P0455-EVAP SYSTEM LARGE LEAK

For a complete wiring diagram, refer to the Wiring Information.

Theory of Operation

The Evap Purge Monitor tests the integrity of the hoses/tube between the throttle body/intake and the fuel tank. The monitor is a two stage test and runs only after the Evap system passes the small leak test. Stage one is non-intrusive. The Powertrain Control Module (PCM) monitors the purge vapor ratio and the Evaporative System Integrity Monitor (ESIM) Switch closed ratio. If the purge vapor ratio is above a calculated value, the monitor passes. If the ESIM switch closed
ratio is greater than calculated value when purge flow is greater than a minimum value, the monitor passes. Stage two is an intrusive test and runs only if stage one does not pass. The PCM commands the purge solenoid to flow at a specified rate to force the purge vapor ratio to update. The ratio is compared to a calibrated specification. If it is less than specified, a one trip failure is recorded. This test can detect if the purge hose is off, obstructed, or the purge valve is not operational.

- **When Monitored:**

  With the engine running, during a cold start test with the fuel level above 12%, ambient temperature between 4°C and 32°C (39°F and 89°F) and the fuel system in closed loop. The test runs when the small leak test is maturing.

- **Set Condition:**

  The PCM activates the Evap Purge Solenoid to pull the Evap system into a vacuum to close the ESIM Switch. Once the ESIM Switch is closed, the PCM turns the Evap Purge solenoid off to seal the Evap system. If the ESIM Switch reopens before the calibrated amount of time, a large leak error is detected. Two Trip Fault. Three good trips to turn off the MIL.

### Possible Causes

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Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

1. **VEHICLE HISTORY AND SERVICE BULLETIN INVESTIGATION**

   1. Turn the ignition on.
   2. Using the scan tool, read DTCs. Record the related Freeze Frame data if any DTCs are present.
   3. Check the following items which may assist in repairing the customer's complaint successfully:

      • Check the vehicle's repair history. If the vehicle has a repair history that pertains to the customer's current complaint, review the repair.
      • Inspect the vehicle for any aftermarket accessories that may have been installed incorrectly.
      • Check for any service bulletin(s) related to the customer's complaint or DTCs. If a service bulletin applies, follow the instructions of the service bulletin.

The vehicle inspection or service bulletin repaired the customer's complaint.
A DTC is present, the vehicle inspection revealed no concerns, no service bulletins apply, or the service bulletin did not repair the customer's complaint.

2. ACTIVE DTC

NOTE: Because a hot vehicle can conceal a potential leak, allow the vehicle to reach ambient temperature before continuing with this procedure.

NOTE: A loose gas cap could cause this DTC to set. Make sure the gas cap is tight and in good condition.

1. Start the engine.
2. Allow the engine to idle.
3. Using the scan tool, perform the ESIM FORCED MONITOR TEST. Allow the test to complete.
4. Using the scan tool, read DTCs.

Is the DTC Active or Pending at this time?

Yes  • Go To 3

No  • Test complete, the condition or conditions that originally set this DTC are not present at this time. Using the wiring diagrams as a guide, check all related splices and connectors for signs of water intrusion, corrosion, pushed out or bent terminals, and correct pin tension.
• Perform the CHECKING FOR AN INTERMITTENT DTC diagnostic procedure. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

3. EVAP SYSTEM INSPECTION

Visually and physically inspect the entire Evaporative Emission System for any of the following conditions:
• Holes or cracks
• Loose seal points
• Damaged or missing components
• Incorrect routing of hoses and tubes
• Loose or missing Fuel Filler Cap or seal
• Damaged locking tabs on the Fuel Filler Cap and/or filler tube
• Damaged seal points on the Fuel Filler Cap and/or filler tube

Were any problems found?

Yes • Repair as necessary.
  • Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No • Go To 4

4. VERIFY EVAPORATIVE EMISSION LEAK

WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated. Failure to do so may result in possible serious or fatal injury.

1. To continue testing you will need Evaporative Emission Leak Detector (EELD) 8404B.

NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.

2. Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal.

3. Block the vent hose of the canister if using the service port.

4. Connect shop air to the EELD.

5. Set the smoke/air control switch to AIR.

6. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).

7. Press the remote smoke/air start button.

8. Position the red flag on the air flow meter so it is aligned with the indicator ball.

9. When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute to the size leak indicated by the DTC set in the PCM.

10. Install the service port adapter 8404-14 on the vehicle's service port and block the vent hose of the Evap Canister (if equipped) or install the service adapter 8404-ADP into the filter line.

11. Connect the Air supply hose from the EELD to the service port (if equipped) or to the adapter 8404-ADP.

12. Press the remote button to activate AIR flow.

NOTE: Larger volume fuel tanks, lower fuel levels, or vehicles equipped with a Flow Management Valve may indicate high flow and will require four to five minutes to fill.

13. Compare the flow meter indicator ball reading to the red flag.

14. ABOVE the red flag indicates a leak present.

15. BELOW the red flag indicates a sealed system.

Is the indicator ball above the red flag?

Yes • Go To 5
No • Refer to the Freeze Frame data recorded in step 1. If the data indicates that the vehicle was in motion when the DTC was set, verify that all hoses are properly connected.

• Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

5. EVAPORATIVE EMISSION LEAK DETECTION

NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.

1. To continue testing, you will need Evaporative Emissions Leak Detector (EELD) 8404B.

2. Remove the Air supply hose from the service port (if equipped) or from the adapter 8404-ADP.

3. Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the adapter 8404-ADP.

4. Set the smoke/air control switch to SMOKE.

NOTE: The flow meter indicator ball will not move in the smoke mode.

5. Press the remote smoke/air start button.

NOTE: Make sure that smoke has filled the Evap system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.

NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.

6. While still holding the remote smoke/air start button, use the white light 8404-CLL to follow the Evap system path, and look for the source of the leak indicated by exiting smoke.

7. If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light 8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke.

8. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.
NOTE: The Evap System is divided into three zones. A leak from any of these zones can cause this DTC to set. The lists below specify the possible leak points in that specific zone. For further assistance see the Zone Identification Charts below.

1. Fuel Cap
2. Recirculation Check Valve
3. Vapor Recirculation Line
4. Signal Vapor Line for FVM
5. Flow Management Valve
6. Fuel Tank to Canister Vapor Line
7. Fuel Tank Vent (Check Valve)
8. Vapor Line to Canister
9. Flow Control Orifice
10. Control Valve
11. Liquid Trap
12. Fuel Tank
13. Check valve
14. Fuel Fill Tube to Tank connector
15. Fuel Fill Tube

1. Filter
2. ESIM Switch
3. Canister Vent Line
4. Evap Canister
5. Chassis Purge Valve
6. Fuel Tank to Canister Vapor Line connection
7. Evap Purge connection

1. Evap Purge Vacuum Line
2. Connection to Chassis Line
3. Connection to Canister
4. Chassis Purge Line
5. Evap Purge Vacuum Line
6. Connection to Evap Purge Harness
7. Chassis Evap Purge Line connection to Engine Vacuum
8. Evap Purge Valve
9. Service Port
NOTE: Carefully inspect the vent side of the Evap Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.

Select the appropriate response from the list below:

A leak was found at the gas cap or fuel filler tube

- Go To 6

A leak was found in one or more of the Evap System zones

- If the leak is at a hose connection, remove the hose then reconnect the hose and check for a leak again. All other leaks repair as necessary.
- Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No leaks were detected

- Go To 7

6. LEAK AT GAS CAP

1. Remove the SMOKE supply tip (black hose) from the service port (if equipped) or to the adapter 8404-ADP.

2. Install Leak Check Adapter 8382 (1/4 turn cap) or Fuel Tank Adapter 6922 (screw on cap) and Leak Check Adapter 8399 (secondary seal depressor) and repeat step 5.

NOTE: The gas cap adapter is being used as a known good cap.

Was a leak found at the gas cap adapter?

Yes

- Replace the Fuel Filler tube assembly.
- Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).
No • Replace the gas cap.
• Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

7. EVAP PURGE SOLENOID

NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for signs of contamination.

1. Disconnect the vacuum hoses at the Evap Purge Solenoid.
2. Using a hand vacuum pump, apply 10 in. Hg. to the "CAN" side of the Evap Purge Solenoid purge solenoid.

NOTE: The solenoid should hold vacuum for a minimum of 15 seconds.

3. Turn the ignition on.
4. Using the scan tool, actuate the Evap Purge Solenoid to the ON position.

NOTE: The vacuum should drop when the solenoid is actuated.

Does the solenoid function as described above?

Yes • Go To 8

No • Verify that there is good pin to terminal contact in the Solenoid and PCM harness connectors. Replace the Evap Purge Solenoid in accordance with the service information if no problems were found in the connectors.
• Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

8. ESIM SWITCH

1. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors between the ESIM Switch and the PCM.
2. Look for any chafed, pierced, pinched, or partially broken wires.
3. Look for broken, bent, pushed out or corroded terminals.
4. Perform any Technical Service Bulletins that may apply.

Were any problems found?

Yes • Repair as necessary.
• Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No • Verify that there is good pin to terminal contact in the ESIM Switch and PCM harness connectors. Replace the ESIM Switch in accordance with the service information if no problems were found in the connectors.
• Perform the PCM VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).