	VT-0001	001	02/18	CWH
	LNG Vehicle Tank Safety			

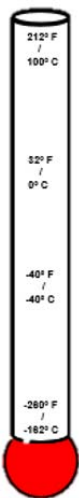
Purpose

This document will provide key information and procedures relating to safety while working on a Chart LNG vehicle tank. Always use proper personal protective equipment (PPE) when making or breaking connections on a Chart LNG tank. Goggles, face shield, and cryogenic gloves and apron are recommended.

Overview

Safety concerns involved with LNG:

Frostbite



Flammability



Expansion



Asphyxiation




Frostbite:

LNG – Liquefied Natural Gas is made from liquefying methane vapor. LNG is colorless, odorless, non-toxic, and non-corrosive. LNG is stored at extremely low temperatures (-162°C/-260°F). Leaks, spilled LNG, or its vapors can contact exposed skin. Skin exposed to such a low temperature can become severely frostbitten.

Flammability:

LNG in its liquid state is not flammable, however once vaporized and mixed with air, it can reach a flammable range. Liquid and vapors released prior to and during repairs can create a potentially flammable situation. All liquid leaks are flammable due to large amounts of vapors forming and mixing with air. Vapor leaks, large and small, have the potential to be flammable if the proper fuel to air mixture is reached.

This procedure is intended for use by trained technicians with experience on systems using LNG. Review all applicable safety documents before beginning this procedure.

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Expansion:

The process used to make LNG condenses the methane vapor by a ratio of 600 to 1. As LNG warms it will begin to vaporize. If stored in an enclosed container, vaporizing LNG will build pressure inside the container. Do not attempt to store LNG in any container not designed for LNG storage. Expansion from the liquid to gas phase can cause a non-LNG rated storage container to rupture.

Asphyxiation:

Methane vapors are lighter than air and will rise. Leaks below or within a confined space can displace oxygen within that space without warning.

Process

Over time Chart LNG tanks may require periodic maintenance. During maintenance the removal of fittings, removal of fuel, or refueling of the tanks may be necessary. All components should be treated as if they contain pressurized LNG or vapor until it is confirmed there is no LNG or vapor present. Components loosened or removed while pressurized LNG or vapor is present have the potential to release cryogenic liquid or vapors. If a component needing to be worked on cannot be isolated from the internal tank by a shut-off valve, the tank will need to be completely de-fueled and de-pressurized prior to repairs.

WARNING: COVER EYES AND EXPOSED SKIN


Accidental contact with LNG and/or its cold vapor with the eyes or skin may cause a freezing injury similar to a burn. Protect the eyes and cover the skin whenever possible contact with cold liquids or vapor exists.

NOTE: Always wear the proper PPE when working with or around LNG. Closed toed shoes, long pants, and long sleeves are also recommended.



Cryogenic Gloves, goggles, face shield, and cryogenic apron

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WARNING: KEEP AWAY FROM FLAME OR SPARK

Natural gas is flammable. Smoking, open flames, and general purpose electrical equipment must be prohibited in areas where LNG is stored or handled. LNG must be stored and transferred under positive pressure to prevent the infiltration of air or other gases. Keep the LNG equipment away from open flames or electrical sparks. Chart LNG tanks should be grounded to prevent static discharge anytime fuel is being transferred into or out of the tank. Never permit smoking in an area where LNG equipment is repaired, filled, or stored.

DANGER: In case of a fire, use only dry chemical fire extinguishers. The use of water or foam extinguishers will cause liquid to rapidly boil and expand, causing a larger more aggressive fire.

WARNING: KEEP THE EQUIPMENT AREA WELL VENTILATED


Although LNG is non-toxic, it can asphyxiate those working in confined areas without adequate ventilation. Any area or enclosed space that does not contain enough oxygen for breathing can cause dizziness, unconsciousness, or even death. Liquefied natural gas, being colorless, odorless, and tasteless cannot be detected by human senses. Due to the extreme low temperatures of LNG, odorants such as mercaptan cannot not added as it would solidify. Without adequate ventilation, natural gas will displace the air and give no warning that there is a non-life supporting atmosphere. Store LNG tanks in a well ventilated area. Chart LNG tanks are designed to vent vapor if internal tank pressure exceeds the normal operating pressure. If a tank containing LNG is stored inside a building for an extended period of time, or if the tank is at the designated relief pressure, methane vapors may be released inside of the building. Gas venting from vehicles powered by LNG may create a flammability hazard if parked indoors. Shops should be equipped with proper safety devices to detect possible hazards.

DANGER: Do not enter any truck with a methane detector that is alarming

WARNING: REMOVE PRESSURE

The LNG fuel system is a pressurized system. Always empty the vessel of LNG liquid and any pressure before working on the LNG fuel system. DO NOT allow LNG to become trapped in piping (between two closed valves). The liquid will vaporize and rapidly increase pressure, bursting the pipe. Always empty the LNG fuel tank and remove any pressure from the system prior to removing parts or components for repair. Do not attempt to store LNG in any container not designed for LNG storage.

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WARNING

Do not modify Chart LNG equipment without authorization from the manufacturer.

WARNING

Do not operate any Chart LNG tank that has been damaged without consulting Chart service Bulletin VT-0006 Damage Criteria or chart LNG Technical Services

DANGER:

Failure to follow these safety precautions can cause property damage, temporary and/or permanent bodily harm, or possibly death.

For questions concerning safety with Chart LNG tanks please contact Chart LNG Technical Service at:
1-800-838-0856

or

LNGVehicleTankTechService@chartindustries.com

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