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# HEALTH AND SAFETY ADVISORY

## GEOHERMAL SYSTEMS

### Ethanol and ethanol/water mixtures

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**Ethanol/water mixtures in geothermal loops are flammable.** Contractors and workers in the geothermal industry need to know that handling ethanol/water mixtures can be hazardous. Vapours from the mixture can be ignited in a small space and near an ignition source—such as in a basement of a home.

An ethanol/water mixture as low as 20% of volume is classified as Class IC flammable liquid by the National Fire Protection Association (NFPA) data standard 325—*Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*, 1994 edition, amended 2001 (Note: this chemical data standard is included in the NFPA *Fire Protection Guide to Hazardous Materials*, 2001 edition). The Ontario Fire Code (Ontario Regulation 213/07 made under the *Fire Protection and Prevention Act*) classifies a Class IC liquid as flammable.

Recently, during the flushing of a geothermal system in the basement of a home, water was mixed with ethanol in a flush cart and the mixture spilled on the floor. The vapours from the flammable mixture ignited, causing a fire.

## HAZARDS AND LEGISLATIVE REQUIREMENTS

Reasonable precautions in accordance with Section 25 (2) (h) of the *Occupational Health and Safety Act* (OHSA) should include, but are not limited to, the following:

1. When dispensing the ethanol and the ethanol/water mixture during the flushing process, you must meet the requirements of Section 22 (4) and Section 63 of the Regulations for Industrial Establishments.
2. The storage of ethanol and ethanol/water mixtures must meet the requirements of Section 22 of the Regulations for Industrial Establishments.
3. Electrical wiring and equipment within 0.9 metres in all directions of the flush-cart vents and/or openings must be approved for *Class 1 Group D Zone 1* locations.
4. Note other possible sources of ignition such as the pilot light of a furnace or gas water heater, an electric flush cart, a trouble light, or the buildup of static electricity.
5. Electrical wiring and equipment between 0.9 metres and 1.5 metres in all directions of the flush cart, and including the area within a horizontal radius of 3 metres of the flush-cart vents and/or openings, to 0.45 metres above the floor must be approved for *Class 1 Group D Zone 2* locations.
6. Provide a spill control kit and a 10B or 10ABC portable fire extinguisher at the location where flammable liquid is dispensed.
7. Provide workers involved in the use and installation of the geothermal system with training in the proper use of the flammable liquid.

You can begin work only after the hazards of the work and the associated safeguards have been identified, communicated to the workers, and addressed.