SUBMITTAL
Horizontally Bored Heat Exchanger

Minnesota Veterans Home - Bemidji
920 Anne St. NW
Bemidji, MN 56601

Architect
Wold Architects and Engineers
332 Minnesota Street, Suite W2000
SAINT PAUL, MN 55102

Engineer

Owner
State of Minnesota Department of Administration
50 Sherburne Ave, Room 112
Saint Paul, MN 55155

Peterson Sheet Metal, Inc.
3728 Bemidji Ave N., Suite 300
Bemidji, MN 56601
(218) 751-4502

Project: Minnesota Veterans Home - Bemidji
Project ID: CC2141

Spec Section: 23 2114
Horizontally Bored Heat Exchanger

Submittal Name

Horizontally Bored Heat Exchanger

Minnesota Veterans Home - Bemidji
920 Anne St. NW Bemidji, MN 56601

Submittal Cover

Submittal No: CC2141-059
Product Submitted: Horizontally Bored Heat Exchanger

Spec Section: 23 2114
Spec Description: Horizontally Bored Heat Exchanger

Supplier:

Phone:
Fax:
Website:
Contact:

Architect: **Wold Architects and Engineers**
332 Minnesota Street, Suite W2000
SAINT PAUL, MN 55102
Phone: (651) 227-7773
Fax: (651) 223-5646
Website:
Contact:

Engineer:

Phone:
Fax:
Website:
Contact:

General Contractor: **Adolfson and Peterson Construction**
5500 Wayzata Blvd, Suite 600
Minneapolis, MN 55416
Phone: (952) 544-1561
Fax:
Website:
Contact: Ben Bowman

Subcontractor:

Phone:
Fax:
Website:

Subcontractor Certification of Compliance

I hereby certify that the product data contained in this submittal package has been reviewed for compliance with the intent of the Contract Documents and coordinated with the project

By: Jaime Quello Date: 05/04/2022

General Contractor Review Stamp

Architect Review Stamp

Engineer Review Stamp

SPECIFICATIONS
Effective September. 2020
Supersedes Jan. 2019
1830 Centennial Ave.
Hastings, NE 68901
Ph: 402-462-2227
Fax: 402-462-5529
Toll Free: 866-851-2227
centennialplastics.com

Centennial PLASTICS, INC.

CenFuse

HDPE 4710—ASTM D3035

- Flexible polyethylene pipe
- Produced from only the finest virgin material
- Backed by a 50-YEAR WARRANTY
- All diameters are IPS, OD controlled and compatible with heat fusion.
- Chlorine resistance: CC3 per ASTM F2263

ASTM D3035			3/4"	1"	1-1/4"	1-1/2"	2"	3"	4"	6"	8"
125 PSI	SDR 17	O.D.	N/A	N/A	1.660"	1.900"	2.375"	3.500"	4.500"	6.625"	8.625"
		I.D.	N/A	N/A	1.464"	1.676"	2.095"	3.088"	3.970"	5.971"	7.549"
		Wall	N/A	N/A	.098"	.112"	.140"	.206"	.265"	.390"	.507"
		Wt./Ft	N/A	N/A	.206#	.269#	.421#	.912#	1.508#	3.268#	5.535#
138 PSI	SDR 15.5	O.D.	N/A	N/A	N/A	1.900"	2.375"	3.500"	4.500"	6.625"	8.625"
		I.D.	N/A	N/A	N/A	1.654"	2.069"	3.048"	3.920"	5.771"	7.513"
		Wall	N/A	N/A	N/A	.123"	.153"	.226"	.290"	.427"	.556"
		Wt./Ft	N/A	N/A	N/A	.294#	.457#	.994#	1.641#	3.5557#	6.034#
160 PSI	SDR 13.5	O.D.	N/A	1.315"	1.660"	1.900"	2.375"	3.500"	4.500"	6.625"	N/A
		I.D.	N/A	1.121"	1.414"	1.618"	2.023"	2.982"	3.834"	5.643"	N/A
		Wall	N/A	.097"	.123"	.141"	.176"	.259"	.333"	.491"	N/A
		Wt./Ft	N/A	.159#	.254#	.333#	.520#	1.128#	1.865#	4.048#	N/A
200 PSI	SDR 11	O.D.	1.050"	1.315"	1.660"	1.900"	2.375"	3.500"	4.500"	6.625"	8.625"
		I.D.	.860"	1.077"	1.358"	1.554"	1.943"	2.864"	3.682"	5.421"	6.936"
		Wall	.095"	.120"	.151"	.173"	.216"	.318"	.409"	.602"	.784"
		Wt./Ft	.122#	.191#	.306#	.402#	.627#	1.36#	2.249#	4.873#	8.263#
250 PSI	SDR 9	O.D.	1.050"	1.315"	1.660"	1.900"	2.375"	3.500"	4.500"	N/A	N/A
		I.D.	.818"	1.023"	1.292"	1.478"	1.847"	2.722"	3.500"	N/A	N/A
		Wall	.117"	.146"	.184"	.211"	.264"	.389"	.500"	N/A	N/A
		Wt./Ft	.146#	.229#	.365#	.479#	.749#	1.626#	2.688#	N/A	N/A

Note: Please see Centennial Plastics website for stocking coil lengths: www.centennialplastics.com

CenFuse HDPE is suitable for connections by heat fusion or compression fittings of the same SDR CenFuse
CenFuse meets AWWA C901 requirements in 3/4" - 3", SDR 9 and 11
CenFuse meets AWWA C906 requirements in 4" - 8" all SDRs

NSF

CenFuse ¾" – 6" is tested and certified to NSF/ANSI Standard 14 and 61 (NSF-pw).
CenFuse 8" is tested and certified to NSF/ANSI Standard 61.
All applicable CenFuse SDR's bear the NSF/ANSI 358-1 Certification Mark.

CenFuse is Certified to NSF/ANSI 372 and conforms with the lead content requirements for "lead free" plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Centennial Plastics follows Proposition 65 (also known as the Safe Drinking Water and Toxic Enforcement Act of 1986). Our products in their finished form, do not require a California Proposition 65 warning label.

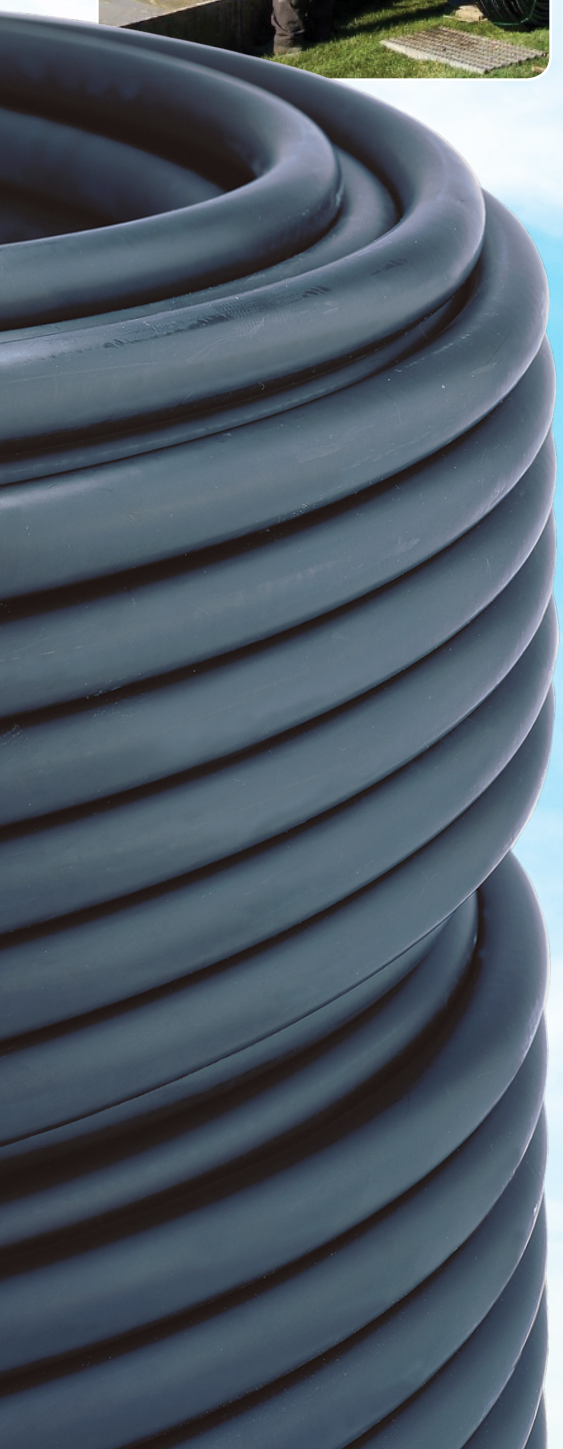
Centennial Plastics, Inc. is an ISO 9001 Certified Company.

Centennial PLASTICS, INC.

Quality and Service That Soars

Geothermal Exchange Pipe and Fittings

Featuring the exclusive earthLoops™ GEOTHERMAL EXCHANGE SYSTEM



The smart choice for closed-loop geothermal heat pump systems

It's no mystery why so many engineers and architects rely on Centennial geothermal products. Centennial Plastics has a strong commitment to offering geothermal pipe that offers worry-free performance and provides true energy savings. Prompt, professional customer service is a top priority. And the search for innovative ways to make our products safer and easier to install never ends.

Success starts with Centennial Geothermal HDPE 4710 CenFuse pipe.

CenFuse geothermal pipe is ideal for horizontal or vertical installations that are underground or submerged in water. CenFuse resists corrosion and abrasions, is thermally conductive and comes in a wide selection of straight lengths, flexible coil lengths and SDRs to meet your specifications.

- Footage markings and product identification are clearly and permanently indented on every coil.
- Coils are secured with plastic banding, stretch-wrapped and shipped on pallets.

CenFuse geothermal pipe is the first in the country to meet NSF International's NSF/ANSI Standard 358-1 for geothermal heat pump systems.

NSF International is an independent third party organization that certifies products for the water, food, health sciences and consumer goods industries. It recently certified CenFuse pipe and Bullet™ U-Bend fittings to the American National Standard for Ground-Source Geothermal Piping systems.

This certification assures engineers, distributors and contractors that the pipe and fittings in Centennial Plastics' EarthLoops™ geothermal exchange system meet optimum safety and quality levels.

Centennial Plastics makes customer satisfaction a top priority.

- For your peace of mind, Centennial Plastics offers a full 50-year non-prorated warranty on CenFuse pipe. (Visit centennialplastics.com for more information.)
- An extensive inventory of geothermal exchange products allows orders to be filled in a timely manner.
- Custom orders or special requests for coil length, straight length or SDR are welcome.

Exclusive EarthLoops™ Geothermal Exchange System makes installation quicker and easier

With the Earth Loops™ system, Bullet™ U-Bend fittings are fused to dual coils of CenFuse pipe at the Centennial Plastics manufacturing facility. The resulting EarthLoops™ arrive at the job site ready for installation.

Bullet™ U-Bend fittings are manufactured from the same virgin HDPE 4710 material as the CenFuse pipe to ensure proper fusion. Made to fit 1¼", 1", and ¾" diameter pipe, the result is the narrowest U-Bend fitting on the market for more efficient drilling. The Bullet™ U-Bend is NSF 358-1 certified.

Dependability and ease of installation are assured in several ways:

- Bullet™ U-Bend fittings are made to SDR 9 specifications to cover 200/250 PSI installations.
- The EarthLoops™ system allows for a narrower bore-hole which in turn needs less grout.
- Bullet™ U-Bend fittings are designed for easy installation, and are securely butt-fused to EarthLoops.™ Look for the unique bullet shape.
- Knockouts are provided for directional/horizontal boring applications.

¾" Bullet™ U-Bend Fitting Patent #US D498, 7715 issued 11/23/04.
1" and 1¼" Bullet™ U-Bend Fitting Patent # US D488, 4865 issued 4/13/04.

EarthLoops™ test-caps set the gold standard for factory-sealed pipe!

The CenFuse pipe used in the EarthLoops™ system is factory-pressurized and sealed with a patent pending test-cap that offers two significant benefits:

- The tight, secure seal formed by the test cap is your assurance that the loops are factory-pressurized and free from leaks and contaminants.
- The test cap's built-in pressure valve allows installers to use a tire gauge for field pressure tests. This can significantly shorten installation time.

Specifications for CenFuse Geothermal Exchange Pipe

CenFuse Geothermal HDPE 4710 Pipe

ASTM D3035		¾"	1"	1¼"	1½"	2"	3"	4"	6"
200 PSI	O.D.	1.050"	1.315"	1.660"	1.900"	2.375"	3.500"	4.500"	6.625"
SDR 11	I.D.	.860"	1.077"	1.358"	1.554"	1.943"	2.864"	3.682"	5.421"
	Wall	.095"	.120"	.151"	.173"	.216"	.318"	.409"	.602"
	Wt/ft	.122#	.191#	.306#	.402#	.627#	1.36#	2.249#	4.873#

CenFuse pipe meets these industry standards:

- *NSF/ANSI 358-1*
- *NSF-14 and 61*
- *ASTM D3035 - CenFuse HDPE 4710*
- *AWWA C901 and C906 requirements*
- *IGSHPA requirements as set forth in Section 1C of the Close Loop/Geothermal Heat Pump Systems Design and Installation Standards.*

CenFuse HDPE Pipe and Bullet™ U-Bend Fitting Raw Material

CenFuse Geothermal HDPE 4710 Pipe

Property	ASTM Test Method	English Units*	SI Units*
Density (Natural)	D 4883	—	0.9485 g/cc
Density (Black)	—	—	0.959 g/cc
Melt Index[1]	D 1238	—	8.5 g/10 min
Tensile Strength @Yield (2 in/min)	D 638	3625 psi	25.0 MPa
Tensile Strength @Break (2in/min)	D 638	5500 psi	38.0 MPa
Enlongation @ Break (2 in/min)	D 638	>600%	>600%
Flexural Modulus[2]	D 790	150,000 psi	1,035 MPa
Notched Izod Impact Strength	D 256	9 ft-lbf/in	0.49 kJ/m
Hardness (Shore D)	D 2240	66	66
Vicat Softening Point	D 1525	259° F	126° C
Brittleness Temperature	D 746	<-180° F	<-118° C
Thermal Stability	D2513/D3350	428°F min	220°C min
Hydrostatic Design Basis @ 23° C	D 2837	1600 psi	11.0 MPa
Hydrostatic Design Basis @ 60° C	D 2837	1000 psi	6.9 MPa
Minumum Required Strength	ISO 9080	—	10.0 MPa
Environmental Stress Crack Resistance[3]	D 1693	>5000 hrs.	>5000 hrs.
Pipe Ring ESCR[4]	—	—	—
Notch Tensile (PENT)	F 1473	>10,000 hrs.	>10,000 hrs.
Carbon Black Concentration	D 1603	2.3%	2.3%
Cell Classification	D 3350	445576C	445576C

[1] *190°C/21,600 g* [2] *2% Secant-Method 1* [3] *Condition C* [4] *Two inch, SIDR 19*

** Typical Values*

Cenfuse Geothermal pipe and EarthLoops™ are available in other SDR's and special lengths. Contact your distributor or visit our website at www.centennialplastics.com.

CenFuse SDR 11 meets the applicable standards for AWWA C901 & C906.

Centennial Plastics is an ISO 9001 certified company.

INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION

national ground water association

PLASTICS PIPE INSTITUTE MEMBER COMPANY

NSF CenFuse is NSF/ANSI 358-1 certified.

GEOEXCHANGE

For more information, contact the dealer nearest you:

Centennial PLASTICS, INC.

Quality and Service That Soars

1830 Centennial Ave.
Hastings, NE 68901
Ph: 402-462-2227
Toll Free: 866-851-2227
Fax: 402-462-5529

5098 Treasure Valley Way
Nampa, ID 83687
Ph: 208-855-4779
Toll Free: 888-321-4801

www.centennialplastics.com

IDB2.5M03/17

PROJECT NAME:_____

PROJECT LOCATION: CITY:_____ **STATE:**_____ **ZIP:**_____

CONTRACTOR:_____

CenFuse 4710 HDPE Pipe, Earth Loops™, and Patented Bullet U-Bend Fittings for Geothermal Heat Pump Systems

SCOPE: **This Product Submittal is for CenFuse polyethylene pipe and Centennial Plastics' Earth Loops™ with Centennial Plastics' Bullet U-Bend fitting for Geothermal Heating and Cooling applications.**

MATERIAL: **CenFuse HDPE and Bullet U-Bend fittings are manufactured from virgin high density polyethylene resin, specifically designed for geothermal applications. Resin cell classification for CenFuse and "Bullet" U-Bend fittings: 445576C per ASTM D 3350. CenFuse pipe is manufactured in accordance with ASTM D 3035. This material contains a minimum 2% Carbon Black as a UV inhibitor to accommodate outside storage. The material has a 1600 psi Hydrostatic Design Basis at 73^0 F. per ASTM D 2837 and is listed in Centennial Plastics name in PPI TR4 as a PE 4710 material.**

CERTIFICATION: **Centennial Plastics certifies that CenFuse polyethylene pipe, Earth Loops and "Bullet" U-Bend fittings meet the specifications and requirements stated here.**

WARRANTY: **CenFuse polyethylene pipe comes with a limited non prorated warranty of 50 years. Centennial Plastics' Earth Loops™ come with a limited non prorated warranty of 50 years. (See Full Limited Warranty for complete conditions).**

Effective April 18, 2005
1830 Centennial Avenue
Hastings, NE 68901
PH: (402) 462-2227
FAX: (402) 462-5529
Toll Free: (866) 851-2227
centennialplastics.com

Mike Mertens
Technical and ESH Manager

PROJECT NAME:_____

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CONTRACTOR:_____

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Mike Mertens
Technical and ESH Manager

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CenFuse meets AWWA C906 requirements in 4" - 8" all SDRs

NSF

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Centennial Plastics follows Proposition 65 (also known as the Safe Drinking Water and Toxic Enforcement Act of 1986). Our products in their finished form, do not require a California Proposition 65 warning label.

Centennial Plastics, Inc. is an ISO 9001 Certified Company.

DRISCOPLEX® 1000 Series Pipe
Industrial HDPE Pipe

DRISCOPLEX® HDPE Pipe is available to meet your needs in compliance with ASTM D3035 or ASTM F714 product standards.

Produced from only the highest rated HDPE pipe material, DRISCOPLEX® 1000 Series Pipe is manufactured from PE4710 resin listed in PPI-TR4.

DRISCOPLEX® HDPE Pipe Advantages:

- ✓ Durable
- ✓ Leak Tight
- ✓ Excellent Flow
- ✓ Low Surge
- ✓ Fatigue Free
- ✓ Impact Resistant
- ✓ Trenchless Install
- ✓ Bend Radius
- ✓ Chemical Resistant
- ✓ UV Protection
- ✓ Flexibility
- ✓ Environmental

Optional Color Stripes to Identify the Application	
Color	**Application**
Green	Wastewater
Purple	Treated Effluent, Reclaimed Water
White – Gray – Brown	Customer Specified

Standard product is solid black with no stripes.
Optional 4 Single Stripe

Performance Pipe, a division of Chevron Phillips Chemical Company LP | 5085 W. Park Blvd | Suite 500 | Plano, TX 75093 | Phone: 800-527-0662 | Fax: 972-599-7329

PERFORMANCE PIPE
A Division of Chevron Phillips Chemical Company LP

DRISCOPLEX® 1000 Series Pipe

DriscoPlex® Series Pipe Material Physical Properties		
Property	**Standard**	**Typical Value†**
Material Designation	ASTM F714	PE4710
Cell Classification	ASTM D3350	445574C (black)
Density [4]	ASTM D1505	0.960 g/cc (black)
Melt Index [4]	ASTM D1238	0.08 g/10 min
Flexural Modulus [5]	ASTM D790	>120,000 psi
Tensile Strength [5]	ASTM D638 Type IV	>3500 psi
SCG (PENT) [7]	ASTM F1473	>500 hours
HDB at 73°F (23°C) [4]	ASTM D2837	1600 psi
Color; UV stabilizer [C] [E]	ASTM D3350	Black Color with UV Stabilizer

This is not a product specification and does not guarantee or establish specific minimum or maximum values or manufacturing tolerance for material or piping products to be supplied. Values obtained from tests of specimens taken from piping product may vary from these typical values.

Common Dimension Ratios for DriscoPlex® 1000 IPS Pipe
(Custom DR's available. Contact Performance Pipe)

IPS		DR 32.5			DR 17			DR 11			DR 9		
ASTM F714 PR		PR = 63 psi			PR = 125 psi			PR = 200 psi			PR = 250 psi		
Pipe Size in.	OD, in.	Min. Wall, in.	Avg. ID, in.	Wgt. lbs/ft	Min. Wall, in.	Avg. ID, in.	Wgt. lbs/ft	Min. Wall, in.	Avg. ID, in.	Wgt. lbs/ft	Min. Wall, in.	Avg. ID, in.	Wgt. lbs/ft
2	2.375	0.073	2.220	0.23	0.140	2.079	0.43	0.216	1.917	0.64	0.264	1.816	0.77
3	3.50	0.108	3.272	0.51	0.206	3.064	0.94	0.318	2.825	1.39	0.389	2.676	1.66
4	4.50	0.138	4.206	0.84	0.265	3.939	1.55	0.409	3.633	2.31	0.500	3.440	2.75
6	6.625	0.204	6.193	1.81	0.390	5.799	3.36	0.602	5.348	5.00	0.736	5.064	5.96
8	8.625	0.265	8.062	3.07	0.507	7.549	5.69	0.784	6.963	8.47	0.958	6.593	10.11
10	10.75	0.331	10.049	4.77	0.632	9.409	8.83	0.977	8.678	13.16	1.194	8.218	15.70
12	12.75	0.392	11.918	6.71	0.750	11.160	12.43	1.159	10.293	18.51	1.417	9.747	22.08
14	14.00	0.431	13.087	8.09	0.824	12.254	14.98	1.273	11.302	22.32	1.556	10.702	26.63
16	16.00	0.492	14.956	10.56	0.941	14.005	19.57	1.455	12.916	29.15	1.778	12.231	34.78
18	18.00	0.554	16.826	13.37	1.059	15.755	24.77	1.636	14.531	36.89	2.000	13.760	44.02
20	20.00	0.615	18.695	16.50	1.176	17.506	30.58	1.818	16.145	45.54	2.222	15.289	54.34
22	22.00	0.677	20.565	19.97	1.294	19.256	37.00	2.000	17.760	55.10	2.444	16.818	65.75
24	24.00	0.738	22.434	23.76	1.412	21.007	44.03	2.182	19.375	65.58	2.667	18.347	78.25
26	26.00	0.800	24.304	27.89	1.529	22.758	51.67	2.364	20.989	76.96	2.889	19.876	91.84
28	28.00	0.862	26.174	32.34	1.647	24.508	59.93	2.545	22.604	89.26	3.111	21.404	106.51
30	30.00	0.923	28.043	37.13	1.765	26.259	68.80	2.727	24.218	102.47	3.333	22.933	122.27
32	32.00	0.985	29.913	42.24	1.882	28.009	78.28	2.909	25.833	116.58	3.556	24.462	139.12
34	34.00	1.046	31.782	47.69	2.000	29.760	88.37	3.091	27.447	131.61			
36	36.00	1.108	33.652	53.46	2.118	31.511	99.07	3.273	29.062	147.55			
42	42.00	1.292	39.260	72.77	2.471	36.762	134.84	3.818	33.905	200.84			
48	48.00	1.477	44.869	95.05	2.824	42.014	176.12						
54	54.00	1.662	50.478	120.29	3.176	47.266	222.90						

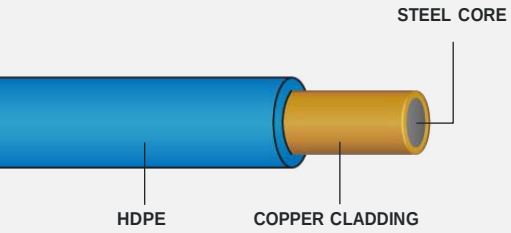
Sizes highlighted in yellow represent standard sizes and DRs. Please contact Performance Pipe for questions about other available sizes and DRs.

This product flyer is intended for reference purposes. It should not be used in place of the advice from a licensed Professional Engineer. Pressure Ratings (PR) are based on an operating temperature up to 80°F and for clean water applications. PR is calculated using 0.63 design factor for HDS as listed in PPI TR-4 for PE4710. Chemical, temperature and environmental use considerations may require additional design factors. Average inside diameter is calculated using Nominal OD and Minimum Wall plus 6% for use in estimating fluid flow. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimensions and tolerances in the applicable pipe manufacturing specification. Additional size and information is available at www.performancepipe.com

Performance Pipe, a division of Chevron Phillips Chemical Company LP | 5085 W. Park Blvd | Suite 500 | Plano, TX 75093 | Phone: 800-527-0662 | Fax: 972-599-7329

KRIS-TECH PRODUCT SPECIFICATIONS

12 EXTRA HIGH STRENGTH- CCS TRACER WIRE



BENEFITS & FEATURES

- √ The corrosion resistance and conductivity of solid copper and the strength of fully annealed high-carbon steel
- √ Higher breaking strength than copper
- √ 11% lighter than solid copper
- √ 1185 lb. break load
- √ 45 or 60 mil HDPE insulation
*Alternative wall thicknesses are available upon request
- √ Bonded metals will not corrode or separate
- √ 'Theft-resistant' (now aftermarket value) and stable price history compared to solid copper
- √ Rated for direct bury
- √ Color-coded in accordance with the American Public Works (APWA) standards for utility identification
- √ Exclusively manufactured by Kris-Tech Wire

APPLICATION

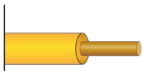
Kris-Tech copper-clad steel (CCS) tracer wire is installed on all non-metallic and metallic underground utilities and wires to enable infrastructure location. CCS tracer wire is ideal for trenching, open cut, and plowing applications when there are no above-ground buildings, roadways, or other obstructions.

PRODUCT DESCRIPTION

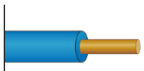
#12 AWG (0.0808" diameter), fully annealed high carbon steel with an extra high-strength solid copper-clad steel conductor. Insulated with a high-density polyethylene (HDPE) insulation rated for direct burial use at 600 or 1000 volts.

COLOR OPTIONS

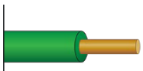
Our tracer wire is manufactured in a range of colors, in conformance with the American Public Works Administration Uniform Color Code. Non-standard colors based on unique customer requirements are also available.



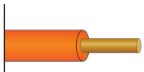
YEL = Natural Gas Lines



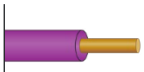
BLU = Potable Water



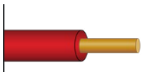
GRN = Sewer Lines



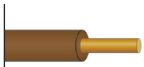
ORG = Fiber Optic or Telecommunications



PUR = Reclaimed Water, Irrigation, or Slurry Lines

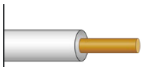


RED = Electrical



BRN = Application for Brown Insulation

B LK= Pet Containment Wire, or Other Uses



WHT = Application for White Insulation

PROUDLY MADE IN THE USA

KrisTech

PART# AND TERMS

HDPE0012011-EHS-*-*****

- √ 12 AWG-Solid CCS Tracer Wire
- √ 45 Mil HMWPE 600 Volt
- √ 60 Mil HMWPE 1000 Volt
- √ Direct Burial

**** INSULATION THICKNESS**
***** INSULATION COLOR**
YEL=Yellow, BLU=Blue, GRN=Green, ORG=Orange, PUR=Purple, RED=Red, BRN=Brown, BLK=Black, WHT=White

****** SPOOL SIZE IN FEET**

SPOOL LABEL

Wound wire on a compact spool made of plastic or wood.

CONDUCTOR

Kris-Tech Wire copper-clad steel wire is composed of a steel core with a uniform and continuous copper cladding completely bonded to the steel throughout. Wire conforms to ASTM B1010

SURFACE CONDITION

Wire surface shall be defect-free, including flakes, pits, voids, and grooves. Wire surface shall be smooth, with no excessive copper dust and residual drawing lubricants.

SPECIFICATIONS

FULL PRODUCT DESCRIPTION

- √ Tracer wire shall be a #12 AWG (0.0808” diameter) fully annealed, high carbon steel, extra high strength solid copper-clad steel conductor (EHS-CCS) rated at 600 or 1000 volts
- √ Insulated with 45 or 60 mil, high density polyethylene (HDPE) insulation rated for direct-burial use
- √ EHS-CCS conductor must meet or exceed 21% conductivity for locate purposes
- √ Break load of 1185 lbs.
- √ HDPE insulation is RoHS compliant and utilizes virgin-grade materials
- √ Insulation colors meet the APWA color code standard for buried utility identification

PRINT LINE

- √ Permanent physical markings: surface print legend on insulation will repeat at a minimum interval of every two linear feet
- √ Ink colors include Black ink for Yellow, Blue, Red, Orange, Purple, Brown, White, and Green insulation, and White ink for Black insulation
- √ Kris-Tech wire #12 AWG EHS-CCS tracer wire — 45 or 60 mil HDPE voltage direct burial only

CLADDING

The steel and copper interface has a metallurgical bond achieved through a high heat and pressure bonding process — the established process for porosity-free material

- **Steel** is high strength, with 0.54 carbon or greater, and verified to meet all required mechanical properties.
- **Copper** is UNS-C10200, OF Copper as per ASTM B-170 (latest revision). High conductivity, oxygen-free copper is used to provide optimal signal performance

KrisTech

INSULATION

The following is a description of the properties of the materials used in Kris-Tech extra high strength tracer wire insulation

MATERIAL DESCRIPTION

- √ Insulation is made up of a copolymer high density polyethylene (HDPE) designed explicitly for insulating highspeed copper wire
- √ It contains the obligatory levels and types of primary antioxidant and metal deactivator additives to meet most Wire and Cable industry requirements
- √ HDPE material is produced with an excellent balance of surface smoothness, tensile and elongation properties, processing ease, abrasion toughness, environmental stress crack, thermal stress crack resistance, and electrical consistency
- √ Insulation conforms to ASTM D1248

QUALITY ASSURANCE

Every Kris-Tech product is manufactured to exact specifications using our rigorous quality control system that ensures products are defect-free and meet or exceed all performance requirements.

SPECIFICATIONS

PHYSICAL, MECHANICAL, & ELECTRICAL PROPERTIES

The wire shall conform to the properties listed in Table 1 & Table 2.

*Diameter tolerances: ±1%

Table 1: Physical, Mechanical, and Electrical Properties

#12 AWG CCS High Carbon Steel	21% EHS CCS Conductor
1. General Specifications	
Wire Hardness	**Extra High Strength(EHS)**
Base Alloy Material	High carbon steel
2. Dimensions	
Diameter, nominal	2.0523 mm / 0.0808 in
Diameter, minimum	2.0318 mm / 0.0800 in
Cross section Area, nominal	3.3 mm^2 / 6,528.6 cmil
Net Weight	26.42 Kg/Km / 17.75 lb/Kft
Copper Thickness, minimum	0.0308 mm / 0.0012 in
Density, typical	7.9900 g/cm^3 / 0.2884 lb/in^3
3. Electrical Specifications	
Electrical Conductivity (IACS), nominal	21%
DC Resistance, maximum	27.98640 ?/Km, 8.52983 ?/Kft
4. Mechanical Specifications	
Breaking Load, minmium	4,552 N / 1,185 lb
Tensile Strength, maximum	1,697 N/mm^2 / 246,253 psi
Tensile Strength, minimum	1,379N/mm^2 / 200,000 psi
Wire Elongation, minimum	1%

Table 2: Physical, Mechanical, and Electrical Properties

High Density Polyethylene Insulator	
1. Physcial Specifications	
Density (ASTM D1505)	0.948 g/cm^3
Melt Mass-Flow Rate (ASTM D1238)	0.80 g/10min
Brittleness Temperature (ASTM D746)	< -76.1 °C
2. Mechanical Specifications	
Tensile-Yield (ASTM D638)	21.7 Mpa
Tensile- Break (ASTM D638)	16.2 Mpa
Tensile-Elongation (Break) (ASTM D638)	590%
3. Electrical Specifications	
Volume Resistivity (ASTM D257)	1.0E+18 Ω·cm
Dielectric Constant (ASTM D150)	2.33
Dissipation Factor (ASTM D150)	7.0E-05

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) :

GHS05 GHS08

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.

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 (Al2O3), 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 (Na2O)	(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.

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.

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/m³)	6 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	20 mppcf (80mg/m^3/%SiO_2)
Nunavut	OEL TWA (mg/m³)	2 mg/m³ (respirable mass) 5 mg/m³ (total mass) 0.05 mg/m³ (regulated under Silica flour-respirable mass) 0.15 mg/m³ (regulated under Silica flour, total mass)
Northwest Territories	OEL TWA (mg/m³)	2 mg/m³ (respirable mass) 5 mg/m³ (total mass) 0.05 mg/m³ (regulated under Silica flour-respirable mass) 0.15 mg/m³ (total mass, regulated under Silica flour)
Yukon	OEL TWA (mg/m³)	300 particle/mL (as measured by Konimeter instrumentation) 20 mppcf (as measured by Impinger instrumentation) 2 mg/m³ (respirable mass)

Iron oxides (1332-37-2)		
USA ACGIH	ACGIH TWA (mg/m³)	5 mg/m³
USA OSHA	OSHA PEL (TWA) (mg/m³)	10 mg/m³ Iron Oxide fume
Nunavut	OEL STEL (mg/m³)	10 mg/m³ (fume)
Nunavut	OEL TWA (mg/m³)	5 mg/m³ (fume)
Northwest Territories	OEL STEL (mg/m³)	10 mg/m³ (fume)
Northwest Territories	OEL TWA (mg/m³)	5 mg/m³ (fume)

Magnesium oxide (MgO) (1309-48-4)		
Mexico	OEL TWA (mg/m³)	10 mg/m³ (fume)
USA ACGIH	ACGIH TWA (mg/m³)	10 mg/m³ (inhalable fraction)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³ (fume, total particulate)
USA IDLH	US IDLH (mg/m³)	750 mg/m³ (fume)
Alberta	OEL TWA (mg/m³)	10 mg/m³ (fume)
British Columbia	OEL STEL (mg/m³)	10 mg/m³ (respirable dust and fume)
British Columbia	OEL TWA (mg/m³)	10 mg/m³ (fume, inhalable) 3 mg/m³ (respirable dust and fume)
Manitoba	OEL TWA (mg/m³)	10 mg/m³ (inhalable fraction)
New Brunswick	OEL TWA (mg/m³)	10 mg/m³ (fume)
Newfoundland & Labrador	OEL TWA (mg/m³)	10 mg/m³ (inhalable fraction)
Nova Scotia	OEL TWA (mg/m³)	10 mg/m³ (inhalable fraction)
Nunavut	OEL STEL (mg/m³)	20 mg/m³ (fume)
Nunavut	OEL TWA (mg/m³)	10 mg/m³ (fume)
Northwest Territories	OEL STEL (mg/m³)	20 mg/m³ (fume)
Northwest Territories	OEL TWA (mg/m³)	10 mg/m³ (fume)
Ontario	OEL TWA (mg/m³)	10 mg/m³ (inhalable)
Prince Edward Island	OEL TWA (mg/m³)	10 mg/m³ (inhalable fraction)
Québec	VEMP (mg/m³)	10 mg/m³ (fume)
Saskatchewan	OEL STEL (mg/m³)	20 mg/m³ (inhalable fraction)

Saskatchewan	OEL TWA (mg/m³)	10 mg/m³ (inhalable fraction)
Yukon	OEL STEL (mg/m³)	10 mg/m³ (fume)
Yukon	OEL TWA (mg/m³)	10 mg/m³ (fume)

Calcium oxide (1305-78-8)		
Mexico	OEL TWA (mg/m³)	2 mg/m³
USA ACGIH	ACGIH TWA (mg/m³)	2 mg/m³
USA OSHA	OSHA PEL (TWA) (mg/m³)	5 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	2 mg/m³
USA IDLH	US IDLH (mg/m³)	25 mg/m³
Alberta	OEL TWA (mg/m³)	2 mg/m³
British Columbia	OEL TWA (mg/m³)	2 mg/m³
Manitoba	OEL TWA (mg/m³)	2 mg/m³
New Brunswick	OEL TWA (mg/m³)	2 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	2 mg/m³
Nova Scotia	OEL TWA (mg/m³)	2 mg/m³
Nunavut	OEL STEL (mg/m³)	4 mg/m³
Nunavut	OEL TWA (mg/m³)	2 mg/m³
Northwest Territories	OEL STEL (mg/m³)	4 mg/m³
Northwest Territories	OEL TWA (mg/m³)	2 mg/m³
Ontario	OEL TWA (mg/m³)	2 mg/m³
Prince Edward Island	OEL TWA (mg/m³)	2 mg/m³
Québec	VEMP (mg/m³)	2 mg/m³
Saskatchewan	OEL STEL (mg/m³)	4 mg/m³
Saskatchewan	OEL TWA (mg/m³)	2 mg/m³
Yukon	OEL STEL (mg/m³)	4 mg/m³
Yukon	OEL TWA (mg/m³)	2 mg/m³

Titanium dioxide (13463-67-7)		
Mexico	OEL TWA (mg/m³)	10 mg/m³
Mexico	OEL STEL (mg/m³)	20 mg/m³
USA ACGIH	ACGIH TWA (mg/m³)	10 mg/m³
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³ (total dust)
USA IDLH	US IDLH (mg/m³)	5000 mg/m³
Alberta	OEL TWA (mg/m³)	10 mg/m³
British Columbia	OEL TWA (mg/m³)	10 mg/m³ (total dust) 3 mg/m³ (respirable fraction)
Manitoba	OEL TWA (mg/m³)	10 mg/m³
New Brunswick	OEL TWA (mg/m³)	10 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	10 mg/m³
Nova Scotia	OEL TWA (mg/m³)	10 mg/m³
Nunavut	OEL TWA (mg/m³)	5 mg/m³ (respirable mass) 10 mg/m³ (total mass)
Northwest Territories	OEL TWA (mg/m³)	5 mg/m³ (respirable mass) 10 mg/m³ (total mass)
Ontario	OEL TWA (mg/m³)	10 mg/m³
Prince Edward Island	OEL TWA (mg/m³)	10 mg/m³
Québec	VEMP (mg/m³)	10 mg/m³ (containing no Asbestos and <1% Crystalline silica-total dust)
Saskatchewan	OEL STEL (mg/m³)	20 mg/m³
Saskatchewan	OEL TWA (mg/m³)	10 mg/m³
Yukon	OEL STEL (mg/m³)	20 mg/m³

Yukon	OEL TWA (mg/m³)	30 mppcf 10 mg/m³

Silica, cristobalite (14464-46-1)		
Mexico	OEL TWA (mg/m³)	0.05 mg/m³ (respirable fraction)
USA ACGIH	ACGIH TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
USA ACGIH	ACGIH chemical category	Suspected Human Carcinogen
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.05 mg/m³ (respirable dust)
USA IDLH	US IDLH (mg/m³)	25 mg/m³ (respirable dust)
Alberta	OEL TWA (mg/m³)	0.025 mg/m³ (respirable particulate)
British Columbia	OEL TWA (mg/m³)	0.025 mg/m³ (respirable)
Manitoba	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
New Brunswick	OEL TWA (mg/m³)	0.05 mg/m³ (respirable fraction)
Newfoundland & Labrador	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
Nova Scotia	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
Nunavut	OEL TWA (mg/m³)	0.05 mg/m³ (respirable mass) 0.15 mg/m³ (total mass)
Northwest Territories	OEL TWA (mg/m³)	0.05 mg/m³ (respirable mass) 0.15 mg/m³ (total mass)
Ontario	OEL TWA (mg/m³)	0.05 mg/m³ (designated substances regulation-respirable)
Prince Edward Island	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
Québec	VEMP (mg/m³)	0.05 mg/m³ (respirable dust)
Saskatchewan	OEL TWA (mg/m³)	0.05 mg/m³ (respirable fraction)
Yukon	OEL TWA (mg/m³)	150 particle/mL

Tridymite (15468-32-3)		
Mexico	OEL TWA (mg/m³)	0.05 mg/m³ (respirable fraction)
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.05 mg/m³ (respirable dust)
USA IDLH	US IDLH (mg/m³)	25 mg/m³ (respirable dust)
Alberta	OEL TWA (mg/m³)	0.025 mg/m³ (respirable particulate)
New Brunswick	OEL TWA (mg/m³)	0.05 mg/m³ (respirable fraction)
Nunavut	OEL TWA (mg/m³)	0.05 mg/m³ (respirable mass) 0.15 mg/m³ (total mass)
Northwest Territories	OEL TWA (mg/m³)	0.05 mg/m³ (respirable mass) 0.15 mg/m³ (total mass)
Québec	VEMP (mg/m³)	0.05 mg/m³ (respirable dust)
Yukon	OEL TWA (mg/m³)	150 particle/mL

Quartz (14808-60-7)		
Mexico	OEL TWA (mg/m³)	0.1 mg/m³ (respirable fraction)
USA ACGIH	ACGIH TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
USA ACGIH	ACGIH chemical category	A2 - Suspected Human Carcinogen
USA OSHA	OSHA PEL (STEL) (mg/m³)	250 mppcf/%SiO_2+5, 10mg/m^3/%SiO_2+2
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.05 mg/m³ (respirable dust)
USA IDLH	US IDLH (mg/m³)	50 mg/m³ (respirable dust)
Alberta	OEL TWA (mg/m³)	0.025 mg/m³ (respirable particulate)
British Columbia	OEL TWA (mg/m³)	0.025 mg/m³ (respirable)
Manitoba	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
New Brunswick	OEL TWA (mg/m³)	0.1 mg/m³ (respirable fraction)
Newfoundland & Labrador	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
Nova Scotia	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
Nunavut	OEL TWA (mg/m³)	0.1 mg/m³ (respirable mass) 0.3 mg/m³ (total mass)
Northwest Territories	OEL TWA (mg/m³)	0.1 mg/m³ (respirable mass)

		0.3 mg/m³ (total mass)
Ontario	OEL TWA (mg/m³)	0.10 mg/m³ (designated substances regulation-respirable)
Prince Edward Island	OEL TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
Québec	VEMP (mg/m³)	0.1 mg/m³ (respirable dust)
Saskatchewan	OEL TWA (mg/m³)	0.05 mg/m³ (respirable fraction)
Yukon	OEL TWA (mg/m³)	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

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

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/m³ (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.

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.

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

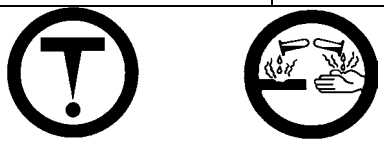
Silica, cristobalite (14464-46-1)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

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)

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 %	

WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects

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

Emegency 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

GeoPro, Inc.

TG Lite | PowerTEC | 1.00 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 IGSHPA's Closed-Loop Design and Installation Standards which require:

- Permeability less than $1.0x10^{-7}$ 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*	**33.0**	gal (US)
Yield	**38.6**	gal (US)

*Mix water must be suitable for human consumption

GROUT PROPERTIES

Target Thermal Conductivity	**1.00**	Btu/hr-ft-°F
Permeability	**$<1x10^{-7}$**	cm/s
Density	**10.5**	lb/gal (US)
Percent Solids	**32.4**	by weight
Percent Active Solids	**26.7**	by weight

MIXING INSTRUCTIONS

1. Fill conventional paddle mixer with 33.0 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

GeoPro, Inc.
877-580-9348

302 East Warehouse
Elkton, SD 57026

geoproinc.com

TRU-BORE®

Certified to NSF/ANSI 60

Product Information

Description

TRU-BORE® is a highly concentrated bentonite based drilling fluid designed for difficult drilling operations in both vertical and horizontal borings. It is an extremely effective high performance viscosifier for horizontal drilling applications to maintain borehole integrity during pullback. It is non-toxic and environmentally safe. Its fast-hydrating formula allows contractors to mix fast and build viscosity quickly. **TRU-BORE®** stabilizes formations ranging from moderate clay soils to high concentrations of sand. By forming a thin tough filter cake, fluid loss to areas around the borehole is reduced. These factors, coupled with excellent gel strength values make **TRU-BORE®** the best risk management tool available today.

Characteristics

- Barrel Yield: 240 - 250
- Fluid Loss: 12 – cc.
- Mesh: 80% ± 2 passing 200 mesh
- PH 8.1 ± .2
- Moisture: 8% ± 1.5

Application

For every 100 gallons of make-up water, adding 15 to 25 pounds of **TRU-BORE®** will yield a viscosity of approximately 45 seconds on a Marsh Funnel. At a rate of 27 pounds per 100 gallons, viscosity can climb to 60 seconds.

CLAY
1½ bags for viscosity of 32-35 seconds, then add **UNI-DRILL®** liquid polymer to reach a viscosity of 42-45 seconds. (The addition of **UNI-DRILL®** keeps the clays from thickening the mud system even more.)
SAND
2¼ - 3 bags for viscosity of 55 ± seconds
UNKNOWN OR MEDIUM SOILS
1½ - 3 bags for viscosity of 45 seconds

Packaging

TRU-BORE® is packaged in 50 pound multi-walled paper bags, palletized 60 bags per pallet and shrink-wrapped.

4375/201302

WYO-BEN, INC., Billings, Montana 800.548.7055 406.652.6351 **www.wyoben.com**

DRILPLEX HDD

Viscosifier

APPLICATIONS

- Water-based bentonite fluids

ADVANTAGES

- High rate of penetration
- Optimum cuttings transport
- Excellent solids suspension
- Borehole stabilization
- Low drilling costs

LIMITATIONS

- DRILPLEX HDD* viscosifier may be adversely affected by anionic polymers or thinners. DRILPLEX HDD viscosifier should only be used to enhance a bentonite-based fluid. The mixing tank must be clean before being used.

The DRILPLEX HDD viscosifier enables the formulation of fluids with exceptional shear-thinning properties, resulting in a drilling fluid with both excellent dynamic and static carrying capacity for solids. This is indicated by high-yield-point and low-plastic-viscosity readings. When not circulating, the mud instantly reverts to a gelled state and results in high suspending capacity indicated by high, nonprogressive gel strength readings.

Certified to NSF/ANSI 60

For 300 galUS [1,136 L] of drilling fluid mix:

- Add 1½ sacks (75 lb [34 kg]) of MAX GEL* viscosifier in freshwater and hydrate for 10 min. If higher rheological properties are desired, mix more gel. For every 7 lb [3.2 kg] of additional gel added, the yield point rises approximately 20 points.
- After the gel is hydrated, add 6 lb [2.7 kg] of DRILPLEX HDD viscosifier (3 vis cups) and mix for an additional 5 to 10 min.
- For torque reduction, add 1.5 galUS [5.7 L] of PLATINUM ROD EASE* lubricant.

DRILPLEX HDD viscosifier is only slightly soluble in water.

Toxicity and handling

Bioassay information is available upon request. Handle as an industrial chemical, wearing protective equipment and observing the precautions described in the MSDS.

Packaging and storage

DRILPLEX HDD viscosifier comes in 25-lb [11.3-kg] multiwall paper sacks with 80 sacks to a pallet. Store in a dry location away from sources of heat or ignition, and minimize dust.

9134FG

Inhibited Propylene Glycol Freeze Protectant

Product Description

9134FG is an inhibited glycol product for use in closed recirculating heating and cooling systems to prevent freezing, pipe burst, corrosion, and scale formation.

9134FG is concentrated USP food grade Propylene Glycol with a food grade dipotassium phosphate-based blend of corrosion inhibitors.

9134FG is registered with NSF as being acceptable for use as a heat transfer fluid where there is possibility of incidental food contact (Category Code HT1). The amount should be the minimum required to accomplish the desired technical effect. This allows 9134FG to be recommended for use in food plant, and ground water hydronic loops.

Features & Benefits

Freeze Protection for systems at risk of freezing and associated damage

Prevents Corrosion – Effective mild steel corrosion protection

Economical and Convenient – May be diluted on site to best concentration

NSF Nonfood Compounds

Physical Characteristics

Color & Appearance:	Clear liquid
Spec. Gravity (20°C):	1.04
Density (20°C):	8.67 lbs / gallon
pH (20°C):	8.9 – 9.9 (10%)
Water Solubility:	Complete
Freeze Point:	Below -60°F (-51°C)

Revision Date: April 13, 2023

Dosage, Monitoring and Control

9134FG is intended to be added to a system with dilution water to achieve the required freeze point depression. Recommended dilution water quality is softened or reverse osmosis (RO) permeate.

9134FG Concentration % by Volume	Freeze Point °F	Burst Point °F
0	32	32
25	14	-1
30	8	-18
35	1	-46
40	-8	-60

This chart uses typical numbers and actual values may vary. Solutions less than 25% glycol are at risk for bacterial contamination and are not recommended without regular testing.

The corrosion protection concentration for **9134FG** can be measured using an orthophosphate test. The recommended control range for orthophosphate for this product is 1,000 – 6,000 ppm. Additional corrosion protection treatments can be added to a system filled with 9134FG; check with your Kurita Representative for compatibility.

For new construction systems, it is recommended to pre-clean and flush the loop prior to glycol addition.

Recommended Feed Systems

9134FG can be added directly to the heating or cooling system or loop and diluted to the desired concentration using good quality water, either softened or reverse osmosis (RO) permeate. Chlorides concentration of dilution water should be below 50 ppm.

Available Packaging

Bulk
Tote: 275 Gallon
Drum: 55 Gallon
Pail: 5 Gallon

Material Compatibility

Concentrated product is compatible with aluminum, stainless steel, mild steel, Buna-N, EPDM, Viton, PTFE, polypropylene, PVDF, silicone.

Concentrated product is not compatible with PVC, or neoprene, especially at temperatures above 50°F.

Storage and Handling

Store between 50 - 95°F. In these conditions, shelf life is 12 months from purchase date.

Harmful if swallowed. Do not drink or taste. Avoid contact with skin. If material gets on skin, wash with plenty of water. If eyes are affected, immediately flush with water for at least 15 minutes and get medical attention. For more information, see Safety Data Sheet (SDS).

Certification

Our quality management system (ISO 9001) is successfully certified by DNV.