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  [Conversion Calculator](#)**2005 GMC Truck Sierra 2500 2WD V8-6.6L DSL Turbo VIN 2**[Vehicle Level](#) → [Powertrain Management](#) → [Fuel Delivery and Air Induction](#) → [Testing and Inspection](#) → [Fuel System Diagnosis](#) → [Fuel System Diagnosis](#) ←

Fuel System Diagnosis

FUEL SYSTEM DIAGNOSIS

FUEL SYSTEM DESCRIPTION

Fuel is drawn by the supply pump through a pre-filter screen in the tank and to the engine through the fuel supply lines. There is no lift pump in the fuel tanks or on the frame. The fuel passes through the base plate of the fuel injector control module (FICM) to cool the module. From the FICM the fuel flows to the [fuel filter](#)/heater element housing, which combines a water separator, a prime pump, a fuel heater element and a filter element. The fuel is then delivered to the high-pressure pump. An integrated hand pump is used to prime the fuel system after changing the fuel filter or servicing the fuel system. The fuel injection pump at the front of the engine valley includes the fuel supply pump and the high-pressure pump. If the fuel system is not supplying enough fuel, a driveability concern may occur. If air is being drawn into the fuel injection system, a Cranks But Will Not Run or Hart Start symptom could exist.

HIGH PRESSURE SYSTEM

The much larger section of the pump assembly is the high-pressure fuel injection pump. The pump is engine-driven by the camshaft gear. From the high-pressure pump, the pressurized flows to the left common fuel rail. A balance pipe from the center of the left rail then feeds the right common fuel rail. Each common fuel rail supplies one bank of 4 fuel injectors. The fuel rail pressure sensor is mounted in the middle of the right common fuel rail.

RETURN SYSTEM

The fuel return system routes fuel from the fuel injectors and the fuel injection pump. The fuel rail pressure relief valve is located in the rear of the left common rail. The return fuel travels to the fuel cooler and then to the fuel tank. This fuel is used to cool and lubricate the injection pump and the injectors.

DIAGNOSTIC AIDS

The following conditions may cause an air leak into the fuel supply system:

- Deformed or cut O-rings at the fuel supply line connections
- Improperly seated fuel supply line fittings
- Porous or weathered rubber fuel supply lines

TEST

Steps 1-6			
Step	Action	Yes	No
1	<p>Important</p> <p>Ensure that a sufficient amount of fuel is in the fuel tank to run the vehicle.</p> <ol style="list-style-type: none"> 1. Install the J 44638 Vacuum Gage to the fuel system service port on the right front side of the engine. 2. Prime the fuel system until 10 psi is indicated on the J 44638. 3. Important <p>It may be necessary to remove engine components for the visual inspections.</p> <p>Visually inspect the following items for restrictions or leaks:</p> <ul style="list-style-type: none"> o Fuel injector control module fuel line connections o Hoses and lines that are flattening when the engine is running, or have kinks that would restrict the flow of fuel o Fuel leaks between the fuel filter/heater element housing and the fuel injection pump 		
	Did you find and correct the condition?	Go to Step 21	Go to Step 2
2	Does the fuel system pressure drop below 2 psi in less than 1 minute?	Go to Step 12	Go to Step 3
3	<ol style="list-style-type: none"> 1. Disconnect the fuel supply line at the engine. 2. Cap off the fuel supply pipe on the engine with a rubber plug and clamp. 3. Disconnect the fuel return line at the engine. 4. Install a J 23738-A Mityvac on the fuel return pipe on the engine. 5. Apply at least 25 inches Hg of vacuum to the fuel return pipe and wait for at least 1 minute for the system to stabilize. Repeat this step 6 additional times. 		
	Does the J 23738-A gage indicate that vacuum dropped below 8 inches Hg of vacuum within 10 minutes?	Go to Step 7	Go to Step 4
4	<ol style="list-style-type: none"> 1. Connect the fuel supply line at the engine. 2. Disconnect the chassis fuel supply line from the fuel sender at the fuel tank. 3. Plug the chassis fuel supply line. 4. Apply at least 25 inches Hg of vacuum to the fuel return pipe with the J 23738-A and wait more than 1 minute for the system to stabilize. 5. Repeat the previous step 10 times. 6. Observe the J 23738-A. 		
	Does the vacuum drop below 8 Hg of vacuum within 10 minutes?	Go to Step 15	Go to Step 5
5	<ol style="list-style-type: none"> 1. Reconnect the return line at the engine. 2. Install a transparent hose between the fuel injection control module (FICM) outlet and the fuel filter inlet with a vertical loop to observe the incoming fuel for air bubbles. 3. Install all components and lines that were previously disconnected or removed. 4. Prime the fuel system 30 times to remove the air from the fuel hoses. 5. Attempt to start the engine. 		
	Did the engine start?	Go to Step 6	Go to Step 12
6	<ol style="list-style-type: none"> 1. Run the engine for at least 10 minutes to allow the fuel system to stabilize, and purge any air from the system. 2. Observe the fuel in the transparent hose. 		
	Are there any air bubbles entering the transparent hose?	Go to Step 10	Go to Step 21

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Steps 7-14

Step	Action	Yes	No
7	<ol style="list-style-type: none"> 1. Disconnect the fuel outlet hose from the outlet pipe of the fuel filter/heater element housing. 2. Open the drain on the fuel filter/heater element housing and drain the fuel into a suitable container. 3. Close the drain. 4. Install a J 23738-A on the outlet port of the fuel filter/heater element housing. 5. Apply 15 inches Hg of vacuum to the fuel pipe and observe the gage. <p>Does the vacuum drop?</p>	Go to Step 13	Go to Step 8
8	<ol style="list-style-type: none"> 1. Connect the fuel supply line at the engine. 2. Remove the J 23738-A from the outlet port of the fuel filter assembly and install it on the fuel outlet hose. 3. Remove the supply hose from the fuel injection pump and plug the hose. 4. Apply 15 inches Hg of vacuum and observe the reading. <p>Does the vacuum drop?</p>	Go to Step 16	Go to Step 9
9	<ol style="list-style-type: none"> 1. Disconnect the fuel injection pump return hose. 2. Cap off the fuel return pipe on the fuel injection pump with a rubber plug, and clamp the plug. 3. Install a J 23738-A to the fuel inlet pipe of the fuel injection pump. 4. Apply 20 inches Hg of vacuum and observe the reading. <p>Does the vacuum drop?</p>	Go to Step 18	Go to Step 17
10	<ol style="list-style-type: none"> 1. Remove the front fuel tank. 2. Remove the fuel sender from the fuel tank. 3. Remove the strainer from the fuel sender and plug the bottom end of the pickup tube. 4. Install a J 23738-A to the upper end of the pickup tube. 5. Apply 15 inches Hg of vacuum and observe the reading. <p>Does the vacuum drop?</p>	Go to Step 20	Go to Step 11
11	<ol style="list-style-type: none"> 1. Install the fuel sender, fuel tank and connect all fuel system connections that were previously disconnected. 2. Prime the fuel system 30 times, or until fuel pressure is 10 psi, to remove the air from the fuel system. Air will be forced out of the system within 2 minutes. 3. Start and run the engine. 4. Observe the fuel entering the transparent hose for air bubbles. <p>Are any air bubbles present in the transparent hose?</p>	Go to Diagnostic Aids	Go to Step 21
12	<ol style="list-style-type: none"> 1. Prime the fuel system 30 times, or until fuel pressure is 10 psi, to remove the air from the fuel system. Air will be forced out of the system within 2 minutes. 2. Remove the hose from the fuel filter/heater element housing outlet fitting and plug the hose. 3. Verify that the J 44638 is installed. 4. Remove the ignition 1 relay. 5. Crank the engine 2-3 times in 15-second intervals and observe the J 44638. <p>Does the J 44638 indicate more than 5 inches Hg of vacuum?</p>	Go to Step 21	Go to Step 18
13	<ol style="list-style-type: none"> 1. Disconnect the fuel supply line from the fuel filter/heater element housing port. Install the J 23738-A to the fuel supply line. 2. Apply 15 inches Hg of vacuum and observe the reading. <p>Does the vacuum drop?</p>	Go to Step 14	Go to Step 19
14	<p>Repair the air leak in the fuel supply pipe on the engine.</p> <p>Did you complete the repair?</p>	Go to Step 21	—

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Steps 15-21

Step	Action	Yes	No
15	Repair the air leak in the fuel supply line between the engine and the fuel tank sending unit. Did you complete the repair?	Go to Step 21	—
16	Repair the leak between the fuel filter/heater element housing outlet and the fuel injection pump inlet. Did you complete the repair?	Go to Step 21	—
17	Replace the fuel injection pump inlet supply hose. Did you complete the replacement?	Go to Step 21	—
18	Replace the fuel injection pump. Did you complete the replacement?	Go to Step 21	—
19	Important Before replacing the fuel filter/heater element housing, inspect the fuel vent screw for damage or cross threading. Replace the vent screw with O-ring if either condition is found. Replace the fuel filter/heater element housing. Did you complete the replacement?	Go to Step 21	—
20	Replace the fuel tank sending unit. Did you complete the replacement?	Go to Step 21	—
21	<ol style="list-style-type: none"> 1. Remove the transparent hose, if necessary, and attach any disconnected components or fuel lines. 2. Clean any fuel spills. 3. Prime the fuel system 30 times to remove the air in the fuel hoses. 4. Start the engine. If the engine starts and stalls, prime fuel system an additional 30 times. 5. Run the engine to ensure no fuel leaks exist. Is the customer concern corrected?	System OK	Go to Symptoms - Computers and Control Systems

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