

# OREGON FUEL INJECTION, INC.

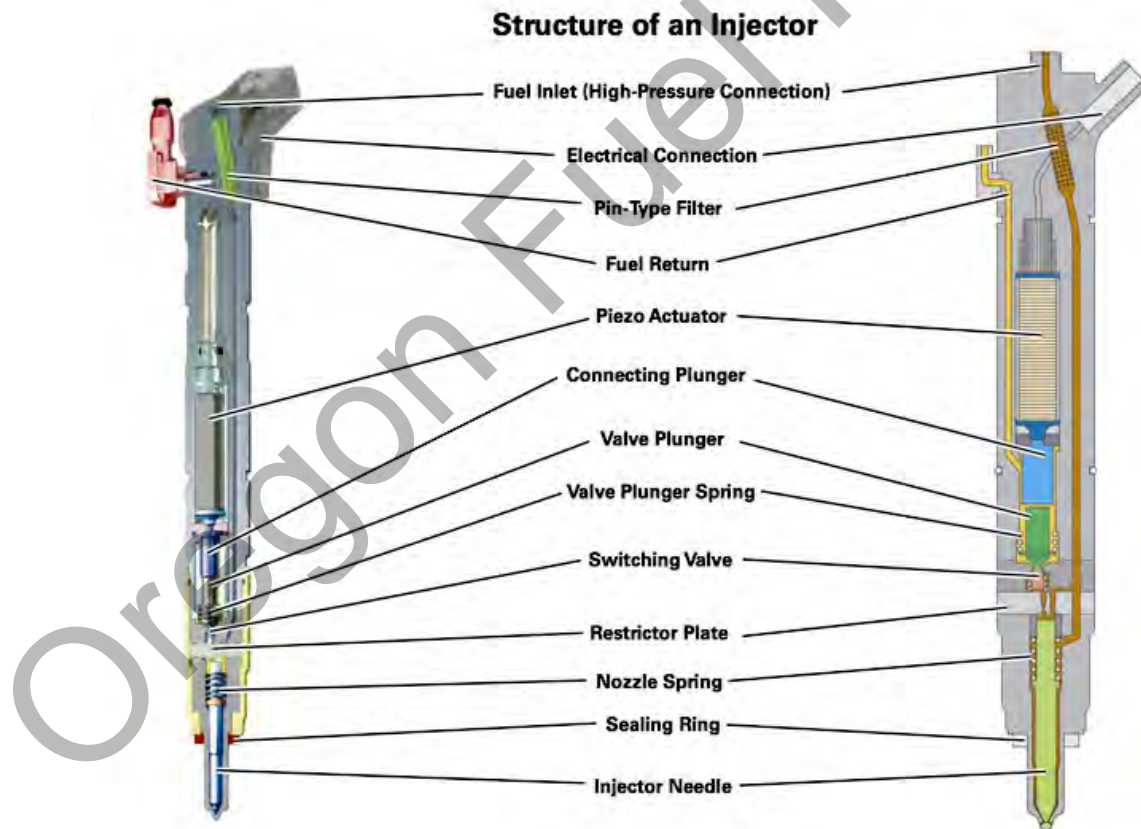
## 2011 – 2016 6.6L LML/LGH Duramax Diagnostics

In order to do proper diagnostics you will need a scan tool, diagnostic service information and some special tools such as a vacuum test gauge J44638 (OTC 6754) available from GM Special Tools <https://gmtoolsandequipment.com/> or Freedom Racing Tool and Equipment. Also note that 1 MPa (megapascal) is equal to approximately 145 PSI, 100 kpa is about 14.5 PSI.

If you don't have service information you can buy a subscription online at [alldatadiy.com](http://alldatadiy.com) or [eAutorepair.net](http://eAutorepair.net).

### Piezo High Pressure Common Rail Basic Information

The high pressure pump builds rail pressure and delivers it to the fuel rail manifold where it flows through the injector lines to the injectors. The fuel pressure regulator in the high pressure pump and the pressure regulating valve in the rail control rail pressure. The injectors have a piezo stack instead of an electro-magnetic solenoid. When energized, the piezo crystals expand, lifting the control valve off of its seat via a hydraulic coupler (connecting plunger below) to begin injection. If the valve seat in the injector is leaking or the pressure regulating valve leaks then it will not build enough rail pressure to start the engine.

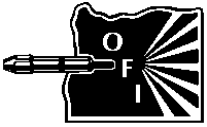


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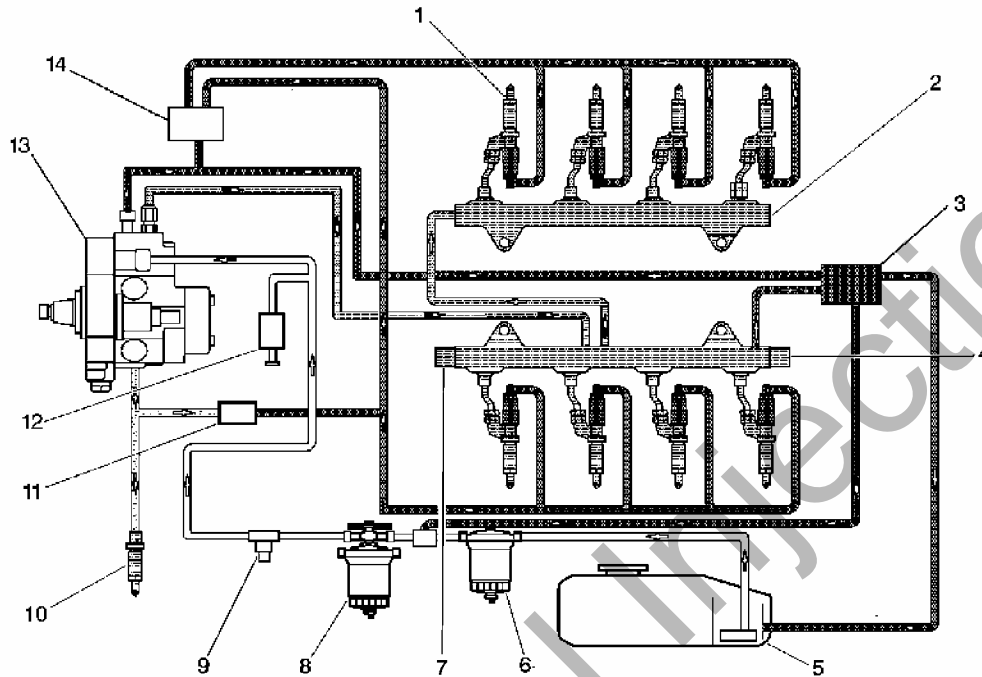
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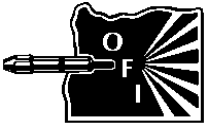
The fuel tank (5) stores the fuel supply. A mechanical high pressure fuel injection pump (13), located below the engine intake, includes the fuel supply pump and the high-pressure pump. Fuel is drawn through the diesel fuel conditioning module (8), which combines a water separator, hand operated fuel prime pump, filter element and then through a fuel filter vacuum switch (9) to the fuel injection pump. The engine control module (ECM) controls the fuel pump pressures by using two fuel pressure regulators, fuel pressure regulator 1 is located on top of the fuel injection pump and fuel pressure regulator 2 (7) is located on a fuel rail (2). The fuel pressure sensor (4) provides a voltage signal to the ECM to indicated fuel rail pressures. The high pressure fuel is supplied to the fuel injectors (1) through separate high pressure pipes. The fuel injectors supply fuel directly to the combustion chambers of the engine. The fuel that is not injected into the combustion chamber is used to help lubricate and cool the injector and is routed back to the fuel tank. The fuel injector return line pressure regulator (14) maintains fuel pressure on the return side of the fuel injectors. This is required for proper fuel injector operation. In the event the vehicle runs out of fuel a check valve (11) in the exhaust aftertreatment fuel injector (10) supply line opens and the fuel supply pump back fills the return side with fuel. (Courtesy GM)

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## CAUTION

The fuel system contains high pressure fuel up to 29,000 PSI. Do not use your fingers to find fuel leaks! High pressure fuel entering your bloodstream may result in amputation or loss of life.

Check and record any DTC, look at snap shot data or save, do not erase codes prior to doing repairs, you will erase the snapshot and other relevant data.

## No Start or Hard Start

1. Confirm actual versus desired rail pressure even under crank no start conditions, to confirm the starting issue is rail pressure related. If rail pressure matches desired, diagnose other codes that may be related to starting problems.
2. Use a vacuum gauge to check the suction side of the fuel system. You should have no more than 5 inches Hg at WOT (wide open throttle) or 7-8 inches Hg under load. If you still have too much restriction after changing the filter, check for collapsing soft fuel lines by the drivers side valve cover and under the truck near the transmission. The fuel tank pick up may also be plugged. Too little vacuum (less than 2 inches Hg) means that it could be sucking air.
3. Check for air in fuel system; install clear lines before and after the filter housing to check for air in the lines.
4. Verify the fuel injector return line pressure is greater than 3 BAR (see “Fuel Injectors” for more information). [Buy LML Injector Return Rail](#)
5. Check the injector returns. Doing this correctly requires special tools. See GM service information. If everything else checks OK, they can also be sent in for testing. [Buy Bosch LML or LGH Injectors.](#) [Injector Testing Information.](#)
  - a. (No Start) Disconnect the electrical connector and return line from one injector. Plug the fuel return line fitting with a suitable tool (CH-50377-A). Crank the engine for 15 seconds and verify no fuel leaks from the injector. If fuel leaks from the injector, replace it. Repeat for all eight injectors.
  - b. (Hard start but runs) Disconnect the return line from one injector. Plug the fuel return line fitting with a suitable tool (CH-50377-A). Use adapter CH-50378 (required to accurately test return, contains regulator to maintain injector return pressure) to route the injector return into a graduated container. Crank or idle the engine until fuel is dripping out of the line. Crank or idle the engine for 15 seconds and measure the return quantity. If the quantity is greater than 3 ml in 15 seconds, replace it. Repeat for all eight injectors.
6. Remove the return hose from the fuel pressure regulator 2 (pressure control valve in left hand rail) and plug the hose. Crank the engine for 15 seconds and measure the fuel from the regulator. The volume of fuel should be less than 10 ml. If it is more, replace the regulator. **The high pressure seal on the pressure control**

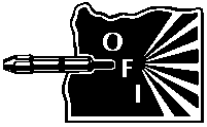
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valve is one time use. Do not remove the pressure control valve unless you are sure it is defective and you are replacing it. [Buy Fuel Pressure Regulator 2](#)

7. Unplug the fuel pressure regulator 2 (pressure control valve in left hand rail) electrical connector. Crank the engine for 15 seconds and verify there is a steady flow of fuel from the fitting on the rail. If there is not, proceed to checking/replacing the high pressure pump.
8. Remove the high pressure regulator from the high pressure pump and check for metal debris. If there is metal found, the entire high pressure fuel system must be checked for metal and replaced as needed. GM recommends replacing the injection pump, rails, high pressure fuel lines, fuel injectors, fuel return rails, indirect fuel injector, and indirect injector fuel feed tubes if metal is found. (See picture under High Pressure Pump). [Buy LML LGH Fuel System Repair Parts](#)

### Black Smoke

**\*\*\*\*Diagnosing smoke related issues on trucks equipped with diesel particulate filters may require temporarily disconnecting the filter or installing a test pipe to see the smoke. Excessive smoke from the tailpipe with a DPF installed usually means the DPF is damaged and may need replaced.**

1. If at idle, use the scan tool to cut out one cylinder at a time and see if the smoke disappears.
2. Dirty air filter
3. Exhaust leaks or Boost leaks, you can usually hear a boost leak as a high pitched squeal or unusual rushing or whooshing air sound under load.
4. Inspect the mass air flow (MAF) sensor for obstruction, contamination, and damage.
5. Inspect for the EGR valve sticking open. Command the valve to 20%. Desired and actual position should not be more than 3% different.

### Misses /Cuts Out

1. Use scan tool to isolate one cylinder at a time. Monitor injector balance rates in park or neutral. Injector balance rates outside of +4 to -6.9 indicate a problem with that cylinder or injector.
2. A missing or damaged chamber gasket or low compression could cause a miss.
3. Crankcase overfull (fuel dilution) can cause a rough run and balance rates out of specification.
4. Inspect the CKP sensor reluctor wheel. Remove the CKP sensor and attempt to move the reluctor wheel front to back or side to side with a probe. If there is any movement, the reluctor wheel retaining bolts are loose.
5. Inspect for an intermittent FRP sensor signal by wiggling the harness between the sensor and the ECM with the ignition ON and the engine OFF, while monitoring the parameter with a scan tool.

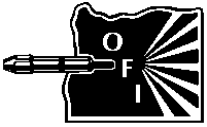
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### Knock

1. Use scan tool to isolate one cylinder at a time. Monitor injector balance rates in park or neutral. Injector balance rates outside of +4 to -6.9 indicate a problem with that cylinder or injector.
2. Use cap off tools to block off one injector at a time.
3. A slight knock can start occurring due to injector problems, often after a contaminated fuel problem.

### Surge or Lope at idle

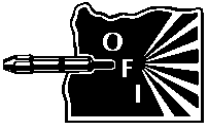
1. Fuel pressure regulator: Map actual versus desired rail pressure, if the graph has a “shark tooth” pattern and there is no air in the system, it is usually caused by a bad fuel pressure regulator.
2. Inspect for an intermittent FRP sensor signal by wiggling the harness between the sensor and the ECM with the ignition ON and the engine OFF, while monitoring the parameter with a scan tool.
3. Air in the fuel system (see fuel supply and filter housing section)
4. Inspect the CKP sensor reluctor wheel. Remove the CKP sensor and attempt to move the reluctor wheel front to back or side to side with a probe. If there is any movement, the reluctor wheel retaining bolts are loose.

### White or blue smoke at idle

**\*\*\*\*Diagnosing smoke related issues on trucks equipped with diesel particulate filters may require temporarily disconnecting the filter or installing a test pipe to see the smoke. Excessive smoke from the tailpipe with a DPF installed usually means the DPF is damaged and may need replaced.**

If the smoke clears in less than 1 minute, this could be normal depending on temperature and altitude. Blue white smoke that burns your eyes is un-burnt fuel; cold temperatures, high altitude and excessive idle time all mean cold combustion and white smoke.

1. Possible bad injector, use the scan tool to cancel one cylinder at a time and see if the smoke clears up. However, using the scan tool to kill the injector does not reduce rail pressure in the injector and the tip can still leak fuel, cap off lines one at a time to pinpoint injector. Also look at the balance rates, if the tip is leaking fuel then the balance rates may be out of specification. Try increasing the rail pressure, we find injector nozzles that leak at idle pressure, but do not leak at higher pressure.
2. Check glow plug operation when cold.
3. Check rail pressure when engine is off, it should be 0 PSI.
4. Inspect the engine coolant temperature (ECT) sensor. Use the scan tool in order to compare the ECT with the ambient air temperature on a cold engine. The readings should be within 5 degrees on one another.



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5. Check the coolant level in the reservoir. White coolant smoke may be mistaken for blue/gray smoke. If the coolant level is low, diagnose the cooling system. Coolant smoke will smell sweet and not burn your eyes like fuel smoke.
6. Excessive idle time can cause white smoke when cold due to carbon build up on injector tips. More than 20% idle time is excessive. If the injectors have excessive carbon on the nozzle tip then balance rates should be high on that cylinder.
7. Per GM TSB PI0235D, loose and/or misaligned exhaust clamp joints at the turbo downpipe can cause white smoke, a fuel smell, and fluid on the exhaust system. This is due to the fuel from the hydrocarbon injector (HCI) leaking from the joints.

### Dilution

1. Some dilution is normal for DPF equipped engines. Regeneration cycles will cause some fuel to leak past the piston rings in the cylinder and drain into the oil. Normal oil change intervals are critical for this reason. LML engines use a “Hydrocarbon Injector” to inject fuel directly into the exhaust stream post turbo. This helps greatly to extend engine oil life.
2. Leak at the high pressure pump drive shaft seal.

### Fuel Supply and Fuel Filter Housing

The fuel filter housing (AKA fuel conditioning module in GM literature) is on the suction side (there is not a fuel supply pump from the factory on pick ups) and are prone to suck air. The 2011 and newer trucks are equipped with a “fuel filter pressure switch” that will open and trigger a “Fuel Filter Restricted” message in the IPC (instrument panel cluster) when supply restriction reaches 14”. Follow the GM fuel system diagnosis in the service manual.

1. Install fuel vacuum test tool.
2. Prime the fuel system with the hand primer until 10 PSI is indicated on the gauge, check for external leaks and repair. If the pressure drops from 10 PSI to 2 PSI in less than 1 minute, remove the fuel outlet line from the filter and cap it. Remove the ignition 1 relay and crank the engine for 2 - 15 second intervals, the high pressure pump should pull at least 12 inches of Hg vacuum. If air gets into the system it will cause a false/low reading.
3. Install clear hoses at the inlet and outlet of the fuel filter housing. Re-prime the system and then start the engine, there should be very little air going into or coming out of the fuel filter housing.
4. Common air ingestion places are the filter housing, drain valve, rubber hoses and quick connections. You need to use clear lines to isolate where the air is coming from and work your way back toward the tank until you don't have any more air coming through the clear line. Unless you know where to get the tool that sees through black rubber lines to find air, your only other option is to bounce around and replace parts.

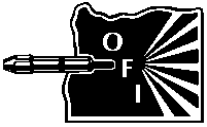
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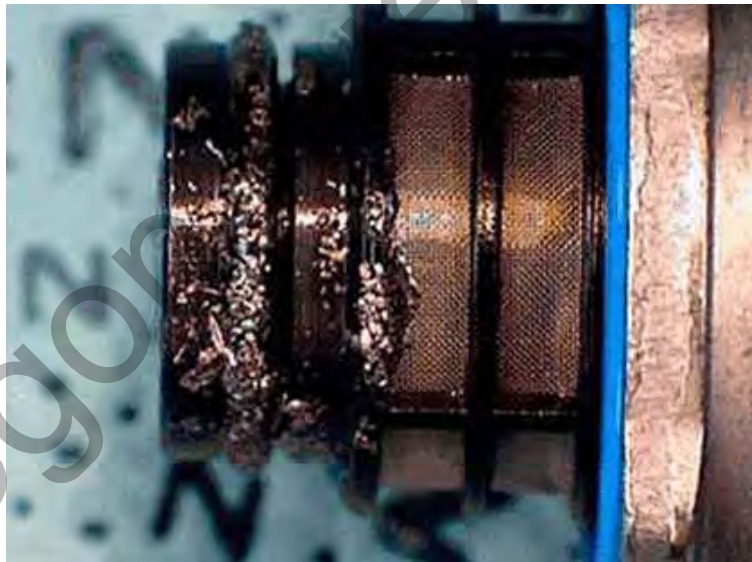


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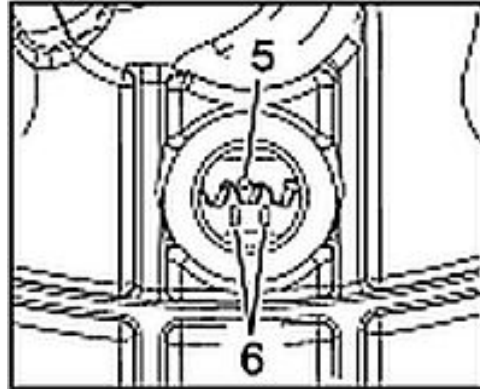
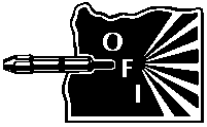
### High Pressure Injection Pump (CP4.2 Pump)

**Note: The CP4.2 pumps are not as durable as the CP3 pumps. Poor fuel supply, contamination, and/or running them out of fuel (plugged fuel filter) will cause them to fail. When they fail it is often catastrophic and they send metal particles throughout the high pressure side of the fuel system, causing further damage.**

1. Check the fuel supply system first: see “Fuel Supply” above.
2. Before condemning the pump for a starting issue you need to be certain that the high pressure fuel system is not leaking the pressure. Check the injector return and the pressure control valve in the fuel rail.
3. If there has been a major contamination issue with dirt and or water then it is very likely that the high pressure pump will need to be replaced. The injectors are typically damaged as well if the pump is damaged.
4. If the pump will not build the desired pressure while cranking and everything else checks OK, remove the regulator from the pump and inspect for metal (see picture below). If there is metal debris, the entire fuel system will need to be cleaned and/or replaced. [Buy CP4 Injection Pump](#)
5. Other CP4 Notes:
  - The CP4 pump gear must be timed properly when installed in the engine. See P



Metal contaminated fuel pressure regulator  
(Courtesy GM)



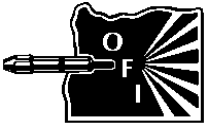
## Fuel Injectors

**Note: The injectors are a piezo type CR injector (see first page). Diagnosis is much different than the earlier generations.**

The engine control module (ECM) supplies a high voltage supply circuit and a high voltage control circuit for each fuel injector. The injector high voltage supply circuit and the high voltage control circuit are both controlled by the ECM. The ECM energizes each fuel injector by grounding the control circuit and supplying each fuel injector with up to 250 V and 20 amps on the voltage supply circuit to activate the piezo type fuel injectors. This is controlled by boost capacitors in the ECM. During the 250 V boost phase the capacitor is used to charge the injector piezo stack allowing for injector opening. The injector is then held open with this high voltage. At the end of the injection event the ECM closes the injector by discharging the injector piezo stack.

1. The injectors are cooled by a calibrated amount of fuel flow through the injector body to the injector return lines. If the injectors are worn, damaged, or contaminated, the amount of fuel flowing through the injector body may increase, resulting in improper injector performance. The maximum allowable leakage for one injector is 3 ml in 15 seconds, cranking or at idle.
2. The injectors require a minimum of 3 BAR (45 psi) of pressure in the return system. Pressure is maintained via a "Constant Pressure Regulator" at 4-11 BAR (58-160 PSI).
3. Other Injector Notes
  - Balance Rates, when checked in Park or Neutral, should indicate bad injectors. Any injectors that are more than  $\pm 6.9$  are a possible cause for rough run.
  - Miss, smoke or rough run usually indicate that the injectors are the cause. LML engines with a DPF may not show any smoke, but frequent DPF regen events would suggest poor combustion.
  - We have seen a couple of vehicles that do not have starting issues, but injector return is excessive at higher rail pressures which may cause the P0087 to set.





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- When replacing the injectors, the “Fuel Injector Correction Reset” must be done. If not, a P026D code may set.
- [Buy New or Reman Bosch LML Injectors](#)

### Turbo

1. LML turbos have a vane position sensor, check actual versus desired.
2. Vane position sensor codes indicate sticky or stuck vanes, unison ring wear, VGT actuator failure, restricted oil supply, or a VGT position sensor failure. The design of these turbos is nearly identical to 6.0l Powerstroke turbos which are known for this type of failure. The turbos may free up at higher rpm due in part to additional oil pressure/volume to drive the vane actuator piston. Stuck unison rings are much more common than actuator or position sensor failures in our experience, and can happen in as few as 40,000 miles. [Buy New Garrett LML Turbo](#)

### Diesel Exhaust Fluid

Diesel exhaust fluid (DEF), AKA reductant or urea, is injected into the exhaust gases prior to entering the SCR (selective catalyst reduction) stage. Within the SCR, NO<sub>2</sub> (Nitrogen dioxide) is converted to nitrogen, carbon dioxide, and water vapor through a catalytic reduction fueled by the injected DEF.

DEF is a mixture of 66% deionized water and 34% urea and will freeze at temperatures below 32 degrees. There are 3 reductant heaters. Reductant heater 1 is in the reductant reservoir, reductant heater 2 is in the supply line to the reductant injector, and reductant heater 3 is at the reductant pump. The ECM monitors the reductant temperature sensor located within the reservoir in order to determine if reductant temperature is below its freeze point. If the ECM determines that the reductant may be frozen, it signals the Glow Plug Control Module (GPCM) to energize the reductant heaters.

Optimum NO<sub>x</sub> reduction occurs at SCR temperatures above 250°C (480°F). At temperatures below 250°C, the incomplete conversion of urea forms sulfates that can poison the catalyst. To prevent this poisoning, the ECM suspends DEF injection when exhaust temperature falls below a calibrated limit. Because of this, any issues with the EGT sensors will affect DEF system operation. **EGT sensor and DEF system codes set at the same time are likely related.**

**In order to properly diagnose and repair the DEF system, a Tech2 or GM MDI scan tool and GM service information is required. There are many safeguards and reset procedures that must be completed when repairs are made in order for the systems to function normally.**

**Reductant quality indicators may show up in the IPC (instrument panel cluster) with no ECM codes. If this happens the Reductant Fluid Quality Test will need to be performed with a scan tool. This test can take up to 70 minutes with the engine running.**

Other notes:

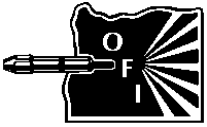
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- A leak in the reductant system can be located by inspecting for a build-up of crystallized diesel exhaust fluid.

### Diesel Particulate Filter

The diesel particulate filter traps soot from the exhaust to lower particulate emissions. During certain driving conditions the engine will perform a regeneration cycle, which will use additional fuel injections and the catalyst to heat up the exhaust temperatures to the point where the soot will be burnt out and form ash. Over time the DPF will become “ash loaded” and need replaced or cleaned.

***Any engine drive-ability issues or fuel system failures will cause premature plugging or failure of the DPF. If the DPF is plugging repeatedly or requiring excessive regeneration cycles there is probably another problem with the engine, turbocharger, fuel system, or EGR system. Repair all other problems PRIOR to addressing the DPF issues.***

1. DO NOT reset the DPF unless the DPF has been replaced or cleaned (removed and cleaned, not regenerated in the vehicle) or the service information instructs you to. The ECM keeps track of fuel used, soot, and ash load. Excess soot and ash load will result if the timer is reset without replacing or cleaning the DPF.
2. If the DPF has been deleted, customers will have run-ability issues if they do not have the correct software. We have also seen EGR related issues that do not set codes with delete software installed. These problems may cause heavy smoke and low power, as well as some other symptoms.
3. A plugged DPF can cause a turbo failure by forcing exhaust under excess pressure around the turbine shaft seals. Low boost/low power complaints must be diagnosed properly and completely prior to repairs!
4. Excessive idle time will also cause DPF restriction due to particulate build up at idle. This will cause poor mileage (zero MPG when idling) due to more frequent regeneration events. Excess idle time could be defined as leaving the pick up running while hooking up a trailer.
5. Using Stanadyne Performance Formula fuel additive, which improves cetane, will reduce regeneration events and improve mileage around town. This is due to a better burn when cold and fewer particulates getting to the DPF.

**Use the following information regarding diagnostic trouble codes in addition to the normal diagnostic procedures outlined in the service manual or technical service bulletins.**

### DTC Codes

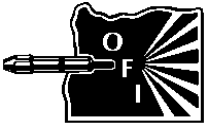
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### **P003A Turbo Boost Control Position Not Learned**

1. Usually sets in conjunction with a P2563 Turbo Boost Control Sensor Performance code. This code usually sets when the unison ring in the turbo is sticking.
2. A defective VGT position sensor can also cause this code to set.
3. Use a Tech2 scan tool to attempt VGT learn. If it will not learn, the unison ring is likely sticky or stuck.

### **P0087 Fuel Rail Pressure Too Low**

See Hard Start/No Start above

### **P0101 MAF Sensor Performance**

1. Most commonly sets due to an aftermarket air filter or intake kit/modifications.
2. Check for ECM updates
3. May cause the engine to go into a limp mode.
4. Can be caused by a restricted DPF or other exhaust components

### **P0191 Fuel Rail Pressure Sensor Performance**

1. Most commonly caused by a defective pressure control valve (fuel pressure regulator 2) or high pressure regulator (fuel pressure regulator 1)
2. The fuel pressure regulator 2 is on the Left Hand (LH) fuel rail. At idle, fuel pressure regulator 2 is used to maintain the desired fuel pressure. If fuel pressure regulator 2 is leaking, the actual pressure will be at least 690 KPa/100 PSI below the desired fuel pressure. Running the engine above 1700 RPM switches the fuel pressure control mode to fuel pressure regulator 1. If fuel pressure regulator 1 is leaking or binding, the fuel pressure will fluctuate above and below the desired fuel pressure by greater than 690 KPa/100 PSI.
3. Check fuel pressure regulator 2 as outlined in "Hard Start/No Start" above.
4. Check engine harness for chafing on the A/C line, near A/C compressor. Known area of harness rub-through.

### **P0401 EGR Insufficient Flow**

1. Check for ECM updates
2. EGR coolers commonly will plug up and cause this code to set.
3. EGR valve failure may cause this code to set.
4. Aftermarket air intake kits or filters can cause MAF related codes to set.

### **P0420 Catalyst System Low Efficiency**

- Similar to P24A0 Diagnosis. This code commonly sets due to a Hydrocarbon Injector failure. Check EGT sensors first, see P24A0.

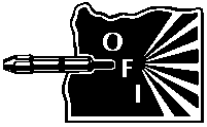
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1. Perform the regeneration and note the exhaust temperature sensor #2 to be over 1000 degrees with temperature sensor #1 more than 600 degrees.
2. If the #2 exhaust temperature is cool, remove the hydrocarbon injector from the exhaust downpipe (the electrical portion of the injector is on the right hand valve cover).
3. With the engine running, energize the hydrocarbon injector using an injector driver tool or other suitable means and expect fuel to exit the injector nozzle. If no fuel, replace the injector and verify diesel fuel is present at the injector during disassembly.

### **P0546** EGT Sensor 1 Circuit High Voltage

1. See P2033, similar procedure, different sensor. Either the sensor or wiring is defective.

### **P0571** Cruise Control Brake Switch Circuit Malfunction

1. Almost always sets due to a bad brake lamp switch but can also be a third brake light, fuse, or cruise control switch, among other possible causes.
2. This code will keep the ECM from performing regeneration and will often lead to other DPF related codes (P1448, P244B, P2463)

### **P20B9** Reductant Heater 1 Control Circuit

1. Typically indicates a failed DEF heater in the DEF tank. Perform diagnostic procedures as outlined in service information.

### **P20EE** Nox Catalyst Efficiency Below Threshold

- Using fuel other than ultra low sulfur content fuel will cause this DTC to set.
1. Check fuel quality. Poor quality fuel, biodiesel, high sulfur fuels may cause this code to set.
  2. Water in the reductant tank will cause this DTC to set. Multiple Reductant Fluid Quality tests will be necessary to heal the system once the reductant is replaced with fresh reductant.
  3. Check for available ECM updates
  4. EGT sensor, EGR, and MAF codes, among others, will cause this code to set. Repair these codes first.
  5. Perform diagnostic procedures as outlined in service information.

### **P20E2** EGT Sensor 1-2 Correlation

1. Sets in conjunction with P0546/P2033 or other EGT related codes
2. Diagnose sensor codes first

### **P204F** Reductant System Performance

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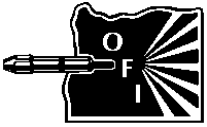
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- The ECM detects the reductant pressure did not reach a calibrated threshold after an initial attempt to build up pressure
  1. This code may set if the DEF is frozen
  2. It may also indicate a bad DEF pump. Perform diagnostics as outlined in service information.

**P207F**- See P20EE

### **P2033** EGT Sensor 2 Circuit High Voltage

- Sensor 2 is between the DOC and DPF
  1. Most commonly caused by a bad EGT 2 sensor, although it can also be a wiring issue.
  2. If the EGT reads 1800+ degrees KOEO, use a fused jumper wire to jump the two EGT sensor wires at the harness connector. The temp should read less than -40 degrees. If it does, replace the EGT sensor. If not, check wire harness and connector.
  3. This code will keep the DPF from regenerating.

### **P2146, P2149, P2152, P2155** Injector Positive Voltage Control Circuit Group 1-4

- Group 1–DTC P2146 with injectors 1 and 4
- Group 2–DTC P2149 with injectors 6 and 7
- Group 3–DTC P2152 with injectors 2 and 5
- Group 4–DTC P2155 with injectors 3 and 8
  1. Shorted injector solenoids or wire harnesses may cause these codes to set.

### **P244B** DPF Differential Pressure Too High

1. Perform service regeneration procedure
2. Make sure there are no other engine or drive train codes that will keep the ECM from performing regular regeneration cycles.

### **P2463** DPF Soot Level Accumulation

1. Perform service regeneration procedure
2. Refer to GM TSB 10-06-05-002
3. The DPF may need to be removed and cleaned or replaced
4. A faulty hydrocarbon injector system can cause excessive soot accumulation

### **P24A0** Closed Loop Diesel Particulate Filter (DPF) Regeneration Control at Limit - Temperature Too Low

- This code commonly sets due to a Hydrocarbon Injector failure.

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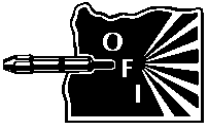
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1. Let the vehicle and exhaust cool to ambient air temperature and then using the scan tool, check all 4 exhaust gas temperature (EGT) sensors. They should read ambient.
2. If any of the EGT sensors do not read ambient air temperature, check the resistance of the EGT sensor and compare the sensor reading with the temperature versus resistance chart in document ID 1847002.
3. If the EGT sensor is not within the resistance chart specification, replace the EGT sensor.
4. If all sensors are reading the same ambient air temperature: Start the vehicle and bring the vehicle up to operating temperature. Using the scan tool, command DPF regeneration while monitoring EGT sensors 1 and 2.
5. During a DPF regent, EGT1 should be between 482-752 degrees Fahrenheit, and EGT 2 should be the hottest of all the sensors in the range of 1022-1292 degrees Fahrenheit.
6. If the EGT2 is less than 1022-1292 Fahrenheit, check the intake system for leaks or restrictions, Exhaust system for leaks or restrictions, Exhaust Aftertreatment Fuel Injector for correct flow, Exhaust Gas Recirculation (EGR) for normal flow, turbocharger for normal operation.
7. If everything checks OK, test the Hydrocarbon Injector for proper flow and operation. See P0420.

### **P2599 Turbo Boost Control Position Performance- High Position**

1. Commonly sets when the unison ring is sticking in the turbo. Usually sets in conjunction with a P003A Turbo Boost Control Position Not Learned code.
2. A defective VGT position sensor can also cause this code to set.

### **Other Useful Tips**

- Medium Duty GM trucks (C4500+) may have a rear axle steer switch located in the center of the dash. If this switch is turned on, the engine will have low power, low boost, and low rail pressure readings. *This switch will also be in trucks without rear steer!*
- Chassis Cab and Medium Duty trucks with a PTO will exhibit the same symptoms as listed above if the switch is on.
- Injector commanded pulse width can be used to determine injector/cylinder issues. As a general rule, anything under .30 ms at idle in gear will indicate an over fueling injector. Anything over .50 will indicate an under fueling injector or weak cylinder.
- Firing Order 1-2-7-8-4-5-6-3

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