

NEW SOUTH WALES FIRE BRIGADES.

OPERATIONS BULLETIN 2003/1



Compressed Natural Gas vehicles

The State Transit Authority (STA) currently operates over 400 compressed natural gas (CNG) buses and firefighters need to be aware of safe working procedures and emergency gas shut-off locations in the event that these vehicles are involved in a serious collision or fire.

Identification of CNG vehicles

A red, circular label attached to the registration plate containing the letters CNG identifies vehicles powered by compressed natural gas. (Note that some older trucks and buses may have a diamond shaped label).



There are currently two different types of CNG powered buses operated by the STA:

- Mercedes buses with gas storage located on the roof, and
- Scania buses with gas storage under the floor.

CNG properties

Natural gas is 90% methane with an odorant added as a safety precaution to ensure that leaks are easily detected. An average person can detect natural gas at concentrations as low as 0.3% by volume in air and this is about 16 times lower than the level that will support combustion.

Natural gas requires a concentration of between 5% and 15% in air for combustion and also has a high ignition temperature (about 600 degrees Celsius). Natural gas is lighter than air and therefore will readily dissipate into the atmosphere. CNG is stored at high pressure (about 20,000 kPa) and while leaks from the on-board storage system will be noisy, this does not make the situation any more hazardous. The resulting high concentrations of gas and its tendency to dissipate upwards make the gas less likely to ignite in the vicinity of the leak.

CNG cylinders incorporate safety features common to most compressed gas cylinders including frangible discs that open to prevent the vessel from failing catastrophically when excessive pressure occurs in the cylinder and relief valves for the controlled release of pressure should the cylinder be exposed to fire.

Safe working procedures at CNG vehicle fires and incidents

- Appliances should approach from up-wind and be positioned safely in relation to the bus.
- Firefighters should wear full PPE and SCBA in the vicinity of the bus and vapour cloud.
- Make a 360-degree inspection of the bus to confirm as soon as possible that it is CNG powered.
- High-pressure water sprays can be used to assist dispersion of the vapour and to control any fire.
- Eliminate ignition sources and remove all people from the vicinity of the bus.
- Control the release of fuel by operating the emergency gas shut-off valves.
- If the fire has been burning for an extended period of time and is impacting on the CNG cylinders, then the potential for a BLEVE exists and all people should be evacuated at least 200 metres from the bus.

Emergency gas shut-off

CNG powered buses are provided with at least two shut-off valves. One is located at the CNG cylinders and the other is designed to isolate the fuel system from the cylinders. The attached diagrams show these locations for the STA Mercedes and Scania buses.



Scania CNG Bus

Two large red handles located here under each of the two unlocked doors. Eight cylinders are mounted underneath the bus.

Scania Natural Gas buses;
Emergency shut off locations.

Emergency Fuel Isolation

- Two emergency fuel-isolating valves are located behind two small hatches on the driver's side of **Scania** buses. On **Mercedes** buses, they are located behind the refuelling hatch.
- To close the valves, both handles should be turned 90 degrees in the direction of the arrow on the label beside each valve.
- The engine will continue running for several minutes after these valves are closed.



Mercedes Benz Natural Gas Bus Emergency Shut off Location

Roof Mounted Cylinders

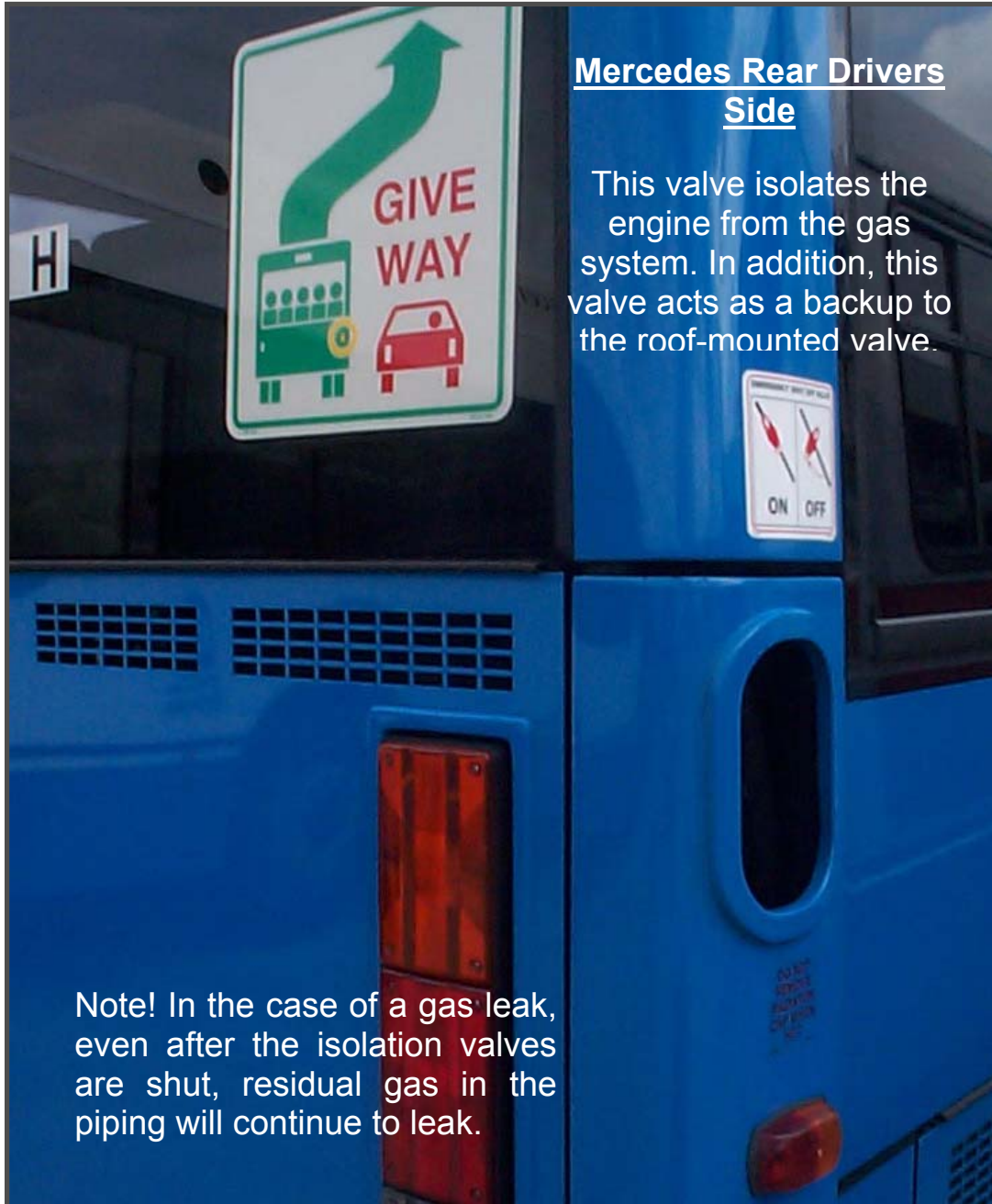
The handle in the driver's cabin operates a quarter turn red handle valve that isolates all stored gas on the bus.



Drivers Cabin

A large red handle located inside the bus isolates the cylinder set in the roof of the bus.

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Mercedes Rear Drivers Side

This valve isolates the engine from the gas system. In addition, this valve acts as a backup to the roof-mounted valve.

Note! In the case of a gas leak, even after the isolation valves are shut, residual gas in the piping will continue to leak.

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