

# VOLCLAY BENTOGROUT™

## BENTONITE INJECTION GROUT FOR REMEDIAL WATERPROOFING

### DESCRIPTION

BentogROUT is a high-solids grout consisting of a proprietary blend of bentonite and polymers formulated for sealing water leaks in existing below-grade structures. BentogROUT is pumped in a fluid state adjacent to the exterior of the structure where it sets up to a solid material forming a waterproofing membrane around the structure. BentogROUT can be used to seal leaks in concrete, masonry block, brick, and stone foundations.

Installation is fast and easy. Simply mix BentogROUT with water and pump it adjacent to the exterior of the building. There it solidifies and expands slightly to form a waterproofing membrane. It can be pumped from above-grade outside the structure without excavating or from the interior of the structure through drilled holes in the walls or floors. Limited jobsite space is required for injection.

Unlike many remedial waterproofing products that are applied as a surface treatment to the interior of the foundation, BentogROUT is applied to the exterior of the building where it stops the water before it can penetrate the structure and further corrode the reinforcing steel. The thick BentogROUT membrane covers the exterior surface of the structure filling voids in the adjacent soil and bridging over small cracks in the concrete. Also, BentogROUT has the ability to self-seal if the structure settles and therefore its performance is not limited by future hairline cracking in the concrete.

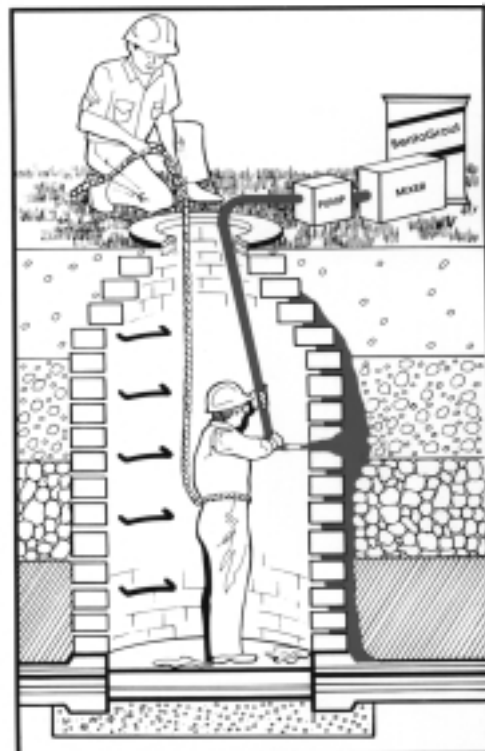
BentogROUT does not shrink or dry out in sub-surface soil formations and is not affected by freeze/thaw cycling. It remains flexible, maintains a putty-like consistency over time, and retains a swell potential to seal itself off. And since BentogROUT primarily consists of a natural minerals it is friendly to the environment and will last the life of the structure.

**Packaging:** BentogROUT is packaged in 50 lb. (22.6 kg), multi-wall bags; 48 bags per pallet. Store in a dry, moderate temperature location.

### APPLICATIONS

- ¥ CONCRETE & MASONRY FOUNDATION WALLS
- ¥ MANHOLES
- ¥ UTILITY VAULTS
- ¥ FOUNDATION SLABS
- ¥ TUNNELS
- ¥ SHEET PILING INTER-

### INJECTION ILLUSTRATION



BentogROUT being injected to seal a below-grade utility manhole.

## PREPARATION

Locate and mark all below-grade electrical, sewer, and mechanical service lines prior to injection operations.

A successful operation requires the installation to occur without mechanical failure of the grout mixing/pumping equipment. Ensure that all required materials are available and in working condition prior to beginning the application. If pumping from the interior of the building, drilling operations should be completed prior to mixing BentogROUT.

**Injection Head:** The contractor will need to fabricate an "Injection Head" to connect the pump hose to the injection pipe. Two examples of "Injection Heads" are pictured below. FIGURE 1 illustrates an Injection Head assembly with two hose connections — one for the grout and the other for a drilling medium (water or air). FIGURE 2 illustrates an Injection Head assembly with only a grout line connection. The Injection Head will also serve as a leverage device in assisting the applicator in inserting the injection pipe into the soil substrate.

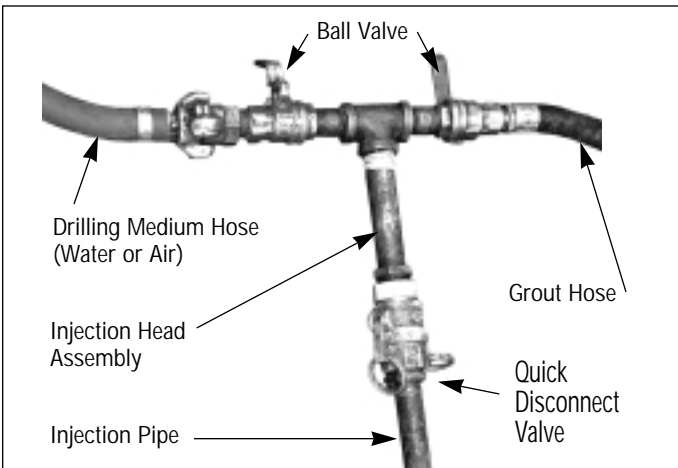


FIGURE 1 — Dual Connection Injection Head Assembly

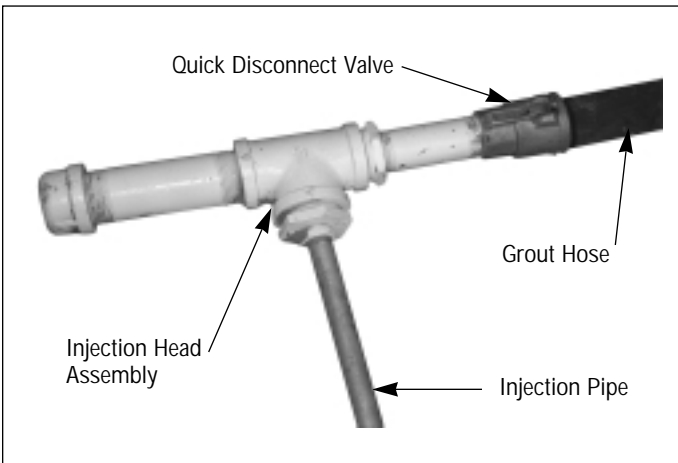


FIGURE 2 — Single Connection Injection Head Assembly

**Mix Water:** Use only clean water. BentogROUT mixes best in cool water with a pH between 8 and 10. High temperature water can accelerate the set up time of the grout.

**Mixing Equipment:** Use mixing equipment capable of producing continuous shear and agitation movement. Progressive cavity pumps with vertical paddle and horizontal ribbon blender type mixers are recommended. It is not recommended to use a piston style pump due to the high spikes in back-pressure generated. *Caution:* Pumping any material under pressure can cause lifting or movement of adjacent structures. CETCO recommends the use of a Chemgrout Model CG-555 grout mixer or equivalent. The trailer mounted CG-555 includes a grout pump and mixer with a self-contained gasoline/hydraulic power unit. For rental or purchase information contact Chemgrout at (708) 354-7112 or [www.chemgrout.com](http://www.chemgrout.com).

**Pumping Pressures:** BentogROUT is typically pumped at pressures of 20-80 psi. But since there are many jobsite variables actual pumping pressure will vary. Variables may include, amount of water added to dry grout, pump hose diameter and length, resistance at hose-head, substrate material and compaction, etc. For example, in large void areas the pumping pressure may only be 10 psi, but as soon as back pressures form the pressure may spike to 100-200 psi. Watch the pumping pressure closely while installing the grout. Backoff as the pressure increases. Additionally, a crew member may be stationed inside the structure to monitor the injection. This is especially important with masonry block foundations.

**Pump Hose:** A 1-1/4" (32 mm) diameter pump hose with a minimum 200 psi pressure rating is recommended. The pump hose should be as short as possible without adversely limiting operations. The longer the hose and the more turns it makes, the greater the pumping pressure decrease at the injection head.

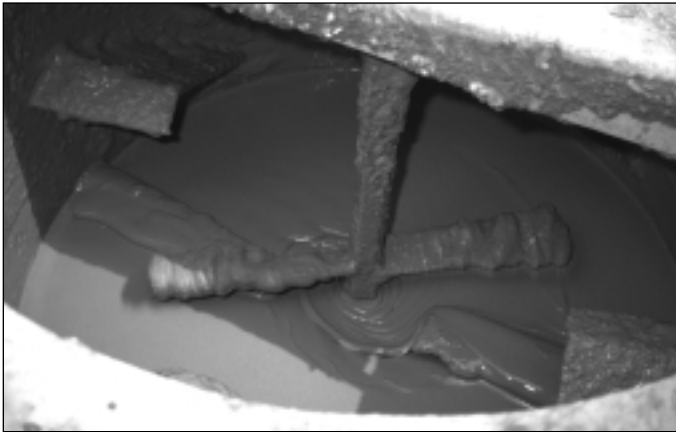


Chemgrout CG-555 trailer mounted pump with mixer.

## INSTALLATION

**Mixing Instructions:** Add 14 gallons (53 l) of fresh water to a motorized mixer and then add a single 50 lb. (22.6 kg) bag of dry BentogROUT to the water. Thoroughly mix for approximately 3-5 minutes until even "oatmeal" consistency.

BentogROUT remains pumpable and placeable for 45 minutes after being mixed. After mixing, if pumping is stopped or suspended, disconnect pump hose with quick disconnect valve at pump head and place end of hose over pump hopper to recycle grout during suspended period. Do not allow mixed grout to stand in hose. It will set up and clog the hose.



Thoroughly mix BentogROUT with 14 gallons of water for 3-5 minutes until grout has even "oatmeal" consistency.

**Coverage Rate:** Typical installation thickness of BentogROUT is 1/2" (12 mm) or greater. Coverage rates will be affected by injection depth, void areas, soil compaction, material waste, etc. A 50 lb. bag of BentogROUT yields 2.2 cubic feet of grout. Estimating a 1/2" (12 mm) thick coverage rate without any void spaces, a 50 lb. bag should cover approximately 50 sq ft (4.6 sq m). Actual results will vary with each project.

### **Surface Injection From Exterior of Building:**

Use 3/8" - 3/4" (10-18 mm) diameter heavy wall steel pipe as injection pipe for BentogROUT placement. Cut the pipe tip at a 45° angle to aid in sinking of the injection pipe. A single pipe can be repeatedly inserted and removed, or numerous pipes can be inserted and then all injected through in sequence.

Insert injection pipe as close as possible to the foundation wall at 24" (0.6 m) on center to the top of the footing or the desired depth. Use a "Tile Rod" or long drill bit to start the first few feet of the injection hole. With a Dual Connection Injection Head, use pressurized air or water jetting to assist in the process of sinking the pipe (see Figure 1). With a Single Connection Injection Head, use the grout as a drilling medium to assist with sinking the pipe (see

Figure 2). For deep depths, it may be necessary to use scaffolding to operate from when first inserting a long pipe.

After sinking the injection pipe to the desired depth, pump grout until it extrudes out at grade or substantial back pressure is achieved. (Caution: Be careful not to inject grout into sub-surface drainage tile.) Continue to pump grout while slowly removing injection pipe. Then move to adjacent injection point and continue process.

### **Interior Injection Through Slab or Wall:**

Drill 5/8" - 3/4" (15-18 mm) diameter holes through the structure where grout injection is planned. A minimum of two holes should be drilled - one for grout injection and the other for pressure release. Insert PVC pipe nipples into the drilled holes to provide a means of connecting a pump hose for injection. Pump BentogROUT through the predrilled holes until grout begins to come out of adjacent hole(s) or substantial backpressure is achieved. For wall injections, begin grout injection at the lowest point on the wall and then work upwards. *Caution:* pumping material under pressure can cause lifting or movement of the structure. After grout injection, a pipe cap can be installed on the nipple to temporarily seal off the hole. Then move to adjacent injection point and continue process. After completing the grout work, remove the pipe nipple and plug hole with a non-shrink hydraulic cement patch product.

An alternative interior injection method is to use a Single Connection Injection Head (Figure 2) with a short 8" (200 mm) heavy wall steel injection pipe for BentogROUT placement. Injection pipe tip may require a rubber gasket to provide a tight seal for pump operations.

**Clean Up:** Clean application tools and mixing equipment with water immediately after use. Remove any access grout from grade surface. Caution mixed grout is slippery.

**Precautions:** It is mandatory that the user take the following precautionary measures to protect workers and the public. Avoid inhalation of powder dust. Ensure adequate ventilation. Avoid contact with eyes. Wear protective eye wear at all times. Flush eyes with water if contact occurs. Additional precautions, safety information and first aid treatments are contained on the Material Safety Data Sheet.

**Limitations:** BentogROUT is not designed to bridge cracks or gaps larger than 1/8" (3 mm). Interior surface cracks greater than 1/8" should be surface sealed with cement based patching material to prevent grout extrusion into the structure. BentogROUT is not designed as a structural patch. BentogROUT is not recommended for above grade or applications that do not provide proper confinement. BentogROUT is not suitable for sealing expansion joints.

# VOLCLAY BENTOGROUT™

## REMEDIAL WATERPROOFING SYSTEM

### EXTERIOR SURFACE GROUT INJECTION



BentogROUT is applied to the outside of the building without excavating the site.

### INTERIOR THROUGH WALL APPLICATION



BentogROUT injected to the exterior of a manhole through pre-drilled holes using a short injection wand.

### EXTERIOR MASONRY WALL APPLICATION



Inject BentogROUT along the exterior of a foundation wall at 24" (600 mm) on center intervals.

### STRUCTURAL SLAB APPLICATION



Inject BentogROUT under an existing slab to provide waterproofing and fill void areas.

## TECHNICAL DATA

### Dry Material Properties (Before Mixing):

Bulk Density	55 lbs/ ft <sup>3</sup>
Specific Gravity	2.5 gm/ cm <sup>3</sup>
Bonded Moisture Content	12%

### Final Set Material Properties:

Permeability	5.2 x 10 <sup>-8</sup> cm/sec
(ASTM D-5084)	
Mud Weight	10.2 lbs/ gal
Cone Penetrometer (24 hours)	44 mm
Yield per bag	2.2 cubic ft (0.06 m <sup>3</sup> )

# CETCO

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