particularly in mining, Mountain Grout products are part of an overall safety and environmental plan.

From large scale mechanized mining operations to small "hand dug" operations, Mountain Grout serves the industry well with polyurethane and acrylate, single and dual component chemical grouts.



PARKING GARAGES



Parking garages are commonly packed in tight urban spaces and are often below grade. This makes excavation around the exterior of the structure almost impossible when cracks develop and begin to leak. Using basic crack injection methods, installers can fill the cracks with Mountain Grout Polyurethane Resin and stop troublesome leaks in parking garages.

If the issue is poorly vibrated or honeycombed concrete, the proper procedure is to drill through the wall and pump the resin to the outside of the structure. If the area is small and specific, drill at an angle to cross the zone, place a packer, and pump at 250+ psi.

The grout will surface almost immediately as the area is likely “rubble” with many leak paths. Still, this method is worth a try and would use far less grout than a large grout curtain. Installers should take care to lay down plastic sheeting to protect the concrete and keep parked cars at a distance to avoid unnecessary property damage.







