



HYUNDAI

Technical Service Bulletin

GROUP	NUMBER
FUEL SYSTEM	23-FL-005H
DATE	MODEL(S)
AUGUST 2023	NEXO FUEL CELL (FE)

SUBJECT: VENTING NEXO FUEL CELL ELECTRIC VEHICLES (FCEV)

This TSB supersedes 22-FL-005H to revise the vent manifold assembly and venting hose.

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

Applicable Vehicles (Certain): All Nexo (FE) Fuel Cell Electric Vehicles (FCEV)



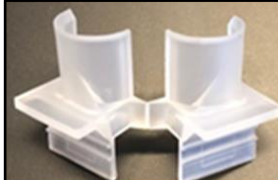
CAUTION

The TSB repair procedure **MUST** be performed at an authorized Hyundai NEXO fuel cell vehicle dealer and by a Hyundai Service Technician who has successfully completed the Fuel Cell Electric Vehicle Training Instructor Led Training course (SVCHFCEVTRAIN222_1097).

For Personal Protective Equipment (PPE) inspection and testing requirements, refer to OSHA standard 1910.137 - Electrical Protective Equipment; and the NEXO shop manual for PPE usage.

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”)

Special Service Tool (SST) Information:

Tool Name	Figure	Remarks
HPR to Vent Hose Adapter (1)		Qty: 1
Vent Manifold Assembly (2)		Qty: 1
Ground Wire (3)		Qty: 2
35' Venting Hose (4)		Qty: 1
Portable Vent Hydrogen Stack Assembly		Follow TSB 20-FL-009H P/N: HVS01
Quick Connector Remover (1/2")		Follow TSB 20-FL-009H P/N: 09356-4W110

Required Tools:

- Global Diagnostic Scan Tablet (GDS-M)
- Hydrogen Gas Detector
- Personal Protective Equipment (PPE)
- 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
- Ratchet and extensions as needed
- Tapered Stopper

Reference Material:

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

 Information

Considerations Before Venting:

- Ensure the venting procedure performed at an approved Hydrogen venting location.
- Ensure the vent stack grounding wire is attached to an approved ground connection.
- Verify that the required tools, equipment, and personal protective equipment (PPE) are ready, available, and in proper working condition.
- Predetermine the desired final tank pressure based on the repair type.

Service Procedure:

- [A. Determine the Hydrogen Tank Pressure Using GDS-M](#)
- [B. Assemble the Portable Hydrogen Vent Stack \(HVS01\) Kit](#)
- [C. Vehicle Preparation and Staging](#)
- [D. 12 Volt and High Circuit Disconnection](#)
- [E. Hydrogen Tank Shut-off Valve](#)
- [F. Releasing Residual Fuel Supply Pressure \(GDS-M Procedure\)](#)
- [G. Releasing Residual Fuel Supply Pressure \(Manual Procedure\)](#)
- [H. Installing the Vent Manifold Assembly](#)
- [I. Venting the Hydrogen Storage Tanks](#)

 **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.

SUBJECT:

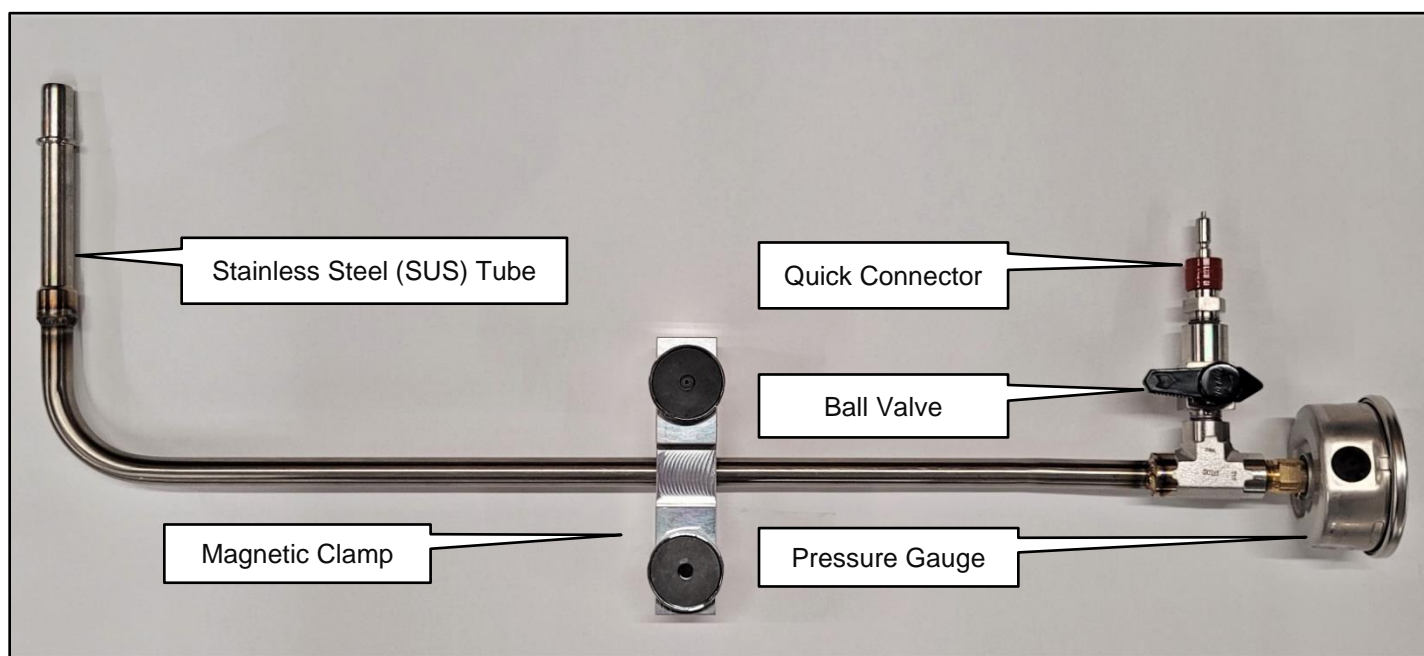
VENTING NEXO FUEL CELL ELECTRIC VEHICLES (FCEV)

Type of Repair	Venting Required Yes / No
Routine Maintenance	No, does NOT require venting
Maintenance / Repair of the Hydrogen System Components	Yes, if Hydrogen storage tank pressure is above 1,100 PSI
Maintenance / Repair of the Hydrogen Storage Tanks / Fill Lines. Open-Flame Activities or Welding within 18 inches (455 mm) of the hydrogen storage containers and lines	Yes, Hydrogen tanks must be completely vented

Refer to the beginning of the procedure on page 5 for detailed instructions.

Vent Manifold Assembly

Review the function of each component before performing this service procedure. The reference picture below identifies the basic components of the manifold assembly.



Stainless Steel (SUS) Tube – Connects to the high-pressure regulator (HPR) during the venting procedure.

Quick Connector – Couples the venting hose to the vent stack assembly.

Ball Valve – Controls the Hydrogen flow when venting the Hydrogen storage tanks.

Pressure Gauge – Monitors the HPR outlet pressure during the venting procedure.

Magnetic Clamp – Secures the vent manifold assembly to the body during the venting procedure.

A. Determine the Hydrogen Storage Tank Pressure Using GDS-M

1. Connect the GDS-M, select the **HMU** (A), and then check the storage tank pressure (B).

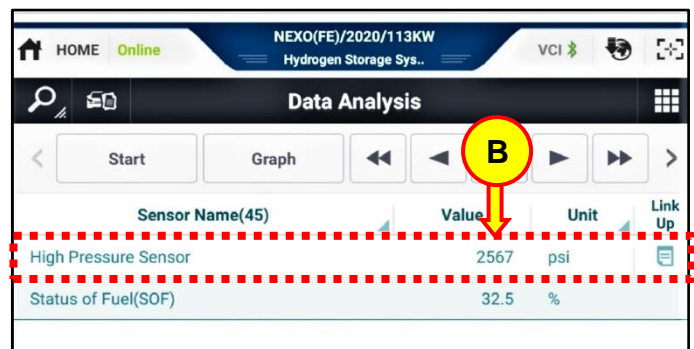
Refer to the table on **page 4** for the **Type of Repair** to determine what pressure is allowed in the storage tanks prior to beginning maintenance or repairs.

If the **tank pressure is less than 1,100 PSI**, proceed to **Section D**.

If the **tank pressure is greater than 1,100 PSI** then proceed to **Section B**.

i Information

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



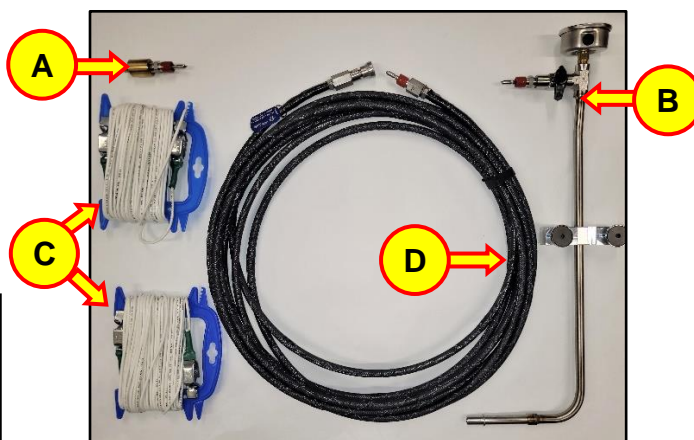
B. Assemble the Portable Hydrogen Vent Stack (HVS01) Kit

1. Refer to **TSB 20-FL-009H** to assemble the HVS01 portable hydrogen vent stack.



2. Gather the following SST's for venting the FCEV.

- HPR to Vent Hose Adapter (A) – Qty: 1
- Vent Manifold Assembly (B) – Qty: 1
- Ground Wire (C) – Qty: 2
- 35' Venting Hose (D) – Qty:1



i Information

Do **NOT** connect the components for the Portable Hydrogen Vent Stack or FCEV Venting SST to other venting systems.

When using the portable vent stack, follow the minimum spacing distances.

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

C. Vehicle Preparation and Staging

i Information

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

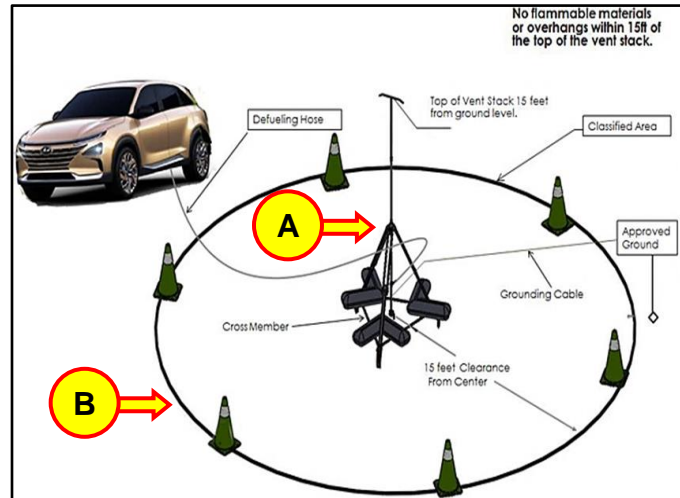
1. In an outdoor area approved for Hydrogen venting, the vehicle must be 15 feet from the assembled and properly grounded portable Hydrogen vent stack (A). The vehicle must be outside the coned off safety circle (B).

! WARNING

Do **NOT** vent Hydrogen during electrically conductive weather conditions.

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

Ensure the portable vent stack is properly grounded.



2. If the vehicle has been in storage for several days, run the fuel cell for a sufficient amount of time to fully charge the 12-volt battery.
3. Do **NOT** leave the headlight switch in auto mode.

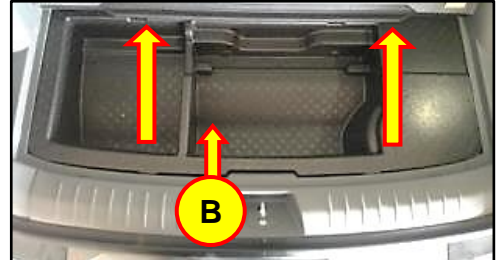
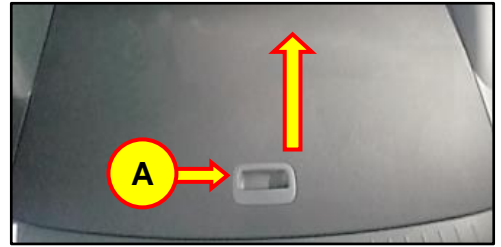
Turn off all lights and accessories including:

- Heater / air conditioner
- Fan
- Audio
- Heated seats
- Rear defroster

4. Place the vehicle in park, apply the parking brake, roll down the windows as necessary, and open the rear hatch.
5. Scan and record all DTCs before performing service procedure.
6. Ensure the Start Stop Button (SSB) is **OFF**, and the fuel stack is **NOT** in Ready Mode. Wait at least 3 minutes. Use appropriate PPE when proceeding with **Section D**.

D. 12 Volt and High Voltage Circuit Disconnection

1. In the rear cargo area, remove the floorboard (A) and cargo tray (B) to access the 12-volt battery connector and high voltage battery safety plug.



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

Refer to the shop manual:

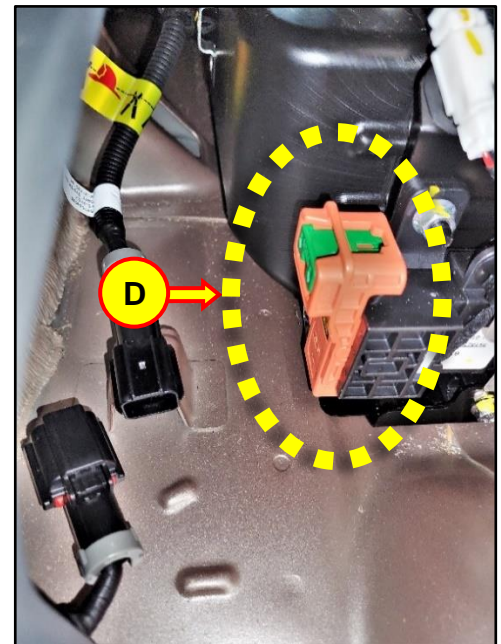
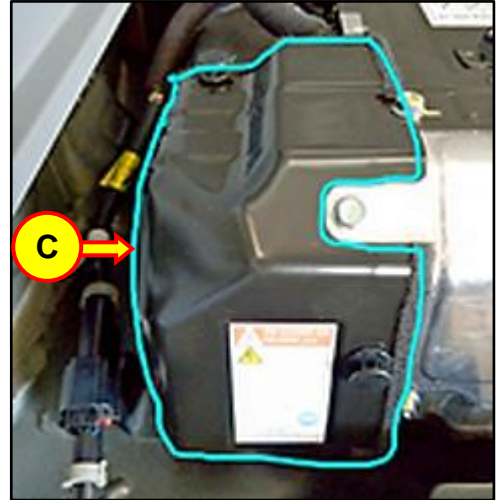
- **Battery Control System > High Voltage Battery Handling Guide > High Voltage Shut-off Procedure.**



3. Remove the metal shield (C) to access the orange-colored high voltage safety plug (D).

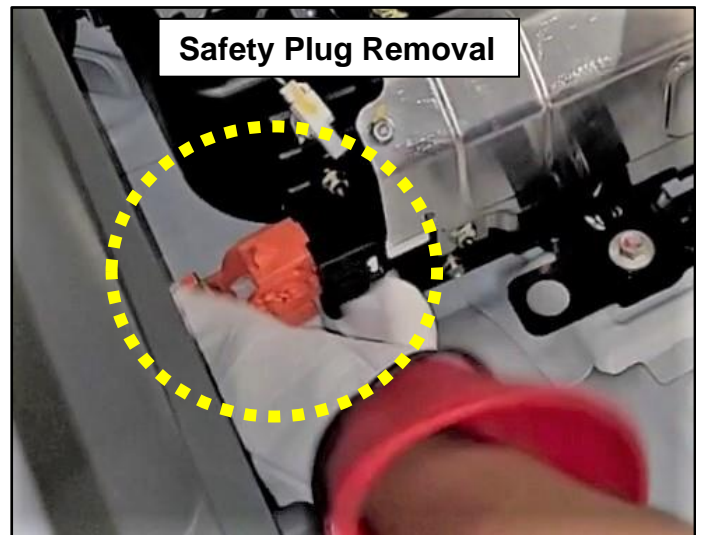
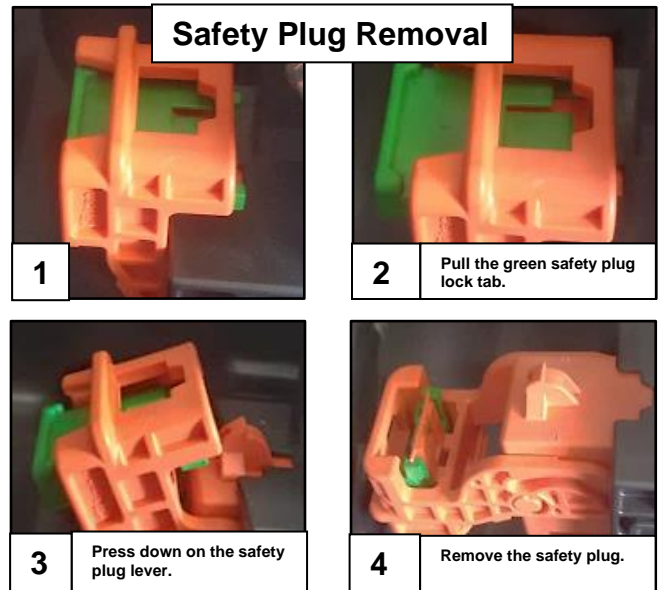
⚠ WARNING

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.



- 4. Follow images 1 - 4 to remove the orange high voltage safety plug.

Store the removed safety plug (E) in a secure location outside and away from the vehicle.



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

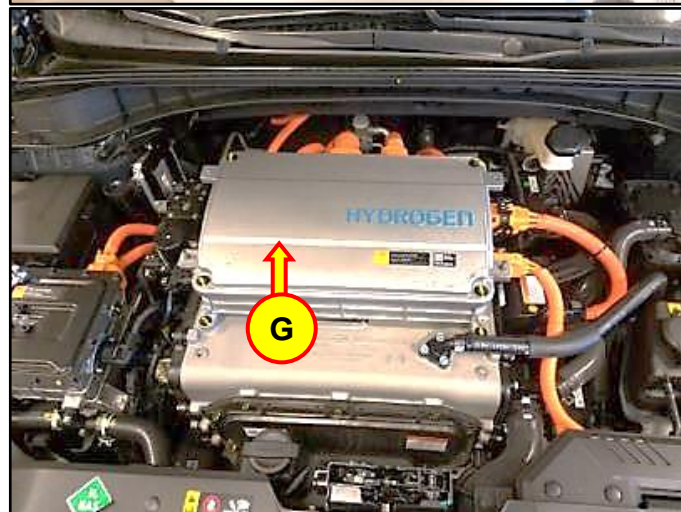
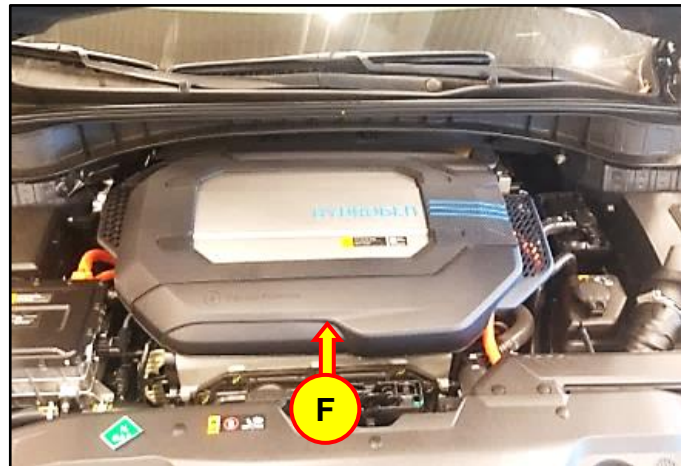
WAIT 5min.



- Open the hood and remove the junction box trim (F) and cover (G).

Tightening Torque:

lb-ft	8
lb-in	96
N.m	11



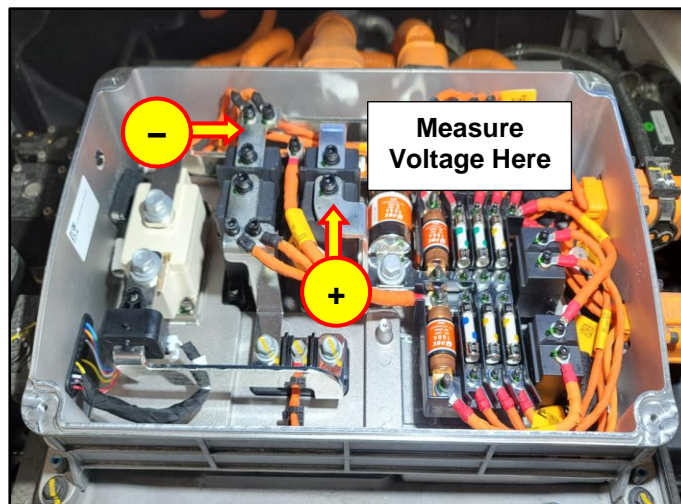
- Using a Digital Volt Ohm Meter (DVOM), measure the voltage across the inverter positive (+) and negative (-) bus bar terminals to inspect for capacitor discharge.

i Information

If the measured voltage is below 30V, the High Voltage Circuit is properly shut down.

⚠ DANGER

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



E. Hydrogen Tank Shut-off Valve

1. At the designated outdoor venting location place wheel chocks to both front and rear passenger side wheels.
2. Use a floor jack or suitable equipment to slightly lift the driver's side of the vehicle to allow for attachment of the vent manifold assembly.

Ensure the vehicle is securely supported by jack stands.

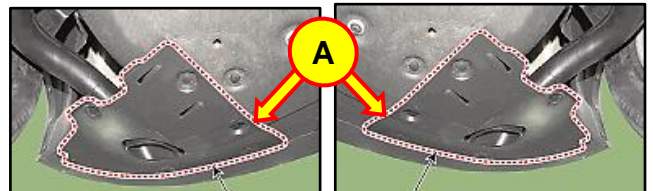
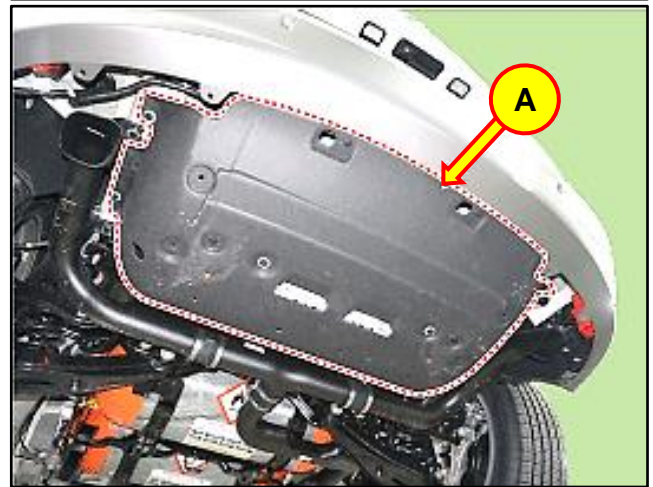
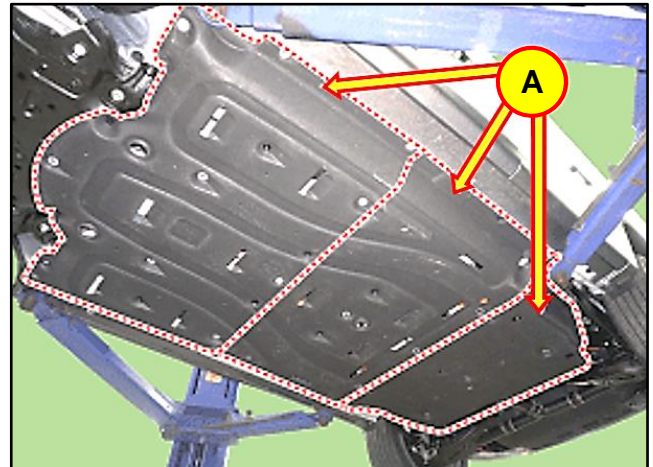
3. Remove the vehicle under covers (A) to access the Hydrogen tank valves and HPR.

Refer to the shop manual:

- **Nexo (Fe) > Hydrogen Storage System > Hydrogen Tank > Repair procedures**

Tightening Torque:

lb-ft	7.3
lb-in	87
N.m	10



4. Close the manual valves for all three (3) Hydrogen storage tanks using a 6 mm hex bit socket or Allen wrench and turn clockwise until fully seated in the closed position.

Tightening Torque:

lb-ft	5.4
lb-in	65
N.m	7.4

NOTICE

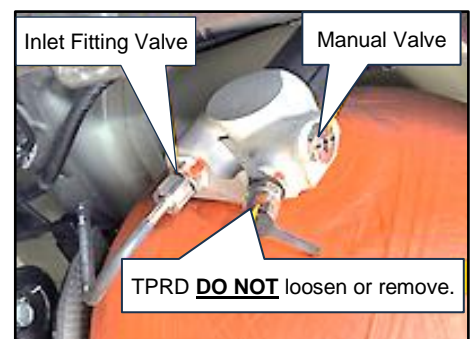
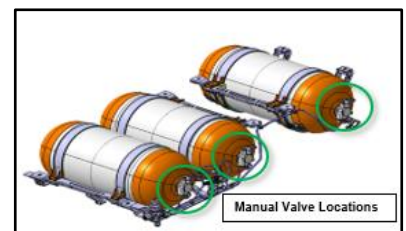
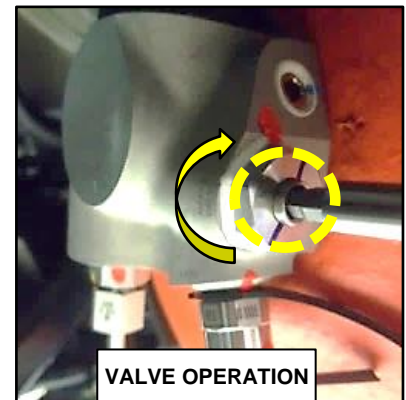
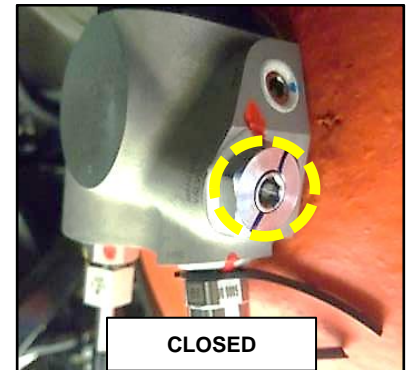
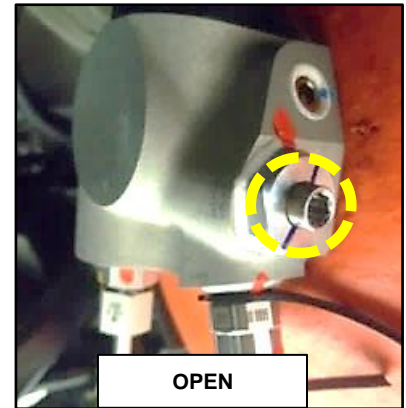
Do **NOT** tighten past the torque specification. Some components of the manual valve may be damaged if over-torqued.

All three (3) Manual valves must be closed before performing release of residual Hydrogen in the fuel supply piping.

Do **NOT** loosen, remove, or disassemble the Thermally activated Pressure Release Device (TPRD).

Loosening the TPRD may result in a Hydrogen leak.

If the TPRD is removed, Hydrogen in the storage tank will discharge at the pressure currently in the tank and at a high volume. If this occurs, the Hydrogen tank must be replaced.



F. Releasing Residual Fuel Supply Pressure (GDS-M Procedure)

1. Ensure the manual valves are closed on all three (3) Hydrogen tanks. (Refer to section E)
2. Reconnect the auxiliary 12-volt battery negative (-) connector (A) located in the rear cargo area.

Press the Start/Stop button twice to turn on the electrical system (Accessory Mode).

NOTICE

Do **NOT** depress the brake pedal when pressing the Start Stop button. Do **NOT** start the fuel cell.

Starting the fuel cell system with the safety plug removed may damage the fuel cell control system.

3. Connect the GDS to Data Link Connector (DLC).

Select the following:

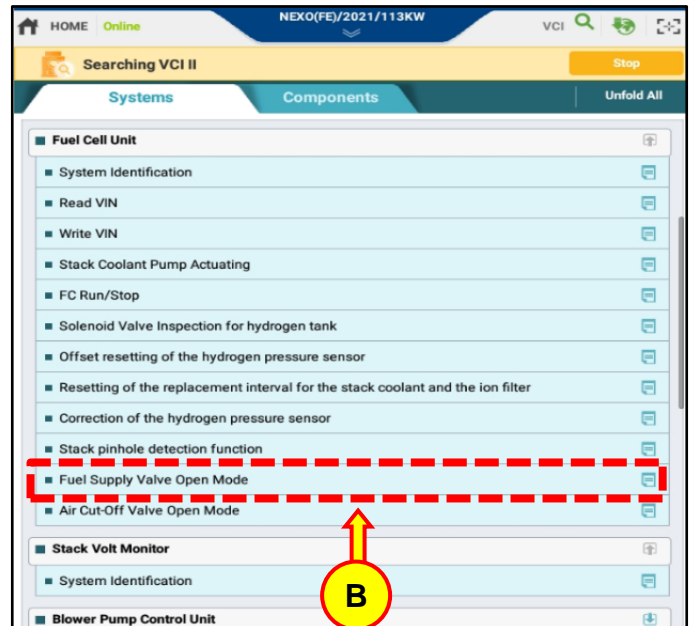
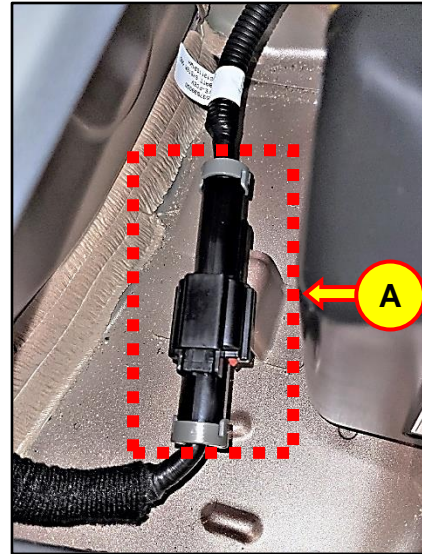
- **Vehicle, Model Year, Engine, System > Vehicle S/W Management > Fuel Cell Unit > Fuel Supply Valve Open Mode (B).**

4. Perform the operation as directed by GDS-M. Then proceed to Section H.



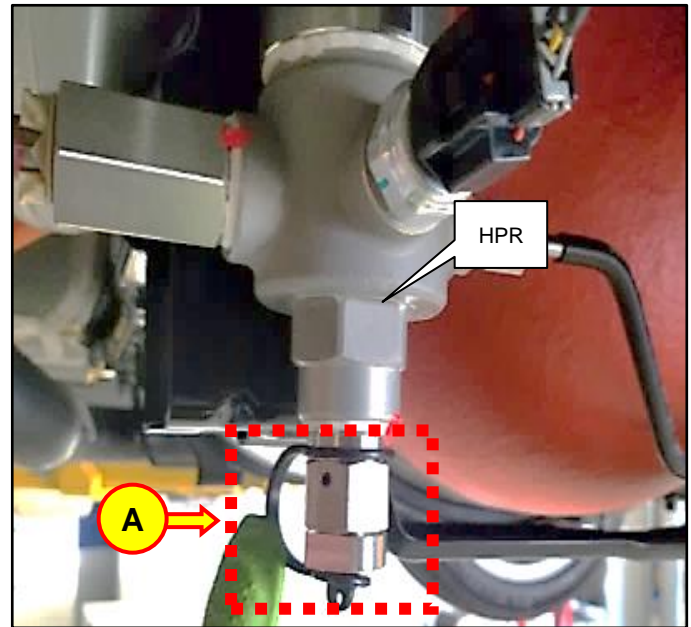
Information

If the **Fuel Supply Valve Open Mode Using GDS-M** procedure **CANNOT** be performed, then go to section **G. Releasing Residual Fuel Supply Pressure (Manual Procedure)** to release the residual pressure in the fuel supply line.



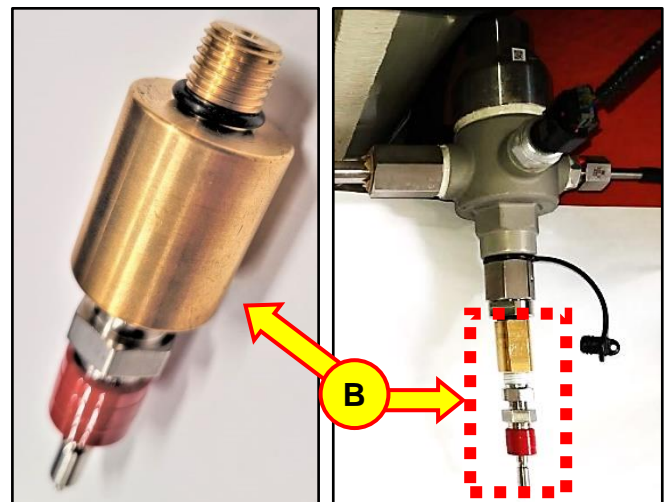
G. Releasing Residual Fuel Supply Pressure (Manual Procedure)

1. Unscrew the plastic protective plug located in the service purge valve (A) at the high-pressure regulator (HPR).



2. Screw the pressure release adapter (B) into the service purge valve.

Ensure the O-ring is in place on pressure release adapter and the pressure release adapter is fully seated in the service purge valve.



3.

i Information

Before proceeding, ensure the grounding cable (wire) (C) is connected to the vent stack and an approved grounding location / device.

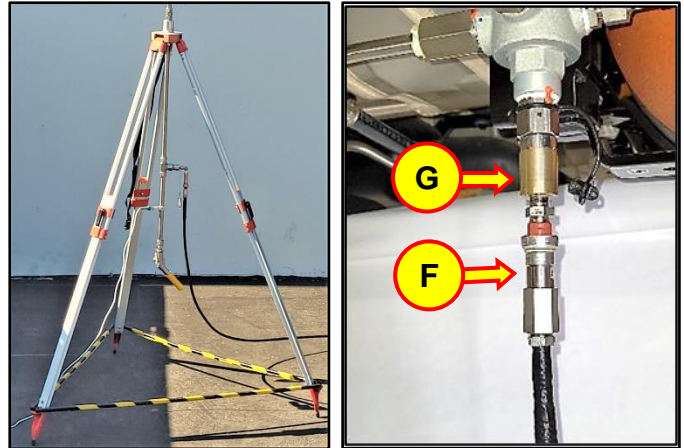
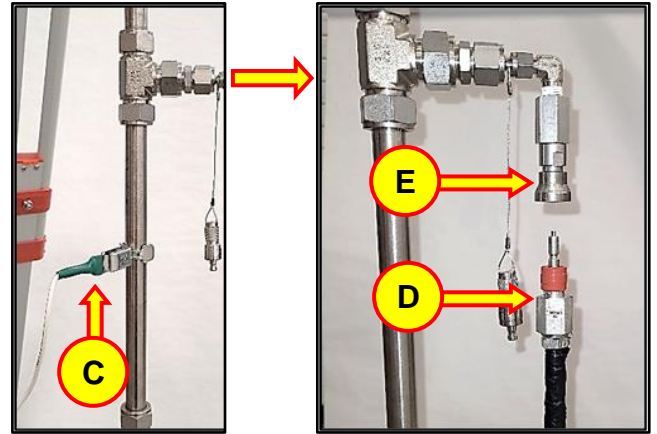
Connect the red stem end (D) of the venting hose into the receptacle (E) on the vent stack assembly.

Attach the receptacle end of the venting hose (F) to the stem end (red) of the pressure release adapter (G).

⚠ CAUTION

While the venting hose is connected to the vent manifold assembly, no personnel should be allowed into the safety circle. Refer to **page 7**.

Do **NOT** connect to the discharge hose to any other venting system used for any other purpose.

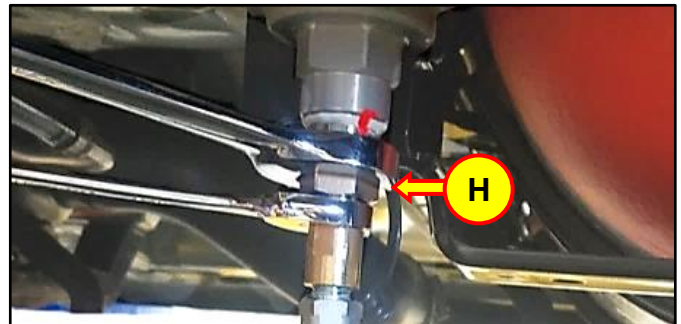


4. To open the service purge valve (H), hold the upper nut (24mm) with a wrench, while turning the lower nut (19mm) **counterclockwise** with another wrench.

i Information

If the lower nut is **NOT** fully opened, residual pressure will remain in the Hydrogen lines.

A momentary hiss sound will be heard at the vent stack, and the line pressure will drop to **zero** within a minute after fully opening the service purge valve.



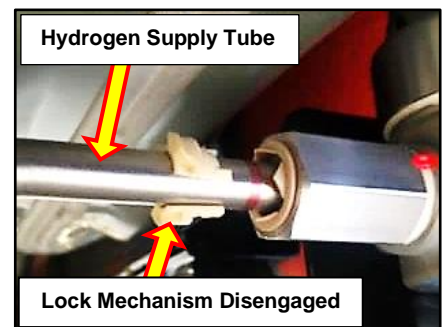
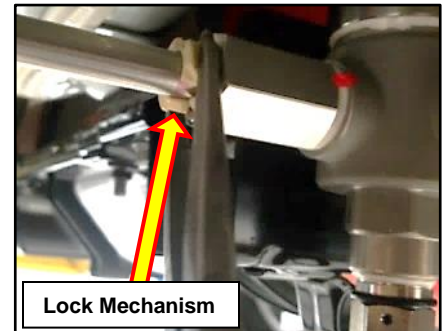
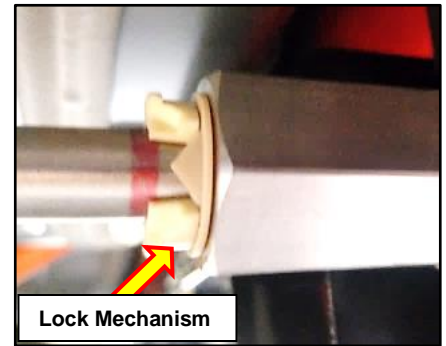
To close the service purge valve, hold the upper nut (24mm) with a wrench, while turning the lower nut (19mm) **clockwise** with another wrench until the lower nut stops turning.

Remove the vent hose and pressure release adapter.

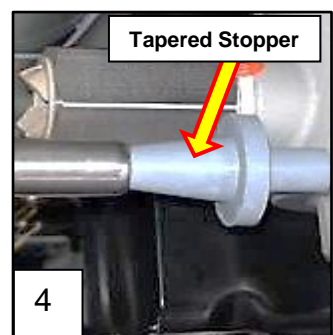
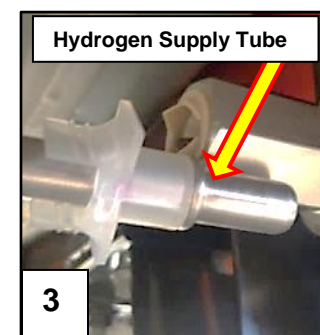
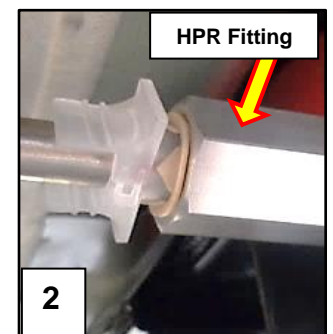
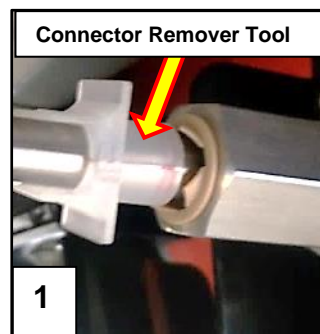
Reinstall the protective plug into the service purge valve.

H. Installing the Vent Manifold Assembly

1. At the HPR fitting, use a needle nose plier with a gentle rocking motion to disengage and slide the lock mechanism backwards on the Hydrogen supply tube.



2. Follow the instructions below to remove the Hydrogen supply tube:
 1. Install quick connector remover tool (P/N 09356-4W110) onto the Hydrogen supply tube. (See page 1)
 2. Push the quick connector remover tool into the HPR fitting until a click can be heard.
 3. Pull the Hydrogen supply tube out of the HPR fitting.
 4. Install a clean stopper into the Hydrogen supply tube to prevent contamination



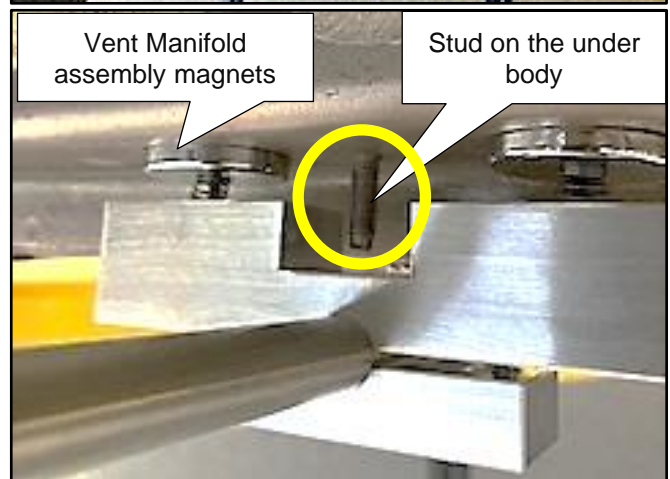
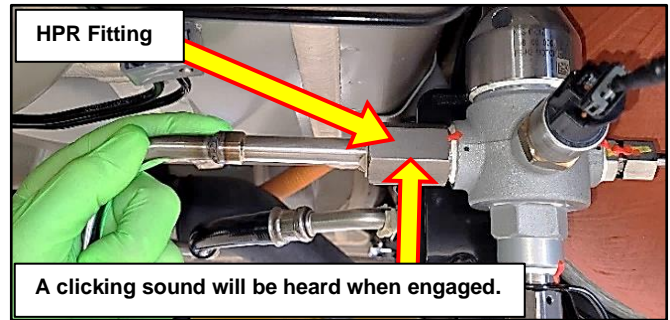
I. Venting the Hydrogen Tank

1. Insert the SUS tube end of the vent manifold assembly into the HPR fitting, replacing the Hydrogen supply tube.

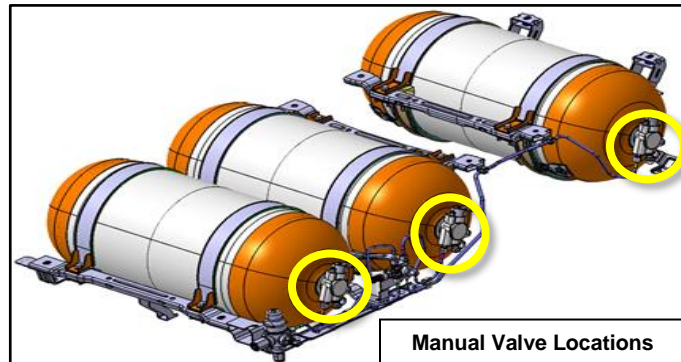
Listen for a clicking sound to confirm that the tube is fully engaged and locked into the HPR fitting.

Verify the connection is secure by gently pulling back on the vent manifold assembly SUS tube.

Rotate the vent manifold assembly upward by aligning the aluminum block opening with the stud on the vehicle's body. Ensure the magnets on the vent manifold assembly are securely attached to the vehicle.



2. Open the manual valves on all three Hydrogen tanks:
 1. Use a 6mm hex bit socket or an Allen wrench to turn the manual valve **counterclockwise** until it stops.
 2. Avoid exceeding the specified opening torque to prevent damage to the manual valve.

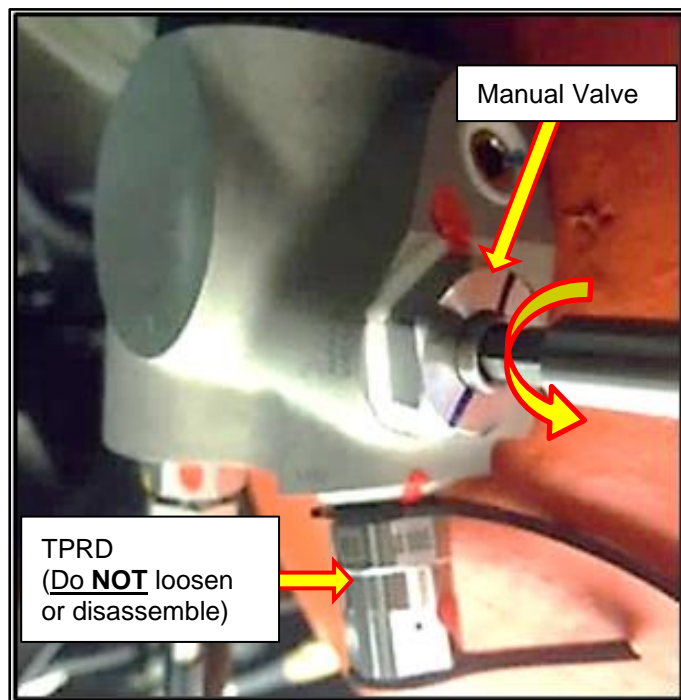


Opening Torque:

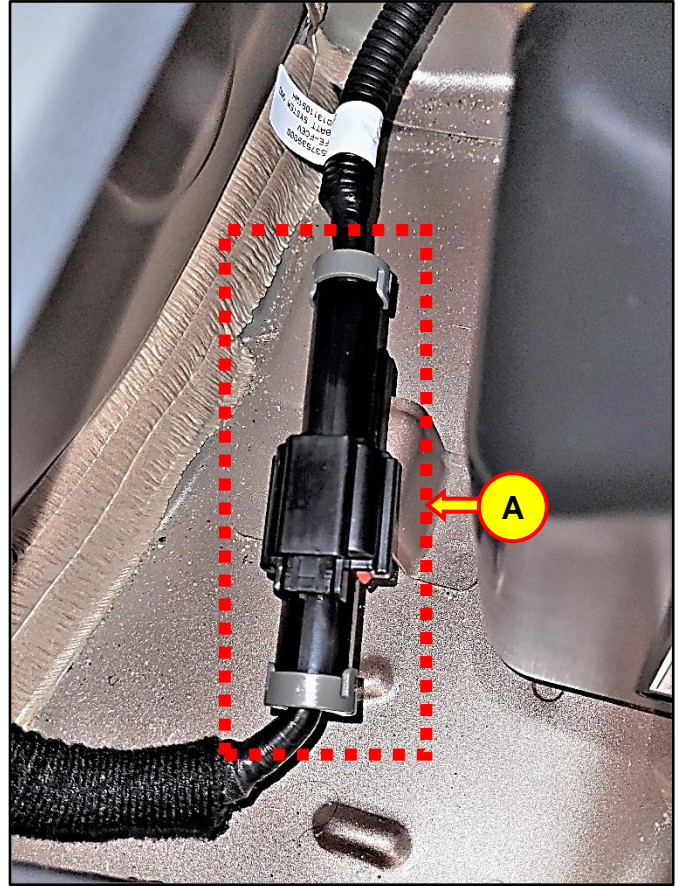
lb-ft	1.7
lb-in	21
N.m	2.4

NOTICE

Components of the manual valve may be damaged if the manual valve is over torqued.



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



4. Press the Start/Stop button twice to turn on the electrical system (Accessory Mode).

NOTICE

Do **NOT** depress the brake pedal when pressing the Start Stop button. Do **NOT** start the fuel cell.

Starting the fuel cell system with the safety plug removed may damage the fuel cell control system.

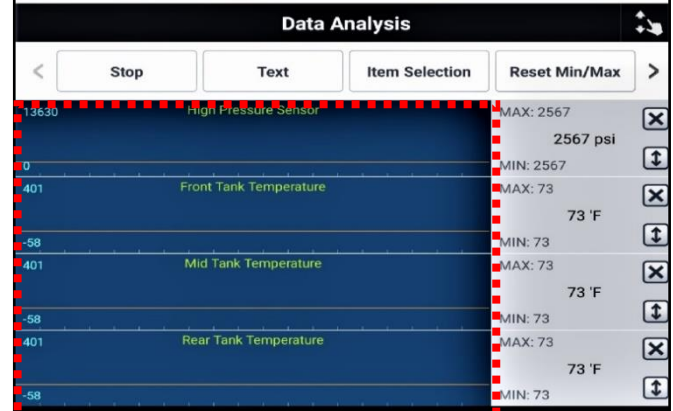
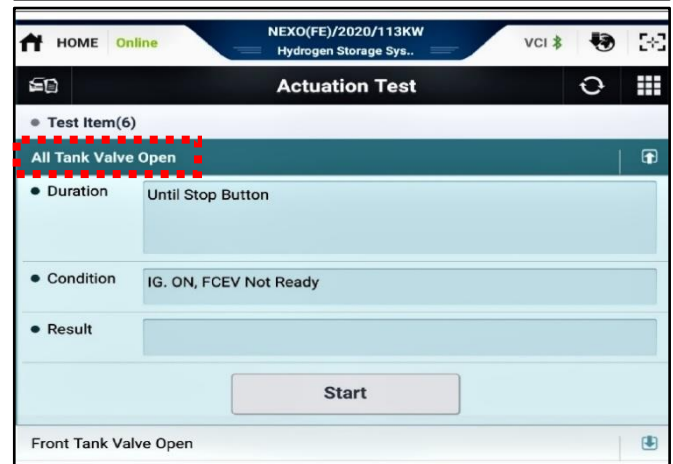
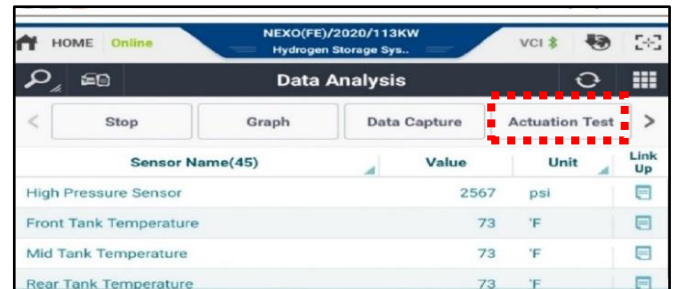
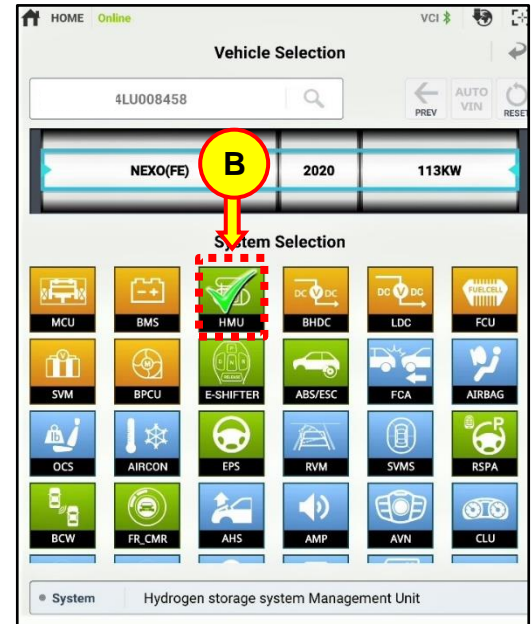
5. Ensure the Hyundai GDS-M has the latest software update per **TSB 15-GI-001** and that GDS-M tablet is fully charged.

Connect the GDS-M to the vehicle:

1. Select **HMU (B)**.
2. From the **Data Analysis**, select **high pressure sensor, tank temperature for the front, mid, and rear tanks**.
3. Select **Actuation Test** and perform the HMU actuation tests for **All Tank Valve Open**.

Monitor tank temperature and pressure during the venting procedure.

Select the graph function to view the tank pressure and tank temperature for the front, mid, and rear tanks during the venting procedure.



6. Gradually open the ball valve on the vent manifold assembly to adjust the venting flow rate.

Use a Hydrogen leak detector to inspect for Hydrogen leaks between the HPR and vent stack assembly.

- If leaks are detected, stop tank valve actuation, allow Hydrogen to disperse, and fix the leaks. Resume venting and repeat the leak check.

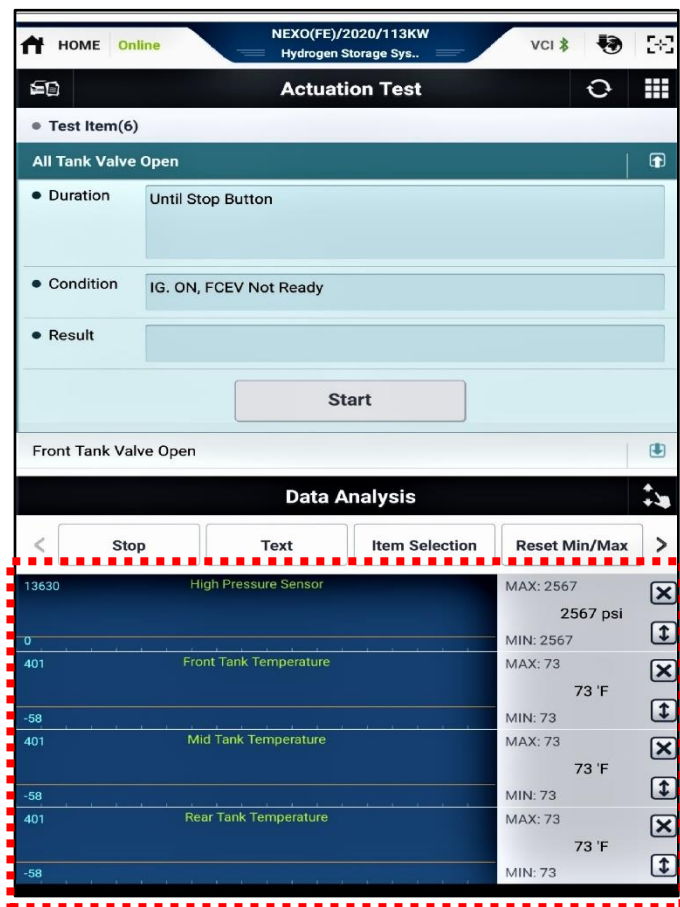
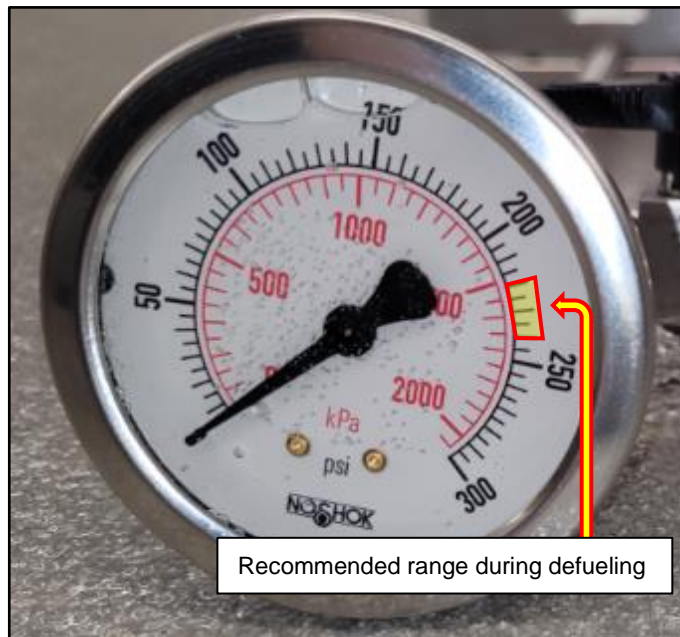
Use the GDS-M to monitor tank pressure (high-pressure sensor) and tank temperature.

Use the vent manifold assembly ball valve to regulate the venting rate and depressurize the tanks at a rate of 145 PSI per minute. Use a watch with minute readout to monitor this rate. The manifold pressure gauge should indicate 220~240 PSI (1517~1655 KPa).

If the tank needs to be completely vented:

1. When the tank pressure reads 435 PSI on the GDS-M, adjust the venting rate so the tank depressurizes at 7 PSI per minute.
2. Use a watch with minute readout to monitor this rate.

If the tank temperature approaches -30°F (-34.4°C), stop venting or reduce the venting rate to maintain tank temperature above -30°F.



NOTICE

To prevent damage to the storage tanks, vent tanks at 145 PSI per minute until the tank pressure is 435 PSI then reduce venting rate to 7 PSI per minute.

With GDS-M monitor temperature of the Hydrogen tanks. Ensure temperature does **NOT** fall below -30°F (-34°C) during the venting procedure.

7. Once the tanks have been vented to the desired pressure, stop the actuation test, and remove the vent manifold assembly from the HPR fitting.

Reinstall the Hydrogen supply tube into the HPR fitting and install the hydrogen supply tube lock mechanism.

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

The venting procedure is complete.

8. Reinstall all parts in reverse order of removal.
9. Scan and clear DTCs in all systems.



Information

Refer to the websites below to confirm Hydrogen station availability before driving or towing the vehicle to a local Hydrogen station:

- <https://h2fcp.org/stationmap/>
(Hydrogen Fuel Cell Partnership)
- <https://h2-ca.com/>
(H2 California)