

**Wisconsin Department of Natural Resource Approved Heat Exchange Drillhole Products - Through 2015**

<b>Approval Date</b>	<b>Manufacturer or Distributor</b>	<b>Product Name</b>	<b>Materials(s)</b>	<b>Uses</b>	<b>Special Conditions</b>
01/27/2014	Arkema	"Arkema Furane® 410A"	R-410 Refrigerant - 50/50 mix of Pentafluoroethane (HFC-125) and Difluoroethane (R-32)	Liquid gas for direct exchange heat pump systems	Use of A1/B1 refrigerant for large systems may require registration with the Department of Safety and Professional Services.
01/26/2004	Baroid Industrial Drilling Products	"Barotherm"	High-solids, bentonite grout for heat-exchange drillholes	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	<b>None – May also be used for water well construction.</b>
07/09/2004	Baroid Industrial Drilling Products	"E-Z Seal"	High solids bentonite grout material (one-sack product)	High solids bentonite grout	<b>Allowed only for low cap. private &amp; non-comm. wells where neat cement grout not required.</b>
08/19/2010	Baroid Industrial Drilling Products	"IDP-523" - Thermally Conductive Grout	High solids bentonite grout with silica sand added (One-sack grout)	Grout, sealing and heat exchange material for closed-loop heat pump drillholes.	<b>None</b>
08/20/2010	Baroid Industrial Drilling Products	"IDP-550" - Thermally Conductive Grout	High solids bentonite grout with silica sand added (One-sack grout)	Grout, sealing and heat exchange material for closed-loop heat pump drillholes.	<b>None</b>
11/20/2009	Brenntag Great Lakes, LLC (Auer Steel, Distributor)	"Ethanol SDA-3C 200 Proof"	Ethanol alcohol antifreeze fluid with isopropyl alcohol as denaturing additive	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	<b>None</b>
07/16/1991	CETCO	"Pure Gold Grout"	Organic-free western sodium bentonite and proprietary mixture of sulfate (NSF Approved)	High solids bentonite grout for use where neat cement grout not required	<b>None</b>
06/28/1987	CETCO	"Volclay Grout" (See CETCO Grout")	Low yield bentonite single component bentonite grout - no additives (NSF Approved)	High solids bentonite grout for use where neat cement grout is not required	<b>Allowed only where neat cement grout is not required - must be mixed according</b>
02/13/2012	CETCO	"CETCO Granular Grout"	Granular Bentonite with additives (NSF Approved)	Clay slurry ingredient; seal for driving casing and sealing material for geothermal drillholes.	<b>None</b>
06/28/1987	CETCO	CETCO Grout" (Formerly "Volclay Grout") (Bentonite Grout)	Low yield bentonite single component bentonite grout - no additives (NSF Approved)	High solids bentonite grout for use where neat cement grout is not required	<b>Allowed only where neat cement grout is not required - must be mixed according to instructions with product</b>
06/07/2004	CETCO Drilling Products	"Geothermal Grout"	High-solids bentonite grout for heat-exchange drillholes	Grout, sealing and heat exchange material for closed-loop heat pump drillholes.	<b>None – May also be used for water well construction.</b>
02/13/2012	CETCO Drilling Products	"High TC Geothermal Grout"	High-solids bentonite grout for heat-exchange drillholes	Grout, sealing and heat exchange material for closed-loop heat pump drillholes.	<b>None</b>
01/27/2014	Copeland®	"Copeland® Ultra 32-3MAF"	POE-32 Lubricant, >99% Polyol Ester with <1% additives	Lubricant for direct exchange heat pump systems	<b>None</b>
06/11/2013	Covalent Laboratores	"ColdFLOW - PEG"	Propylene Glycol with inhibitors.	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	<b>None</b>
08/13/1998	Cowboy Mining Co.	"Cowboy Brand Grout"	High Solids Bentonite Grout (100% Bentonite) (NSF-Approved)	High Solids Bentonite Grout – Allowed for low capacity wells when neat cement grout not required	<b>Mixed according to Mfg.'s instruction</b>
06/28/1990	Distributed by Economy Mud Products Co.	"Econoplug Grout"	High solids (30%) sodium bentonite grout material	High solids bentonite (clay) grout for use where neat cement grout is not required	<b>Mud weight of 9.9 lbs/gal. - check for settling</b>
09/27/2012	Distributed by Industrial Solutions, Inc	"Eco-Smart HTF"	Propylene glycol based antifreeze fluid with corrosion inhibitor	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	<b>None</b>
06/29/1990	Distributed by International Drilling Fluids, Inc.	"Kwik - Ben"	Powdered, drilling mud -type bentonite (200-mesh) with ½ lb./ton proprietary polymer added (NSF Approved)	Rotary drilling mud clay; clay slurry ingredient	<b>None</b>
11/20/2008	Dow Chemical Company	"DOWFROST"	Propylene glycol based antifreeze fluid with corrosion inhibitor	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	<b>None</b>

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01/27/2014	DuPont™	"DuPont™ SUVA 410A"	R-410 Refrigerant - 50/50 mix of Pentafluoroethane (HFC-125) and Difluoroethane (R-32)	Liquid gas for direct exchange heat pump systems	Use of A1/B1 refrigerant for large systems may require registration with the Department of Safety and Professional Services.
02/09/1998	Federal Summit/MI SWACO	"Kwik-Plug Fine"	Granular bentonite (8-mesh)	High Solids bentonite grout; Annular space seal for driving casing	None
02/09/1998	Federal Summit/MI SWACO	"Kwik-Plug Micro"	Granular bentonite (16-20 mesh)	High Solids bentonite grout; Annular space seal for driving casing	None
09/11/2009	Fremont Industries Water Management Solutions	"Fremont 9134FG; 9134FG-25D; 9134FG-30D; 9134FG-35D; 9134FG-40D; 9134FG-45D & FG9134-50G"	Propylene glycol-based antifreeze fluid with corrosion inhibitor	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
09/25/2012	Fremont Industries/CDG Environmental/Anderson Chemical	"CDG Solution 3000"	0.3% Chlorine Dioxide Aqueous Solution	Biocide for well rehabilitation and closed loop heat pump applications	* See Warning in Footnote
09/12/2001	Geo Pro, Inc. & Black Hills Bentonite, L.L.C.	"BH 20 Grout"	High solids (20%) bentonite grout	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None – May also be used for water well construction.
08/06/2002	Geo Pro, Inc. & Black Hills Bentonite, L.L.C.	"BH Ultra"	High solids (20%) bentonite grout	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None – May also be used for water well construction.
08/06/2002	Geo Pro, Inc. & Black Hills Bentonite, L.L.C.	"Thermal Grout Lite"	High solids (20%) bentonite grout	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None – May also be used for water well construction.
08/06/2002	Geo Pro, Inc. & Black Hills Bentonite, L.L.C.	"Thermal Grout Select"	High solids (20%) bentonite grout	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None – May also be used for water well construction.
12/03/2007	GeoPro, Inc.	"PowerTEC"	Graphite-based product	Additive for approved high solids bentonite grout, but only for closed-loop geothermal drillholes.	To be used only for geothermal drillholes, according to Mfg.'s instructions.
03/21/2014	GeoPro, Inc.	"PowerTECx"	Graphite-based product	Additive for approved high solids bentonite grout, but only for closed-loop geothermal drillholes.	To be used only for geothermal drillholes, according to Mfg.'s instructions.
06/05/2009	Halliburton (Baroid) Industrial Drilling Products	"Barotherm Gold"	High-solids thermally conductive bentonite grout for heat-exchange drillholes	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None – May also be used for water well construction.
03/04/2011	Halliburton (Baroid) Industrial Drilling Products	"Barotherm Max"	High-solids thermally conductive bentonite grout for heat-exchange drillholes. Contains carbonaceous additives, mainly graphite.	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	May only be used for closed-loop geothermal drillholes
02/02/2009	Halliburton (Baroid) Industrial Drilling Products	"Barotherm Plus"	High-solids thermally conductive bentonite grout for heat-exchange drillholes.	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None – May also be used for water well construction.
03/11/2011	Halliburton (Baroid) Industrial Drilling Products	"Bore-Grout"	High-solids thermally conductive bentonite grout for heat-exchange drillholes that are not vertical (plumb).	Grout, sealing or heat exchange material for closed-loop heat pump geothermal drillholes.	May only be used for closed-loop geothermal drillholes that are not vertical.
07/26/2013	Hawkins, Inc.	"Chill Pro"	Propylene glycol-based antifreeze fluid with a sodium salt solution corrosion inhibitor and an organic acid additive for pH control	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
03/23/2011	Hercules Chemical Company	"Cryo-tek/AL"	Propylene glycol-based antifreeze fluid with a sodium salt solution corrosion inhibitor and an organic acid additive for pH control	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
03/01/2011	H-O-H Water Technology, Inc.	"PRO-KOOL 75M"	Propylene glycol based antifreeze fluid with a corrosion inhibitor, a buffering agent and a pH adjuster.	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
01/27/2014	Honeywell	"Honeywell Genetron® AZ-20"	R-410 Refrigerant - 50/50 mix of Pentafluoroethane (HFC-125) and Difluoroethane (R-32)	Liquid gas for direct exchange heat pump systems	Use of A1/B1 refrigerant for large systems may require registration with the Department of Safety and Professional Services.
05/18/2007	Houghton Chemical Corporation	"Safe-T-Therm"	Propylene glycol based antifreeze fluid	Heat transfer fluid for closed-loop geothermal drillhole heat exchange systems	None

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03/16/2011	Houghton Chemical Corporation	"GeoSafe 25"	Ethanol alcohol (ethyl alcohol) antifreeze fluid with denaturants and a phosphate additive for corrosion control (A diluted form of "GeoSafe")	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
03/16/2011	Houghton Chemical Corporation	"GeoSafe"	Ethanol alcohol (ethyl alcohol) antifreeze fluid with denaturants and a phosphate additive for corrosion control.	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
07/01/2014	Interstate Chemical Co. Inc.	"Biogreen Geotherm"	Corn Sugar Derived Propylene glycol based heat exchange fluid with corrosion inhibitors	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
07/01/2014	Interstate Chemical Co. Inc.	"Intercool Geotherm"	Propylene glycol based heat exchange fluid with corrosion inhibitors	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
10/15/2008	Interstate Chemical Co. Inc.	"Intercool P-323"	Propylene glycol based antifreeze fluid with corrosion inhibitor	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
03/15/2011	Interstate Chemical Company	"PROCOOL"	Ethanol alcohol (ethyl alcohol) antifreeze fluid with a phosphate additive for corrosion control.	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
02/02/2001	Loresco International, Inc.	"Loresco Type SC.3"	A base carbon material with a proprietary ingredient for reducing surface tension for compact settling under water.	Conductive backfill material to surround anodes in a cathodic protection drillhole.	<b>NR 812 requires prior department approval for a cathodic protection drillhole.</b>
07/01/1992	Loresco; Distributed by Cathodic Engineering Equip. Co., Inc.	"EnviroCoke IV"	Conductive Carbon Grout; High temperature calcined petroleum coke particles and Portland cement.	Grout for deep anode drillholes used for cathodic protection.	<b>NR 812 requires prior department approval for a cathodic protection drillhole.</b>
01/27/2014	Lubrizol	"Lubrizol EMKARATE RL 32-3MAF"	POE-32 Lubricant, >99% Polyol Ester with <1% additives	Lubricant for direct exchange heat pump systems	None
07/30/2013	MI SWACO	"Smooth Grout Thermal"	High-solids thermally conductive bentonite grout for heat-exchange drillholes.	Grout, sealing or heat exchange material for closed-loop heat pump geothermal drillholes.	<b>May only be used for closed-loop geothermal drillholes.</b>
05/06/2008	MI SWACO HDD Mining and Water Well Group	"Gopher Grout"	High solids bentonite grout (NSF Certified)	Bentonite grout. Allowed for low capacity wells where neat cement grout is not required.	<b>Mud weight at least 9.4 lbs/gal.</b>
05/06/2008	MI SWACO HDD Mining and Water Well Group	"Smooth Grout 20"	High solids bentonite grout (NSF Certified)	Bentonite grout. Allowed for low capacity wells where neat cement grout is not required.	<b>Mud weight at least 9.4 lbs/gal.</b>
05/06/2008	MI SWACO HDD Mining and Water Well Group	"Smooth Grout 30"	High solids bentonite grout (NSF Certified)	Bentonite grout. Allowed for low capacity wells where neat cement grout is not required.	<b>Mud weight at least 10.0 lbs/gal.</b>
07/08/1993	N.L. Baroid	"AquaGrout Catalyst: a.k.a. "Benseal - AquaGrout Catalyst"	Granular bentonite mixed with a catalyst composed of four inorganic ingredients	High solids bentonite grout. For use where neat cement grout is not required	<b>Allowed only for low cap. private &amp; non-comm. wells where neat cement grout not required.</b>
04/19/2010	Noble Company	"NOBURST HD"	Monopropylene (Propylene glycol) - based antifreeze fluid with corrosion inhibitor	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
04/16/2010	Noble Company	"NOBURST HD 100"	Monopropylene (Propylene glycol) - based antifreeze fluid with corrosion inhibitor and defoaming agent	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
04/20/2010	Noble Company	"NOBURST HD 50%"	Monopropylene (Propylene glycol) - based antifreeze fluid with corrosion inhibitor and defoaming agent	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
01/27/2014	Nu-Calgon	"Nu-Calgon EMKARATE RL 32-3MAF"	POE-32 Lubricant, >99% Polyol Ester with <1% additives	Lubricant for direct exchange heat pump systems	None
03/02/2011	NU-Calgon	"Freeze-kontr'l"	Propylene glycol-based antifreeze fluid with corrosion inhibitor	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
01/27/2014	Parker	"Parker EMKARATE RL 32-3MAF"	POE-32 Lubricant, >99% Polyol Ester with <1% additives	Lubricant for direct exchange heat pump systems	None
03/20/2012	Pharmco-aaper	"Exoendosol 101"	Ethanol alcohol antifreeze fluid with denaturing and lubricant additives	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None

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03/13/1996	Polymex Drilling systems (PdsCo)	"PdsCo Grout"	High Solids Bentonite Grout (NSF Approved)	High solids bentonite grout - allowed for low capacity wells where neat cement grout not required	Mixed according to Mfg's instructions
02/27/2009	Rhomar Water Management, Inc.	"EnviroGard"	Non-toxic propylene glycol based antifreeze fluid.	Heat transfer fluid for ground-coupled, closed-loop geothermal heat exchange systems	None
01/30/2009	Rhomar Water Management, Inc.	"RhoGard Ultra DP"	Non-toxic propylene glycol based antifreeze fluid.	Heat transfer fluid for ground-coupled, closed-loop geothermal heat exchange systems	None
09/22/2014	SAE Inc	"Conducrete"	Portland Cement and Coke Breeze	Conductive backfill material to surround anodes in a cathodic protection drillhole.	NR 812 requires prior department approval for a cathodic protection drillhole.
11/08/2012	Shamrock Chicago Corp	"Rockfrost HD"	Propylene glycol based antifreeze fluid with corrosion inhibitor and coloring dye	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
11/08/2012	Shamrock Chicago Corp	"Shamrock Lo Tox Antifreeze"	Propylene glycol based antifreeze fluid with corrosion inhibitor and coloring dye	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
11/08/2012	Shamrock Chicago Corp	Champion RV Antifreeze Minus 100	Propylene glycol based antifreeze fluid with corrosion inhibitor and coloring dye	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
12/08/2009	SuperGrout Products, LLC	"Geo SuperGrout"	Cementitious grout containing Portland Cement and other cement derivatives	Grouting material for closed-loop, heat exchange drillholes.	None
04/30/2013	UTILITY Manufacturing Company	"No-Freez"	Propylene Glycol with inhibitors and dye.	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
04/30/2013	UTILITY Manufacturing Company	"Polar Grade No-Freez"	Propylene Glycol with inhibitors and dye.	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
04/30/2013	UTILITY Manufacturing Company	"Super Polar Grade No-Freez Concentrate"	Propylene Glycol with inhibitors and dye.	Heat exchange fluid for closed-loop geothermal heat exchange heating/cooling systems	None
01/27/2014	Virginia	"Virginia EMKARATE RL 32-3MAF"	POE-32 Lubricant, >99% Polyol Ester with <1% additives	Lubricant for direct exchange heat pump systems	None
09/18/2009	WaterFurnace International	"Environol"	Non-toxic ethanol (grain) alcohol-based antifreeze fluid with additives for lubrication, denaturing and coloring.	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
02/09/2010	Wausau Chemical Corporation	"Heat Transfer Fluid HTF-PG-HD"	Propylene glycol-based antifreeze fluid with two corrosion inhibitors	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	* See Warning in Footnote
02/09/2010	Wausau Chemical Corporation	"Heat Transfer Fluid HTF-PG-HD"	Propylene glycol-based antifreeze fluid with two corrosion inhibitors	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
11/25/2009	Wausau Chemical Corporation	"Heat Transfer Fluid-PG-ND"	Propylene glycol-based antifreeze fluid with corrosion inhibitor	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
05/11/2012	Wausau Chemical Corporation	"Geo Blend PG"	Propylene glycol antifreeze fluid containing a denaturant and dye.	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
04/28/2011	Wausau Chemical Corporation	"Geo Blend IP"	Ethanol alcohol (ethyl alcohol) antifreeze fluid containing isopropyl alcohol, an acetate denaturant and a green dye.	Heat exchange transfer fluid for closed-loop geothermal heat exchange heating/cooling systems	None
02/04/1997	Wyo-Ben, Inc.	"Grout-Well DF"	Same as above except grout uses granular.	Bentonite grout. Allowed for low capacity wells where neat cement grout is not required.	Mud weight at least 9.4 lbs/gal.
02/04/1997	Wyo-Ben, Inc.	"Grout-Well"	High solids bentonite grout (NSF Approved)	Bentonite grout. Allowed for low capacity wells where neat cement grout is not required.	Mud weight at least 9.4 lbs/gal.
05/15/2003	Wyo-Ben, Inc.	"TD-16"	Coated granular bentonite grouting material	High solids bentonite grouting for use where neat cement grout is not required; And for a sealing and heat exchange material for closed-loop heat pump drillholes.	None
03/18/2010	Wyo-Ben, Inc.	"Therm-Ex Grout Plus"	High solids geothermal bentonite grout	Grout, sealing or heat exchange material for closed-loop	None

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03/17/2010	Wyo-Ben, Inc.	"Therm-Ex Grout"	High solids geothermal bentonite grout	Grout, sealing or heat exchange material for closed-loop heat pump drillholes.	None
06/29/1990	Wyo-Ben, Inc.	"Enviroplug Grout"	High solids (30%) sodium bentonite grout material	High solids bentonite (clay) grout for use where neat cement grout is not required	<b>Mud weight of 9.9 lbs/gal. - check for settling</b>
<b>*When a product containing an acid is added to a well in combination with a chlorine product, adding too much of the acid or adding it too quickly, can lower the pH of the solution to a point where hazardous chlorine</b>					