



BAROTHERM[®] PLUS

Two-Part Thermally-Conductive Grout

Description BAROTHERM[®] PLUS thermally-conductive grout is a bentonite material designed for use in grouting boreholes containing ground source heat loops. BAROTHERM PLUS thermally-conductive grout when combined with silica sand at various concentrations, yields a high-solids grout with thermal conductivity values ranging between 1.0 and 1.2 BTU/hr-ft.^{°F} (1.73 – 2.03 watts/m.^{°C}). BAROTHERM PLUS thermally-conductive grout does not contain any polymers.

Applications/Functions *The use of BAROTHERM PLUS thermally-conductive grout assists and promotes the following:*

- A high-solids, thermally-conductive grout medium with low permeability for ground source heat loops
- Versatile grout and sealing material for water well applications

Advantages

- Efficient heat transfer
- Promotes development of a low permeable, flexible seal to prevent commingling of aquifers
- NSF/ANSI Standard 60 certified
- No heat of hydration

Typical Properties

- Appearance Beige to tan powder
- Specific Gravity 2.6
- Thermal Conductivity (k) range 1.0 – 1.2 BTU/hr-ft.^{°F}
- Thermal Conductivity (k) (SI units) 1.73 – 2.08 watts/m.^{°C}
- Yield Volume range 33.0 – 43.1 gal/batch
- Grout Weight range 13.9 – 14.8 lb/gal
- Permeability < 7.0 x 10⁻⁸ cm/sec

Recommended Treatment

- The recommended treatment is based on the desired thermal conductivity value or k. Please refer to the treatment table below.

k Btu/hr ft °F	Silica Sand lb/50-lb	Water gal/50-lb	Slurry Volume Yield (gallons)	Density lb/gal	Total Solids
1.0	250	19.3	33.0	13.9	65.1%
1.1	350	21.6	39.8	14.5	68.9%
1.2	400	22.6	43.1	14.8	70.4%

k watts/m. ^{°C}	Silica Sand kg/22.7-kg	Water liters/22.7-kg	Slurry Volume Yield (liters)	Density SG	Total Solids
1.73	113.4	73.1	124.9	1.67	65.1%
1.90	158.8	81.8	150.6	1.74	68.9%
2.08	181.4	85.6	163.2	1.78	70.4%

Recommended Mixing Procedure

- To optimize yield and performance of BAROTHERM® PLUS thermally-conductive grout it is recommended to pre-treat the make-up water with Soda Ash to less than or equal to 100 mg/l total hardness and a pH of 8.5 – 9.5
- Using a mixing device, blend one sack of BAROTHERM PLUS thermally-conductive grout into the appropriate amount of freshwater. Rate of addition should be about 20 to 30 seconds per 50-lb (22.7-kg) bag. Mix for approximately 30 to 90 seconds, depending on the mixer. Add sand at a rate of 20 to 30 seconds per sack and pump.
- The use of dry silica sand with a silicon dioxide (SiO₂) content > 99% and a particle size ranging between 50 and 70 mesh is recommended.
- Blend, do not over mix and do not use a centrifugal pump. Pump slurry through 1.25 inch tremie into borehole without delay.
- The subsurface environment that the respective bentonite sealing material or grout is to be placed into should always be taken into consideration when selecting the appropriate material to compose the well seal. If the formation water chemistry has a total hardness of greater than or equal to 500 parts per million and/or a chloride content of greater than or equal to 1500 parts per million the use of a bentonite material may not be appropriate for this environment. In the event that questions regarding subsurface environments arise it is always best to consult your local Baroid IDP representative to determine if the Baroid product of choice is appropriate for the given conditions.

Packaging

BAROTHERM PLUS thermally-conductive grout is packaged in 50-lb (22.7-kg) multi-wall paper bags, containing 0.7 ft³ (0.02 m³).

Availability

BAROTHERM PLUS thermally-conductive grout can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products

Product Service Line, Halliburton

3000 N. Sam Houston Pkwy. E.

Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613
