

 <p>2506 South Elm Street Greenville, IL 62246 www.enertechmfg.com (888)-436-3783</p>	<h2>Technical Bulletin</h2> <p>Safe Handling of Ethanol & Methanol</p> <p>June 16, 2011</p> <p>TB11.003</p>
--	---

Scope

Information is provided in this bulletin for geothermal installers and service technicians to understand the potential safety hazards and health issues present with the handling of Ethanol or Methanol. Further information will provide a clear definition of the proper procedures for handling the chemicals.

Hazards and Health Effects

Hazards can include:

1. Fire/Explosion
2. Spills

The above hazards can be avoided by following the safe handling procedures in this bulletin.

Health effects include:

1. Direct exposure causes eye irritation.
2. Skin absorption causes skin irritation.
3. Ingestion causes mouth, throat, esophageal and gastrointestinal tract irritation.
4. Inhalation may cause headaches, dizziness and nausea.
5. Overexposure may cause central nervous system, kidney, liver and lung damage.

The proper safety precautions should be taken to handle toxic chemicals.

Ethanol and Methanol Properties

The table below provides key information for the two types of alcohol anti-freezes used in ground loop systems. Methanol is a wood alcohol and Ethanol is a grain alcohol.

Properties	Methanol	Procool (Ethanol)
Composition	100% Methanol	92.14% Ethanol 7.5% Water .3% Other
Flash Point (closed vessel) ¹	60.1F	62°F
Explosive Limits ²	6 - 36.5%	3.1 - 18%
Appearance	Clear	Blue Liquid
Vapor Density (Air=1) ³	>1	>1
Specific Gravity (at 60°F)	0.753	0.81

1. Flash point is defined as the minimum temperature at which the vapor pressure of a liquid is sufficient to form an ignitable mixture with air near the surface of the liquid.
2. The lower explosive limit (LEL) of a flammable liquid is defined as the minimum concentration of the vapor in air for which a flame can propagate. The upper explosive limit (UEL) of a flammable liquid is defined as the maximum concentration of the vapor in air for which a flame can propagate.
3. Both densities are greater than 1 and make the vapors heavier than air.

Safe Handling

Since the flash points are low with alcohol, the vapor will be present in almost all working conditions. All percentages of alcohol used in ground loops will release enough vapors to be ignited. As the alcohol is mixed with water at lower percentages the flash point decreases.

Composition	Flash Point
Methanol 25% Water 75%	102°F
Ethanol 25% Water 75%	94°F
Methanol 20% Water 80%	110°F
Ethanol 20% Water 80%	97°F

The flash points listed in the table above are much safer for handling of the alcohols. When handling methanol and ethanol on jobsites, Enertech recommends methanol and ethanol to be mixed with water at a percentage not to exceed 25%. All flushing procedures should be performed outdoors. If there is no outdoor alternative, flushing must be performed in a well ventilated area indoors. During flushing avoid the use of trouble lights, open flames, sparks or fusion irons. Keep cell phones away from the flushing solution, as well. Inform any other trades working on the site to avoid the use of ignition sources and of the risks of the chemical. Be sure to have alcohol foam, carbon dioxide or water supply fire suppression available at the locations exposed to chemical vapors.

At a minimum, the recommended personal protective equipment is side shielded safety glasses and chemical resistant neoprene, butyl rubber or vinyl gloves.

Storage

Flammable liquids should not be stored near heat, ignition sources, powerful oxidizing agents or other reactive chemicals. Flammable liquids should not be stored near an exit, stairway, or any area normally used for the safe exit of people. The quantity of flammable liquids should be limited to what is immediately needed. Flammable liquids should not be stored above eye level. Bulk quantities of flammable liquids, such as 30 or 55 gallon drums, must be stored in properly designed indoor storage rooms or outside storage areas. Indoor storage rooms containing flammable and combustible liquids must meet the requirements of OSHA Standard 1910-106(d). These standards include spill control measures, spark-proof electrical fixtures, fire suppression equipment, and ventilation requirements. Appropriate fire extinguishers must be located in work areas using flammable liquids. Smoking is prohibited in areas where flammable liquids are used or stored. "No Smoking" and "Flammable Liquids" signs shall be prominently posted in areas where flammable liquids are used or stored.

Transportation

Flammable solvents should be transported in metal or other protective containers.

Grounding and Bonding

Transferring liquids from one metal container to another may produce static electricity sparks capable of igniting the flammable vapors. To discharge the static electricity, dispensing drums should be adequately grounded and bonded to the receiving container before pouring.

Bonding between containers may be made by means of a conductive hose or by placing the nozzle of the dispensing container in contact with the mouth of the receiving container. If the container cannot be grounded, then the liquid should be poured slowly to allow the charge time to disperse.

Spills

For a small spill treat the surface with sorbent materials, such as vermiculite or activated carbon, to remove the remaining methanol. Materials should absorb the solvent and reduce the vapor pressure so that ignition is impossible. If a spill occurs, stop or reduce discharge of material if this can be done without risk. Eliminate all sources of ignition. Avoid skin contact and inhalation. Do not walk through spilled product. Stay upwind and keep out of low-lying areas. Leaking containers should be removed to the outdoors or to an isolated, well-ventilated area, and the contents transferred to a suitable container. Remove a large spill with explosion proof pumps or vacuum equipment. Then, treat the surface with sorbent materials, such as vermiculite or activated carbon

Disposal

Any waste ethanol or methanol should be disposed of through hazardous waste collection and disposal companies.