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SJB/ BBK

First Fill/Hot Fill and Warm Fill Fueling Procedure for LNG Vehicle Tanks

The purpose of this procedure is to provide guidance for filling LNG fuel tanks that have never been put into service, are without pressure due to repair and maintenance (hot tank), or are at relief valve pressure (warm tank).

Warning:

Always wear appropriate LNG protective gear when performing the following procedures.

First Fill /Hot Tank Filling Procedure

When an LNG tank is first installed on a vehicle it is considered to be a hot tank. Installing cold LNG into a hot tank will cause the LNG to take on the heat contained in the inner tank and components. When this happens the LNG boils rapidly, builds excessive pressure, and may even lift the pressure relief valve. To properly cool the inner vessel the following steps must be completed in order.

1. Connect the station fill coupler to the vehicle.
2. Put 20 to 40 liters of LNG into the tank, then stop filling.
3. Ensure that the tanks liquid (use) valve has been fully opened up (counterclockwise), if it is not open slowly open the valve fully, then turn it clockwise approximately ¼ turn.
4. Leak test the entire LNG plumbing system and all components.

Note: If leaks are found they must be repaired before continuing with this procedure.

5. Drive the vehicle for 10 – 15 minutes or longer. As the vehicle is driven the engine will be using (lowering) the tanks vapor pressure as well as the LNG temperature and the inner tank temperature.

Note: The amount of time required to drive the vehicle to decrease fuel pressure may vary. This

is dependent upon the size of tank and engine fuel usage.

6. Recheck the entire system for leaks.
7. Reconnect the fuel stations fill receptacle to the vehicle and perform normal filling procedure.

Fueling a warm tank

An LNG tank that has been out of service for an extended period of time but still contains liquid will probably be at or near its relief pressure (normally 16 bar). This type of condition is referred to as a warm tank. A warm tank will still contain liquid but the liquid is at a relatively higher temperature than found in normal operating conditions. The pressure in this tank must be reduced below the fuel stations operating pressure before it can be filled. Reducing the pressure in the tank will cause the remaining liquid to boil inside the tank. This will cool the liquid and the inner tank. Two methods that will reduce tank pressure are:

1. If enough fuel remains in the tank, drive the vehicle. As the vehicle is driven the tanks pressure will gradually decrease.
2. Once normal operating pressure is reached the tank can be filled or topped off using the normal filling procedure.

This procedure is for use by trained mechanics experienced with using LNG systems and vacuum technology. Review all pertinent safety documents before starting this procedure.