

# Safety Warning

## Acid Exposure of Comdyne Vehicular CNG Cylinders

www.cleanvehicle.org  
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Recently a Comdyne CNG cylinder ruptured during fueling, killing the driver. The cylinder was located under the rear of a shuttle van which had been rear-ended by a sedan, under-riding the van bumper. The cylinder ruptured later when the vehicle was fueled following the collision repair. The critical damage to the cylinder was the result of battery acid splashed from the sedan onto the cylinder, but some impact damage cannot be ruled out.

The cylinder was manufactured by Comdyne. This cylinder design can rupture at normal operating pressures after exposure to a strong acid, such as battery acid. Comdyne cylinders continuously exposed to simulated battery acid in a laboratory ruptured after five to ten hours, depending on pressure.

**Comdyne cylinders exposed to acid in a collision or other mishap should be depressurized as soon as possible to prevent rupture.**

An emergency defueling procedure is provided in the *Natural Gas Vehicle Cylinder Care and Maintenance Handbook* reprinted at the end of this warning.

**The cylinders should then be removed from service, rendered unusable, and disposed of.**

Safe methods for disposal of CNG cylinders are described in CGA C-6.4 available at [http://www.cganet.com/publication\\_detail.asp?id=C-6.4](http://www.cganet.com/publication_detail.asp?id=C-6.4).

Federal rules for new cylinders require the label "**This container should be visually inspected after a motor vehicle accident or fire and at least every 36 months or 36,000 miles, whichever comes first, for damage and deterioration.**" This minimum safety inspection is not sufficient for a Comdyne CNG cylinder exposed to battery acid. Acid damage does not necessarily leave detectable visible evidence until just before rupture. Without an effective method to detect acid damage, safety requires that any Comdyne cylinder exposed to acid be immediately emptied and destroyed.

Other brands of CNG cylinders may be damaged by battery acid but the Comdyne is addressed here because it has repeatedly demonstrated a short time to rupture after acid exposure. CVEF recommends that any CNG cylinder that has been exposed to battery acid be examined in accordance with either the vehicle or cylinder

manufacturer's recommendations. The cylinder manufacturer's address and telephone number appear on the federally-required cylinder label.

If you cannot contact the manufacturer, contact Hank Seiff at [hseiff@cleanvehicle.org](mailto:hseiff@cleanvehicle.org) (703) 534-6151. For more information on CNG cylinder inspection, see <http://www.cleanvehicle.org/technology/cylinder.shtml>.

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From: "Natural Gas Vehicle Cylinder Care and Maintenance," (June 2001, GTI-01/0119) reprinted courtesy of the Gas Technology Institute, [www.gastechnology.org](http://www.gastechnology.org).

### 5.1.1 Atmospheric Venting Equipment

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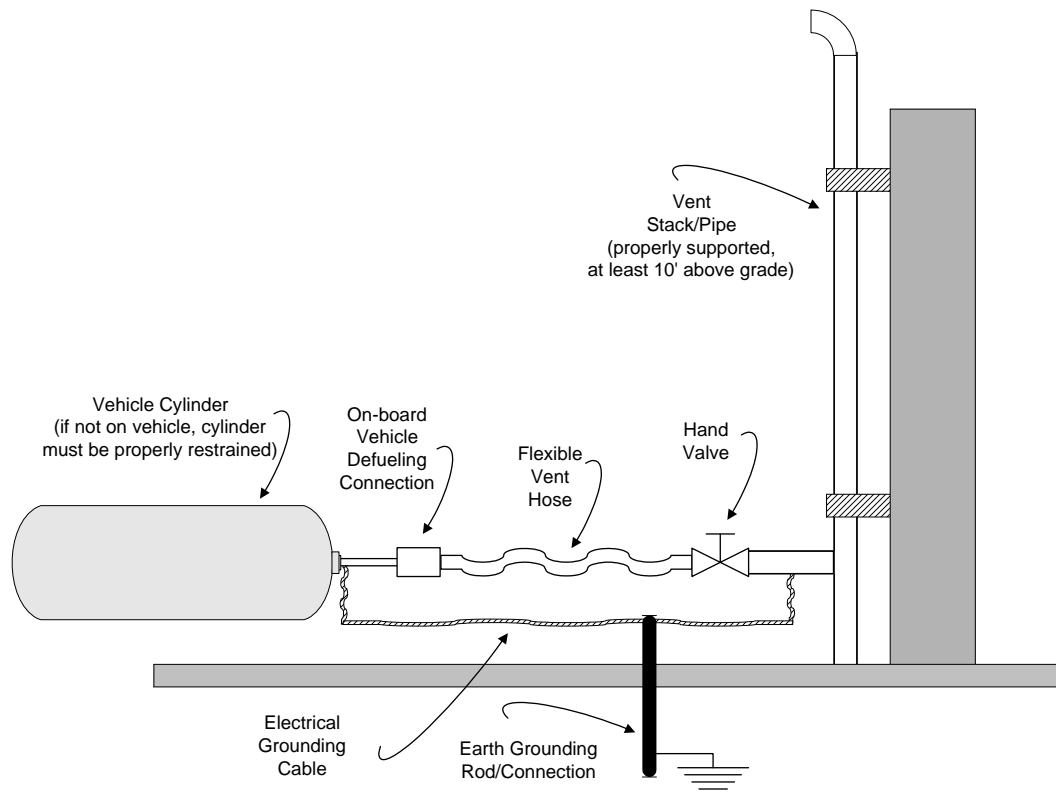
*CAUTION: The use of atmospheric venting of natural gas to depressurize a natural gas cylinder must be done with care. Improper equipment or procedures raises the risk of fire from gas igniting from nearby flames, ignition sources, or--more importantly--from static discharge. A static electrical charge can build up when venting gas. This electrical charge can ignite the natural gas. Use all necessary precautions to prevent exposure to ignition sources—including static electrical charge.*

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The following is provided only as general guidance in the event that no other procedure is available. Consult the local Fire Marshal or other sources for more specific information.

A schematic diagram of a typical venting facility is shown in Figure 5-1. At a minimum, this includes the following equipment:

- On-board defueling connection – installed on the vehicle. Consult the vehicle manufacturer for information.
- Vent pipe on property. This typically consists of 2-inch diameter steel pipe supported to a building or structure. The pipe should extend a minimum of 2 feet higher than the support structure and at least 10 feet above the ground. The vent pipe must be connected to an electrical ground. There should not be any ignition sources near this vent pipe.
- Electrical ground connection: Consisting of a 3 gauge (a battery cable, for example) or heavier stranded copper wire attached at one end to a driven ground rod or another suitable electrical ground. The other end should be clamped to the venting pipe and the cylinder valve.
- A high pressure, electrically conductive flexible hose.
- A hand valve to control the flow of gas.



**Figure 5-1. General atmospheric venting equipment**

In addition to the above items, it would be good practice to consider the following:

- Having a portable fire extinguisher present at the defueling location with a rating of not less than 20-B:C
- Posted signs such as “NO SMOKING ” and “FLAMMABLE GAS”
- Installing a flame arrestor downstream of the hand valve

As noted, if the cylinder is free standing (that is, not mounted on a vehicle) it is important that the cylinder be restrained before venting. Cylinders can and will move if the gas is released at a fast rate.

### **5.1.2 Emergency Defueling Procedure To Atmosphere**

Emergency venting procedures should be used in situations where there is an absolute need to remove the CNG from the vehicle immediately and it is not possible to follow the Scheduled Defueling procedure in 5.1.3.

Using the equipment and procedures discussed in 5.1.1 as a starting point, the general procedure for emergency venting is as follows:

1. Ensure that an electrical connection has been established between the cylinders, the vent system, and earth ground.
2. Connect the on-board defueling connection to the vent system using a high-pressure flexible hose. Consult the vehicle manufacturer for information.
3. Slowly open the hand valve to release the gas. Adjust the hand valve to achieve a steady flow of gas out the vent pipe. Allow the transfer of fuel at a slow pace to prevent freezing. No gas flow may indicate a normally closed solenoid valve on the cylinder. Consult the vehicle manufacturer for information to open electronic solenoids.
4. Allow the on-board storage system to vent completely.
5. When completed, disconnect all the connections.

Note: Certain Type 4 plastic-lined cylinders may be sensitive to rapid defueling. Consult the cylinder manufacturer for guidance.