FCCC MT-45 MT-55 CNG FUEL SYSTEM
P80 - P100 - P120 UPS USER MANUAL

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I. Proprietary Statement

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Portions of this manual drawn from information provided by Hexagon Agility® suppliers are used with permission.

II. Trademark Notice

Hexagon® is a registered trademark of Hexagon Technology AS. Agility® is a registered trademark of Agility Fuel Solutions LLC.

III. Preface

This manual contains the latest information available at time of publication and is offered for download from Hexagon Agility®. Hexagon Agility® reserves the right to make future changes in products or information contained in this manual without prior notice.

This manual contains general safety, operation, maintenance, and inspection information for the Hexagon Agility® compressed natural gas (CNG) fuel system. Refer to the original equipment manufacturer (OEM) operation manual or service publications for information on non-Hexagon Agility® systems or components.

No attempt should be made to operate, fill, install, or maintain the fuel system until this manual and all referenced supporting documentation are read and understood.

IV. Warning Statements Used in this Manual

⚠ WARNING

Personal injury or death may occur if procedures are not followed.

⚠ CAUTION

Damage to equipment, engine, fuel system or vehicle is possible if instructions are not followed.

NOTICE

Best practices or hints to help an operation or procedure go smoothly.

V. Support, Service or Parts

Hexagon Agility® prides itself on supporting its customers after the sale. We offer complete service support to our customers.

When calling or emailing, please provide your name, phone number, email address, and complete vehicle information: **VIN**, **year**, **make**, **model**, **mileage**, and its **current location**. A service advisor will contact you to arrange vehicle repair or a ship a part.

Customer Care



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VI. Introduction

This vehicle is equipped with a Hexagon Agility® fuel system built for medium duty natural gas vehicle (NGV) applications. The engine and fuel system are designed to operate on compressed natural gas (CNG) and/or renewable natural gas (RNG). Natural gas is an abundant, clean burning, readily available domestic fuel with the benefits of significantly reduced greenhouse gas emissions and lower operating costs

This manual is an operator's reference guide providing general instructions to ensure proper operation and maintenance of the Hexagon Agility® fuel system. Proper fuel system maintenance and operation are vital to vehicle up time and user satisfaction. Procedures outlined within this manual are a supplement to Hexagon Agility® service manuals developed for trained service personnel. Failure to adhere to these procedures may void fuel system warranty.

Refer to original equipment manufacturer (OEM) operation manual or service publications for information on systems or components not supplied by Hexagon Agility®.

⚠ WARNING

This manual is intended as a supplement to formal training in operation and maintenance of CNG fuel systems.

⚠ WARNING

No attempt shall be made to operate, fill, maintain, or repair the CNG fuel system until this manual and all referenced supporting documentation have been read and fully understood.

1. Safety

1.1. Natural Gas Facts

1. **Natural gas is flammable.** However, natural gas only burns within a narrow range when mixed with air in a ratio of between 5 and 15 percent. Compressed natural gas (CNG) will not burn in the highly concentrated form found inside fuel system cylinders.
2. **Natural gas is odorless, tasteless,** and **non-toxic.** Mercaptan is injected into CNG to give it a “rotten egg” odor to aid leak detection.
3. **Natural gas is lighter than air;** because of this property, CNG rises and diffuses into the atmosphere when released.
4. **Natural gas has a pump octane rating of 120**. In comparison, regular gasoline is 87, premium gasoline is around 94, and propane is 105.
5. **Renewable natural gas (RNG)** or “biogas” resulting from the decomposition of organic matter under anaerobic conditions reduces reliance on fossil fuels and diversifies domestic energy production.

1.2. CNG Pressure Safety Precautions

CNG possesses unique hazards which are not present in gasoline or diesel fuel. Unlike gasoline and diesel which are liquids at room temperature and pressure, CNG is in a gaseous state under the same conditions. For storage purposes, natural gas must be compressed to 3600 psi (250 bar). Hexagon Agility® minimizes these potential hazards with state-of-the-art design and testing practices.

Normal CNG Fuel System Pressure Ranges		
	Minimum	**Maximum**
High Pressure	3600 psi (250 bar)	4000 psi (275 bar)
Low Pressure	120 psi (8.2 bar)	150 psi (10.3 bar)

⚠ WARNING

- **Memorize manual shutoff valve location(s) (FIGURE 1) and normal CNG system pressure ranges.**
- **If anything does not look correct, notify maintenance personnel immediately. Turn ignition switch OFF, turn 1/4-manual shutoff valve (FIGURES 1 and 2) to the CLOSED position and set parking brake.**

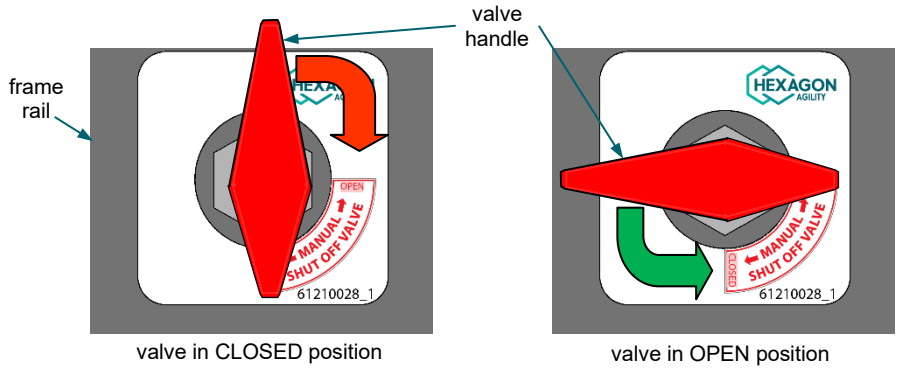


FIGURE 1. 1/4-turn manual shutoff valve is located driver side chassis rail.
Rotate handle clockwise to **CLOSE**; counterclockwise to **OPEN**.

1.3. Qualified Personnel

Due to the presence of high-pressure and flammable fuel, CNG fuel systems are a form of hazardous energy storage requiring special training for safe operation.

⚠ WARNING

Hexagon Agility® fuel systems must be maintained and inspected exclusively by qualified trained personnel.

⚠ WARNING

Never attempt to service the Hexagon Agility® fuel system. The fuel system operates under high pressure; injury could result, and vital system components can be damaged. Service should be only performed by Hexagon Agility® certified Authorized Service Providers.

⚠ WARNING

Have vehicle towed to repair facility. *Refer to Section 1.10.*

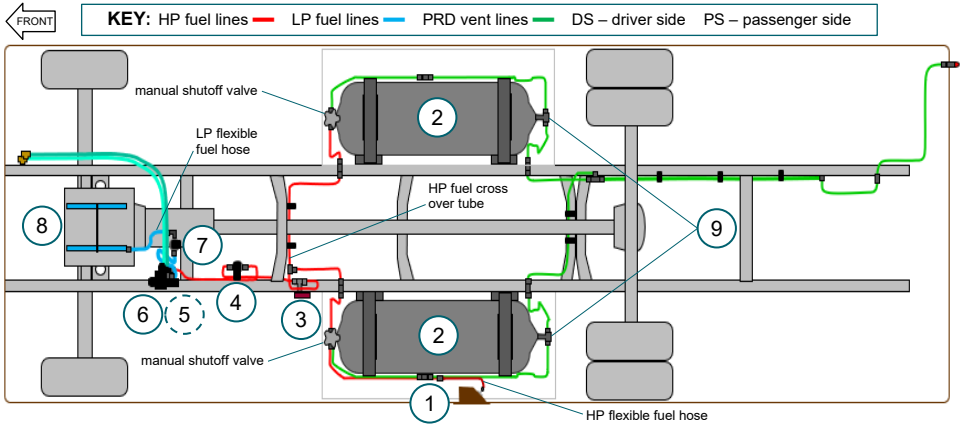


FIGURE 2. FCCC MT CNG fuel system components

1 fuel fill panel
2 CNG cylinders
3 1/4-turn manual shutoff valve
4 HP fuel filter
5 solenoid supply valve
6 pressure regulator
7 LP fuel filter
8 fuel rail assembly
9 plug PRDs

1.4. Vehicle Safety Precautions

The following safety precautions must be observed when operating CNG vehicles and fueling equipment:

1. A portable fire extinguisher must be installed on the vehicle in an easily accessible location.
2. Do not start engine if a fuel leak is suspected.
3. Do not smoke or produce an open flame within 30 feet (9 m) of a CNG vehicle or dispensing/filling station.
4. Never attempt to open pressurized system components.
5. Always ground vehicle prior to defueling.
6. If vehicle must be out of service for an extended period, turn cylinder manual shutoff valves to the “OFF/CLOSED” position and run the engine until it stalls to consume residual fuel in lines. FIGURE 2

   NOTICE

   Observe any lockout-tagout (LOTO) guidelines.

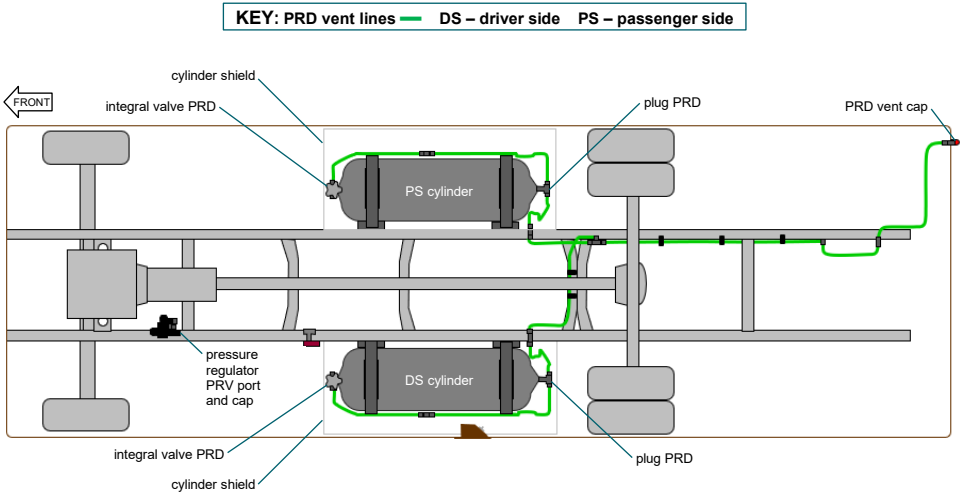


FIGURE 3. FCCC MT CNG pressure relief device (PRD) locations and PRD vent line routing *(green lines)*

1.5. CNG Cylinder Safety

Each individual CNG fuel cylinder has a manual shutoff valve at one end which allows the fuel in that cylinder to be isolated from the rest of the system. During normal operation, all cylinder manual shutoff valves should be OPEN. FIGURE 1

This vehicle is equipped with temperature activated pressure relief devices (PRDs) to evacuate stored fuel safely in the event of a thermal event. PRDs trigger when cylinder(s) surroundings or internal enclosure temperatures exceed 212°F (100°C) to 220°F (110°C) and use vent lines which exit to the vehicle rear to evacuate the pressurized gas.* The PRD vent system design permits controlled fuel evacuation/flaring under certain environmental conditions. FIGURE 3

⚠ WARNING

Memorize manual shutoff valve locations. FIGURES 1 and 2

NOTICE

Check permanent labels on CNG cylinders to verify OEM and expiration date.

*Refer to Section 2.2.1.

1.6. Emergency Shut Down Procedure

1. Turn ignition switch OFF.
2. Set parking brake.
3. If equipped and if it safe to do so: turn OFF main battery disconnect switch.
4. if it safe to do so Turn red 1/4-turn manual shutoff valve on driver side chassis frame rail to the OFF/CLOSED position. FIGURES 1 and 2

⚠ WARNING

If vehicle is involved in an accident or fire, CNG fuel system must be inspected by a qualified fuel system inspector.

NOTICE

Refer to Hexagon Agility® "First Responder Guide," ENP-084, for CNG firefighter information.

1.7. Emergency Response for Gas Leaks

If vehicle has sustained damage or a gas leak is suspected, i.e., a persistent “rotten eggs” odor is present or a continual hissing sound is heard, it could be a natural gas leak. If gas ignites, injury or death could result.

⚠ WARNING

1. Do not attempt to start vehicle.
2. Do not smoke or allow anyone else to smoke near the vehicle.
3. Evacuate area and keep traffic and pedestrians away.
4. Do not use road flares.
5. Do not approach vehicle if any ignition sources such as fire, sparks, electrostatic charges, lights, or electronic devices may be present.
6. If ignition sources may be present, vehicle doors and compartments should remain closed.
7. If no ignition sources are present, open vehicle doors and compartments to prevent gas accumulation.

8. If vehicle is indoors, push or tow vehicle outside and away from any ignition sources. Open building windows and doors to allow ventilation. Avoid turning on any lights, fans, or electronics which may spark. Pay special attention to overhead sources of ignition since natural gas is lighter than air.
9. Turn ignition switch OFF, set parking brake, and turn battery OFF at main disconnect switch.
10. If it is safe to do so, close 1/4-turn manual shutoff valve and both cylinder manual shutoff valves. FIGURES 1 and 2. Beware that gas may continue to leak with ignition OFF and manual shutoff valves closed.

⚠ WARNING

NEVER use a flame to detect natural gas.

11. If it is safe to do so, check fuel system near damaged area for leaks by smell (rotten egg odor), sight (ice or bubble formation), and sound (audible hiss). Verify leak location(s) with Swagelok® Snoop® leak detection fluid.

⚠ WARNING

Fuel system leaks must be repaired by a qualified technician.

1.8. Vehicle Fire Procedure

1. **Always call 9-1-1 first**.
2. Get all persons out of vehicle as quickly as possible.
3. Evacuate area; proceed to the front of the vehicle and move to a safe distance.
4. Inform any emergency personnel present that the vehicle is a CNG vehicle.
5. Be prepared to show first responders the locations of 1/4-turn manual shutoff valve and cylinder shutoff valves. FIGURES 1 and 2

⚠ WARNING

If fire is confirmed to be limited to vehicle components such as overheated brakes, burning hydraulic lines, or combustible cargo, trained personnel may attempt to extinguish fire to prevent spread to fuel system components.

1.9. Vehicle Jump-Starting

Refer to OEM manual for proper jump-starting procedures.

⚠ WARNING

- **If CNG fuel system has a leak, spark from jumper cables could ignite gas, causing injury or death.**
- **Do not attempt to jump start vehicle if a strong smell of natural gas is present or if a continual hissing sound is audible. Immediately close all manual shutoff valves if either condition occurs.**
- **Have vehicle towed to an authorized repair facility.** *Refer to Section 1.10.*

1.10. Vehicle Towing

Refer to OEM manual for proper towing procedures.

⚠ WARNING

Towing vehicle with improperly positioned tow straps, hooks, or chains can damage CNG system components including cylinders and fuel lines. Serious damage or injury could result. Do not use fuel system components as tow attachment points.

1.11. Vehicle Storage

If vehicle will be stored for an extended period (60+ days), follow OEM vehicle storage procedure.

⚠ WARNING

If a fuel leak is suspected, vehicle must be inspected by a qualified fuel system inspector before it is stored.

1.12. Vehicle Lifting Precautions

Never place a jack on CNG cylinder, cylinder shield or other fuel system components to raise vehicle. Serious damage to CNG system components, cylinder, cylinder shield or cylinder mount may result. Lifting on cylinder structure, valves, or mounting attachments can result in fuel leaks or damage to cylinder mounting devices.

Refer to OEM vehicle manual for proper jacking instructions.

NOTICE

- **Use only OEM recommended jacking points.**
- **Always inspect lift/jacking point to avoid contact with fuel lines or cylinders.**

1.13. Welding and Hot Work Precautions

Metal cutting, welding, brazing, soldering, grinding, and other procedures which involve flame or generate heat, hot particles, and/or sparks present dangers to the vehicle, fuel system, and all persons in the vicinity.

⚠ WARNING

- **Before performing any hot work procedure, verify fuel system is leak-free by performing a leak test with Swagelok® Snoop®.**
- **Verify vehicle is parked in a well-ventilated area. Do not park vehicle in an area where CNG may accumulate.**

NOTICE

- **Before performing any welding on the vehicle chassis or body, verify the main battery disconnect switch is turned off. Follow OEM or body builders' manual for welding procedures.**
- **Disconnect CNG fuel system electrical connector at Hexagon Agility® ECU to prevent damage.**

For any welding or hot work in or near a CNG vehicle, fuel storage, or fuel dispenser, always observe the following safety recommendations:

1. If welding or hot work is performed **more than 6 ft (2 m)** from the CNG vehicle fuel system, it is not necessary to defuel the system. However, the fuel system must be depressurized. *Refer to Depressurization Procedure in DSM.0008.*
2. If performing hot work **closer than 6 ft (2 m)** to a CNG vehicle fuel system, the fuel system must be defueled *(refer to Defueling Procedure in DSM.0008),* and the following additional precautions must be followed:

⚠ WARNING

Cover all CNG components including cylinders and fuel lines with fireproof blankets or a metal shield. Isolation must prevent sparks and slag from hitting the cylinders.

NOTICE

A single spark or weld slag could compromise CNG cylinders or components.

⚠ WARNING

If a cylinder is hit by a spark or slag, the vehicle must be removed from service and inspected.

1.14. Vehicle Painting

If the vehicle or components need painting, Hexagon Agility® recommends selecting a paint process which does not require heat curing the finish.

Temperatures required to harden some paint finishes could cause pressure relief devices (PRDs) to activate.

⚠ WARNING

If selected vehicle paint method requires heat curing, the fuel system must be defueled *(Refer to Depressurization Procedure in DSM.0008.)* **and CNG cylinder(s) must be removed and reinstalled by an authorized service provider (ASP).**

1.15. Returning Vehicle to Service

1. Verify battery is fully charged.
2. Perform pre-trip inspection. *Refer to Section 2.1.*
3. Start engine. *Refer to Section 2.3.*

1.16. Compressed Natural Gas (CNG) Blue Diamond Decal

United States and Canadian law require vehicles powered by compressed natural gas display the CNG blue diamond decal to alert emergency personnel in the event of an accident. **FIGURE 4**

This decal must be affixed to the right rear of the vehicle body, above the bumper and NOT to the bumper. CNG blue diamond decals also appear on both body sides adjacent to the DOT number.

CNG blue diamond decals are available from Hexagon Agility®.



FIGURE 4. CNG blue diamond decal

1.17. General Safety Precautions

⚠ WARNING

1. Follow all maintenance procedures in order; do not skip steps unless noted.
2. Never use an open flame as a source of illumination near a CNG fuel system.
3. Hexagon Agility® CNG fuel systems are to be serviced in designated areas that comply with all federal, state and municipal laws and regulations.
4. CNG servicing and fueling areas must be well ventilated.
5. Perform all inspection, maintenance, and service procedures in a dust free environment.
6. Never attempt to depressurize or vent a system by loosening a fitting.
7. DO NOT cut fuel lines.

2. Operation

2.1. Pre-Trip Inspection

2.1.1. Coolant Level Check

Refer to OEM service manual for coolant level check and inspection. Cooling system maintenance is critical for proper engine and fuel system operation.

NOTICE

The cooling system is a sealed system. An annual top off is normal; take vehicle to a repair facility if frequent top off is required. Warranty may be voided if under full condition is ignored.

2.1.2. Fuel System Check

Inspect CNG fuel system prior to vehicle operation:

1. Inspect for structural damage to fuel system housings, covers, fasteners, cylinder mounting points, etc.

   ⚠ CAUTION

   If any system components or structural parts are damaged, the vehicle must be removed from service and a qualified fuel system inspector must perform a detailed inspection.

2. Check entire fuel system for any signs of damage or wear.
3. Check fuel system for gas leaks by smelling for rotten egg odor, looking for frost or ice formation on system components, and listening for hissing noises.
4. Verify cylinder manual shutoff valves are OPEN. FIGURE 2
5. Verify red handle 1/4-turn manual shutoff valve is OPEN. FIGURES 1 and 2

6. Verify PRD vent lines are not kinked, plugged or damaged, and PRD vent cap is in place. **FIGURES 3** and **5**

⚠ CAUTION

If PRD vent cap is missing, inspect PRD vent tubes for moisture and debris and replace fitting and cap.*



FIGURE 5. PRD vent fitting and cap assembly.

7. Verify dust cap is securely installed** on fuel fill receptacle. **FIGURE 6**
8. Check high pressure gauge to confirm at least 400 psi (27.5 bar) of fuel is onboard. **FIGURE 6**. Refuel if necessary. *Refer to Section 2.4.*
9. Turn ignition to ON position.
10. Verify instrument panel fuel gauge is functional.

*Obtain replacement fitting and cap assembly from Hexagon Agility.

**Drive away protection (DAP) will prevent vehicle start unless dust cap is properly in place.

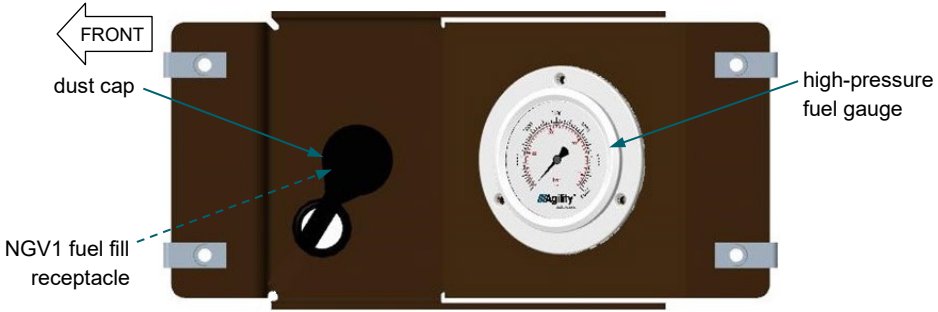


FIGURE 6. Fuel fill panel is located on the middle of the driver side of the vehicle body.

If all is normal, the vehicle is cleared for operation. If anything appears wrong, a qualified CNG system technician must make necessary repairs.

⚠ CAUTION

Fuel system check is required each day of operation. Information on detailed, formal CNG system inspections is provided in Subsection 3.2.1.

2.2. Fuel System

2.2.1. CNG Storage

A pair of Type 4 CNG cylinders are mounted on the driver side and passenger side chassis frame rails. The cylinders store a combined 30 gasoline gallon equivalent (GGE) of CNG at a nominal pressure of 3600 psi (250 bar).*

The cylinders are protected from physical damage and UV exposure by removable shields.

Each cylinder is safeguarded against rupture by thermally activated pressure relief devices (PRDs) integral to the manual shutoff valves and PRD plugs. FIGURE 2

PRD vent lines (FIGURES 3 and 7) branching off cylinder manual shutoff valves and PRD plugs are plumbed into a PRD vent system which allows controlled release of CNG from a vent fitting at the top rear of the vehicle. FIGURE 5

*Depending on the fill process and the ambient temperatures, the high-pressure gauge may show 4000 psi (275 bar).

2.2.2. CNG System Flow

The FCCC MT fuel system begins at the middle of driver side of the body at the fuel fill panel. High-pressure hoses and tubes convey CNG to the chassis mounted components bolted to the driver side frame rail and connect to the passenger side CNG cylinder via a HP fuel crossover tube. **FIGURE 7**

The pressure regulator conditions fuel for the engine by reducing gas pressure from 3600 psi (250 bar) to approximately 125 psi (8.6 bar). Low-pressure CNG then flows to the LP filter, through a flexible LP fuel hose to the fuel rails on the OEM intake manifold where fuel injectors supplying each cylinder bank. **FIGURE 7**

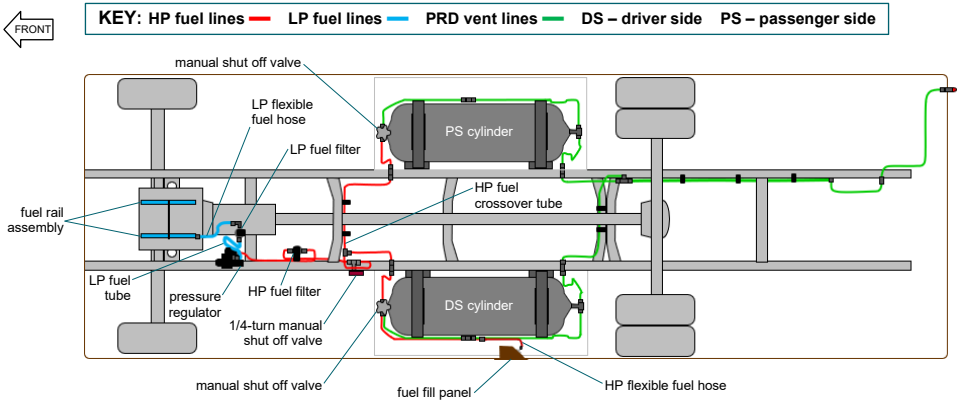


FIGURE 7. FCCC MT CNG fuel system flow:
Fuel fill panel → HP flexible fuel hose → cylinders → 1/4-turn manual shutoff valve → HP fuel filter → pressure regulator → LP fuel filter → LP flexible fuel hose → fuel rail assembly → fuel injectors *(not shown)*

2.2.3. CNG Fuel System Components

Beginning at the driver side rear of the vehicle, the function, operation and location of each component in the Hexagon Agility® FCCC MT fuel system is described below.

1. **Fuel fill panel.** The fuel fill panel is the initial operator interface between the vehicle CNG storage and delivery system and the engine. FIGURES 7 and 8. The panel is located on the driver side of the vehicle body just behind the door, and consists of multiple components performing the following respective functions:
   a. **NGV1 fuel receptacle**. The standard CNG receptacle at fueling stations across North America. FIGURE 8
   b. **Fuel receptacle dust cap.** Protects fuel system from moisture and debris intrusion; integral Drive Away Protection (DAP) prevents engine start if cap is not installed. FIGURE 8

      NOTICE

      DAP dust cap must be installed before starting engine.
   c. **High pressure fuel gauge**. Indicates fuel pressure in the cylinders and plumbing components flowing to the pressure regulator. FIGURE 8

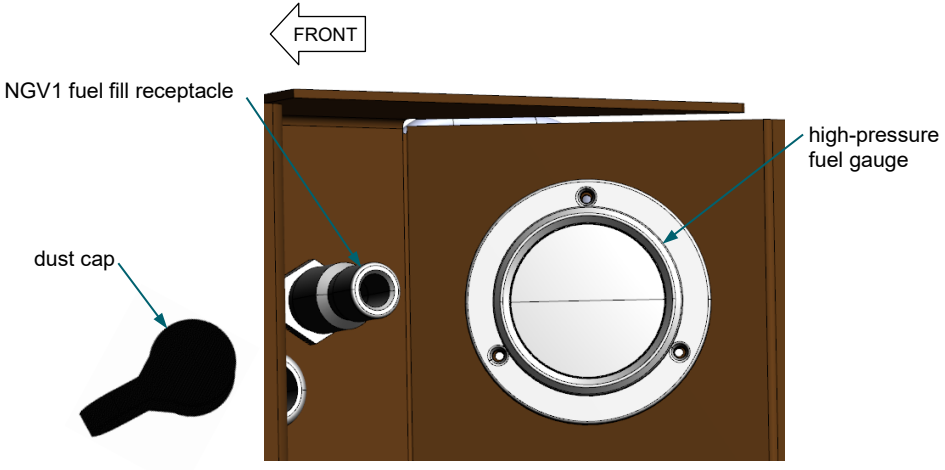


FIGURE 8. Fuel fill panel components.

2. **High-pressure flexible fuel hose**. Connects fuel fill panel to high-pressure fuel lines. FIGURE 7
3. **CNG cylinders**. The driver side and passenger side CNG cylinders are connected by a HP fuel cross over tube. FIGURE 7 *Refer to Section 2.2.1.*
4. **1/4-turn manual shutoff valve**. Red handled valve shuts off the flow of fuel from the cylinders to the engine. The manual shutoff valve is located on the outside of the driver side chassis rail, just aft of the driver side door. FIGURES 1 and 7

   NOTICE

   1/4-turn manual shutoff valve must be in OPEN position for normal operation.
5. **High-pressure (HP) fuel filter**. Initial trap for any fuel impurities. Located on the inside of the driver side chassis rail. FIGURE 7
6. **Pressure regulator**. Reduces CNG from 3600 psi (250 bar) cylinder pressure to 125 psi (8.6 bar) for use by engine. The regulator is located on the inside of the driver side chassis rail and is equipped with a pressure relief valve. FIGURES 2 and 9

NOTICE

Pressure relief valve cap must be in place during operation. If cap is missing, obtain replacement from Hexagon Agility®.

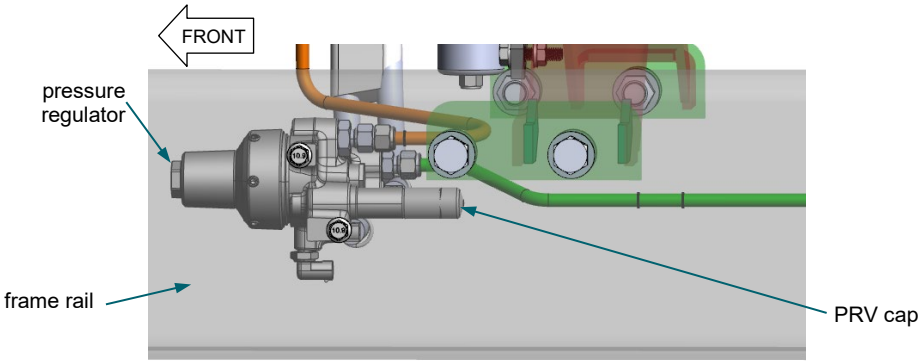


FIGURE 9. Pressure regulator and pressure relief valve (PRV) cap

7. **Supply solenoid valve**. Safety device integral to the pressure regulator and activated by vehicle ignition. When the ignition is OFF, the supply solenoid valve is closed and CNG flow to the engine is shut off. When the ignition is ON, the supply solenoid valve is always open supplying CNG to the engine. FIGURE 3
8. **Low-pressure (LP) fuel filter**. Secondary trap for any fuel impurities. Located above the transmission on a frame crossmember. FIGURE 7
9. **Low-pressure flexible fuel hose**. Connects LP fuel filter to fuel rail assembly. FIGURE 4
10. **Fuel rail assembly**. Consists of a pair of fuel rails located on either side of the intake manifold which house fuel injectors to supply low pressure CNG to each engine cylinder bank. FIGURE 7
11. **Fuel injectors**. Eight fuel rail mounted fuel injectors supply CNG to each of the eight engine cylinders.
12. **ECU**. Electronic control unit (ECU) monitors and directs CNG system operation. The ECU is located to the left of the steering wheel below the dash.

2.3. Engine Starting

The CNG fuel system operates very much like a gasoline system. Use the following procedure to start the engine:

1. Verify 1/4-turn manual shutoff valve and cylinder manual valves are OPEN. **FIGURES 1** and **2**

   NOTICE

   - **Manual shutoff valves must be fully OPEN for proper system operation.**
   - **Excess flow protection requires opening manual shutoff valves slowly; if a click is heard while opening valve, close valve to reset the excess flow valve.**

2. Prime fuel system by cycling ignition to the ON/RUN position. Supply solenoid valve will open to allow CNG to flow and may be accompanied by an audible click.
3. Wait 15 seconds, then cycle ignition to OFF position.
4. Engage start to crank engine.

   NOTICE

   Do not press accelerator pedal prior to or while starting the engine.

5. If engine does not start, repeat fuel system prime by cycling ignition to ON/RUN position.

   NOTICE

   Fuel system prime cycle may need to run 4-5 times after prolonged storage.

6. Allow engine to idle until the system equalizes pressure in the fuel lines and rails.

   NOTICE

   If the engine runs rough, do not drive vehicle until engine runs smoothly.

2.4. Vehicle Fueling

NOTICE

These are general fueling guidelines. Always consult fuel station personnel or postings for specific fuel dispenser operating instructions and procedures.

2.4.1. Fuel Properties and Quality

The 6.0L V8 engine is designed to operate on CNG. Clean burning CNG offers reduced emissions for cleaner air and lower vehicle operating costs.

⚠ WARNING

- **Wear approved eye protection when fueling.**
- **CNG is flammable. Keep sparks and open flames away from CNG. Do not smoke while fueling vehicle.**
- **Natural gas is colorless, odorless, and highly flammable. An additive like the odor of sulfur or rotten eggs is added to CNG to alert to the presence of a gas leak.**

The engine and fuel system require high quality CNG free of dust, oil, or other contamination.

⚠ CAUTION

Use of CNG not meeting SAE J1616 quality standards, or operator failure to properly cap and clean fueling system connections may decrease engine performance and damage vital Hexagon Agility® system components or emission controls. Damage to components resulting from fuel contamination is NOT covered under warranty.

2.4.2. Fueling Procedure

⚠ WARNING

- **Operators must memorize vehicle 1/4-turn manual shutoff valve location and cylinder manual valve locations. FIGURE 4 Operators untrained or inexperienced with filling a Hexagon Agility® CNG equipped vehicle should consult a qualified CNG station operator.**
- **Never connect fuel fill nozzle to fuel receptacle if O-ring is missing or damaged; this could cause serious injury or property damage.**

Referring to Section 2.3.3., perform the following steps to fuel the vehicle.

1. Turn engine OFF and set parking brake. *If required:* set wheel chocks.
2. Ensure no open flames or ignition sources are present.
3. Remove dust cap from fuel fill receptacle. FIGURE 8
4. Wipe fuel fill receptacle and fill nozzle. FIGURE 8

NOTICE

Check for signs of oil or other contaminants. An oily or dusty condition may be an indication of poor fuel quality or a station that is not well maintained. Report unsatisfactory conditions to the station operator.

5. Inspect fuel receptacle O-ring.

⚠ CAUTION

Verify O-ring is seated in groove and is not damaged or missing. If a new O-ring is required, it may be obtained from Hexagon Agility®. *Please refer to "Support, Service, or Parts" above to order.*

Connect fill nozzle to fuel receptacle. FIGURE 8

NOTICE

If natural gas odor is present, the fuel receptacle O-ring may be worn or damaged.

6. Turn nozzle valve to "FILL" position and CNG will begin to flow.
7. Continue filling until fuel station dispenser shuts off automatically.

8. Carefully disconnect filling nozzle from fuel receptacle by rotating fill nozzle valve to the “VENT” position.

   NOTICE

   Fuel receptacle is designed to prevent nozzle from disconnecting while under pressure.

9. Return fueling nozzle to dispenser.
10. Install dust cap on fuel fill receptacle. FIGURE 8

    NOTICE

    Drive Away Protection (DAP) safety interlock requires fuel receptacle dust cap be in place for engine to start.

2.4.3. Fast Fill vs. Slow Fill and Pressure/Temperature Relationship

CNG stations typically fill to a service pressure of 3600 psi (250 bar). During fast filling, it is normal for gas to heat up as it compresses inside the cylinder(s). On a hot day, pressure from the filling station will indicate a 100% full cylinder with a system pressure of 3600 psi (250 bar), but the fuel cylinders may not be filled completely.

For example, when the ambient temperature is 120°F (50°C) in the afternoon, the CNG dispenser stops at 3600 psi (250 bar) as expected. However, later that evening ambient temperature drops to 70°F (20°C). As the CNG cools, pressure in the cylinder(s) decreases. Therefore, instead of having a complete fill of 3600 psi (250 bar) at 120°F, cylinder pressure is about 3000 psi (207 bar) at 70°F (20°C) or approximately 83% full.

Fueling stations can partially compensate for the heat generated during fast filling, but generally cannot achieve more than 70% to 80% fill rates. On the other hand, slow filling results in nearly 100% full, because the CNG can cool during the filling process.

2.4.4. Fueling Station Locations

Public and private CNG filling station locations are listed on the following U.S. government website:

http://www.afdc.energy.gov/locator/stations/

3. Service and Maintenance

3.1. Recommended Fluids

The Hexagon Agility® CNG fuel system is a purpose built for medium duty compressed natural gas operation. Proper maintenance is critical to protect your investment. Poor maintenance can lead to premature engine wear and fuel system damage. Keep records to document proper maintenance as outlined in this manual. Failure to properly maintain fluids can result in costly repairs not covered by warranty.

⚠ CAUTION

The use of OEM recommended fluids is critical to proper engine and fuel system operation and longevity. Failure to use correct fluids can lead to engine and fuel system damage not covered by warranty.

3.1.1. Fuel System Coolant

The Hexagon Agility® pressure regulator is supplied with coolant from the OEM coolant system.

⚠ CAUTION

Follow OEM recommended coolant specifications.

⚠ CAUTION

Do not use well water to mix with coolant. Well water contains minerals which promote cooling system electrolysis; this can cause premature cooling system damage.

3.2. Maintenance Schedule

Hexagon Agility® has established the following maintenance intervals to ensure safe and reliable engine fuel system operation. For questions regarding engine and fuel system service and maintenance please refer to the Hexagon Agility® website for the latest contact information.

Required Engine & Fuel System Service	Interval*		
	Years	mi.	km
Replace spark plugs	n/a	50000	80000
Drain and change LP fuel filter element	n/a	5000	8000
Drain and change HP fuel filter element	n/a	7500	12000
Inspect CNG cylinders and mounts**	1	100000	161000
Visually inspect all CNG hoses and lines**	1†	100000	161000

**Vehicles operating in harsh environments may require more comprehensive or more frequent inspections.*

***Check with Authority Having Jurisdiction for additional cylinder and/or fuel system inspection schedule requirements. Refer to Section 3.2.1.*

†All CNG hoses must be inspected every month or 200 hours.

⚠ WARNING

Personal injury or death could result from neglecting to perform the above recommended services.

⚠ CAUTION

Failure to perform the above services according to manufacturer recommendations may void fuel system warranty.

NOTICE

The above services must be performed by trained professionals.

3.2.1. CNG Fuel Cylinder and Fuel System Inspection Requirements

U.S. Federal Motor Vehicle Safety Standards (FMVSS) Section 304 requires visual CNG cylinder inspections every 12 months or sooner.

⚠ CAUTION

Inspections must be performed by certified inspectors using guidelines from the fuel cylinder manufacturer in addition to the guidelines listed in this manual.

⚠ WARNING

If a CNG-fueled vehicle has been involved in an accident or fire, the system and cylinders must be inspected by a certified (CGA C-6.4 or other) CNG fuel system inspector.

For detailed fuel system inspections, Hexagon Agility® recommends two practical fuel system inspection schedules–to be selected by the vehicle owner:

1. The common industry recommendation of every 3 years or 36000 miles, whichever occurs first,

   OR

2. After every 1 year or 100,000 miles, whichever occurs first.

In addition, Hexagon Agility® recommends a daily walk-around or pre- and post-trip visual inspection be performed, regardless of which detailed fuel system inspection schedule is followed. *Refer to Section 2.1. Pre-trip Inspection.*

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FCCC MT-45 MT-55 CNG FUEL SYSTEM
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