Tulsa Gas Technologies, Inc.

NFPA–52 2010
Chapter 8
Terms for CNG

- Diesel Gallon Equivalent: Aprox. 148cf of Natural Gas (DGE) 148,000 BTUs
- Gasoline Gallon Equivalent: Approx. 124 cf of Natural Gas (GGE) 124,000 BTUs
- BTU: British Thermal Unit
- Therm: 100,000 BTUs
- Dekatherm: 1,000,000 BTUs or MMBTU
- CFM: Cubic Feet Per Minute
Tulsa Gas Technologies, Inc

**Slow Fill** (Time Fill) Where a vehicle sits for hours to be refueled by small compressors

**VRA** Vehicle refueling appliance (Home Refueling)

**Fast Fill** Where Natural gas is received from the gas company, run through a compressor to storage cylinders then dispensed into a vehicle (Refuel time is 5 to 7 minutes)
Time-Fill Fueling Station

NG Utility Main

Gas Dryer

Compressor

Temperature Compensation

Temperature Compensation

75% Full

50% Full

25% Full
Cascade Fast-Fill Fueling Station

NG Utility Main

Gas Dryer

Compressor

Priority Fill System

Temperature Compensation

Storage Bypass

Sequencing Valves

1-low

2-Med

3-High
Chapter 8 CNG Compression, Gas Processing, Storage, and Dispensing Systems

8.3 General System Requirements
8.3.1 Where systems are served by a gas utility, the utility shall be notified of all CNG installations.
8.3.4 Vehicles shall not be considered a source of ignition with respect to the provisions of this chapter
(Exception) Vehicles containing fuel-fired equipment.
8.3.7 Compression equipment shall be designed for use with CNG and for the pressures and temperatures to which it can be subject under normal operating conditions.
8.3.8 Compression equipment shall have pressure relief devices that limit each stage pressure to the maximum allowable service pressure for the compression cylinder and piping associated with that stage of compression.

8.3.9 Where CNG compression equipment is operated unattended, it shall be equipped with high discharge and low suction pressure controls.

8.3.10 Control circuits that SHUT DOWN shall remain down until manually activated or reset after a safe shutdown is performed.
8.4 System Sitting

8.4.2 Outdoors
8.4.2.2 A facility in which CNG Compression, storage, and dispensing equipment are sheltered by an enclosure that is constructed of non combustible or limited-combustible materials and that has at least one side predominantly open and a roof designed for ventilation and dispersal of escaped gas shall be considered to be located out doors.

8.4.3.12 Indoor fast-filling, Outdoor storage, and Compression
Fast-filling fueling indoors shall be permitted where storage and compression equipment is located outdoors complying with 8.4.2.1 Through 8.4.2.7 and 8.4.2.9.
8.5 Installation of Containers and Container Appurtenances
8.5.1 Storage containers shall be installed above ground on stable, noncombustible foundations or in vaults with ventilation and drainage.
8.5.1.1 Horizontal containers shall have no more than two points of support longitudinally.

8.5.2.1 Horizontal installed containers shall not be in direct contact with each other.

8.5.2.2 Composite containers shall be protected from UV radiation as required by manufacture.


8.6 Installation of Pressure Relief Device

8.6.1 Pressure relief valves shall be so arranged that they discharge to a safe area and so that escaping gas does not impinge on a building, other equipment, or areas that could be occupied by the public.

8.6.3 An over pressure protection device, other than a rupture disc, shall be installed in a fueling transfer system to prevent overpressure in the vehicle.

8.6.4 The set pressure of the over pressure protection device shall not exceed 125 percent of the set pressure of the fueling nozzle it supplies. (Typically 3000 nozzle 3750 psi, 3600 nozzle 4500 psi)
8.8 Installation of pressure gauges. Gauges or other readout devices shall be installed to indicate compression, discharge pressure, storage pressure, and dispenser pressure.
8.9 Installation of piping and hoses

8.9.1.1 Exterior piping shall be either buried or installed above ground and shall be supported and protected against mechanical damage.

8.9.1.2 Underground piping shall be buried not less than 18” below the surface of the ground unless otherwise protected from damage by movement of the ground.

8.9.1.3 Underground and aboveground piping shall be protected from corrosion in compliance with recognized practices.

8.9.1.4 Threaded pipe and fittings shall not be used underground.
8.10 System Testing

8.10.1 Piping, tubing and hose and hose assemblies shall be leak tested after assembly to prove them free from leaks at a pressure equal to at least the normal service pressure of that portion of the system.

8.10.1 Pressure relief valves shall be tested at least every 3 years.
8.11 Installation of Emergency Shutdown Equipment

8.11.1 Manually Operated Container Valve
8.11.1.1 A manually operated container valve shall be provided for each DOT and TC storage cylinder.
8.11.1.2 Each group of ASME storage vessels up to a maximum combined capacity of 10,000 scf shall be provided with a manually operated shutoff valve.
8.11.1.3 A manually operated shutoff valve shall be installed as close to a container or group of containers as practical.
8.11.5 A emergency Manual shutdown device shall be provided with in 10ft of the dispensing area and also greater than 25ft from the dispensing area.
8.11.6 Breakaway protection shall be provided in a manner that, in the event of a pull away, natural gas ceases to flow at any separation.

8.11.6.1 A break away device shall be provided at every dispensing point.

8.11.7 Control circuits shall be arranged so that, when an emergency shutdown device is activated or electric power is cut off, systems that shutdown shall remain down until manually activated or reset after a safe condition is restored.

8.11.8 Fast-Fill Station

8.11.8.1 Each line between a gas storage facility and a dispenser at a fast-fill station shall have a valve that closes when one of the following occurs:

(1) The power supply to the dispenser is cut off.
(2) Any ESD device at the refueling station is activated.
8.12 Installation of Electrical Equipment

8.12.1 Fixed Electrical equipment and wiring within the area in Table 8.4.2.9 shall comply with Table 8.4.2.9 and shall be installed in accordance with NFPA 70, NEC

Summary:
Every thing inside the dispenser cabinet is Class 1 Div.1 group D
Outside the dispenser with in 5 feet in every direction Class 1 Div.2 Group D
Compressor area is Class 1 Div. 2 Group D.
8.12.3 Classified areas shall not extend beyond a un-pierced wall, roof, or vapor tight partition.
8.12.2 With the approval of the AHJ, classified areas specified in Table 8.4.2.9 shall be permitted to be reduced or eliminated by positive pressure ventilation from a source of clean air or inert gas in conjunction with effective safe guards against ventilator failure by purging methods recognized in NFPA 496.

Note, Some dispenser and compressor manufactures are using this method of creating a safe area with in a Class 1 Div. 1 Group D environment. This method required constant follow up to prevent tampering with the air-purge system.

8.13.2 Static protection shall not be required where CNG is transferred by conductive or non conductive hose, flexible metallic tubing, or pipe connections where both halves of the metallic couplings are in continuous contact.
Mod. FMQ (SMALL Q)
FMQ-2, FMQ-2.5, FMQ-2-36

Dimensions: 540 x 500 x 990 mm
Weight: 66 kg
Operating temperature: from -40°C to +45°C
Outlet pressure:
FMQ-2, FMQ-2.5 207 bar
FMQ-2-36 248 bar
Power supply: 220 Volt
Average electric consumption: 0.9 ÷ 1.3 Kwh
Flow: from 2.55 to 4.30 mc/h
Sound emission level: 49 dBA at 5 mt

Provided with:
n°2 flexible hoses with gun, with tear-resistant joint, for refuelling 2 vehicles simultaneously.