



PRODUCT SUBMITTAL INFORMATION

THERMAL GROUT SELECT 100

PO Box 255 • Elkton, SD 57026 • (605) 542-7391 • Fax (605) 542-1303
PO Box 150 • Bowie, TX 76230 • (940) 872-8097 • Fax (940) 872-3678

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THERMAL GROUT SELECT is a unique bentonite-based two-part, field mixed, high to extreme-high solids material that can be mixed to meet a range of thermal conductivity's from 1.00 to 1.20 Btu/hr-ft-°F. It has been specifically developed for closed-loop ground-coupled heat pump applications where thermal conductivity in the vertical bore column is critical to system performance. This product is certified by the National Sanitation Foundation International to ANSI/NSF Standard 60, *Drinking Water Treatment Chemical - Health Effects*. **THERMAL GROUT SELECT** contains no chemical polymers or organic matter.

When both Part I and Part II materials are supplied by GeoPro, Inc. and are mixed according to the following specifications, **THERMAL GROUT SELECT** will yield a bentonite-based grouting material with a minimum thermal conductivity of 1.00 Btu/hr-ft-°F as determined when tested in accordance to ASTM D-5334, "Standard Test Method for Determination of Thermal Conductivity of Soils and Soft Rock by Thermal Needle Probe Procedure". The specific mixture described in this document is called **THERMAL GROUT SELECT 100**.

MIXING INSTRUCTIONS for THERMAL GROUT SELECT 100 (per each unit):

The following information is considered proprietary and confidential and should not be shared with any competing company to GeoPro, Inc.

1. Place 18.0 gallons of fresh water in a conventional paddle mixing tank.
2. Start mixer and add one 50 lb bag of *Bentonite Base (Part I - Thermal Grout Select)*.
3. Add 250 lbs of *Thermal Enhancement Compound (Part II - Silica Sand)* at a moderate rate (in about 4 to 6 minutes) and continue to mix for another 1 to 2 minutes to obtain a consistent mixture.
4. Pump with a positive displacement pump (piston pump recommended) through a 1-1/4" inside diameter tremie pipe at a rate of 5 to 15 gallons per minute.

When mixed according to these instructions, each unit will yield 32.0 gallons with a density of 14.07 lb/gal. The total solids content will be 66.6% and will have a linear shrinkage potential of less than 11%. The above amount of thermal enhancement compound will equate to 55.5% of this product by weight.

The permeability of this mixture will be less than 8.0×10^{-8} cm/sec, which has been verified by an independent testing laboratory using ASTM D-5084, "Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter, Method C - test with increasing tailwater level", and is below most States regulations and the U.S. Environmental Protection Agency's maximum recommendations of 1×10^{-7} cm/sec. Copies of the independent lab reports are available upon request.

FIELD QUALITY CONTROL for THERMAL GROUT SELECT 100:

GeoPro, Inc. strongly recommends that a field quality control process be employed when using any thermally-enhanced grouting material. Therefore, GeoPro will supply, at no charge, three sample containers with return cartons per commercial project using **THERMAL GROUT SELECT 100**. Through the course of the project, it is recommended that at least three sample specimens be taken of the mixed grouting material. The recommended frequency would be as follows: once at the beginning of the installation; once approximately one-third through the installation; and once approximately two-thirds through the installation. Each time GeoPro receives the sample, an analysis will be performed in accordance to ASTM D-5334 to verify the specified thermal performance of the sample with a written report being sent immediately to the entity requesting the analysis.

For each project, additional sample containers can be supplied and analyses performed for a modest fee.

Allan Skouby, Director of Sales and Marketing
GeoPro, Inc.