INSTRUCTION TO SERVICE

ITS61424	8/15/2025
SECTION:	241-Fuel System
SUBJECT:	Replace the original pressure relief valve with a new part with a lower set pressure point.
ISSUE:	Buses have issues of fuel overpressure on the low-pressure side after being parked for extended periods.
SUMMARY:	Replace the pressure relief valve to reduce the pressure set point for the release of excess fuel pressure on the low-pressure side.

ITS61424

Ref. NHTSA Recall No.	Ref. Transport Canada Recall No.
Not Applicable	Not Applicable

PROCEDURE:

1. Set park brake and chock wheels.
2. Open the rear engine and fuse box access doors.
3. Turn the main battery disconnect switch to the “OFF” position.
4. Follow the hydrogen venting procedure in NF service manual, ensure that both Zone 1 and Zone 2 have been completely drained of hydrogen gas and that the manual tank valves are closed. The hydrogen venting procedure have been provided in Appendix B for reference.

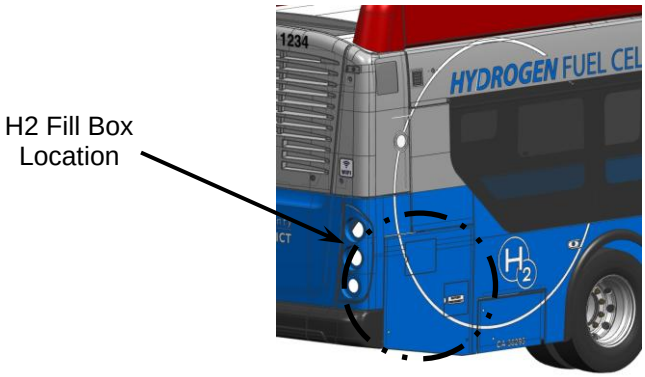


Figure 1: H2 Fill Box Location

5. Locate the H2 Fill Box inside the engine compartment, see figure 1 and 2.

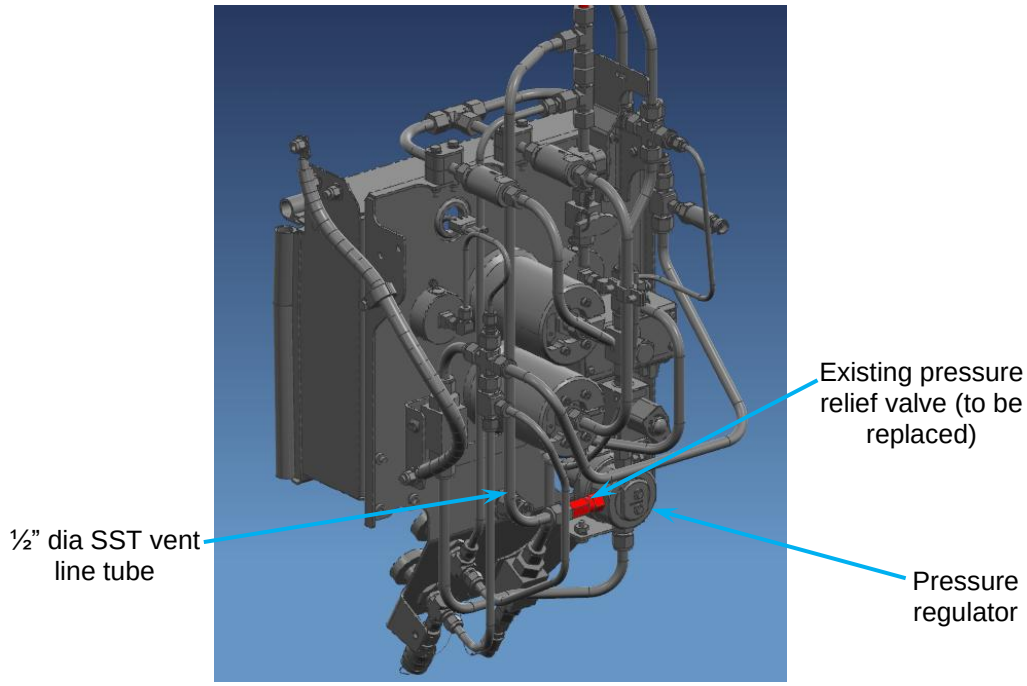


Figure 2: H2 Fill Box Viewed from the Inside of Engine Compartment

6. In the following steps 7-10, ensure cleanliness of the parts to be handled in accordance with NFI's Hydrogen Gas Cleanliness Specifications, provided in appendix D for reference.
7. Using a backup wrench to loosen the fitting nuts connected to the pressure regulator and the ½" dia SST vent line tube. Disconnect the existing pressure relief valve connected to pressure regulator.
8. Disconnect and remove the existing pressure relief valve from the ½" dia SST vent line tube, and discard it.
9. Install the new pressure relief valve P/N 1136830 (vendor P/N CRV8T-6S-V-167) on the same port of pressure regulator, tighten and torque to 22 FT-LBS.
10. Reconnect the ½" dia SST vent line tube on the new pressure relief valve, tighten as per Appendix A.
11. Recommissioning Purge the Fuel lines as per Appendix C.
12. Close the rear engine and fuse box doors.
13. Remove all tools and debris from work area to return vehicle to service.
14. Turn the main battery disconnect switch to the "ON" position.

LABOUR ESTIMATE				
	Operation	Number of Technician(s)	Hours	Labor Time T X HR
1	Replace the original pressure relief valve with a new part with a lower pressure set point.	1	2.0	2.0

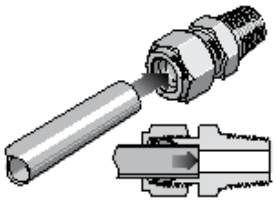
PARTS REQUIRED					
Item	Part Number	Description	Qty. per Coach	Units	Notes
1	1136830	VALVE-PRESSURE RELIEF 167 PSIG	1	EA	

Appendix A:

Installation Instructions

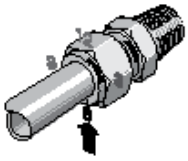
Swagelok Tube Fittings Up to 1 in./25 mm

These instructions apply both to traditional fittings and to fittings with the advanced back-ferrule geometry.

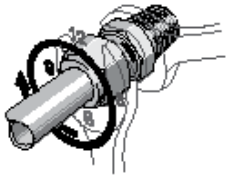


Fully insert the tube into the fitting and against the shoulder; rotate the nut finger-tight.

High-pressure applications and high safety-factor systems: *Further tighten the nut until the tube will not turn by hand or move axially in the fitting.*



Mark the nut at the 6 o'clock position.



While holding the fitting body steady, tighten the nut one and one-quarter turns to the 9 o'clock position.

For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut only three-quarters turn to the 3 o'clock position.

Swagelok Tube Fittings Over 1 in./25 mm

1. Preswage the ferrules onto the tube using a Swagelok multihead hydraulic swaging unit (MHSU).
2. Apply the lubricant packaged with the fitting lightly to the body threads and the rear surface of the back ferrule.
3. Insert the tube with preswaged ferrules into the fitting until the front ferrule seats against the fitting body; rotate the nut finger-tight.
4. Mark the nut at the 6 o'clock position.
5. While holding the fitting body steady, tighten the nut one-half turn to the 12 o'clock position.

Use the Swagelok MHSU gap inspection gauge to ensure that the fitting has been tightened sufficiently.

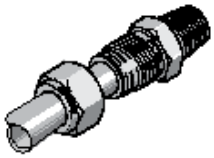
Reassembly—All Sizes

You may disassemble and reassemble Swagelok tube fittings many times.

⚠ **Always depressurize the system before disassembling a Swagelok tube fitting.**

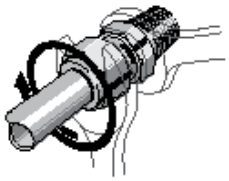
Prior to disassembly, mark the tube at the back of the nut; mark a line along the nut and fitting body flats.

Use these marks to ensure that you return the nut to the previously pulled-up position.



Insert the tube with preswaged ferrules into the fitting until the front ferrule seats against the fitting body.

Over 1 in./25 mm sizes: *If needed, reapply lubricant lightly to the body threads and the rear surface of the back ferrule.*



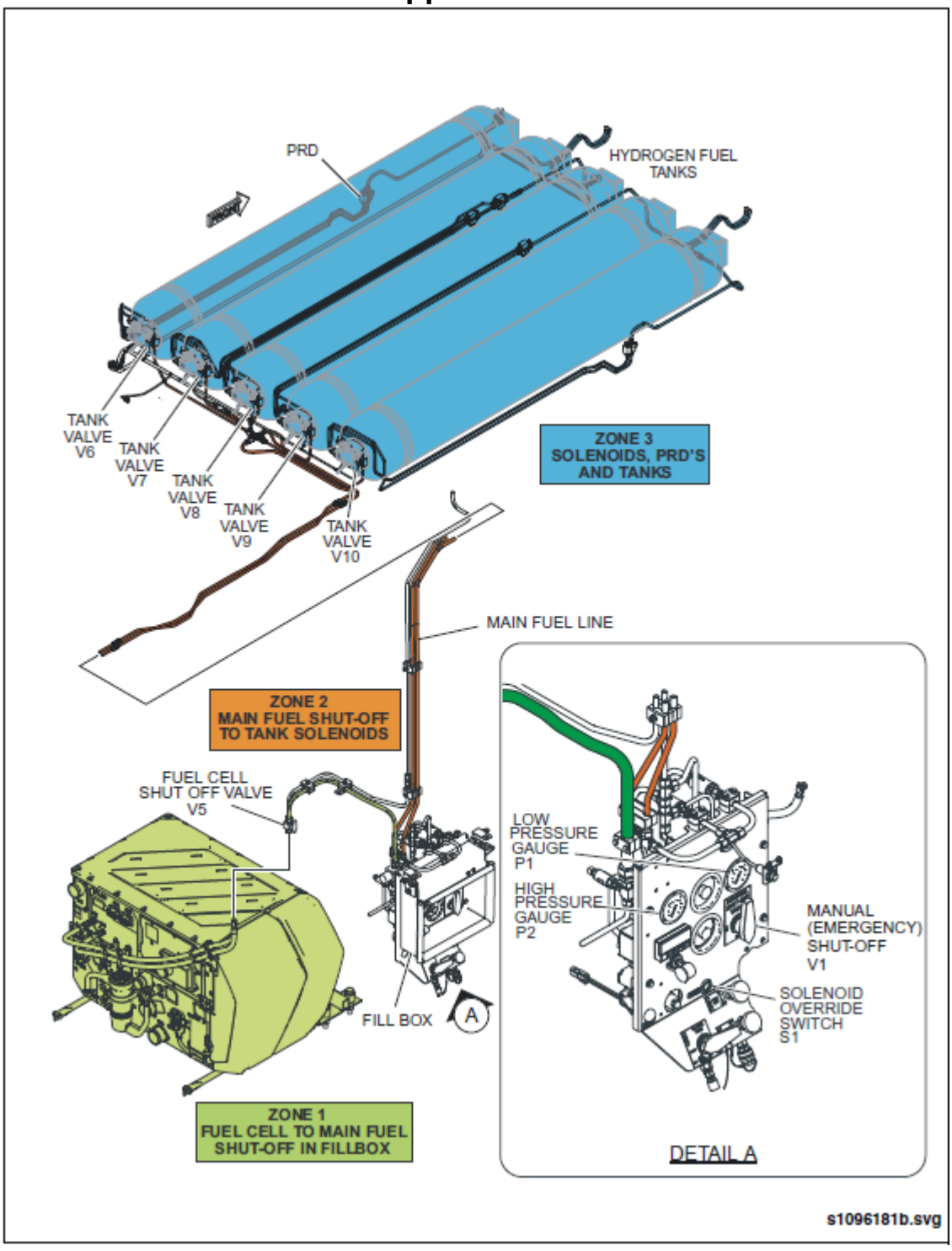
While holding the fitting body steady, rotate the nut with a wrench to the previously pulled-up position, as indicated by the marks on the tube and flats. At this point, you will feel a significant increase in resistance. Tighten the nut slightly.

⚠ **Do not use the Swagelok gap inspection gauge with reassembled fittings.**

O-Seal Male Connectors

1. Turn the O-seal connector into the female end until it is finger-tight.
2. Tighten the O-seal connector until it makes metal-to-metal contact with the face of the female end.
3. Tighten slightly with a wrench.

Appendix B:


PRD
HYDROGEN FUEL TANKS
TANK VALVE V6
TANK VALVE V7
TANK VALVE V8
TANK VALVE V9
TANK VALVE V10
ZONE 3 SOLENOIDS, PRD'S AND TANKS
MAIN FUEL LINE
ZONE 2 MAIN FUEL SHUT-OFF TO TANK SOLENOIDS
FUEL CELL SHUT OFF VALVE V5
FILL BOX
A
ZONE 1 FUEL CELL TO MAIN FUEL SHUT-OFF IN FILLBOX
LOW PRESSURE GAUGE P1
HIGH PRESSURE GAUGE P2
MANUAL (EMERGENCY) SHUT-OFF V1
SOLENOID OVERRIDE SWITCH S1
DETAIL A
s1096181b.svg

4.4. Hydrogen Venting Procedure

⚠ WARNING

Personnel must understand the associated risks when working with hydrogen (H2) gas (and pressurized gas in general), as well as adhere to safe work procedures. Personal Protective Equipment (PPE) for eyes and hearing must be worn. Work in a well ventilated area with an appropriate gas detection system, when required. Hoses used to purge and fill system may rupture or disconnect inadvertently under pressure. Precautions must be taken to avoid injury.

⚠ WARNING

Before opening the fuel cell module, a separate residual hydrogen bleed down procedure must be performed. A shock hazard exists when hydrogen is still present in the cell stack. Hydrogen will dissipate from the stack if the vehicle has been shut down for 10 hours. To remove the shock hazard immediately follow the Residual Hydrogen Bleed Down procedures in the OEM service manual.

Excess flow valves, integral to the hydrogen tank solenoid valves are a safety feature that protect against uncontrolled venting of gas from the tank module. During purging or defueling, these valves can be inadvertently tripped when flow rates are too aggressive. When purging or defueling, if the flow of gas stops suddenly, it should be assumed that one or more excess flow valve(s) has / have tripped and that pressure remains in the tank(s). Excess flow valves are self-resetting when tank and plumbing pressures are allowed to equalize. Resetting can be initiated by either closing the vent valve, allowing the downstream pressure to build (can take up to 15 minutes or more), or pressurizing the downstream plumbing directly. Venting should be started slow and gradually increased.

4.4.1. Materials Required

- ❒ Nitrogen source (99.95% purity)
- ❒ Hydrogen source (SAE J2719 purity)

4.4.2. Hydrogen Fuel System Zones

For venting purposes, the fuel system is divided into distinct zones. Any maintenance, repairs, or replacement of components in the fuel system require that the affected zone be vented of pressurized gas. Each zone has its own specific venting procedure that must be followed. The process includes isolating areas with the valves. The fill box provides the valves and connection ports for the vent stack and fill connections. Additionally the various zones are illustrated for clarity in this section. See “Fig. 7-7: Hydrogen Fuel System Venting Zones” on page 18. The fuel system zones are defined as follows:

- ❒ Zone One - the area between the fuel cell and the manual (emergency) shut-off valve (V1) in the fill box. This area includes the low pressure solenoid valve, low pressure gauge, low fuel pressure switch (if installed), low pressure sample needle valve, and manual purge valve.
- ❒ Zone Two - the area between the manual (emergency) shut-off valve (V1) in the fill box and the fuel tank isolation valves (V6-V10). This area includes the pressure regulator, pressure relief device, in-line filter, high pressure gauge, fill receptacles, high pressure defuel valve and lines and fittings up to the tank isolation valves.
- ❒ Zone Three - the area including the fuel tank solenoid valves, pressure relief devices, PRDs and fuel tanks.

4.4.3. Venting Preparation

⚠ WARNING

The presence of ignition sources may lead to an explosion hazard. DO NOT

Hydrogen Venting Procedure

use jumper wires from an external power source to energize tank solenoid valves during the venting process.

DO NOT leave the vehicle unattended during the venting process. Ensure all shut-off valves are properly locked out or tagged so as to prevent inadvertent opening of a valve during the venting process. Ensure that the high pressure gauge is tagged to identify high pressure within the system whenever Zone One or Zone Two areas have been vented.

Ensure that the discharged gas is connected to a recovery system in accordance with local environmental regulations.

In an emergency the system can be vented through the roof vent stack.

Prior to conducting any venting activity ensure the following steps are followed:

1. Minimize the pressure in the fuel tanks by driving the vehicle, if practical, to use up as much of the fuel as possible.
2. Perform the venting procedure outdoors.
3. Provide a direct ground for the purge line and for the recovery system to dissipate static charges that may build up during venting. Use a No. 3 gauge wire to connect to a suitable ground such as a water main or a pipe that is installed 8 feet (2.4 m) into the ground.
4. Connect a bonding wire from the fueling station to the ground stud on the vehicle.

4.4.4. Zone One Venting Procedure

Vent the fuel lines between the fuel cell and the manual (emergency) shut-off valve (V1) as follows:

1. Connect ground lead to fill box grounding stud.
2. Ensure that fuel cell hose quarter-turn shut-off valve (V5) (normally open) is open.
3. Ensure that the manual (emergency) quarter-turn shut-off valve (V1) (normally open) is closed.
4. Open the solenoid valve (normally closed) at fill box using the Solenoid Override Switch (S1).
5. To vent, slowly open needle roof vent defuel valve (V4) (normally closed) below fill panel.
6. Monitor lower pressure on Low Pressure Gauge (P1) and higher pressure on High Pressure Gauge (P2).

NEW FLYER

Hydrogen Venting Procedure

4.4.5. Zone Two Venting Procedure

Vent the area between the fuel cell and the tank shut-off valves (V6-V10) as follows:

1. Connect ground lead to fill box grounding stud.
2. Ensure that fuel cell hose quarter-turn shut-off valve (V5) (normally open) is open.
3. Ensure that the manual (V1) (emergency) quarter-turn shut-off valve (normally open) is open.
4. Ensure tank manual quarter-turn shut-off valves (V6-V10) (normally open) are closed.
5. Open the Solenoid valve (normally closed) at fill box using the Solenoid Override Switch (S1).
6. Connect fill panel high pressure vent port to vent stack with vent hose.
7. Connect nitrogen source to fill receptacle(s) (TN1 HF/TN5).
8. To vent, slowly open quarter-turn dump valve (normally closed) below fill panel.
9. Monitor upper pressure on High Pressure Gauge (P2), lower pressure on lOw Pressure Gauge (P1).
10. Vent pressure to: 50 psig (3.4 barg)

Nitrogen Purge Cycle 1

Pressurize system to: ..... 450 psig (30 barg)

Hold at pressure: .....5 minutes

Vent pressure to: ..... 50 psig (3.4 barg)

Nitrogen Purge Cycle 2

Pressurize system to: ..... 450 psig (30 barg)

Hold at pressure: .....5 minutes

Vent pressure to: ..... 50 psig (3.4 barg)

Nitrogen Purge Cycle 3

Pressurize system to: ..... 450 psig (30 barg)

Hold at pressure: .....5 minutes

Vent pressure to: .....Atmosphere

⚠ WARNING

DO NOT disconnect fittings with system under pressure.

11. Remove valve forces, fuel fill nozzle, vent hose and ground lead (in that order).

Appendix C:

Recommissioning Purge

4.5. Recommissioning Purge

☞NOTE:

Once required maintenance has been completed, recommission the affected zones. Refer to 4.5.1. "Complete System" on page 20 in this section if the full system has been decommissioned. Refer to 4.5.2. "Plumbing Only" on page 21 in this section if just the plumbing was decommissioned.

4.5.1. Complete System

1. Connect ground lead to fill box grounding stud.
2. Ensure that fuel cell fuel hose is disconnected from fuel cell H2 inlet and secured
3. Ensure that fuel cell hose quarter-turn shut-off valve (normally open) (V5) is open.
4. Ensure that the manual (emergency) quarter-turn shut-off valve (normally open) (V1) is open.
5. Ensure that all roof tank manual quarter-turn shut-off valves (normally open) (V6-V10) are open.
6. Open the Solenoid valve (normally closed) at fill box using the Solenoid Override Switch.
7. Using diagnostic computer open high-pressure solenoid valves (normally closed) at tank valves that are to be defuelled.
8. Connect low pressure sample port to vent stack with vent hose.
9. Connect nitrogen source to fill receptacle (TN1 HF/T5).
10. To vent, slowly open quarter-turn dump valve (normally closed) below fill panel.

☞NOTE:

Flushing too fast will trip tank valve excess flow features, stopping flow.

11. Monitor upper pressure on High Pressure Gauge (P2), lower pressure on Low Pressure Gauge (P1).

Nitrogen Purge Cycle 1

Pressurize system to:.....
250 psig (17 barg) // 25 m3 of N2

Hold at pressure:.....30 minutes

Vent pressure to: 50 psig (3.4 barg)

Nitrogen Purge Cycle 2

Pressurize system to:.....
250 psig (17 barg) // 25 m3 of N2

Hold at pressure:.....30 minutes

Vent pressure to: 50 psig (3.4 barg)

Nitrogen Purge Cycle 3

Pressurize system to:.....
250 psig (17 barg) // 25 m3 of N2

Hold at pressure:.....30 minutes

Vent pressure to: 50 psig (3.4 barg)

☞NOTE:

Ensure that fuel cell hose is secured and directed away from personnel and equipment.

12. Carefully open and close fuel cell hose shut-off valve slightly and momentarily to

clear any debris from the line & hose (nose blow).

13. Connect fuel cell hose to fuel cell.
14. Connect hydrogen source to fill receptacle (TN1 HF/TN5).

Hydrogen Purge Cycle 1

Pressurize system to: ..... 725 psig (50 barg) // 6,5 kg of H2

Hold at pressure: .....10 minutes

Vent pressure to: ..... 30 psig (2 barg)

Hydrogen Purge Cycle 2

Pressurize system to: ..... 725 psig (50 barg) // 6,5 kg of H2

Hold at pressure: .....10 minutes

Vent pressure to: ..... 30 psig (2 barg)

Hydrogen Purge Cycle 3

Pressurize system to: ..... 725 psig (50 barg) // 6,5 kg of H2

Hold at pressure: .....10 minutes

Vent pressure to: ..... 30 psig (2 barg)

15. Remove valve overrides on the diagnostic computer, fuel fill nozzle, vent hose & ground lead (in that order). The system can now be safely Leak Tested Refer to 4.6. "Pressure & Leak Test" on page 21 and / or Filled with hydrogen (H2) gas. Refer to 4.3. "Fuel Fill" on page 15 for information on the fill procedure.

4.5.2. Plumbing Only

1. Connect ground lead to fill box grounding stud.
2. Ensure that fuel cell fuel hose is connected to the fuel cell H2 inlet
3. Ensure that fuel cell fuel hose shut-off valve (normally open) (V5) is open.
4. Ensure that emergency fuel shut-off quarter-turn valve (normally open) is open.
5. Open the Solenoid valve (normally closed) at fill box using the Solenoid Override Switch.
6. Connect low pressure sample port to vent stack with vent hose.
7. Confirm tank manual quarter-turn shut-off valves (previously closed) (V6-V10) are closed.
8. Using diagnostic computer open one tank solenoid valve (normally closed).
9. Open the low-pressure sampling needle valve (normally closed).
10. Slowly open tank's isolation quarter-turn shut-off valve (V6-V10). This should be the valve corresponding to the tank valve being opened using the diagnostic computer. When opening crack valve only slightly, This is to flush the residual air / nitrogen in the fuel lines.
11. This uses the hydrogen stored in the tanks to flush the fuel lines.

☞NOTE:

Flushing too fast will trip tank valve excess flow features, stopping flow.

☞NOTE:

Some deflagration (popping) may occur during flush.

12. Close valve after 3-5 seconds of moderate flow.
13. Close the low-pressure sampling needle valve (normally closed) (V4).
14. Open remaining tank isolation quarter-turn shut-off valves (normally open) (V6-V10).

☞NOTE:

Tanks will equalize when the coach is keyed on.

4.6. Pressure & Leak Test

⚠WARNING

DO NOT EXCEED 6,350 psi TEST PRESSURE. This procedure requires pressurization of the fuel system with hydrogen. Safety precautions must be taken to ensure that personnel avoid injury from a sudden release of test pressure. Hoses used to administer the tests may rupture or disconnect inadvertently under pressure. Precautions must be taken to avoid injury. Never disassemble or tighten fittings under pressure. Proper personal protective

equipment (PPE) for eyes and hearing must be worn.

1. Connect ground lead to fill box grounding stud.
2. Ensure that manual (emergency) quarter-turn shut-off valve (normally open) (V1) at the fill box is open.
3. Ensure that all manual quarter-turn shut-off valves (normally open) (V6-V10) at tanks are open.
4. Ensure that fuel cell hose shut-off quarter-turn valve (normally open) (V5) in fuel cell compartment is open.
5. Open the Solenoid valve (normally closed) at fill box using the Solenoid Override Switch.
6. Connect fill panel high-pressure vent port to vent stack with vent hose.
7. Connect hydrogen source to fill receptacle (TN1 HF/TN5).
8. Pressurize system in staged increments, as follows:

❒ 250 psig

❒ 500 psig

❒ 2,500 psig

❒ 5,000 psig // 37,5 kg of H2

At each staged pressure increment, apply liquid leak detector (Snoop) to all double-ferrule fittings, SAE (O-Ring Boss) fittings, tank valves and end plugs.

Allow leak detector to dwell for 3 minutes, without formation of bubbles.

9. If leak is found:

❒ Depressurize system (isolate as required) via defuel port valve.

❒ Mark nut position of leaking tightened fitting with marker.

❒ Disassemble leaking connection.

❒ Look for leak-path or foreign material.

❒ Reassemble corrected connection.

❒ Re-tighten per manufacturer's instructions (double-ferrule) or indicated torque value on drawing (SAE).

❒ Continue testing in staged pressure increments per instructions above, double checking previously leaking fittings are now bubble-tight.

10. After testing with final pressure, dwell for 15 minutes without measurable pressure loss.
11. Reconfirm witness marks on any repaired, leak-free fittings with appropriate method approved by QA department (Torque Seal, paint marker &c.).
12. Close solenoid valve located at fill box.
13. Remove vent hose & ground lead.

Appendix D:

3) **ASSEMBLIES, VALVES, REGULATORS, FITTINGS, HOSES & FLEXIBLE TUBING**

a) ALL ASSEMBLIES, VALVES, REGULATORS, FITTINGS, HOSES AND FLEXIBLE TUBING ARE TO BE STORED IN THEIR ORIGINAL PACKAGING. REMOVE FITTINGS FROM THE BOXES ONLY PRIOR TO ASSEMBLY.

b) PRODUCTS SHALL BE CLEANED AS INDIVIDUAL COMPONENTS TO BE FREE OF BURRS, CHIPS, LOOSE PARTICLES, OIL, GREASE AND CONTAMINANTS.

c) COMPONENTS SHALL BE INSPECTED BY THE UNAIDED EYE UNDER BRIGHT ILLUMINATION.

d) ASSEMBLIES WITH OPEN PORTS OR TUBES MUST BE CLOSED OFF WITH CLEAN PLASTIC OR FOAM BUNGS.

e) OPEN FITTINGS OR TUBING MUST BE COVERED BY A CLEAN CLOTH AT THE END OF EACH DAY.

f) IF REQUIRED, SPARINGLY APPLY LUBRICANT SUCH AS DUPONT™ KRYTOX® 102 (OIL) OR 202 (GREASE), (OR ENGINEERING APPROVED EQUIVALENT). APPLY JUST PRIOR TO ASSEMBLY TO AVOID DEBRIS FROM STICKING TO GRASE.

g) AFTER ANY REQUIRED ASSEMBLY AND TESTING, PACKAGE FINISHED PRODUCTS TO PROTECT THEM FROM CONTAMINATION AND DAMAGE DURING SHIPPING AND STORAGE.

h) CAP ANY EXPOSED MALE THREADS.