



Coffee Break Training - Fire Protection Series

Hazardous Materials: Cryogenic Liquid Vaporizers

No. FP-2014-8 February 25, 2014

Learning Objective: The student will be able to explain why ice accumulates on cryogenic system vaporizers.

Bulk medical gas containers are a familiar sight at hospitals, large convalescent centers, and other health care facilities. Generally, oxygen and nitrogen are stored as cryogenic liquids, and nitrous oxide and carbon dioxide are stored as refrigerated liquids.

Medical gases often are delivered to patient care rooms and surgery suites through a network of pipes supplied from the bulk storage tanks. Liquefied bulk storage often is the preferred method because of the volume of gases that are used on a regular basis.

In order to use gases from a bulk cryogenic vessel, the liquid must be transformed into a gas. Cryogenic liquids are converted to gaseous state using a vaporizer, such as the one illustrated. While steam and electric vaporizers occasionally are used, the most widely employed vaporizers obtain heat from the surrounding air. The most common type of vaporizer is the ambient finned tube vaporizer. The fins absorb the warm ambient air and transfer the heat to the cryogenic liquid flowing in the tube. The heat transfer converts the liquid into a gas.

Ice accumulations on these systems are normal. The cryogenic liquid in the tank is very cold, usually less than -100 F (-73.3 C). Cold liquid entering the vaporizer will cause moisture in the outside air to condense and freeze, especially on humid days. The freezing will be at the point where the pipe leaves the tank and enters the vaporizer. Ice will be on part of the vaporizer but not all of it because the vaporizer is employed to convert the liquid to gas.

A little bit of ice is normal, but a large amount of ice on the piping can possibly damage the piping, especially if the pipe is not supported properly. In areas where vaporizer piping is subject to regular accumulations of ice, the system installer may reduce the pipe hanger/support span to accommodate the added weight of the ice.

If there is a problem with the operation of the medical gas system due to ice accumulations, it should be addressed by someone competent to work on the equipment. Knocking the ice off with a hand tool is not recommended because it may damage the vaporizer or pipe network or cause a leak. Cool, tepid or hot water or steam may be employed to remove the ice.

For more information on the hazards of medical gas systems, download the U.S. Fire Administration Technical Report TR-107, "Fires Involving Medical Oxygen Equipment," at <http://www.usfa.fema.gov/downloads/txt/publications/tr-107.txt>.



This bulk liquid oxygen container and vaporizer (right) are part of a hospital's medical gas system.



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