



Massachusetts Department of Environmental Protection

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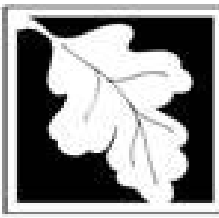
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Massachusetts Department of Environmental Protection
 Bureau of Resource Protection-Wetlands
**Submittal Platform for WPA Form 1 - Request for
 Determination of Applicability**
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

NEWTON
 City/ Town

A. General Information

1. Project Location:

a. Street Address 53 ROOSEVELT RD
 b. City/Town NEWTON c. State MA d. Zip Code 02459
 e. Latitude 42.31371 N f. Longitude 71.19332 W
 g. Map/Plat # 80613/559 h. Parcel/Lot # 810490000100
 i. Project Description GEOHERMAL HEAT PUMP

2. Applicant:

Individual Organization

a. First Name SATYA b. Last Name KOTA
 c. Organization _____
 d. Mailing Address 53 ROOSEVELT RD
 e. City/Town NEWTON f. State MA g. Zip Code 02459
 h. Phone Number 617-413-3101 i. Email keerthires@gmail.com

3. Property Owner:

more than one owner

a. First Name SATYA b. Last Name KOTA
 c. Organization _____
 d. Mailing Address 53 ROOSEVELT RD
 e. City/Town NEWTON f. State MA g. Zip Code 02459
 h. Phone Number 617-413-3101 i. Email keerthires@gmail.com

To: Whom it may concern

As per the homeowner's request I am providing a "basic synopsis of what the vertical loop installation" would involve at - 53 Roosevelt Circle Newton, MA. Based on the fact that the yard exists within the Newton, MA flood plain there are apparently more significant groundwater and site drainage elements that need to be reviewed and approved before we can proceed.

Geothermal opened and closed loop guidelines published by the Commonwealth of Massachusetts can be found here : <https://www.mass.gov/files/documents/2016/08/ot/gshpguid.pdf> . That said, we know each town has different site specific regulations and that each town maintains primacy re: decisions/approvals for land use.

The Kota's intended vertical loop project scope:

-Total of 750' of vertical bore is planned. Likely two boreholes at about 375' each. Boreholes are separated by 20' horizontally.

-After boreholes are in and 2 – 1.25" HDPE pipes are installed with u-bend in the bottom (picture an upside-down hairpin) the void around the 2 – 1.25" pipes in the 6" artesian bore hole is back filled with bentonite grout.

-When this "phase 1" is completed there will likely be 2-3 yards of tailings that come out of the borehole. It can include, rocks, sand, and likely mostly ground up bedrock. Steel casing is hammered into the "competent bedrock" to keep surface water from intruding and to keep the well from caving in on itself on the way down to bedrock.

-We would also plan to build a perimeter using silt fence and straw wattles in order to keep any drilling mud or other solids from entering the storm drain in the middle of the back yard.

-While drilling the holes there will be a pit dug around the borehole so that water and drilling mud can be deployed. This seals the overburden so that the well remains open as they drill to depth. That pit would lead via a 1' deepX1' wide trench over to a simple diffusement pit. There the clean water would percolate back into the soil and we scoop out the drilling mud that settles on the top of the pit. In this particular application we understand that the tailings and solids all have to be removed from the site. This is planned for this application and will cost the Kota's an additional \$2,000 for the backhoe and dump truck to remove the solids from drilling and mudding.

-When drill truck leaves there would be 2 6" pipes sticking up out of the ground with two 1.25" pipes extending above (the upside down hairpin). Then a tremie rig arrives and backfills the void in the 6" borehole to complete the loop and make a conductive connection from the loop pipes to the earth. (phase 2) This also seals off the loop and so no other liquid or material can then enter or exit the open ground/well area. Any mixed grout that overflows would also be scooped up and removed.

-If the driller encounters water when drilling the two 375' boreholes it must be cleared out of the hole and is typically perked back into the yard via the same perk pit noted earlier.

-If we can drain any encountered water through a sieve bag and back to the property to percolate back down this is included in the current contract price. If holding tanks and water trucks have to be brought

in because we cannot percolate clean water back to the ground, that equipment and trucking will add \$4,500/truck load of liquid. There could be no truckloads or several.

-The final step (phase 3) will require a backhoe to dig a 2' wide by 4' deep trench to marry the two boreholes together. That trench would then be dug over to the entry into the basement equipment room to serve the supply of the two loops together to serve the equipment inside. All trenching material would be backfilled into the trenches it came out of, so no net gain or loss of solid material on the property in this case.

Massachusetts Geothermal understands that the unknowns and other restriction like advance perc. and soil testing costs along with what could be significant additional costs of mitigating all solids and liquids from the site may prove too financially burdensome for the Kota's. For this reason we are prepared to return the deposit we received on 4/13/2023 in full should they decide not to proceed.

-If the decision is to proceed a supplemental contract will need to be confirmed with a clear understanding of potential additional costs that could be incurred.

See attached information re: drilling mud and grout we would use in this and virtually all other vertical loop applications.

Signed,

Martin Orio

Massachusetts Geothermal

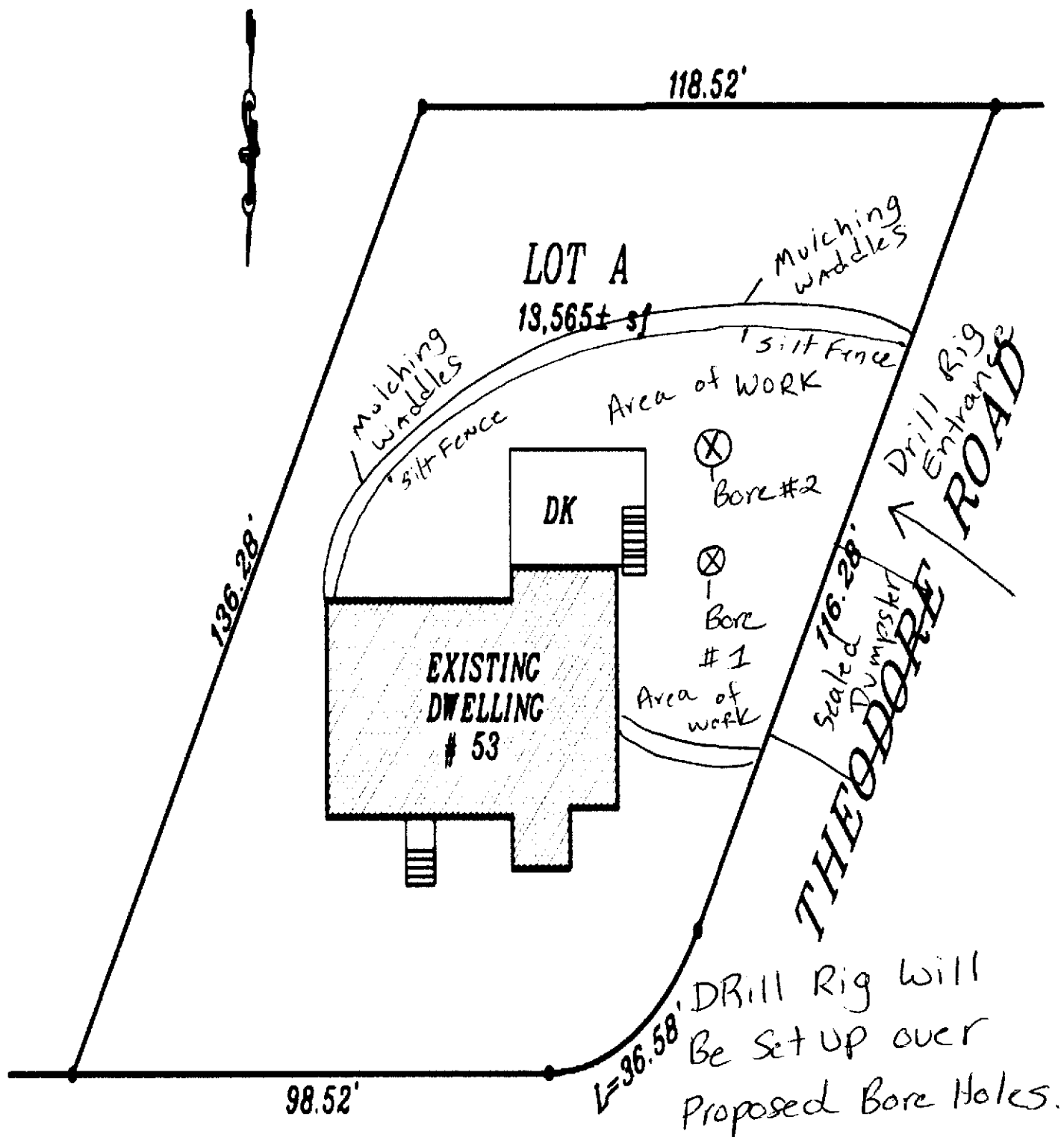
8 Grove Street Medfield, MA 02052

martin@massachusettsgeothermal.com

508-904-5815

Closed Loop Geothermal

⊗ = Proposed Bore Holes
380' Deep



ROOSEVELT ROAD

TG Lite | PowerTEC | 1.14 Btu/hr-ft-°F

PRODUCT SUBMITTAL INFORMATION

PRODUCT MANUFACTURER & DESCRIPTION

TG Lite and PowerTEC are manufactured, distributed and supported by GeoPro, Inc.

When supplied by GeoPro and mixed according to our specifications, this TG Lite and PowerTEC recipe will yield a bentonite-based thermal grout that provides an environmental seal in the bore annulus with the engineering properties described.

PRODUCT PERFORMANCE & TECHNICAL DATA

This product complies with IGSHA's Closed-Loop Design and Installation Standards which require:

- Permeability less than 1.0×10^{-7} cm/s per ASTM D-5084.
- Thermal conductivity tested per ASTM D-5334.
- Compliance with NSF/ANSI Standard 60 requirements for purity and suitability for contact with drinking water.

Properties and associated certifications are independently verified by a third party laboratory. Copies of independent test reports are available upon request.

FIELD QUALITY CONTROL

When using TG Lite with PowerTEC, GeoPro strongly recommends a field quality control process consisting of:

- Thermal conductivity testing of grout samples
- Submission of material usage reports

Grout samples should be collected in the field and tested in a lab (per ASTM D-5334) to verify that the product meets minimum thermal performance requirements. Thermal conductivity testing is a free service that GeoPro provides. Sample containers are available upon request.

Material usage reports are available for download on our website. Contact us for more information.

BATCH RECIPE

TG Lite	2	bag(s)
PowerTEC	1	bag(s)
Fresh Water*	31.0	gal (US)
Yield	36.7	gal (US)

*Mix water must be suitable for human consumption

GROUT PROPERTIES

Target Thermal Conductivity	1.14	Btu/hr-ft-°F
Permeability	$<1 \times 10^{-7}$	cm/s
Density	10.6	lb/gal (US)
Percent Solids	33.8	by weight
Percent Active Solids	27.9	by weight

MIXING INSTRUCTIONS

1. Fill conventional paddle mixer with 31.0 gal (US) of fresh water (according to mix table). *Accurate mix water volume measurements are critical.*
2. Start mixer and add 1 bag(s) of PowerTEC.
3. Add 2 bag(s) of TG Lite and mix until uniform (approx. 2-3 minutes).
4. Pump with a positive displacement pump (piston pump recommended) through a 1-¼ in tremie pipe.

PACKAGING INFORMATION

TG Lite is packaged in 50 lb bags with 54 bags per heat shrunk pallet.

PowerTEC is packaged in 32 lb bags with 75 bags per heat shrunk pallet.

created: 2021-05-02



QUIK-GEL®

Viscosifier

Description QUIK-GEL® viscosifier is an easy-to-mix, finely ground (200-mesh), premium-grade, high-yielding Wyoming sodium bentonite. QUIK-GEL viscosifier imparts viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.

Applications/Functions *The use of QUIK-GEL viscosifier promotes or assists the following:*

- Mix with fresh water to form a low-solids drilling fluid for general drilling applications
- Viscosify water-based drilling fluids
- Reduce filtration by forming a thin filter cake with low permeability
- Improve hole-cleaning capability of drilling fluids
- Mix with foaming agents to make "gel/foam" drilling fluids for air/foam drilling applications

Advantages

- NSF/ANSI Standard 60 certified
- Single-sack product and cost effective
- Can provide lubricity for drilling fluids
- Can mix easily and quickly reach maximum viscosity
- Can yield more than twice as much mud of the same viscosity as an equal weight of API oilfield grades of bentonite

Typical Properties

• Appearance	Grey to tan powder
• Bulk density, lb/ft ³	68 to 72 (compacted)
• pH (3% solution)	8.9

Recommended Treatment Mix slowly through a jet mixer or sift slowly into the vortex of a high-speed stirrer.

Approximate Amounts of QUIK-GEL viscosifier Added to Freshwater			
Application/Desired Result	lb/100 gal	lb/bbl	kg/m ³
Normal Drilling Conditions	15-25	6-10	18-30
Unconsolidated Formations	35-50	15-21	42-60
Make-Up For Gel/Foam Systems	12-15	5-7	14-18

- 1 bbl = 42 U.S. gallons

Additional Information *Note:*

- For optimum yield, pre-treat make-up water with 1-2 pounds of soda ash per 100 gallons of water (1.2-2.4 kg/m³).

Packaging QUIK-GEL viscosifier is packaged in 50-lb (22.7-kg) multiwall paper bags.

Availability QUIK-GEL viscosifier can be purchased through any Baroid Industrial 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.

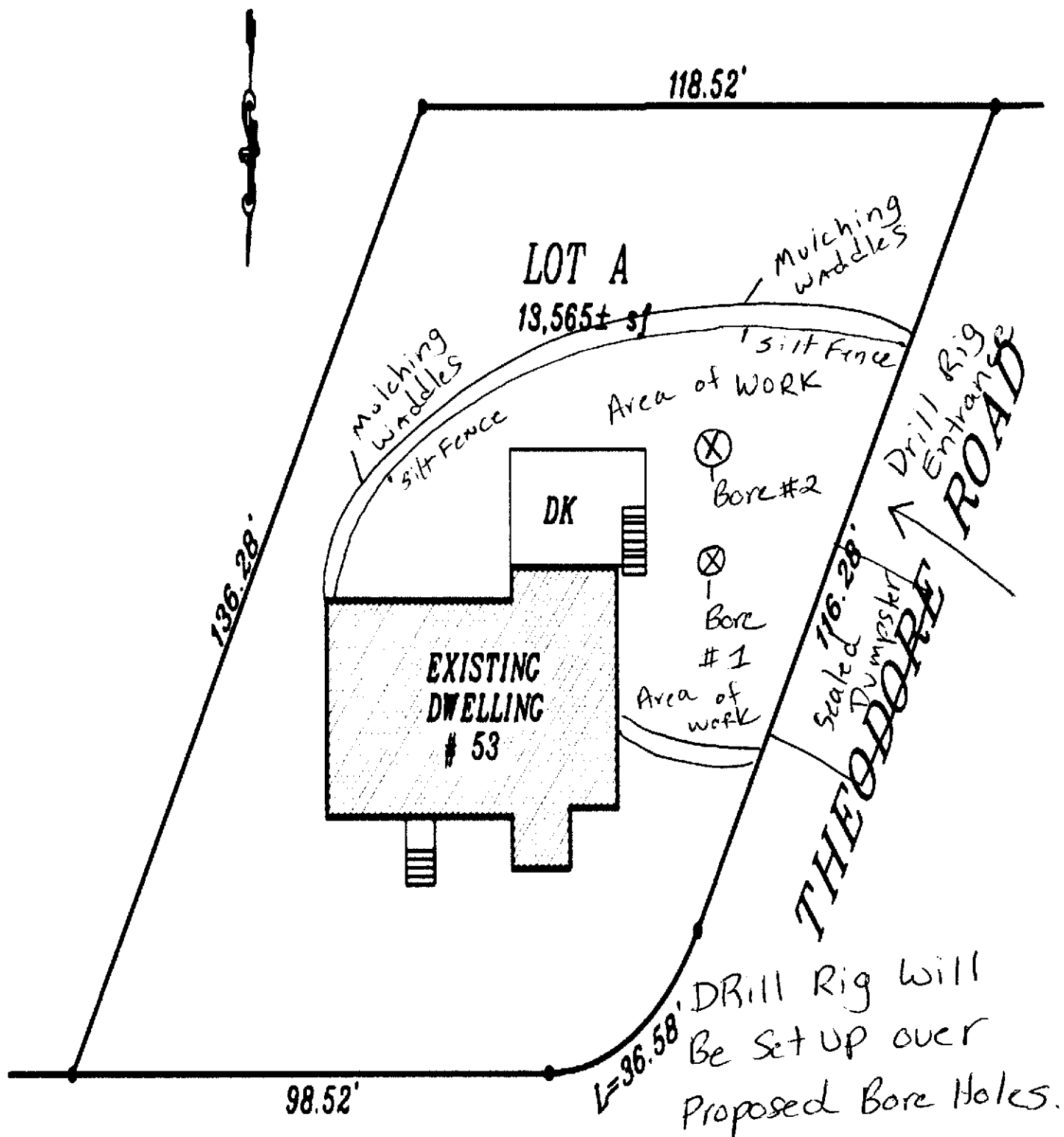
Houston, TX 77032

Customer Service (800) 735-6075 Toll Free (281) 871-4612

Technical Service (877) 379-7412 Toll Free (281) 871-4613

Closed Loop Geothermal

⊗ = Proposed Bore Holes
380' Deep



ROOSEVELT ROAD



Black Hills Bentonite LLC
Thermal Grout Lite
Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012
Rules And Regulations Original Date of Issue: 04/21/2016
Revision Date: 06/27/2019
Version: 2.0

SECTION 1: IDENTIFICATION

Product Identifier

Product Form: Mixture

Product Name: Thermal Grout Lite

Synonyms: Grouting bentonite

Intended Use of the Product

Geothermal well sealant.

Name, Address, and Telephone of the Responsible Party

Company

Black Hills Bentonite LLC

PO Box 9

Mills, WY 82644

307-265-3740

blkhlsbent@aol.com

Emergency Telephone Number

Emergency Number : 307-247-8188

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

Classification (GHS-US)

Skin Irrit. 2 H315

Eye Dam. 1 H318

Carc. 1A H350

STOT RE 1 H372

Full text of H-phrases: see section 16

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US)



Signal Word (GHS-US)

: Danger

Hazard Statements (GHS-US)

: H315 - Causes skin irritation.

H318 - Causes serious eye damage.

H350 - May cause cancer.

H372 - Causes damage to organs through prolonged or repeated exposure.

Precautionary Statements (GHS-US)

: P202 - Do not handle until all safety precautions have been read and understood.

P260 - Do not breathe dust.

P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.

P270 - Do not eat, drink or smoke when using this product.

P280 - Wear protective gloves, protective clothing, and eye protection.

P302+P352 - IF ON SKIN: Wash with plenty of water.

P305+P351+P338 - IF IN EYES: Rinse cautiously with water for 3-10 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313 - If exposed or concerned: Get medical advice/attention.

P362 - Take off contaminated clothing and wash before reuse.

P405 - Store locked up.

P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Other Hazards

Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. If involved in a fire or other decomposition occurs: corrosive, toxic, and acrid vapors may be released.

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product Identifier	% (w/w)	Classification (GHS-US)
Silica, amorphous	(CAS No) 7631-86-9	38.4 - 66	Not classified
Disodium carbonate	(CAS No) 497-19-8	1 - 5, 5 - 10, 10 - 20	Eye Irrit. 2A, H319
Water	(CAS No) 7732-18-5	8 - 20	Not classified
Diphosphoric acid, disodium salt	(CAS No) 7758-16-9	1 - 5, 5 - 10, 10 - 20	Acute Tox. 4 (Oral), H302 Eye Irrit. 2A, H319
Aluminium oxide (Al ₂ O ₃), hydrate	(CAS No) 1333-84-2	10.56 - 19	Not classified
Quartz	(CAS No) 14808-60-7	1 - 5	Carc. 1A, H350 STOT SE 3, H335 STOT RE 1, H372
Iron oxides	(CAS No) 1332-37-2	1.5 - 4.5	Not classified
Sodium oxide (Na ₂ O)	(CAS No) 1313-59-3	0.9 - 1, 1 - 3.5	Skin Corr. 1B, H314 Eye Dam. 1, H318
Calcium oxide	(CAS No) 1305-78-8	0.3 - 1, 1 - 2.5	Skin Irrit. 2, H315 Eye Dam. 1, H318 STOT SE 3, H335
Magnesium oxide (MgO)	(CAS No) 1309-48-4	0.48 - 2	Not classified
Silica, cristobalite	(CAS No) 14464-46-1	0.1 - 1	Carc. 1A, H350 STOT RE 1, H372
Tridymite	(CAS No) 15468-32-3	0.1 - 1	Carc. 1A, H350 STOT RE 1, H372
Potassium oxide	(CAS No) 12136-45-7	0.12 - 0.7	Skin Corr. 1C, H314 Eye Dam. 1, H318
Titanium dioxide	(CAS No) 13463-67-7	0.06 - 0.1, 0.1 - 0.2	Carc. 2, H351

Full text of H-phrases: see section 16

More than one of the ranges of concentration prescribed by the Controlled Products Regulations has been used where necessary, due to varying composition.

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label if possible).

Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists.

Skin Contact: Remove contaminated clothing. Flush with plenty of water for at least 3-10 minutes. Seek medical advice if irritation develops or persists. Wash contaminated clothing before reuse.

Eye Contact: Rinse cautiously with water for at least 3-10 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists.

Ingestion: Do not induce vomiting. Rinse mouth. Seek medical attention if any problems arise.

Most Important Symptoms and Effects Both Acute and Delayed

General: Causes serious eye damage. Causes skin irritation. May cause cancer. Repeated or prolonged inhalation may damage lungs.

Inhalation: May cause respiratory irritation. Repeated or prolonged exposure to respirable (airborne) crystalline silica dust will cause lung damage in the form of silicosis. Symptoms will include progressively more difficult breathing, cough, fever, and weight loss.

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Skin Contact: Causes skin irritation. Symptoms may include redness, pain, swelling, itching, burning, dryness, and dermatitis.

Eye Contact: Causes serious eye damage. Symptoms may include redness, pain, swelling, itching, burning, tearing, and blurred vision.

Ingestion: Ingestion is likely to be harmful or have adverse effects.

Chronic Symptoms: May cause cancer. May cause damage to organs through prolonged or repeated exposure. Repeated or prolonged exposure to respirable (airborne) crystalline silica dust will cause lung damage in the form of silicosis. Symptoms will include progressively more difficult breathing, cough, fever, and weight loss.

Indication of Any Immediate Medical Attention and Special Treatment Needed

If you feel unwell, seek medical advice (show the label where possible).

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Alcohol-resistant foam. Dry chemical. Carbon dioxide. Use extinguishing media appropriate for surrounding fire.

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire.

Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not flammable.

Explosion Hazard: Product is not explosive.

Reactivity: Reacts with water. Hazardous reactions may occur on contact with certain chemicals. Refer to incompatible materials.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.

Firefighting Instructions: Use water spray or fog for cooling exposed containers.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: May release corrosive vapors. May liberate toxic gases.

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Avoid all contact with skin, eyes, or clothing. Avoid breathing dust.

For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Use safe, appropriate measures.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Stop leak if safe to do so. Eliminate ignition sources. Ventilate area.

Environmental Precautions

Prevent entry to sewers and public waters.

Methods and Material for Containment and Cleaning Up

For Containment: Contain and collect as any solid.

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely. Spills should be contained with mechanical barriers. Transfer spilled material to a suitable container for disposal.

Reference to Other Sections

See Heading 8. Exposure controls and personal protection. For further information refer to section 13.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and when leaving work.

Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Comply with applicable regulations.

Storage Conditions: Store in a dry, cool, and well-ventilated place. Keep container closed when not in use. Keep/Store away from direct sunlight, extremely high or low temperatures, and incompatible materials.

Incompatible Materials: Strong acids. Strong oxidizers. Water.

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Specific End Use(s)

Geothermal well sealant.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government

Silica, amorphous (7631-86-9)		
USA OSHA	OSHA PEL (TWA) (mg/m ³)	6 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	20 mppcf (80mg/m ³ /%SiO ₂)
Nunavut	OEL TWA (mg/m ³)	2 mg/m ³ (respirable mass) 5 mg/m ³ (total mass) 0.05 mg/m ³ (regulated under Silica flour-respirable mass) 0.15 mg/m ³ (regulated under Silica flour, total mass)
Northwest Territories	OEL TWA (mg/m ³)	2 mg/m ³ (respirable mass) 5 mg/m ³ (total mass) 0.05 mg/m ³ (regulated under Silica flour-respirable mass) 0.15 mg/m ³ (total mass, regulated under Silica flour)
Yukon	OEL TWA (mg/m ³)	300 particle/mL (as measured by Konimeter instrumentation) 20 mppcf (as measured by Impinger instrumentation) 2 mg/m ³ (respirable mass)
Iron oxides (1332-37-2)		
USA ACGIH	ACGIH TWA (mg/m ³)	5 mg/m ³
USA OSHA	OSHA PEL (TWA) (mg/m ³)	10 mg/m ³ Iron Oxide fume
Nunavut	OEL STEL (mg/m ³)	10 mg/m ³ (fume)
Nunavut	OEL TWA (mg/m ³)	5 mg/m ³ (fume)
Northwest Territories	OEL STEL (mg/m ³)	10 mg/m ³ (fume)
Northwest Territories	OEL TWA (mg/m ³)	5 mg/m ³ (fume)
Magnesium oxide (MgO) (1309-48-4)		
Mexico	OEL TWA (mg/m ³)	10 mg/m ³ (fume)
USA ACGIH	ACGIH TWA (mg/m ³)	10 mg/m ³ (inhalable fraction)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA OSHA	OSHA PEL (TWA) (mg/m ³)	15 mg/m ³ (fume, total particulate)
USA IDLH	US IDLH (mg/m ³)	750 mg/m ³ (fume)
Alberta	OEL TWA (mg/m ³)	10 mg/m ³ (fume)
British Columbia	OEL STEL (mg/m ³)	10 mg/m ³ (respirable dust and fume)
British Columbia	OEL TWA (mg/m ³)	10 mg/m ³ (fume, inhalable) 3 mg/m ³ (respirable dust and fume)
Manitoba	OEL TWA (mg/m ³)	10 mg/m ³ (inhalable fraction)
New Brunswick	OEL TWA (mg/m ³)	10 mg/m ³ (fume)
Newfoundland & Labrador	OEL TWA (mg/m ³)	10 mg/m ³ (inhalable fraction)
Nova Scotia	OEL TWA (mg/m ³)	10 mg/m ³ (inhalable fraction)
Nunavut	OEL STEL (mg/m ³)	20 mg/m ³ (fume)
Nunavut	OEL TWA (mg/m ³)	10 mg/m ³ (fume)
Northwest Territories	OEL STEL (mg/m ³)	20 mg/m ³ (fume)
Northwest Territories	OEL TWA (mg/m ³)	10 mg/m ³ (fume)
Ontario	OEL TWA (mg/m ³)	10 mg/m ³ (inhalable)
Prince Edward Island	OEL TWA (mg/m ³)	10 mg/m ³ (inhalable fraction)
Québec	VEMP (mg/m ³)	10 mg/m ³ (fume)
Saskatchewan	OEL STEL (mg/m ³)	20 mg/m ³ (inhalable fraction)

Thermal Grout Lite

Safety Data Sheet

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Saskatchewan	OEL TWA (mg/m ³)	10 mg/m ³ (inhalable fraction)
Yukon	OEL STEL (mg/m ³)	10 mg/m ³ (fume)
Yukon	OEL TWA (mg/m ³)	10 mg/m ³ (fume)
Calcium oxide (1305-78-8)		
Mexico	OEL TWA (mg/m ³)	2 mg/m ³
USA ACGIH	ACGIH TWA (mg/m ³)	2 mg/m ³
USA OSHA	OSHA PEL (TWA) (mg/m ³)	5 mg/m ³
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	2 mg/m ³
USA IDLH	US IDLH (mg/m ³)	25 mg/m ³
Alberta	OEL TWA (mg/m ³)	2 mg/m ³
British Columbia	OEL TWA (mg/m ³)	2 mg/m ³
Manitoba	OEL TWA (mg/m ³)	2 mg/m ³
New Brunswick	OEL TWA (mg/m ³)	2 mg/m ³
Newfoundland & Labrador	OEL TWA (mg/m ³)	2 mg/m ³
Nova Scotia	OEL TWA (mg/m ³)	2 mg/m ³
Nunavut	OEL STEL (mg/m ³)	4 mg/m ³
Nunavut	OEL TWA (mg/m ³)	2 mg/m ³
Northwest Territories	OEL STEL (mg/m ³)	4 mg/m ³
Northwest Territories	OEL TWA (mg/m ³)	2 mg/m ³
Ontario	OEL TWA (mg/m ³)	2 mg/m ³
Prince Edward Island	OEL TWA (mg/m ³)	2 mg/m ³
Québec	VEMP (mg/m ³)	2 mg/m ³
Saskatchewan	OEL STEL (mg/m ³)	4 mg/m ³
Saskatchewan	OEL TWA (mg/m ³)	2 mg/m ³
Yukon	OEL STEL (mg/m ³)	4 mg/m ³
Yukon	OEL TWA (mg/m ³)	2 mg/m ³
Titanium dioxide (13463-67-7)		
Mexico	OEL TWA (mg/m ³)	10 mg/m ³
Mexico	OEL STEL (mg/m ³)	20 mg/m ³
USA ACGIH	ACGIH TWA (mg/m ³)	10 mg/m ³
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA OSHA	OSHA PEL (TWA) (mg/m ³)	15 mg/m ³ (total dust)
USA IDLH	US IDLH (mg/m ³)	5000 mg/m ³
Alberta	OEL TWA (mg/m ³)	10 mg/m ³
British Columbia	OEL TWA (mg/m ³)	10 mg/m ³ (total dust) 3 mg/m ³ (respirable fraction)
Manitoba	OEL TWA (mg/m ³)	10 mg/m ³
New Brunswick	OEL TWA (mg/m ³)	10 mg/m ³
Newfoundland & Labrador	OEL TWA (mg/m ³)	10 mg/m ³
Nova Scotia	OEL TWA (mg/m ³)	10 mg/m ³
Nunavut	OEL TWA (mg/m ³)	5 mg/m ³ (respirable mass) 10 mg/m ³ (total mass)
Northwest Territories	OEL TWA (mg/m ³)	5 mg/m ³ (respirable mass) 10 mg/m ³ (total mass)
Ontario	OEL TWA (mg/m ³)	10 mg/m ³
Prince Edward Island	OEL TWA (mg/m ³)	10 mg/m ³
Québec	VEMP (mg/m ³)	10 mg/m ³ (containing no Asbestos and <1% Crystalline silica-total dust)
Saskatchewan	OEL STEL (mg/m ³)	20 mg/m ³
Saskatchewan	OEL TWA (mg/m ³)	10 mg/m ³
Yukon	OEL STEL (mg/m ³)	20 mg/m ³

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Yukon	OEL TWA (mg/m ³)	30 mppcf 10 mg/m ³
Silica, cristobalite (14464-46-1)		
Mexico	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable fraction)
USA ACGIH	ACGIH TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
USA ACGIH	ACGIH chemical category	Suspected Human Carcinogen
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	0.05 mg/m ³ (respirable dust)
USA IDLH	US IDLH (mg/m ³)	25 mg/m ³ (respirable dust)
Alberta	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable particulate)
British Columbia	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable)
Manitoba	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
New Brunswick	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable fraction)
Newfoundland & Labrador	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
Nova Scotia	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
Nunavut	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable mass) 0.15 mg/m ³ (total mass)
Northwest Territories	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable mass) 0.15 mg/m ³ (total mass)
Ontario	OEL TWA (mg/m ³)	0.05 mg/m ³ (designated substances regulation-respirable)
Prince Edward Island	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
Québec	VEMP (mg/m ³)	0.05 mg/m ³ (respirable dust)
Saskatchewan	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable fraction)
Yukon	OEL TWA (mg/m ³)	150 particle/mL
Tridymite (15468-32-3)		
Mexico	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable fraction)
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	0.05 mg/m ³ (respirable dust)
USA IDLH	US IDLH (mg/m ³)	25 mg/m ³ (respirable dust)
Alberta	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable particulate)
New Brunswick	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable fraction)
Nunavut	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable mass) 0.15 mg/m ³ (total mass)
Northwest Territories	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable mass) 0.15 mg/m ³ (total mass)
Québec	VEMP (mg/m ³)	0.05 mg/m ³ (respirable dust)
Yukon	OEL TWA (mg/m ³)	150 particle/mL
Quartz (14808-60-7)		
Mexico	OEL TWA (mg/m ³)	0.1 mg/m ³ (respirable fraction)
USA ACGIH	ACGIH TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
USA ACGIH	ACGIH chemical category	A2 - Suspected Human Carcinogen
USA OSHA	OSHA PEL (STEL) (mg/m ³)	250 mppcf/%SiO ₂ +5, 10mg/m ³ /%SiO ₂ +2
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	0.05 mg/m ³ (respirable dust)
USA IDLH	US IDLH (mg/m ³)	50 mg/m ³ (respirable dust)
Alberta	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable particulate)
British Columbia	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable)
Manitoba	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
New Brunswick	OEL TWA (mg/m ³)	0.1 mg/m ³ (respirable fraction)
Newfoundland & Labrador	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
Nova Scotia	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
Nunavut	OEL TWA (mg/m ³)	0.1 mg/m ³ (respirable mass) 0.3 mg/m ³ (total mass)
Northwest Territories	OEL TWA (mg/m ³)	0.1 mg/m ³ (respirable mass)

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

		0.3 mg/m ³ (total mass)
Ontario	OEL TWA (mg/m ³)	0.10 mg/m ³ (designated substances regulation-respirable)
Prince Edward Island	OEL TWA (mg/m ³)	0.025 mg/m ³ (respirable fraction)
Québec	VEMP (mg/m ³)	0.1 mg/m ³ (respirable dust)
Saskatchewan	OEL TWA (mg/m ³)	0.05 mg/m ³ (respirable fraction)
Yukon	OEL TWA (mg/m ³)	300 particle/mL

Exposure Controls

Appropriate Engineering Controls: Ensure adequate ventilation, especially in confined areas. Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure. Ensure all national/local regulations are observed.

Personal Protective Equipment: Protective goggles. Gloves. Protective clothing. Insufficient ventilation: wear respiratory protection.



Materials for Protective Clothing: Suitable materials with adequate protection.

Hand Protection: Wear protective gloves.

Eye Protection: Chemical safety goggles.

Skin and Body Protection: Wear suitable protective clothing.

Respiratory Protection: Use a NIOSH-approved respirator whenever exposure may exceed established Occupational Exposure Limits.

Environmental Exposure Controls: Do not allow the product to be released into rivers, streams or local sewage systems.

Consumer Exposure Controls: Do not eat, drink, or smoke during use

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State	: Solid
Appearance	: Grey Powder
Odor	: Earthy
Odor Threshold	: Not available
pH	: 9 - 11
Evaporation Rate	: Not available
Melting Point	: Not available
Freezing Point	: Not available
Boiling Point	: Not available
Flash Point	: Not available
Auto-ignition Temperature	: Not available
Decomposition Temperature	: Not available
Flammability (solid, gas)	: Not available
Lower Flammable Limit	: Not available
Upper Flammable Limit	: Not available
Vapor Pressure	: Not available
Relative Vapor Density at 20 °C	: Not available
Relative Density	: Not available
Specific Gravity	: 2.65
Solubility	: Water: Insoluble
Partition Coefficient: N-Octanol/Water	: Not available
Viscosity	: Not available
Explosion Data – Sensitivity to Mechanical Impact	: Not expected to present an explosion hazard due to mechanical impact
Explosion Data – Sensitivity to Static Discharge	: Not expected to present an explosion hazard due to static discharge

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Reacts with water. Hazardous reactions may occur on contact with certain chemicals. Refer to incompatible materials.

Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Direct sunlight. Extremely high or low temperatures. Ignition sources. Incompatible materials.

Incompatible Materials: Strong acids. Strong oxidizers. Water.

Hazardous Decomposition Products: The decomposition products are corrosive and hazardous to health.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity: Not classified

LD50 and LC50 Data: Not available

Skin Corrosion/Irritation: Causes skin irritation

pH: 9 - 11

Serious Eye Damage/Irritation: Causes serious eye damage

pH: 9 - 11

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not classified

Carcinogenicity: May cause cancer

Specific Target Organ Toxicity (Repeated Exposure): Causes damage to organs through prolonged or repeated exposure

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: May cause respiratory irritation. Repeated or prolonged exposure to respirable (airborne) crystalline silica dust will cause lung damage in the form of silicosis. Symptoms will include progressively more difficult breathing, cough, fever, and weight loss

Symptoms/Injuries After Skin Contact: Causes skin irritation. Symptoms may include redness, pain, swelling, itching, burning, dryness, and dermatitis

Symptoms/Injuries After Eye Contact: Causes serious eye damage. Symptoms may include redness, pain, swelling, itching, burning, tearing, and blurred vision

Symptoms/Injuries After Ingestion: Ingestion is likely to be harmful or have adverse effects

Chronic Symptoms: May cause cancer. May cause damage to organs through prolonged or repeated exposure. Repeated or prolonged exposure to respirable (airborne) crystalline silica dust will cause lung damage in the form of silicosis. Symptoms will include progressively more difficult breathing, cough, fever, and weight loss

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data:

Silica, amorphous (7631-86-9)	
LD50 Oral Rat	> 5000 mg/kg
LD50 Dermal Rabbit	> 2000 mg/kg
LC50 Inhalation Rat	> 2.2 mg/l (Exposure time: 1 h)
Calcium oxide (1305-78-8)	
LD50 Oral Rat	> 2000 mg/kg
LD50 Dermal Rabbit	> 2500 mg/kg
Titanium dioxide (13463-67-7)	
LD50 Oral Rat	> 10000 mg/kg
Quartz (14808-60-7)	
LD50 Oral Rat	> 5000 mg/kg
LD50 Dermal Rat	> 5000 mg/kg

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Diphosphoric acid, disodium salt (7758-16-9)	
LD50 Oral Rat	1800 mg/kg
LC50 Inhalation Rat	> 0.58 mg/l/4h
Disodium carbonate (497-19-8)	
LD50 Oral Rat	4090 mg/kg
LC50 Inhalation Rat	2300 mg/m ³ (Exposure time: 2 h)
Silica, amorphous (7631-86-9)	
IARC Group	3
Titanium dioxide (13463-67-7)	
IARC Group	2B
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.
Silica, cristobalite (14464-46-1)	
IARC Group	1
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.
Tridymite (15468-32-3)	
IARC Group	1
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.
Quartz (14808-60-7)	
IARC Group	1
National Toxicology Program (NTP) Status	Known Human Carcinogens.
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity No additional information available

Silica, amorphous (7631-86-9)	
LC50 Fish 1	5000 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])
EC50 Daphnia 1	7600 mg/l (Exposure time: 48 h - Species: Ceriodaphnia dubia)
Calcium oxide (1305-78-8)	
LC50 Fish 1	1070 mg/l (Exposure time: 96 h - Species: Cyprinus carpio [static])
Disodium carbonate (497-19-8)	
LC50 Fish 1	300 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
EC50 Daphnia 1	265 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC 50 Fish 2	310 - 1220 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])

Persistence and Degradability Not available

Bioaccumulative Potential

Silica, amorphous (7631-86-9)	
BCF Fish 1	No bioaccumulation expected
Calcium oxide (1305-78-8)	
BCF Fish 1	No bioaccumulation
Disodium carbonate (497-19-8)	
BCF Fish 1	No bioaccumulation

Mobility in Soil Not available

Other Adverse Effects

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, territorial, provincial, and international regulations.

Ecology – Waste Materials: Avoid release into rivers, streams, and local sewage systems.

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

SECTION 14: TRANSPORT INFORMATION

In Accordance with DOT Not regulated for transport

In Accordance with IMDG Not regulated for transport

In Accordance with IATA Not regulated for transport

In Accordance with TDG Not regulated for transport

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Thermal Grout Lite	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard
Silica, amorphous (7631-86-9)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Iron oxides (1332-37-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Magnesium oxide (MgO) (1309-48-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Calcium oxide (1305-78-8)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard
Potassium oxide (12136-45-7)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard
Sodium oxide (Na₂O) (1313-59-3)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard
Titanium dioxide (13463-67-7)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard
Water (7732-18-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Silica, cristobalite (14464-46-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard
Tridymite (15468-32-3)	
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard
Quartz (14808-60-7)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard
Diphosphoric acid, disodium salt (7758-16-9)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Disodium carbonate (497-19-8)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	

US State Regulations

Titanium dioxide (13463-67-7)	
U.S. - California - Proposition 65 - Carcinogens List	WARNING: This product contains chemicals known to the State of California to cause cancer.

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Quartz (14808-60-7)	
U.S. - California - Proposition 65 - Carcinogens List	WARNING: This product contains chemicals known to the State of California to cause cancer.
Silica, amorphous (7631-86-9)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	
Magnesium oxide (MgO) (1309-48-4)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	
Calcium oxide (1305-78-8)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	
Potassium oxide (12136-45-7)	
U.S. - New Jersey - Right to Know Hazardous Substance List	
Titanium dioxide (13463-67-7)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	
Silica, cristobalite (14464-46-1)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	
Tridymite (15468-32-3)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	
Quartz (14808-60-7)	
U.S. - Massachusetts - Right To Know List	
U.S. - New Jersey - Right to Know Hazardous Substance List	
U.S. - Pennsylvania - RTK (Right to Know) List	

Canadian Regulations

Thermal Grout Lite	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects Class E - Corrosive Material
Silica, amorphous (7631-86-9)	
Listed on the Canadian DSL (Domestic Substances List)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria
Aluminium oxide (Al2O3), hydrate (1333-84-2)	
Listed on the Canadian DSL (Domestic Substances List)	

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

WHMIS Classification	Uncontrolled product according to WHMIS classification criteria
Iron oxides (1332-37-2)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria
Magnesium oxide (MgO) (1309-48-4)	
Listed on the Canadian DSL (Domestic Substances List)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria
Calcium oxide (1305-78-8)	
Listed on the Canadian DSL (Domestic Substances List)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class E - Corrosive Material Class D Division 2 Subdivision B - Toxic material causing other toxic effects
Potassium oxide (12136-45-7)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class E - Corrosive Material
Sodium oxide (Na₂O) (1313-59-3)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class E - Corrosive Material
Titanium dioxide (13463-67-7)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects
Water (7732-18-5)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria
Silica, cristobalite (14464-46-1)	
Listed on the Canadian DSL (Domestic Substances List)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects
Tridymite (15468-32-3)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects
Quartz (14808-60-7)	
Listed on the Canadian DSL (Domestic Substances List)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects
Diphosphoric acid, disodium salt (7758-16-9)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects
Disodium carbonate (497-19-8)	
Listed on the Canadian DSL (Domestic Substances List)	
Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	

Thermal Grout Lite

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects
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This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date : 06/27/2019

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

GHS Full Text Phrases:

Acute Tox. 4 (Oral)	Acute toxicity (oral) Category 4
Carc. 1A	Carcinogenicity Category 1A
Carc. 2	Carcinogenicity Category 2
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Eye Irrit. 2A	Serious eye damage/eye irritation Category 2A
Skin Corr. 1B	Skin corrosion/irritation Category 1B
Skin Corr. 1C	Skin corrosion/irritation Category 1C
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H315	Causes skin irritation
H318	Causes serious eye damage
H319	Causes serious eye irritation
H335	May cause respiratory irritation
H350	May cause cancer
H351	Suspected of causing cancer
H372	Causes damage to organs through prolonged or repeated exposure

Party Responsible for the Preparation of This Document

Black Hills Bentonite LLC

Emergency Number: 307-247-8188, 307-265-3740

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

North America GHS US 2012 & WHMIS 2