



CNG FAST FUELING PROCEDURE

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Credit: Marathon Corporation wishes to thank the Capital Region Airport Commission (Richmond International Airport) Richmond Virginia for the use of their facilities and vehicles in the pictures in this document.

General Fueling Information--Overview

This document is intended to give CNG fueling personnel an understanding of correct procedures and safety measures. There are differences among fueling stations and among CNG vehicles. While this document provides generalized information, any procedures designed for a specific station should override the general information provided herein.

CNG fueling differs from liquid fueling in that CNG utilizes a completely closed pressurized system. The fueling procedure is usually terminated automatically by the dispensing equipment. Unlike liquid fuels, it is unlikely that any spillage would occur. If CNG is released, it is in gaseous form and will dissipate quickly to the atmosphere. In spite of these safety advantages, CNG is a combustible gas that is handled and stored at high pressures. It should be treated with caution.

General Fueling Information--Nozzles

Although most new CNG vehicles in the United States are designed for 3600 psig (nominal fill pressure), there are still some 3000 psig (nominal fill pressure) vehicles in use in the US, and there are dispensers with both 3600 and 3000 psig hoses.

Fueling personnel need to determine which pressure each vehicle is designed for. Some fueling nozzles and vehicle receptacles will be color coded blue for



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3000 psi and yellow for 3600 psi.

3000 psi nozzles are designed to fuel both 3000 & 3600 psi vehicles. 3600 psi nozzles will fuel only 3600 psi vehicles.

Many CNG fleets fuel only at their own fueling station and therefore there should be no issue of selecting the proper fueling nozzle.



**3000 psi
fueling
nozzle**

**3600 psi
fueling
nozzle**



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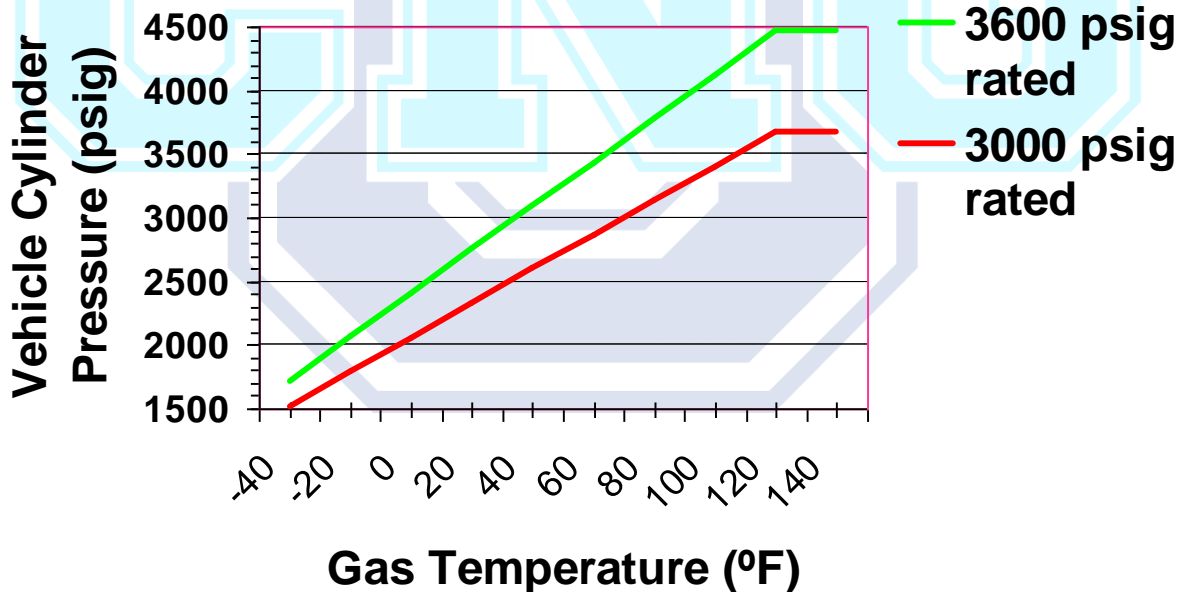
General Fueling Information—Temperature Compensation

Unlike liquid fueled vehicles (which are filled by volume only), CNG vehicles are filled to a particular gas density. This density is a function of pressure, temperature and gas composition. To ensure that vehicles are filled to rated capacity, CNG fueling stations adjust the dispensed pressure to account for changes in gas temperature due to atmospheric temperature changes and for the increase in gas temperature that occurs during fueling.

The chart below indicates the relationship between temperature and pressure of the gas. Note that the gas density at any points on the line is equal. Note also that **when the gas is hot, it is permissible to fuel to as much as 125 percent of the nominal pressure**. Conversely **in cold conditions, the vehicle may receive much less pressure, but the same amount of fuel is dispensed**.

Temperature Compensation

Nominal Fill Pressure ~ 3000/3600 psig @ 70° F



**Code prohibits exceeding 125% of nominal fill pressure.
A 3000 psi system allows maximum pressure of 3750 psi.
A 3600 psi system allows maximum pressure of 4500 psi.**

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General Fueling Information—Safety

As with any motor fuel, any source of ignition should be eliminated in the fueling area. Fueling personnel must observe the following.

1. Extinguish all smoking or flames in the fueling area.
2. Turn the vehicle ignition off, place vehicle in park and lock the parking brake. Leave the vehicle off until fueling is complete.
3. Do not use cellular phones, pagers or other electronic equipment in the fueling area.
4. Familiarize yourself with the locations of all Emergency Shut Down (ESD) buttons which are placed at various locations in the station. The first action in the event of any emergency is to press a CNG ESD button. This will shutdown all CNG station equipment.
5. Inspect fueling hose for any visible damage before fueling. If the hose has any damage, do not use it. Report the damaged hose to a person who has station responsibility.
6. Fueling staff must be trained in the proper fueling procedures for their vehicle and station. This training must identify proper procedures to address all emergency and abnormal fueling conditions.



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CNG Fueling Procedure--Fast Fill

1. Park the vehicle in the correct location to allow fueling without excessive tension on the hose.



2. Open fuel door (if applicable) on the vehicle and remove dust cover from the vehicle receptacle.



3. Ensure the nozzle handle is in the "off" position. Remove the fill nozzle from the dispenser. Place the nozzle over the receptacle and begin locking the nozzle onto the receptacle by rotating the handle; gently "rocking" the nozzle if necessary—excessive force should not be required. Carefully rotate the nozzle handle to the full "on" position; usually 180°.



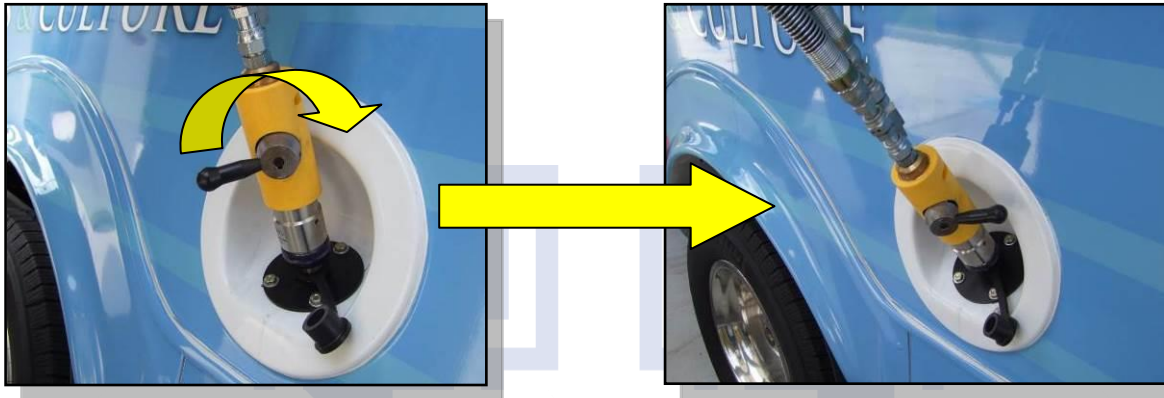
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Fueling personnel should stand to one side of the nozzle, as it is positioned on the receptacle.



4. Authorize the fuel management system (if applicable).

5. Activate the dispenser following the instructions provided by the manufacturer; either by pressing a button or turning a lever. You will hear the dispenser valve open and gas start to flow. The dispenser display should start to increment. On some dispensers, gas will flow briefly, stop, then restart.



6. Gas will continue to flow to the vehicle until the dispenser senses that the vehicle is nearing termination pressure. At this point, the dispenser may automatically pause and then resume the fill one or more times, until the vehicle is full. The fill is automatically terminated when the vehicle is full.

7. On some dispensers, a light will turn off or on to signal the end of the fill. On other dispensers, the fueling personnel will determine that the fill is complete by observing that the dispenser head display has stopped



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incrementing. The operator may hear when the flow has stopped. Fueling personnel must not prematurely disconnect the nozzle or terminate the fill before the fill is completed. This will result in under filled vehicles.

8. Turn the dispenser off by following the instructions provided by the manufacturer.



9. Disconnect the nozzle from the vehicle receptacle. Fueling personnel should stand to one side of the nozzle, as it is removed from the receptacle. Fueling personnel may notice a small "puff" of gas as the nozzle is disconnected from the receptacle. This is a normal occurrence with the de-pressurizing of the receptacle interface.



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10. Hang the dispenser nozzle in its dispenser holster.



11. Replace the dust cover on the vehicle receptacle and close the vehicle fill door (if applicable).



12. In the event of any type of emergency, press a station CNG ESD button and vacate the area of danger. Follow other emergency procedures as posted or instructed.



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