



# HYUNDAI

## Technical Service Bulletin

GROUP <b>FUEL SYSTEM</b>	NUMBER <b>20-FL-008H-1</b>
DATE <b>December, 2020</b>	MODEL(S) <b>NEXO FUEL CELL (FE FCEV)</b>

**SUBJECT:** VENTING NEXO FUEL CELL ELECTRIC VEHICLES (FCEV)

*This bulletin supersedes TSB# 20-FL-008H by revising the requirements for venting the Hydrogen tank prior to conducting repairs.*

**Description:**

This bulletin provides information on how to properly vent Hydrogen from a Nexo FCEV for maintenance or repairs.

**Applicable Vehicle:** 2019-2020MY Nexo Fuel Cell

**Warranty Information:**

Normal Warranty Applies

**Required Tools & Equipment**

- Portable Hydrogen Vent Stack (HVS01) Kit with Venting Manifold and Venting Hoses
- Global Diagnostic Scan Tablet (GDS-M)
- Hydrogen Gas Detector
- Personal Protective Equipment
- Torque Wrench
- Floor Jack, Wheel Chock, Jack Stands
- Various size metric sockets, 6mm hex socket
- Tape Measure
- Vehicle Communication Interface II (VCI-II)
- Digital Volt Ohm Meter (DVOM)
- Watch/clock
- 19mm and 24 mm Combo Wrenches
- Quick Connector Remover Tool
- Ratchet and extensions as needed
- Tapered Stopper

**Reference Materials**

Media Location	Title	Name / Description
Hyundaitechinfo.com	Nexo Service Manual	Hydrogen Storage System
Hyundaitechinfo.com	TSB 20-FL-009H	Portable Vent Stack Assembly Procedure
Hyundaitechinfo.com	TSB 15-GI-001	ECU Update Procedure For Tablet-Based GDS Mobile

**Before Venting Questions/Considerations:**

- Is the venting procedure being completed at a pre-defined Hydrogen venting location?
- Is a suitable grounding connection available, and in proper working condition?
- Are the required tools, equipment and PPE ready, available and in proper working condition?
- Has the desired venting endpoint of the tanks been determined based on type of repair?

Review the following venting requirements prior to conducting repairs on a Nexo FCEV. Communicate with all applicable authority groups for additional venting requirements at your location.

### Circumstances when venting Hydrogen from FCEV is necessary.

#### 1. For routine maintenance work.

- Hydrogen storage tanks venting is not necessary so long as maintenance or repairs do not involve; parts or components that may contain hydrogen (storage tanks, fill lines, delivery lines, fuel cell) and/or the high voltage system components.

#### 2. For maintenance/repair of Hydrogen system components (excluding Hydrogen storage tanks and fill lines) and/or High Voltage system components.

- Hydrogen storage tanks pressure must be below 500psi.

#### 3. For maintenance/repair of the Hydrogen storage tanks/fill lines; where open flame activities or welding occurs within 18 inches (455 mm) of the Hydrogen storage tanks and lines.

- Hydrogen tanks must be completely vented.

Follow the Hydrogen Storage Tanks Venting Procedure. (Page 4)

## WARNING

### Precautions when a Hydrogen leak is suspected

1. Move the vehicle outdoors.
2. Turn off all electrical equipment, eliminate possible ignition sources, open all windows/doors.
3. Use a hydrogen leak detector to find the cause of the leak.
4. Vent Hydrogen from the vehicle as needed for repairs.
5. Replace the component(s) as necessary to repair the leak.
6. After above procedures are completed, use suitable Hydrogen leak detector and recheck for any Hydrogen leak.

This Fuel Cell Electric Vehicle (FCEV) utilizes up to 450 volts and compressed Hydrogen gas stored up to 10,000 psi. Only qualified, trained technicians should perform the venting procedure.

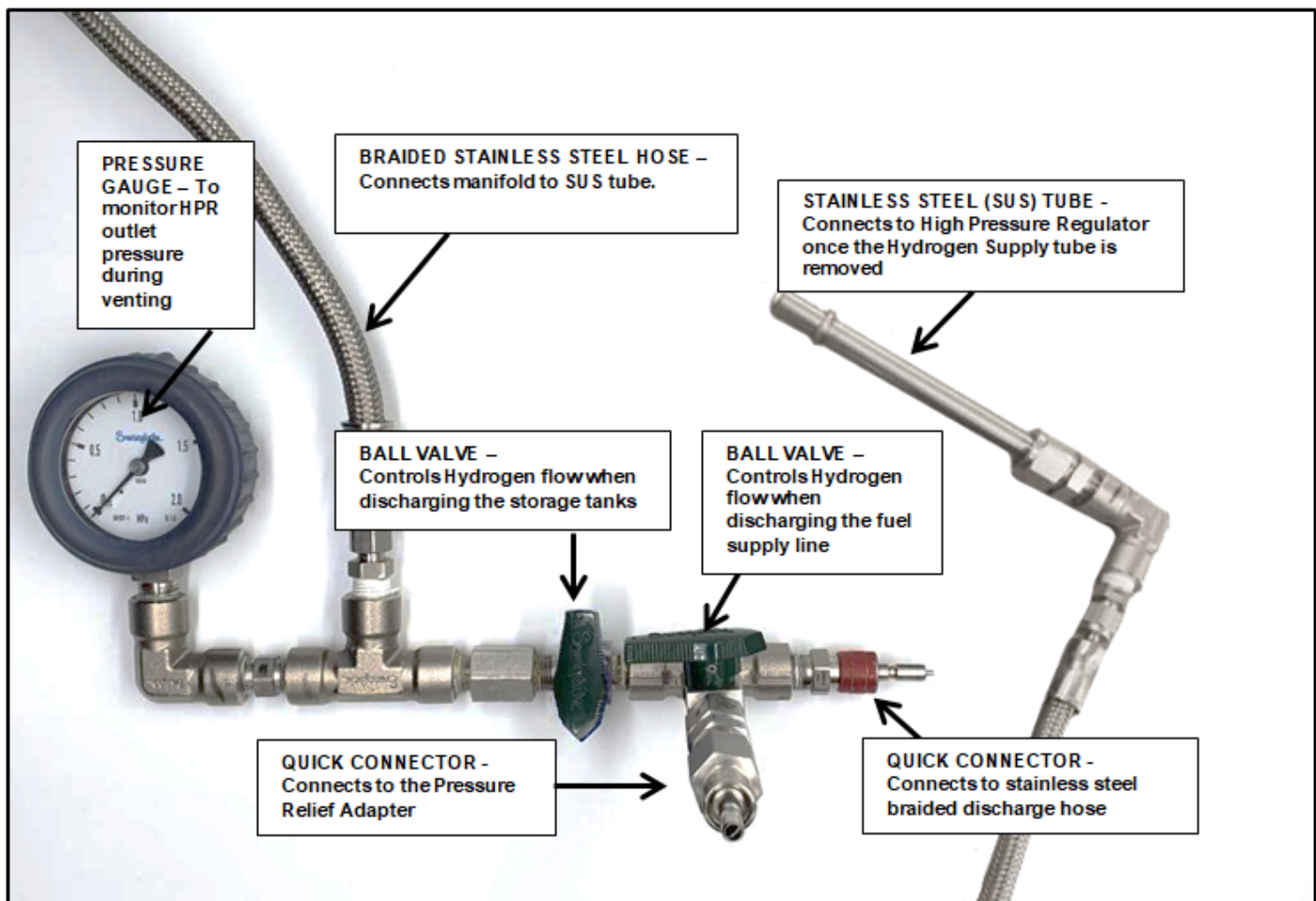
Before performing the service procedure, ensure the proper **Personal Protective Equipment (PPE)** is worn to prevent injury. Verify PPE is not expired and in proper working condition.

## CAUTION

When replacing any of the hydrogen storage system components, there may be leakage in the connecting part. Inspect for Hydrogen leaks after repairing / replacing any component that is part of the Hydrogen system. (Refer to Hydrogen Storage System – “General Information”)

**Manifold Assembly:**

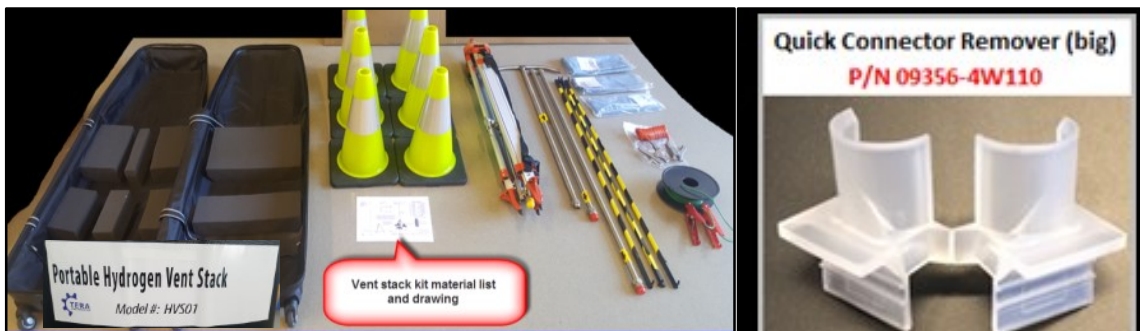
Review the function of each Manifold Assembly component before performing this service procedure. The reference picture below outlines the basic function(s) of the manifold assembly.



**Hydrogen Storage Tanks Venting Procedure:**

**A. Portable Hydrogen Vent Stack (HVS01) Kit**

1. Assemble the portable Hydrogen Vent Stack Part Number (HVS01) using TSB 20-FL-009H.



Locate the FCV Venting Manifold Kit which includes the following:



Kit Contents –

- Manifold Assembly
- Auxillary gas hose
- Three 10 foot long venting hoses

Do not connect any part of the Portable Hydrogen Vent Stack, Venting Manifold, or Venting hose to any other venting system used for any other purpose

When using the Portable Vent Stack, follow the minimum spacing distances.

Feet	Minimum Spacing From Hydrogen Vent Exit.
2	Above adjacent equipment
5	Above rooftops
5	Spherically, to Class 1, Division 1 Electrical Classification
10	Grade level to hydrogen vent exit
15	Spherically, to Class 1, Division 2 Electrical Classification
17	Overhead utilities; Non-fire-rated buildings; Flammable, combustible or other hazardous materials process or storage systems
20	Exposed persons and parked cars
40	Lot lines; Air intakes; Building/Structure opening; Open flames or welding.

Ensure the Portable Vent Stack is properly grounded.

**B. Vehicle Preparation and Staging:****⚠ WARNING**

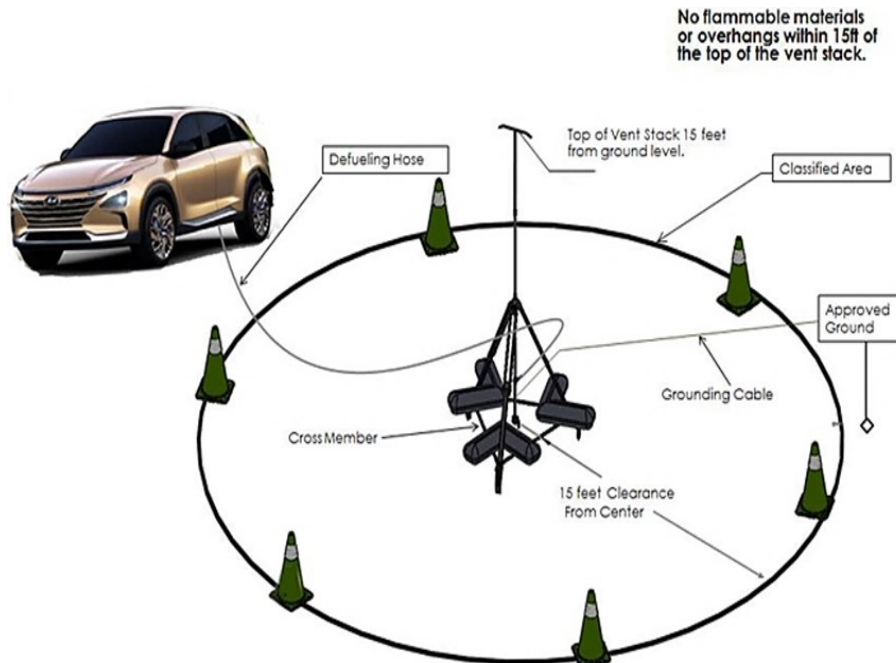
Do not vent Hydrogen during electrically conductive weather conditions.

**NOTICE**

Before performing the service procedure, verify that the GDS-M is adequately charged.

1. In an outdoor area approved for Hydrogen venting, the vehicle must be 15 feet or greater from the assembled and properly grounded Portable Hydrogen Vent Stack. The vehicle must be outside the coned off safety circle.

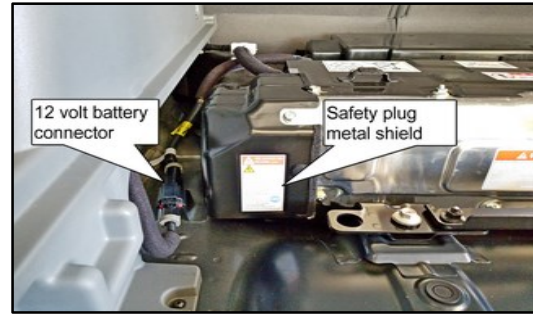
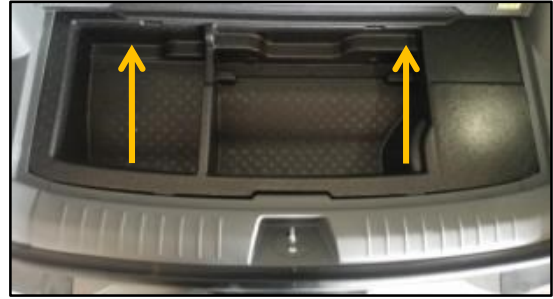
While the vent hose is connected to the manifold assembly, no personnel should be allowed into the safety circle.



2. If the vehicle has been in storage for several days, run the fuel cell for a sufficient amount of time to ensure that the 12 volt battery is fully charged.
3. Ensure that the 12 volt battery will not become discharged during the venting procedure by turning off all lights and accessories including heater/air conditioner, fan, audio, heated seats, rear defroster, etc.
4. Do not leave the headlight switch in auto mode.
5. Place the vehicle in park.
6. Apply the parking brake, roll down the windows as necessary, and open the rear hatch.
7. Scan and record all DTCs before performing service procedure.
8. Ensure the Push Button Start Stop (PBSS) is off, and the fuel stack is not in Ready Mode. Wait at least 3 minutes, and use appropriate PPE before proceeding to Section C.

**C. 12 Volt and High Voltage Circuit Disconnection**

1. In the rear cargo area, remove the floorboard and cargo tray to access the 12 volt battery connector and high voltage battery Safety Plug.



2. Disconnect the 12 volt battery negative (-) connector.

**⚠ WARNING**

Before performing the service procedure, ensure proper **Personal Protection Equipment (PPE)** is worn to prevent injury. Verify PPE is not expired and in proper working condition.

3. Remove the metal shield to access the High Voltage Safety Plug.

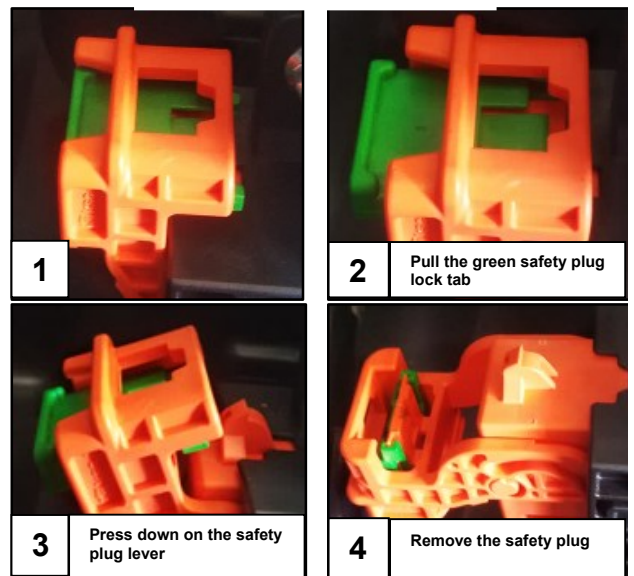


4. Follow 1- 4 below to remove the orange high voltage safety plug.  
Store the removed safety plug in a secure location outside and away from the vehicle.

**Safety Plug Removal**



**Safety Plug Removal**



5. Wait 5+ minutes to allow the high voltage system capacitor to discharge.

**NOTICE**

The High Voltage Junction Box (HVJB) cover is located under the hood and on top of the fuel stack in the fuel cell compartment.

**⚠ DANGER**

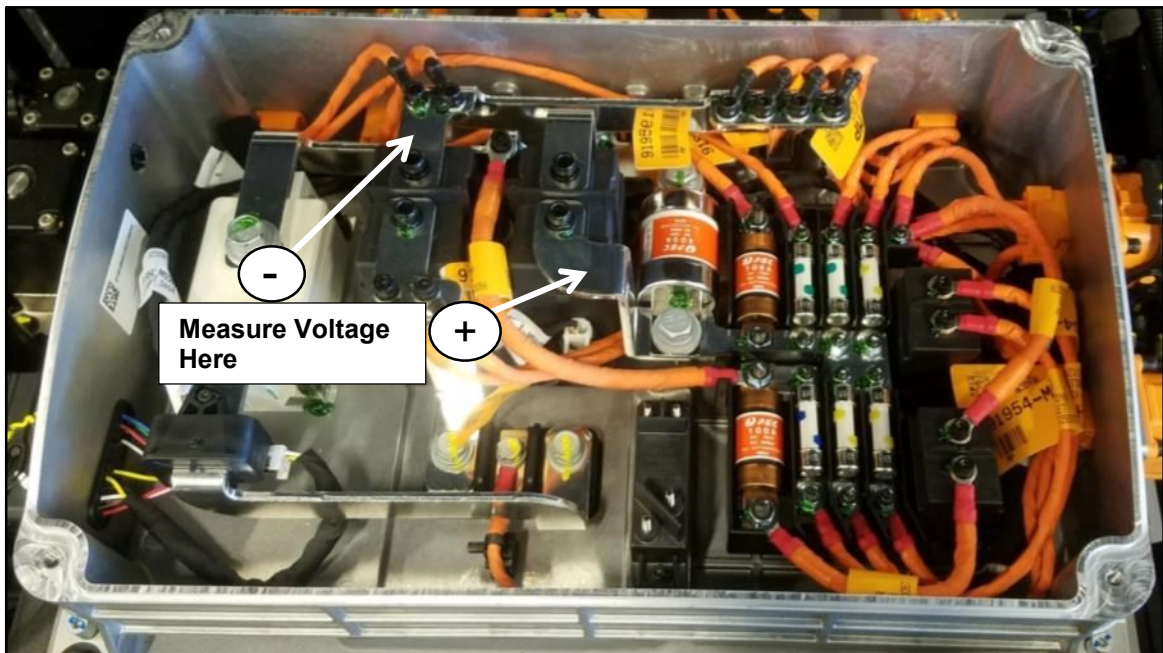
The High Voltage Junction Box (HVJB) may be electrically energized up to 450 volts.

6. Remove the junction box trim and cover.



High voltage junction box cover: Assembly bolt torque. 9.8 - 11.8 N.m (1.0 - 1.2 kgf.m, 7.2 - 8.7 lb-ft)

7. Using a Digital Volt Ohm Meter (DVOM), measure the voltage across the inverter positive and negative bus bar terminals to inspect for capacitor discharge. If the measured voltage is below 30V, the High Voltage Circuit is properly shut down.



#### D. Hydrogen Tank Valves Shut-Off

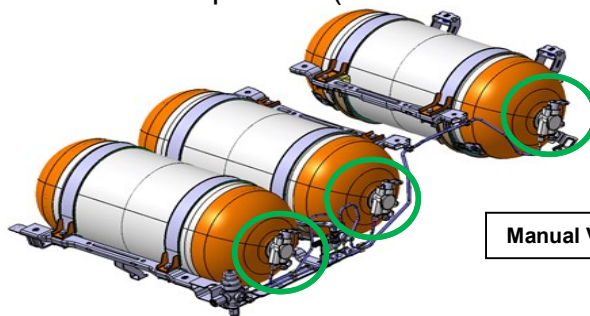
1. Place wheel chocks to both front and rear passenger side wheels.
2. Using a floor jack or suitable equipment, slightly raise the driver's side of the vehicle to allow for attachment of the Vent Manifold Assembly.
3. Ensure the vehicle is securely supported. Use devices such as jack stands that are load rated to safely support the Nexö.
4. Remove the vehicle under covers to access the Hydrogen Tank Valves and High Pressure Regulator. See service manual Nexö(Fe) > Hydrogen Storage System > Hydrogen Tank > Repair procedures.

Floor under cover bolt torque : 7.8 - 11.8 N.m (0.8 - 1.2 kgf.m, 5.8 - 8.7 lb-ft)

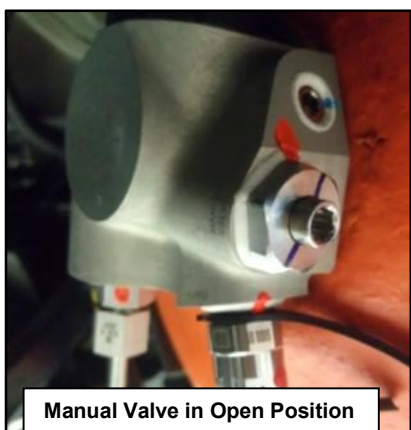




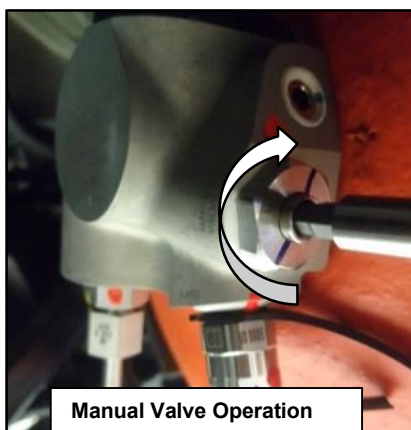
- 5. Close the manual valves on all three Hydrogen storage tanks using a 6mm hex socket (turn clockwise) until fully seated in the closed position (flush with the valve body).



**Manual Valve Locations**



**Manual Valve in Open Position**



**Manual Valve Operation**



**Manual Valve in Closed Position**

**E. Residual Pressure Release in Fuel Supply Line**

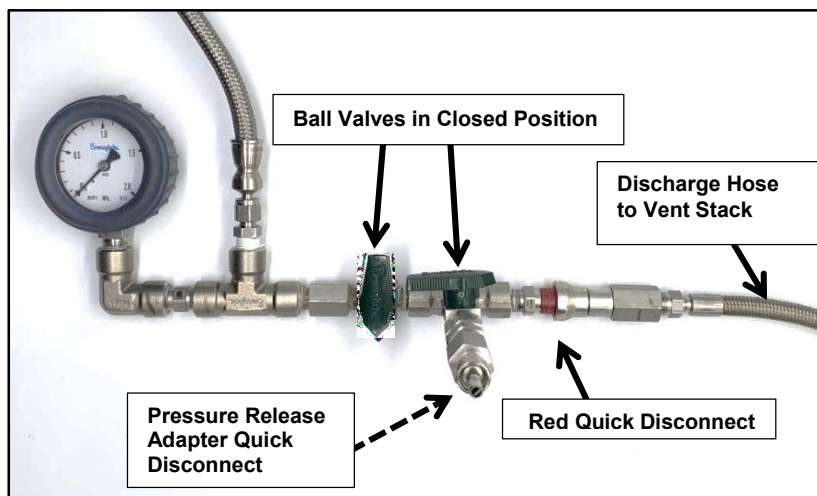
- 1. Unscrew the plug located in the Service Purge Valve at the High Pressure Regulator (HPR).



2. Screw the Pressure Release Adapter into the Service Purge Valve.  
Ensure the Pressure Release Adapter is fully seated in the Service Purge Valve.

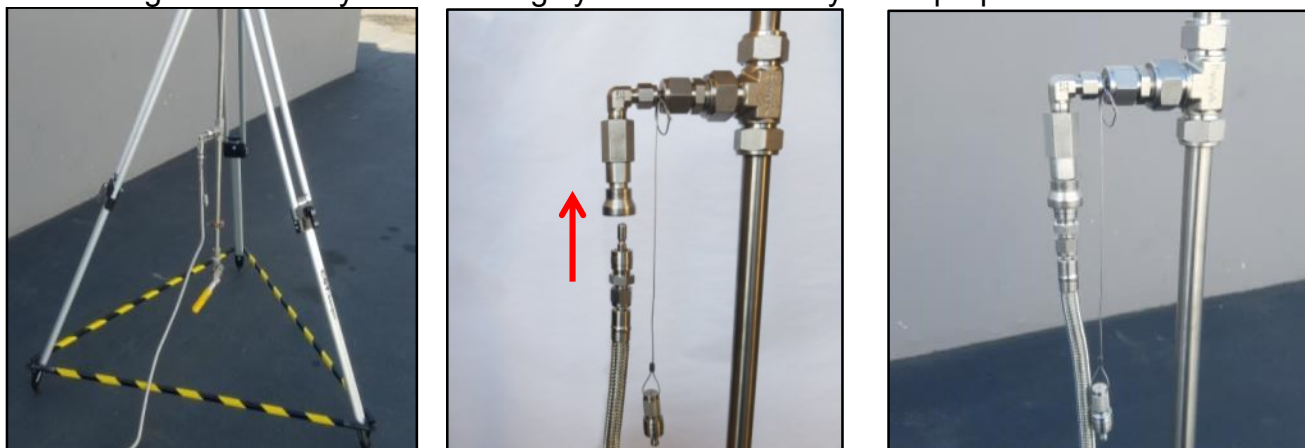


3. Verify that both Manifold Assembly ball valves are closed.  
Connect the Manifold Assembly to the Pressure Release Adapter quick disconnect.  
Connect the vent stack hose to the Manifold Assembly red quick disconnect.

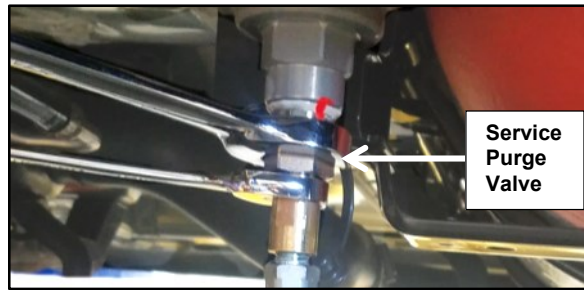


While the vent hose is connected to the manifold assembly, no personnel should be allowed into the safety circle

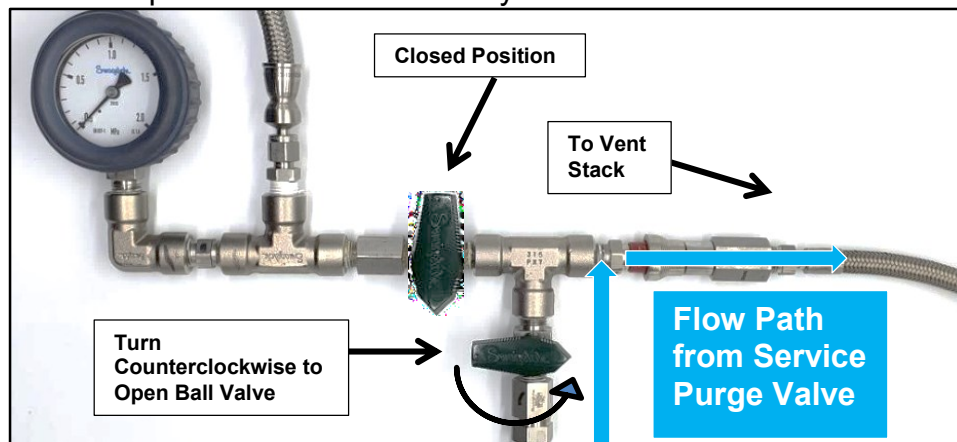
4. Connect the discharge hose from the Manifold Assembly to the vent stack. Do not connect to the discharge hose to any other venting system used for any other purpose.



- While holding the upper nut (24mm), turn the lower nut (19mm) on the Service Purge Valve counter clockwise until the lower nut stops turning to open the service purge valve.



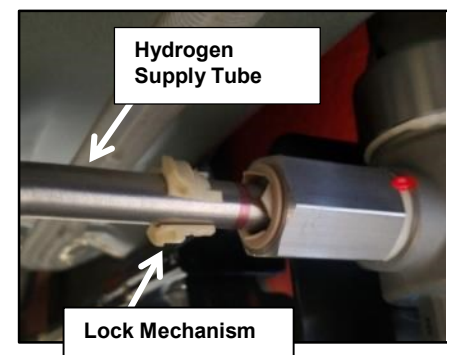
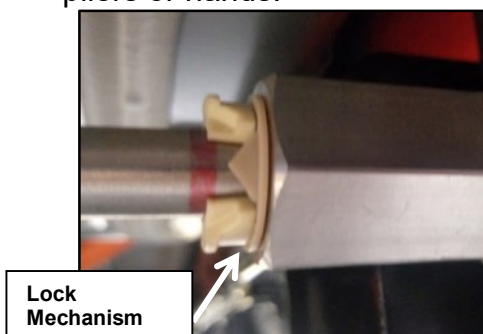
- Using a Hydrogen leak detector, check for Hydrogen leaks at the fitting between the Service Purge Valve and Manifold Assembly. Refer to the warning on Page 2 if a leak is suspected.
- Open the Manifold Assembly ball valve located in line with the Pressure Release Adapter and a momentary hiss sound will be heard. After the hissing sound stops, close the Service Purge Valve, then close the opened Manifold Assembly ball valve.



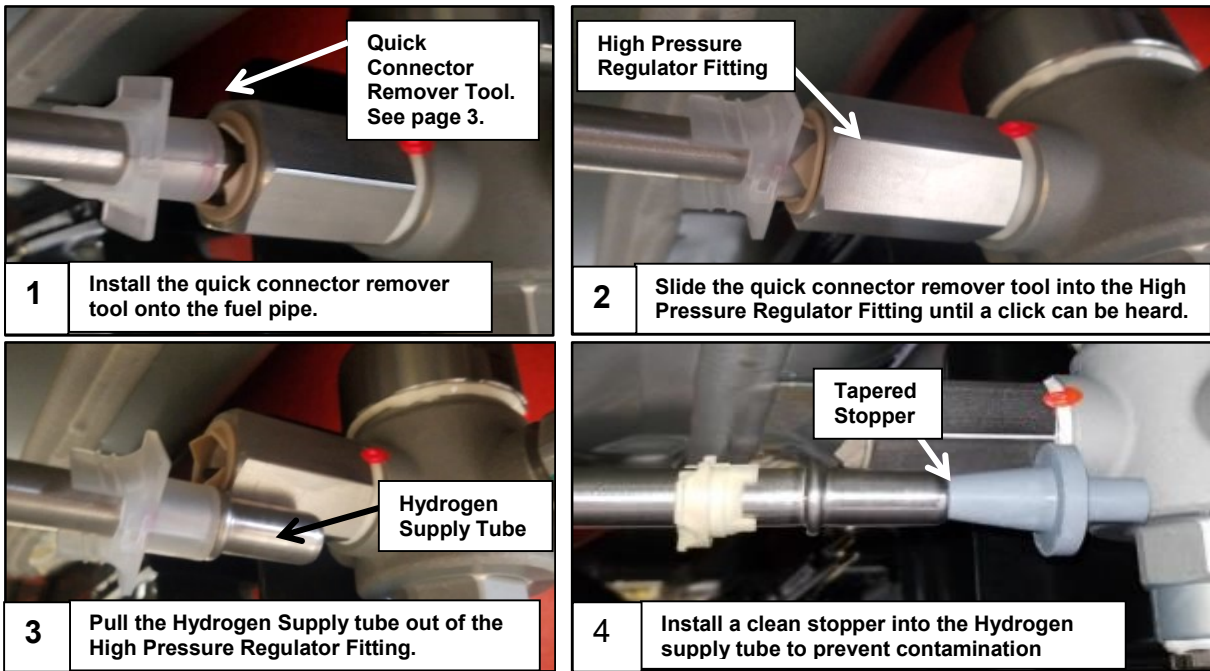
- Remove the Manifold Assembly and Pressure Release Adapter, then reinstall the Service Purge Valve plug back into the Service Purge Valve.

**F. Hydrogen supply tube disconnection using the release tool**

- Slide the lock mechanism backwards employing a gentle rocking motion using needle nose pliers or hands.



2. Follow the instructions below to properly remove the Hydrogen supply tube.



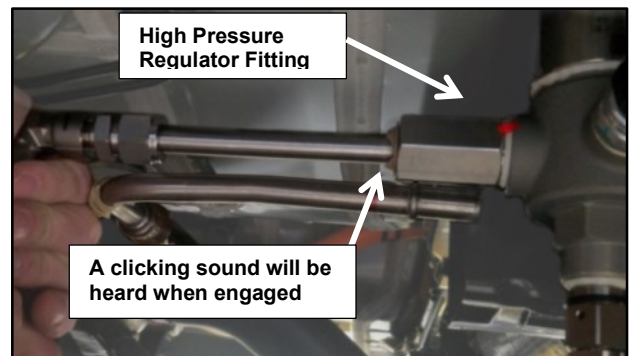
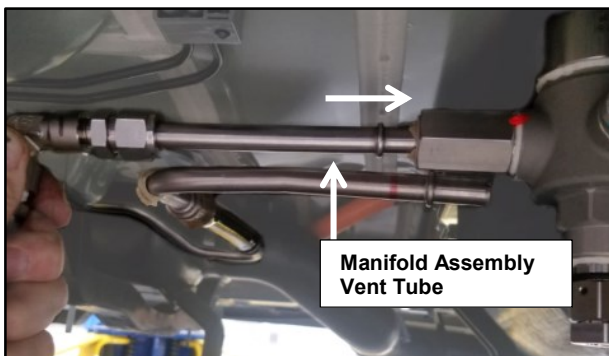
**G. Hydrogen Tank Venting**

1.

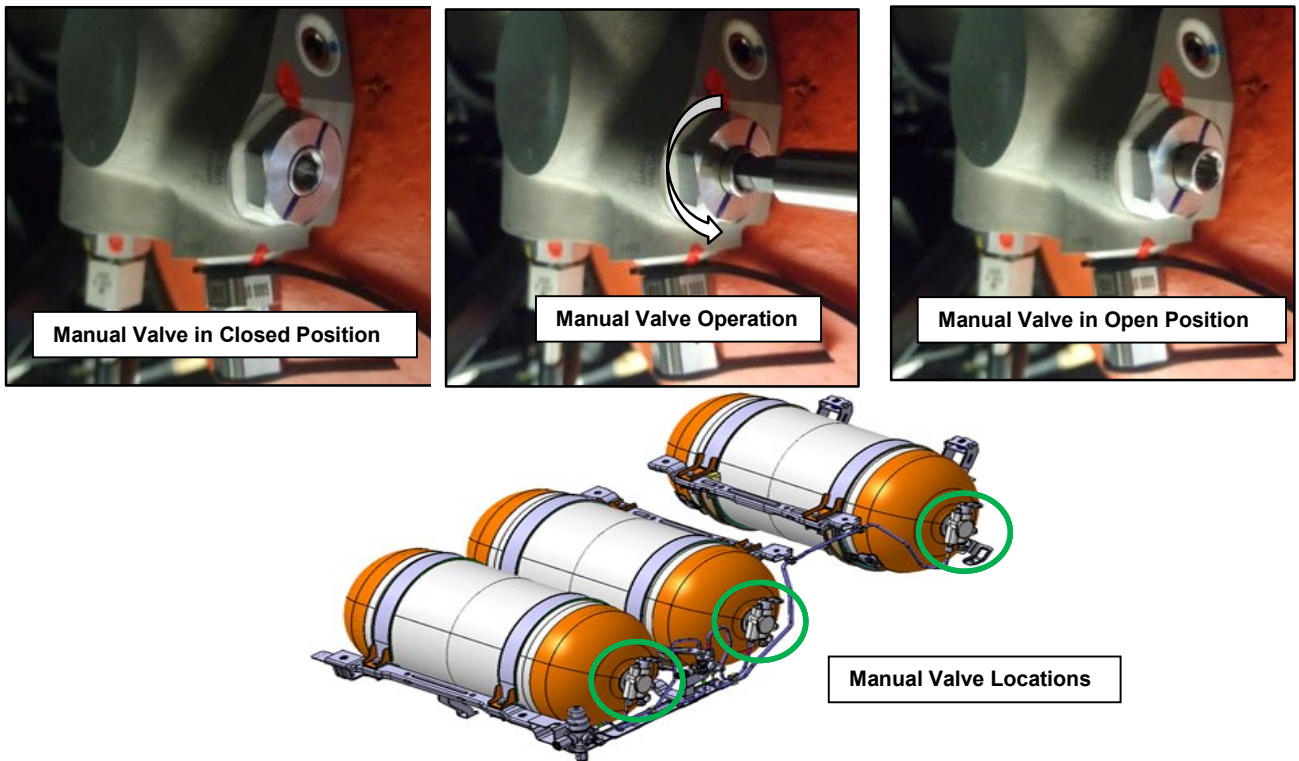
**NOTICE**

Verify that both Manifold Assembly ball valves are closed.

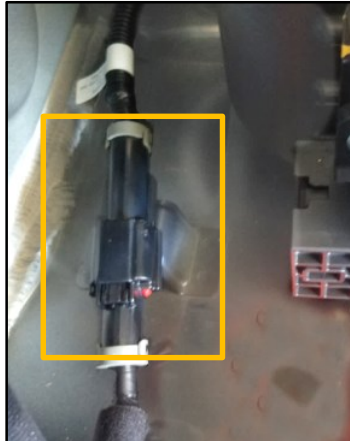
Insert the Manifold Assembly vent tube into the High Pressure Regulator fitting where the Hydrogen supply tube was removed. A clicking sound will be heard when the tube is fully engaged and locked into the High Pressure Regulator Fitting. Pull back on the Manifold Assembly vent tube to verify that the tube is locked into the High Pressure Regulator Fitting.



- Using a 6mm male hex socket, turn the manual valve counterclockwise until the valve stops. Fully reopen the manual valves on all three Hydrogen Storage Tanks.



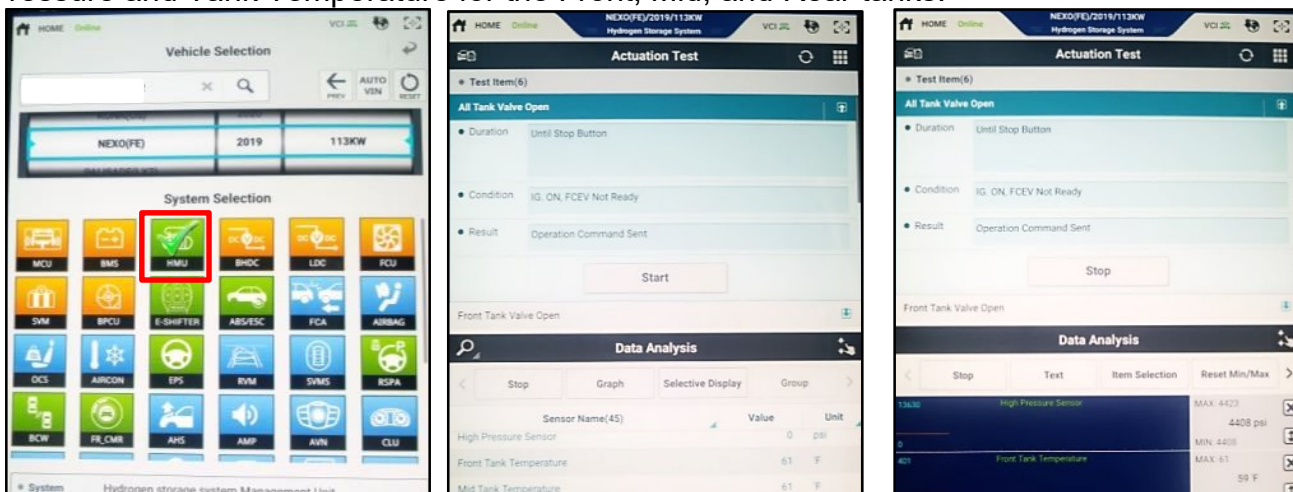
- Reconnect the auxiliary 12V battery negative (-) connector located in the rear cargo area.



- Press the Start/Stop button twice (Do not depress the brake pedal) to turn on the electrical system (Accessory Mode). Do not start the fuel cell.
- Ensure the Hyundai GDS-M has the latest software update per **TSB 15-GI-001** and that GDS is fully charged.

Connect the GDS-M to the vehicle, select HMU (Hydrogen Management Unit). From Data Analysis, select high pressure sensor, tank temperature for Front, Mid, Rear tanks. Perform the HMU actuation tests (All Tank Valve Open).

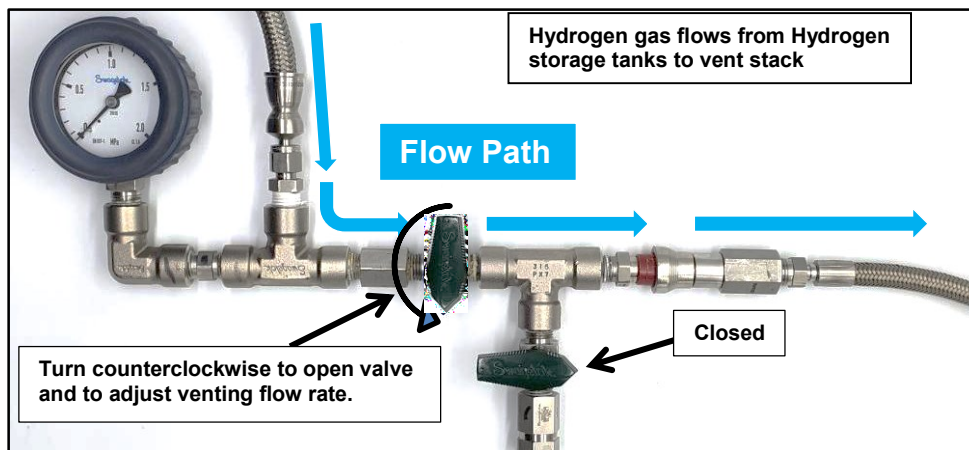
Monitor tank temperature and pressure during the venting procedure, and graph Tank Pressure and Tank Temperature for the Front, Mid, and Rear tanks.



6. Gradually open the Manifold Assembly ball valve until the valve handle points to the red discharge hose fitting. Regulate the venting flow with this valve.

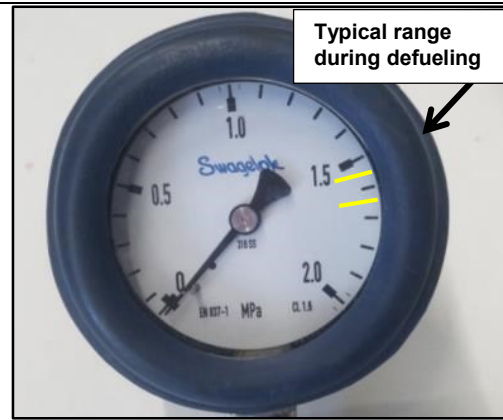
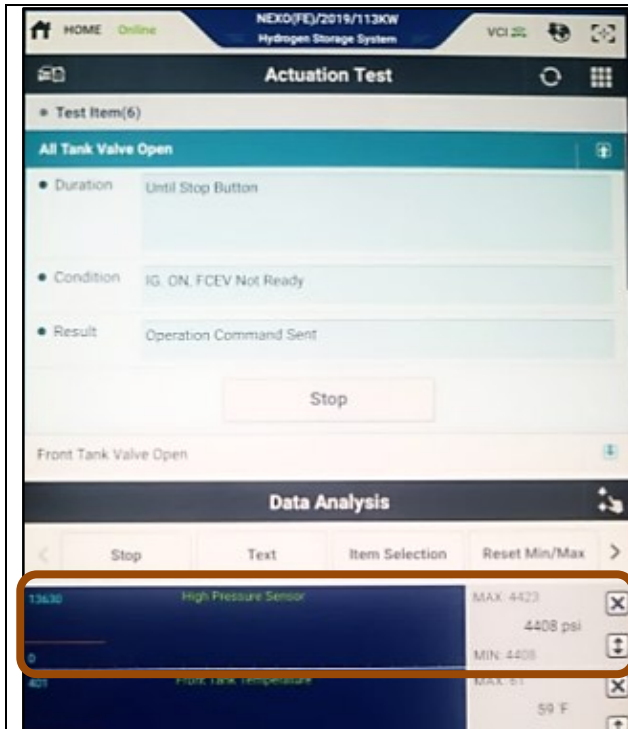
Using a Hydrogen leak detector, inspect for Hydrogen leaks at all fittings between the Service Purge Valve and Vent Stack Assembly. If Hydrogen leaks are suspected, stop (turn off) tank valve actuation, allow Hydrogen to disperse then correct leak(s). Resume venting, repeat leak check of fittings between the Service Purge Valve and Vent Stack Assembly.

(Arrow shape of ball valve handle points in direction of gas flow)



Use the Manifold Assembly ball valve to regulate the venting rate to depressurize the tanks at 145psi per minute, typically 1.55-1.65 MPa indicated on the manifold pressure gauge when the tank pressure reads 435 psi on the GDS-M.

Monitor the tank pressure on the GDS-M, and adjust the venting rate so that the tank depressurizes at 7 psi per minute using a watch with minute readout.



If the tank temperature approaches -40F, stop venting or reduce the venting rate to maintain tank temperature above -40F.

## NOTICE

Vent tanks at 145 psi per minute until 435 psi is reached, then reduce venting rate to 7 psi per minute.

7. Once the tanks have been vented to the desired amount, stop the actuation test and remove the Manifold Assembly Vent Tube.

Reinstall the Hydrogen supply tube to the High Pressure Regulator fitting and install the Hydrogen supply tube lock mechanism.

Using a Hydrogen leak detector, check for Hydrogen leaks at the HPR fittings and any repair involving any part of the Hydrogen system.

8. Reinstall all parts in reverse order of removal.
9. Scan and clear DTCs in all systems.
10. The service procedure is now complete.