DTC P0420

DTC DESCRIPTOR

DTC P0420

Catalyst System Low Efficiency

DIAGNOSTIC FAULT INFORMATION

Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

CIRCUIT/SYSTEM DESCRIPTION

A 3-way catalytic converter (TWC) controls emissions by converting hydrocarbons (HC) and carbon monoxide (CO) into CO2, and oxides of nitrogen (NOx) into nitrogen. The TWC also stores oxygen. The control module monitors this oxygen storage capacity by comparing the pre and post-catalyst oxygen sensor signals while adding and subtracting fuel during specific idle conditions. The control module compares the engine and catalyst oxygen sensor signals in order to determine if the oxygen storage capacity of the catalyst is degraded.

IMPORTANT: A new converter with less than 100 miles on it may set P0420 due to out-gassing of the internal matting. Operating the vehicle at highway speeds for approximately 1 hour may correct the condition.

If the ECM detects the degraded condition DTC P0420 sets.

CONDITIONS FOR RUNNING THE DTC

- DTCs P0031, P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0128, P0130, P0131, P0132, P0133, P0134, P0137, P0138, P0140, P0141, P0171, P0172, P0300, P0326, P0327, P0336, P0340, P0341, P0500 (manual transmission only), P0506, P0507, P0601, P0602, P0606, P0641, P0722, P0723, P1133, P1134 are not set.
- The engine has been running for more than 10 minutes.
- The vehicle has been driven at more than 1,200 RPM for more than 1 minute.
- The vehicle speed is less than 3.2 km/hr (2 mph).
- The vehicle is in Closed Loop.
- For automatic transmissions, the transmission is in reverse, drive, or low.
- The engine coolant temperature (ECT) is between 70-125°C (156-257°F).
- The barometric pressure (BARO) is more than 70 kPa.
- The catalytic converter (TWC) calculated temperature is between 550-765°C (1022-1,409°F).
- The intake air temperature (IAT) is between -20 and +80°C (-4 and +176°F).
- The battery voltage is more than 10.7 volts.
- The throttle position (TP) is 1.5 percent or less.
- The short term fuel trim (FT) is between -10 and +10 percent.

- This diagnostic attempts one test during each valid idle period when the above conditions have been met. This diagnostic attempts up to 12 tests during each drive cycle.

CONDITIONS FOR SETTING THE DTC

- The control module has determined the catalyst efficiency has degraded below a calibrated threshold.
- This diagnostic may conclude in as few as one test attempt. However, this diagnostic may require as many as 18 test attempts, which would require at least 3 drive cycles. Each test attempt may conclude within approximately 1 minute.

ACTION TAKEN WHEN THE DTC SETS

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame/Failure Records.

CONDITIONS FOR CLEARING THE MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

DIAGNOSTIC AIDS

- Inspect for the following conditions, which may cause a catalytic converter to degrade:
  - An engine misfire
  - High engine oil or high coolant consumption
  - Retarded spark timing
  - A weak or poor spark
  - A lean fuel mixture
  - A rich fuel mixture
  - A damaged oxygen sensor or wiring harness
  - The catalyst test may abort if the vehicle falls outside the conditions for running the DTC.
  - A catalyst may be temporarily degraded if a fuel with high sulfur content has been used. Drive the vehicle at highway speeds for 10 minutes and retest the converter.
- If an intermittent condition cannot be duplicated, the information included in the Freeze Frame Records can be useful in determining the vehicle operating conditions when the DTC was set.
- If the condition is determined to be intermittent, refer to **Testing for Intermittent Conditions and Poor Connections** .

REFERENCE INFORMATION

Electrical Information Reference

Diagnostic Trouble Code (DTC) List - Vehicle

CIRCUIT/SYSTEM VERIFICATION

Operate the vehicle within the Conditions for Running the DTC.

- If the DTC fails this key cycle, proceed with Circuit/System Testing.

CIRCUIT/SYSTEM TESTING

NOTE: Refer to Three-Way Catalytic Converter Damage Notice .

NOTE: Refer to Heated Oxygen Sensor (HO2S) Resistance Learn Reset Notice .

IMPORTANT: A new converter with less than 100 miles on it may set P0420 due to out-gassing of the internal matting. Operating the vehicle at highway speeds for approximately 1 hour may correct the condition.

1. Inspect the catalytic converter for the following conditions:
   - Dents
   - A severe discoloration caused by excessive temperatures
   - Road damage
   - An internal rattle caused by damaged catalyst substrate
   - Restrictions
     - If a condition is found, replace the catalytic converter.
2. Inspect the exhaust system for the following conditions:
   - Leaks
   - Physical damage
   - Loose or missing hardware
   - Properly torqued HO2S
   - If a condition is found, repair the exhaust system.
3. Inspect the HO2S 2 for the following conditions:
   - A grounded wiring harness
   - Damage
   - If a condition is found, replace the HO2S 2.
   - If no physical condition is detected, replace the catalytic converter.

REPAIR PROCEDURES

IMPORTANT: A new converter with less than 100 miles on it may set P0420 due to out-gassing of the internal matting. Operating the vehicle at highway speeds for approximately 1 hour may correct the condition.

- **Catalytic Converter Replacement**
- **Heated Oxygen Sensor Replacement - Position 2**
- **Exhaust Leakage**
- **Restricted Exhaust**

REPAIR VERIFICATION

1. Operate the vehicle within the Conditions for Running the DTC.
2. Verify if DTC P0420 has passed or failed this ignition cycle with the scan tool.
3. If 6 tests have been attempted and the DTC has not run or passed during this key cycle, turn the key to OFF for 30 seconds, then run the test a second time.
4. A maximum of 12 tests per key cycle will run if each test is a combination of passed, failed, or aborted tests.

IMPORTANT: DO NOT touch the accelerator, the HVAC, or the steering wheel while a catalyst test is in progress.

5. After a code clear, the catalyst test will run once if the test is a pass.
6. Allow the engine to return to a stabilized idle. Keep the vehicle in DRIVE.

DTC P0442

SYSTEM DESCRIPTION

This diagnostic tests the evaporative emission (EVAP) system for a small leak when the key is turned OFF and the correct conditions are met.

Heat from the exhaust system is transferred into a vehicle fuel tank while the vehicle is operating. When the vehicle is turned OFF and the EVAP system is sealed, a change in the fuel tank vapor temperature occurs, which results in corresponding pressure changes in the fuel tank vapor space. This change is monitored by the control module using the fuel tank pressure sensor input. The control module then makes a judgement on the integrity of the system. With a 0.51 mm (0.02 in) leak in the system, the amount of pressure change observed is significantly less than that of a sealed system.

If the control module detects a pressure change less than a calibrated amount, DTC P0442 sets.

DTC DESCRIPTOR

This diagnostic procedure supports the following DTC:

DTC P0442 Evaporative Emissions (EVAP) System Small Leak Detected

CONDITIONS FOR RUNNING THE DTC

IMPORTANT: The following conditions must be met prior to ignition OFF.

- Before the engine control module (ECM) can report DTC P0442 failed, DTCs P0443, P0446, P0449, P0452, P0453, P0455, and P0496 must run and pass.
- DTCs P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0125, P0128, P0446, P0452, P0453, P0455, P0461, P0462, P0463, P0464, P0496, P0502, P0601, P0602, P0606, P0641, P2610 are not set.
- The diagnostic runs once after a cold start drive cycle.
- The start-up intake air temperature (IAT) is between 4-30°C (39-86°F).
- The start-up engine coolant temperature (ECT) is less than 30°C (86°F).
- The start-up IAT and ECT are within 8°C (15°F).
- The barometric pressure (BARO) is more than 74 kPa.
- The ambient air temperature is between 2-32°C (36-90°F).
- The engine run time minimum is 10 minutes.
- The vehicle has traveled more than 5 kilometers (3 miles) this trip.
- The ECT is more than 70°C (158°F).
- The fuel level is between 15-85 percent.
- The ignition is OFF.
- A refueling event is not detected.
- DTC P0442 runs once per drive cycle when the above conditions are met.
- One test occurs at ignition OFF after a drive cycle, and may require up to 45 minutes to complete. No more than 2 tests per day are allowed.

CONDITIONS FOR SETTING THE DTC

- The control module detects a pressure change that is less than a calibrated amount.
- Five to 12 tests must be completed to report a Fail with up to 17 hours between tests.

ACTION TAKEN WHEN THE DTC SETS

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame/Failure Records.

CONDITIONS FOR CLEARING THE MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.

- Clear the MIL and the DTC with a scan tool.

DIAGNOSTIC AIDS

- To help locate intermittent leaks, use the **J 41413-200** Evaporative Emission System Tester (EEST) to introduce smoke into the EVAP system. See **Special Tools** . Move all EVAP components while observing smoke with a High Intensity White Light.
- A leak in the EVAP system can be verified by use of the flow meter on the **J 41413-200** . See **Special Tools** . Refer to the **J 41413-200** operation manual for flow meter use instructions. See **Special Tools** .
- To improve the visibility of the smoke exiting the EVAP system, observe the suspected leak area from different angles with a High Intensity White Light.
- A condition may exist where a leak in the EVAP system only exists under a vacuum condition. By using the scan tool Purge/Seal function to create a vacuum, seal the system and observe the FTP parameter for vacuum decay, this type of leak may be detected.
- For intermittent conditions, refer to **Intermittent Conditions** .

TEST DESCRIPTION

The numbers below refer to the step numbers on the diagnostic table.

3: Introducing smoke in 15-second intervals may allow smaller leak areas to be more noticeable. When the system is less pressurized, the smoke will sometimes escape in a more condensed manner.

5: This step verifies that repairs are complete and that no other condition is present.

DTC P0442

Step	Action	Yes	No
Schematic Reference: Evaporative Emissions (EVAP) Hose Routing Diagram			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to **Step 2**	Go to **Diagnostic System Check - Vehicle**
2	**IMPORTANT:** • **Larger volume fuel tanks and/or those with lower fuel levels may require several minutes for the floating indicator to stabilize.** • **Refer to the J 41413-200 Evaporative Emission System Tester (EEST) operation manual for detailed instructions. See Special Tools .** 1. Turn OFF the ignition. 2. Using the **GE-41415-50** Fuel Tank Cap Adapter, connect the **J 41413-200** to the vehicle filler neck. See **Special Tools** . 3. Use the flow meter on the **J 41413-200** to determine if there is a leak greater than 0. See		

	Special Tools .51 mm (0.020 in) in the EVAP system. 4. Compare the flow meter's stable floating indicator position to the red flag. Is the floating indicator below the red flag?	Go to Diagnostic Aids	Go to **Step 3**
3	**IMPORTANT:** **Ensure that the vehicle underbody temperature is similar to the ambient temperature and allow the surrounding air to stabilize before starting the diagnostic procedure. System flow will be less with higher temperatures.** 1. Turn OFF the ignition. 2. Using the **GE-41415-50** , connect the **J 41413-200** to the vehicle filler neck. See **Special Tools** . 3. Turn ON the ignition, with the engine OFF. 4. Seal the system and apply smoke to the system until smoke is visible at the **J 41413-VLV** EVAP Service Port Vent Fitting. See **Special Tools** . 5. Remove the **J 41413-VLV** once smoke is observed. See **Special Tools** . 6. Continue to introduce smoke into the EVAP system for an additional 60 seconds. 7. Inspect the entire EVAP system for exiting smoke with a High Intensity White Light. 8. Continue to introduce smoke at 15-second intervals until the leak source has been located. Did you locate and repair a leak source?	Go to **Step 5**	Go to **Step 4**
4	1. Disconnect the **GE-41415-50** from the fuel fill pipe. See **Special Tools** . 2. Install the fuel fill cap to the fuel fill pipe. 3. Connect the **J 41413-200** nitrogen/smoke supply hose to the EVAP service port. See **Special Tools** . 4. Use the remote switch to introduce smoke into the EVAP system. 5. Inspect the entire EVAP system for exiting smoke with a High Intensity White Light. 6. Continue to introduce smoke at 15-second intervals until the leak source has been located.		Go to Diagnostic

	Did you locate and repair a leak source?	Go to **Step 5**	Aids
5	**IMPORTANT:** **Larger volume fuel tanks and/or those with lower fuel levels may require several minutes for the floating indicator to stabilize.** 1. Use the flow meter on the **J 41413-200** to determine if there is a leak greater than 0. See **Special Tools** .51 mm (0.020 in) in the EVAP system. 2. Compare the flow meter's stable floating indicator position to the red flag. Is the floating indicator below the red flag?	Go to **Step 6**	Go to **Step 2**
6	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List - Vehicle**	Go to **Step 7**
7	**IMPORTANT:** **The malfunction indicator lamp (MIL) may remain ON after the repair unless the DTCs are cleared.** Clear the DTCs with a scan tool.Did you complete the action?	System OK	-

DTC P0443

CIRCUIT DESCRIPTION

An ignition voltage is supplied directly to the evaporative emission (EVAP) canister purge solenoid valve. The EVAP canister purge solenoid valve is pulse width modulated (PWM). The scan tool displays the amount of ON time as a percentage. The control module monitors the status of the driver. The control module controls the EVAP canister purge solenoid valve ON time by grounding the control circuit via an internal switch called a driver. If the control module detects an incorrect voltage for the commanded state of the driver, this DTC sets.

DTC DESCRIPTOR

This diagnostic procedure supports the following DTC:

DTC P0443 Evaporative Emission (EVAP) Purge Solenoid Control Circuit

CONDITIONS FOR RUNNING THE DTC

- The ignition is ON.
- The system voltage is between 6-18 volts.

- DTC P0443 runs continuously once the above conditions are met.

CONDITIONS FOR SETTING THE DTC

- The control module detects that the commanded state of the driver and the actual state of the control circuit do not match.
- The above conditions are present for a minimum of 2.5 seconds.

ACTION TAKEN WHEN THE DTC SETS

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

CONDITIONS FOR CLEARING THE MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

TEST DESCRIPTION

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests if the concern is active. The EVAP canister purge solenoid valve is PWM. You should hear a clicking sound when the EVAP canister purge solenoid valve is commanded to 50 percent. The clicking sound should stop when the EVAP canister purge solenoid valve is commanded to 0 percent. The rate at which the valve cycles should increase when the commanded state is increased, and decrease when the commanded state is decreased.

5: This step verifies that the control module is providing ground to the EVAP canister purge solenoid valve.

6: This step tests if a ground is constantly being applied to the EVAP canister purge solenoid valve.

DTC P0443

Step	Action	Yes	No
Connector End Views Reference: Engine Control Module (ECM) Connector End Views and **Engine Controls Connector End Views**			
	Did you perform the Diagnostic System Check - Vehicle?		Go to **Diagnostic**

1		Go to **Step 2**	**System Check - Vehicle**
2	1. Turn ON the ignition, with the engine OFF. 2. Command the evaporative emission (EVAP) canister purge solenoid valve to 50 percent, then to 0 percent with a scan tool. Does the EVAP canister purge solenoid valve respond to the commanded state?	Go to **Step 3**	Go to **Step 4**
3	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Turn ON the ignition, with the engine OFF. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 4**	Go to **Intermittent Conditions**
4	1. Turn OFF the ignition. 2. Disconnect the EVAP canister purge solenoid valve harness connector. 3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 1 voltage circuit of the EVAP canister purge solenoid valve with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go to **Step 5**	Go to **Step 11**
5	1. Connect a test lamp between the control circuit of the EVAP canister purge solenoid valve and the ignition 1 voltage circuit of the EVAP canister purge solenoid valve. 2. Command the EVAP canister purge solenoid valve to 0 percent with a scan tool. Does the test lamp illuminate?	Go to **Step 8**	Go to **Step 6**
6	Command the EVAP canister purge solenoid valve to 50 percent with a scan tool. Does the test lamp illuminate or pulse when the EVAP purge solenoid valve is commanded to 50 percent?	Go to **Step 9**	Go to **Step 7**
7	Test the control circuit of the EVAP canister purge solenoid valve for an open or for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** .		

	Did you find and correct the condition?	Go to **Step 14**	Go to **Step 10**
8	Test the control circuit of the EVAP canister purge solenoid valve for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** . Did you find and correct the condition?	Go to **Step 14**	Go to **Step 13**
9	Inspect for poor connections at the harness connector of the EVAP canister purge solenoid valve. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** . Did you find and correct the condition?	Go to **Step 14**	Go to **Step 12**
10	Inspect for poor connections at the harness connector of the control module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** . Did you find and correct the condition?	Go to **Step 14**	Go to **Step 13**
11	Repair the open or short to ground in the ignition 1 voltage circuit. Refer to **Wiring Repairs** . Did you complete the repair?	Go to **Step 14**	-
12	Replace the EVAP canister purge solenoid valve. Refer to **Evaporative Emission (EVAP) Canister Purge Solenoid Valve Replacement** . Did you complete the replacement?	Go to **Step 14**	-
13	Replace the electronic control module (ECM). Refer to **Control Module References** for replacement, setup, and programming. Did you complete the replacement?	Go to **Step 14**	-
14	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Turn ON the ignition, with the engine OFF. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 15**
15	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List - Vehicle**	System OK

DTC P0446

SYSTEM DESCRIPTION

This DTC tests the evaporative emission (EVAP) system for a restricted or blocked EVAP vent path. The control module commands the EVAP canister purge solenoid valve Open and the EVAP canister vent solenoid valve Closed. This allows vacuum to be applied to the EVAP system. Once a calibrated vacuum level has been reached, the control module commands the EVAP canister purge solenoid valve Closed and the EVAP canister vent solenoid valve Open. The control module monitors the fuel tank pressure (FTP) sensor for a decrease in vacuum. If the vacuum does not decrease to near 0 inches H2O in a calibrated time, this DTC sets.

The following table illustrates the relationship between the ON and OFF states, and the Open or Closed states of the EVAP canister purge and vent solenoid valves.

DTC P0446

Control Module Command	EVAP Canister Purge Solenoid	EVAP Canister Vent Solenoid
ON	Open	Closed
OFF	Closed	Open

DTC DESCRIPTOR

This diagnostic procedure supports the following DTC:

DTC P0446 Evaporative Emissions (EVAP) Vent System Performance

CONDITIONS FOR RUNNING THE DTC

- DTCs P0030, P0036, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0120, P0121, P0122, P0123, P0125, P0128, P0130, P0131, P0132, P0133, P0134, P0135, P0136, P0137, P0138, P0140, P0141, P0220, P0442, P0443, P0449, P0452, P0453, P0455, P0502, P0562, P0563, P0641, P0651, P1133, P1134 are not set.
- The ignition voltage is between 11-18 volts.
- The barometric pressure (BARO) is more than 74 kPa.
- The fuel level is between 15-85 percent.
- The start-up engine coolant temperature (ECT) is between 4-30°C (39-86°F).
- The start-up intake air temperature (IAT) is between 4-30°C (39-86°F).
- The start-up ECT and IAT are within 8°C (14.4°F) of each other.
- The vehicle speed sensor (VSS) is less than 137 km/h (85 mph).
- The purge solenoid valve is enabled.
- DTC P0446 runs once per trip when the above conditions have been met.

CONDITIONS FOR SETTING THE DTC

- The FTP sensor is more than 8 inches H2O for 2 seconds during the 13 minute test.

  OR

  The FTP is less than -2.5 inches H2O or more than +5 inches H2O for 3 seconds after a cold start ignition

ON.

- The fuel tank vacuum is greater than a calibrated amount for a calibrated period of time.

ACTION TAKEN WHEN THE DTC SETS

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

CONDITIONS FOR CLEARING THE MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

DIAGNOSTIC AIDS

- The EVAP system tests run when the engine is first started and meets the Conditions for Running the DTC. An intermittent condition could be caused by a damaged EVAP vent housing, a temporary blockage at the EVAP canister vent inlet, or a pinched vent hose. A blockage in the vent system will also cause a poor fuel fill condition.
- An EVAP canister, vent hose, or vent solenoid valve that has restricted flow may cause this DTC to set. Using a purge solenoid command with a scan tool will allow vacuum to be applied to the system instead of pressure. With the engine running, the EVAP canister vent solenoid valve open, and the EVAP canister purge solenoid valve commanded to 100 percent, the fuel tank vacuum should not increase to more than 5 inches H2O.
- An EVAP canister filter that is restricted can cause this DTC to set. Refer to **Evaporative Emission (EVAP) System Cleaning** .
- Disconnecting one component at a time while the EVAP system is under flow will help to pinpoint a restriction in the system.
- Reviewing the Failure Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.
- For intermittent conditions, refer to **Intermittent Conditions** .

DTC P0446

Step	Action	Values	Yes	No
Schematic Reference: Evaporative Emissions (EVAP) Hose Routing Diagram and **Engine Controls**				

Schematics
Connector End View Reference: Engine Control Module (ECM) Connector End Views or **Engine Controls Connector End Views**

1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to **Step 2**	Go to **Diagnostic System Check - Vehicle**
2	Inspect the evaporative emission (EVAP) system for the following conditions: • A damaged EVAP vent solenoid valve-Refer to **Evaporative Emission (EVAP) Canister Vent Solenoid Valve Replacement** . • A pinched EVAP vent hose • A damaged EVAP canister-Refer to **Evaporative Emission (EVAP) Canister Replacement** . Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 3**
3	1. Turn on the ignition 2. Command the EVAP canister vent solenoid valve ON and OFF with a scan tool. Do you hear or feel the EVAP canister vent solenoid valve click when commanded ON and OFF?	-	Go to **Step 5**	Go to **Step 4**
4	1. Remove the EVAP canister vent solenoid valve from the EVAP canister. Refer to **Evaporative Emission (EVAP) Canister Purge Solenoid Valve Replacement** . 2. Connect the EVAP canister vent solenoid valve electrical connector. 3. Command the EVAP vent solenoid valve ON and OFF with the scan tool. Does the EVAP canister vent solenoid valve operate when it is commanded ON and OFF?	-	Go to **Step 5**	Go to **Step 12**
	1. Turn OFF the ignition.			

5	2. Install the EVAP canister vent solenoid valve if removed in previous step. 3. Disconnect the EVAP purge pipe from the EVAP purge solenoid valve. Refer to **Evaporative Emission (EVAP) Canister Purge Solenoid Valve Replacement** . 4. Turn ON the ignition, with the engine OFF. Is the Fuel Tank Pressure Sensor parameter within the specified range?	-1 to +1 in H2O	Go to **Step 6**	Go to **Step 14**
6	**IMPORTANT:** • **DO NOT exceed the specified value in this step. Exceeding the specified value may produce incorrect test results.** • **Refer to the J 41413-200 Evaporative Emissions System Tester (EEST) operation manual for detailed instructions. See Special Tools .** 1. Turn OFF the ignition. 2. Connect the EVAP purge pipe. 3. Using the **GE-41415-50** Fuel Tank Cap Adapter, connect the **J 41413-200** to the vehicle's fuel filler neck. See **Special Tools** . 4. Turn ON the ignition, with the engine OFF. 5. Command the EVAP canister vent solenoid valve closed with a scan tool. 6. Use the **J 41413-200** to pressurize the EVAP system with NITROGEN to the first specified value. See **Special Tools** . 7. Observe the Fuel Tank Pressure Sensor parameter with a scan tool. Is the Fuel Tank Pressure Sensor parameter more than the second specified value?	10 in H2O 5 in H2O	Go to **Step 7**	Go to **Step 13**

7	1. Start the engine with the **J 41413-200** still connected to the fuel filler neck. See **Special Tools** . 2. Allow the engine to idle. 3. Use the Purge/Seal function to seal the system with a scan tool. 4. Command the EVAP canister purge solenoid valve to 30 percent. 5. Observe the vacuum/pressure gage on the **J 41413-200** and the FTP parameter on the scan tool. See **Special Tools** . 6. Allow the vacuum to increase on the gage of the **J 41413-200** until it reaches approximately 16 inches H2O or until the vacuum reached the abort limit on the scan tool. See **Special Tools** . 7. Use the Purge/Seal function to seal the system with a scan tool. Was the difference between the FTP parameter on a scan tool and the vacuum/pressure gage on the **J 41413-200** less than the specified value? See **Special Tools** .	1 in H2O	Go to **Step 8**	Go to **Step 14**
8	Did the Fuel Tank Pressure Sensor parameter on a scan tool display more than the specified value?	3.2 V	Go to **Step 9**	Go to **Step 14**
9	**IMPORTANT:** • **DO NOT exceed the specified value in this step. Exceeding the specified value may produce incorrect test results.** • **Refer to the J 41413-200 operation manual for detailed instructions. See Special Tools .** 1. Turn ON the ignition with the engine OFF 2. Use the **J 41413-200** to pressurize the EVAP system with NITROGEN to the first specified value. See **Special Tools** . 3. Command the EVAP canister vent	5 in H2O -1 to +1 in H2O		

	solenoid valve open. Does the Fuel Tank Pressure sensor parameter return to the second specified value?		Go to **Step 10**	Go to **Step 17**
10	1. Turn ON the ignition with the engine OFF 2. Use the **J 41413-200** to pressurize the EVAP system with NITROGEN. See **Special Tools** . With NITROGEN flowing and the EVAP canister vent solenoid valve OPEN, does the Fuel Tank Pressure Sensor parameter remain below the specified value?	3 in H2O	Go to **Step 11**	Go to **Step 17**
11	1. Start the engine. 2. Allow the engine to idle. 3. With the EVAP canister vent solenoid valve OPEN, command the EVAP canister purge solenoid valve to 100 percent with a scan tool. Does the Fuel Tank Pressure sensor parameter display more vacuum than the specified value?	-5 in H2O	Go to **Step 17**	Go to Diagnostic Aids
12	1. Disconnect the EVAP canister vent solenoid valve. 2. Command the EVAP canister vent solenoid valve OFF. 3. Probe the control circuit of the EVAP canister vent solenoid with a test lamp that is connected to battery positive. Does the test lamp illuminate?	-	Go to **Step 13**	Go to **Step 18**
13	Test the EVAP canister vent solenoid control circuit for a short to ground. Refer to **Testing for Short to Ground** and **Wiring Repairs** . Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 16**
14	Test for an intermittent and for a poor connection at the fuel tank pressure (FTP) sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and	-		

	Connector Repairs . Did you find and correct the condition?		Go to **Step 21**	Go to **Step 15**
15	Test the low reference circuit of the FTP sensor for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** . Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 19**
16	Test for an intermittent and for a poor connection at the control module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** . Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
17	Inspect the EVAP vent system for a restriction. Did you find and correct the condition?	-	Go to **Step 21**	Go to Diagnostic Aids
18	Replace the EVAP canister vent solenoid valve. Refer to **Evaporative Emission (EVAP) Canister Vent Solenoid Valve Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
19	Replace the FTP sensor. Refer to **Fuel Tank Pressure Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
20	Replace the engine control module (ECM). Refer to **Control Module References** for replacement, setup, and programming. Did you complete the replacement?	-	Go to **Step 21**	-
21	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 60 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 22**
22	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List -**	

			Vehicle	System OK

