

SAFE HANDLING OF ETHANOL AND ETHANOL–WATER MIXTURES IN GEOTHERMAL LOOPS

HRAI was notified by the Ontario Ministry of Labour that there have been safety incidents concerning the use of ethanol in geothermal heat pump installations in the province of Ontario. For this reason, HRAI is issuing this hazard alert to make all members across the country aware of this issue and to list the steps recommended by the Ontario Ministry for the safe handling of ethanol and ethanol-water mixtures in geothermal installations.

Hazard Summary

Due to environmental concerns, a growing number of geothermal systems are utilizing an ethanol-water mixture as an alternative to glycol when dealing with heat exchange fluid in the ground loop.

Ethanol-water mixtures as low as 20% ethanol in the total system volume are classified as Class IC flammable liquids by NFPA 30 Flammable and Combustible Liquids Code. The vapours of the mixture are ignitable in the presence of an ignition source that is capable of raising the vapour temperature above the auto ignition temperature of the flammable liquid.

In a recently documented incident which involved the flushing of an installed geothermal system, ethanol and water were mixed in the basement of a home. During this process, the mixture spilled onto the basement floor and the vapours from the flammable mixture were ignited by an ignition source in the basement resulting in a fire.

Who Should Be Aware of This Hazard?

All sectors involved in the geothermal industry must be aware of the hazards associated with the use of an ethanol-water flammable liquid mixture including installers, maintenance personnel, designers and others involved in the HVAC and geothermal industry.

Safety Precautions

Basic safety precautions concerning ethanol-water mixtures should include (but not be limited to) the following:

- Safe dispensing of ethanol and the ethanol water mixtures during the flushing process as per the mechanical ventilation and grounding/bonding requirements stated in the following provincial codes (e.g., Section 22(4)(a),(b) and Section 63(c) of the Ontario Regulations for Industrial Establishments).

- Storage of ethanol and ethanol-water mixtures must meet the requirements of applicable provincial codes for fire prevention/protection (e.g. Section 22 of the Ontario Regulations for Industrial Establishments).
- The equipment in the vicinity of the flammable liquid must meet the requirements of the provincial electrical code for use near such a flammable liquid (e.g., Ontario Electrical Safety Code, 23rd Edition for a Class I, Zone 2 area).
- All sources of ignition must be at least 3m from the ethanol or ethanol-water mixture including flush carts.
- A spill control kit and a 10B or 20B portable fire extinguisher must be provided at the location where the flammable liquid (ethanol or ethanol-water mixture) is dispensed.
- Workers involved in the installation and service of geothermal systems must be trained on the proper use of the flammable liquid.

This information is provided as an overview of the issue to raise awareness within the HRAI membership regarding safety precautions that should be taken when using ethanol-water mixtures in geothermal installations. This is not a complete list of the safety issues involved and the codes that would apply in each member's market area. HRAI encourages each member who works in the geothermal sector to contact their local and provincial authorities to determine his/her regulatory obligations concerning this issue.

For more information, contact Scott Papp at the HRAI office 1-800-267-2231 x233 or e-mail spapp@hrai.ca.

Regards,

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