



# Service Bulletin

Bulletin No.: 16-NA-102

Date: August, 2019

## TECHNICAL

**Subject: Duramax Diesel Hard Start, No Start, DTCs P0087, P0088, P0191, P128E or Injection Pump Replacement**

Brand:	Model:	Model Year:		VIN:		Engine:	Transmission:
		from	to	from	to		
Chevrolet	Express	2010	2016			Diesel (RPOs LML or LGH)	
	Silverado 2500/3500						
GMC	Savana						
	Sierra 2500/3500						

<b>Involved Region or Country</b>	North America, Israel
<b>Condition</b>	<p>Some customers may comment on one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>• Hard start</li> <li>• No start</li> </ul> <p>Some technicians may find one or more of the following DTCs set in the Engine Control Module (ECM):</p> <ul style="list-style-type: none"> <li>• P0087: Fuel Rail Low Pressure</li> <li>• P0088: Fuel Rail High Pressure</li> <li>• P0191: Fuel Rail Pressure Sensor Performance</li> <li>• P128E: Fuel Rail Pressure Performance</li> </ul> <p>⇒ Normal SI Diagnostics may be inconclusive or lead to Fuel Injection Pump replacement.</p>

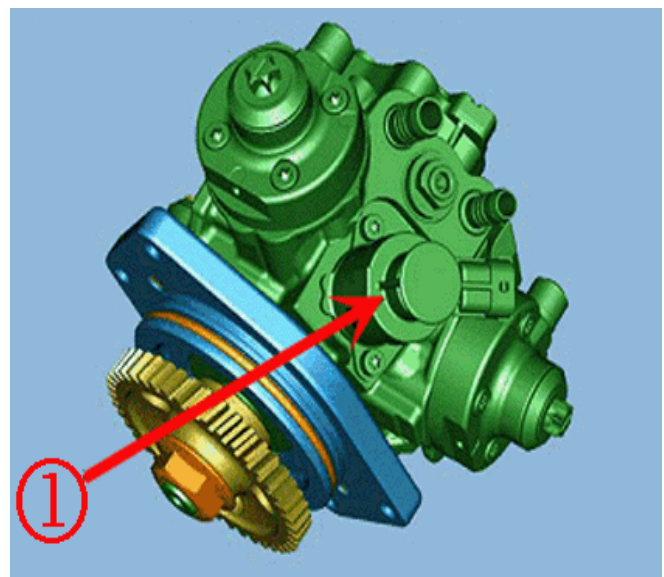
## Service Procedure

### Fuel Injection Pump Diagnosis Procedure

Complete the current SI diagnostics for any symptoms or DTCs found.

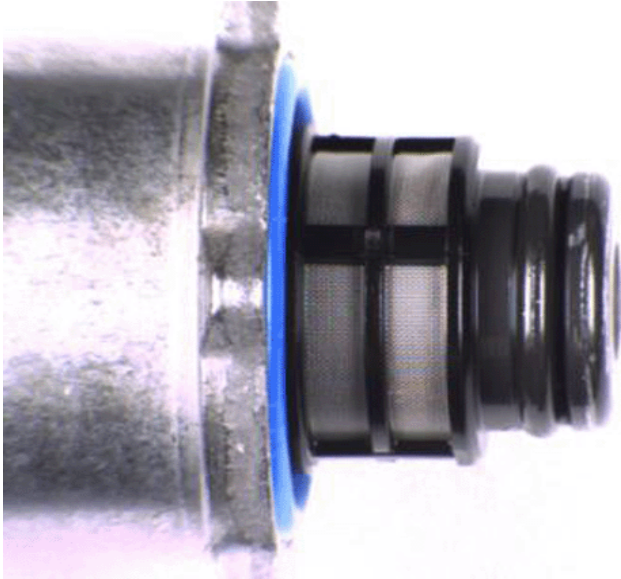
If the current SI diagnostic has led to Fuel Injection Pump replacement, replace the fuel injection pump. Refer to *Fuel Injection Pump Replacement* in SI. Once the fuel injection pump is removed, remove the Fuel Pressure Regulator 1 and inspect for debris that can be picked up with a magnet.

**Note:** Clean the area around Pressure Regulator 1 before removal. It is possible that road debris could find its way into the regulator port when it is removed. A small piece of dirt on Pressure Regulator 1 does not qualify for the fuel system repairs recommended in this Bulletin.



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Remove the Fuel Injection Pump / Pressure Regulator 1 for inspection.

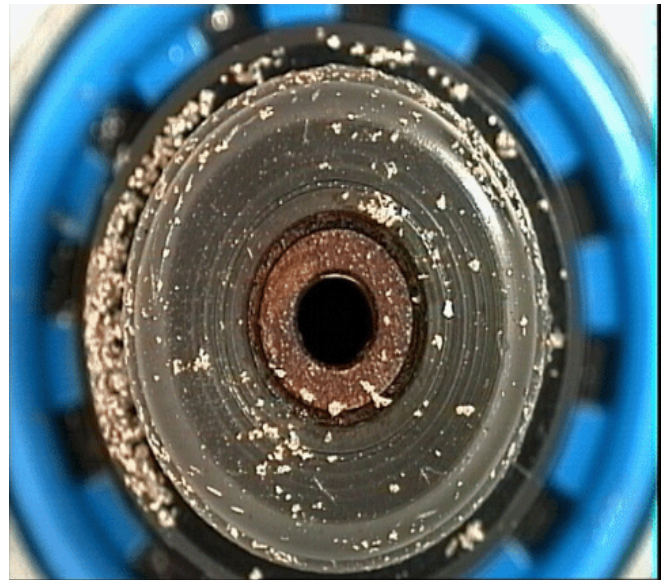


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If Pressure Regulator 1 has no debris that can be picked up with a magnet on the screen, continue with Fuel Injection Pump replacement.



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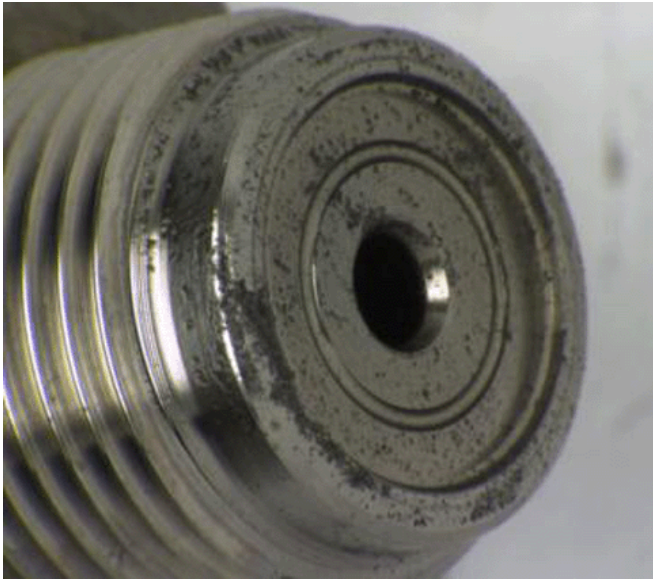


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If there are only a few pieces of debris that can be picked up with a magnet found on Pressure Regulator 1, remove the Fuel Rail Pressure Sensor and/or Fuel Pressure Regulator 2 (Pressure Relief Valve) for inspection.



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If additional debris that can NOT be picked up with a magnet (Contamination) is found on the Fuel Pressure Regulator 1, Fuel Rail Pressure Sensor, and/or Fuel Pressure Regulator 2 (Pressure Relief Valve), refer to PIP5370 and Contaminants-in-Fuel Diagnosis. DO NOT perform the repair listed in this bulletin.

**Important:** If debris that can be picked up with a magnet as described above is found, complete the repairs listed below:

## Service Procedure For All Vans

### Cleaning and Flushing Procedure

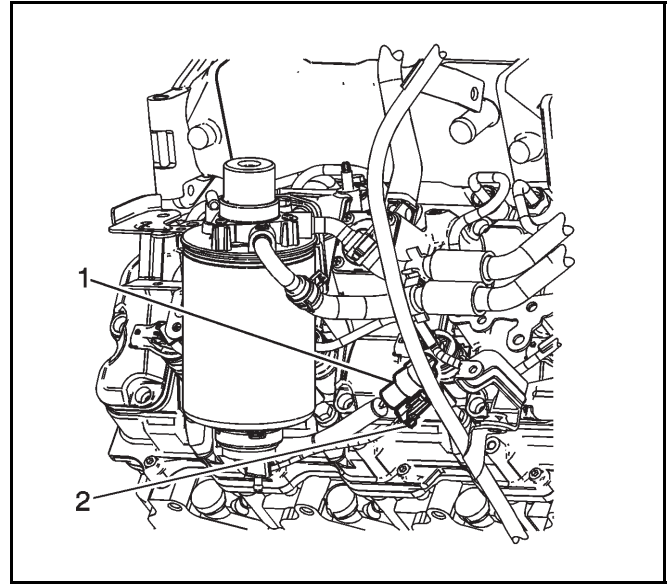
1. Replace all the parts listed in the Parts Information below.
2. Clean and flush all fuel chassis lines, filter pipes, and other engine mounted fuel system pipes that are not being replaced.
3. The fuel filter housing must be cleaned with a new fuel filter installed.
4. The fuel tank and fuel sender must be cleaned and flushed.

**Note:** The Indirect Fuel Injector (Hydrocarbon Injector) and its fuel lines must be purged of air any time it is removed or replaced. Failure to do so may damage the injector. Perform the Diesel Particulate Filter (DPF) Regeneration Enable any time the indirect injector or its fuel lines are opened/removed or replaced. This will force regeneration as soon as conditions allow and will purge any air from the system. Refer to *Diesel Particulate Filter (DPF) Regeneration Enable* in SI.

## Service Procedure For All P/U Trucks

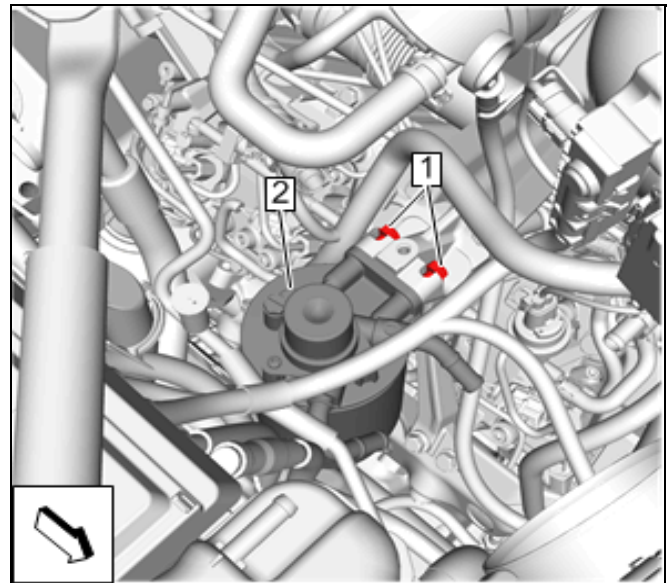
### Removal Procedure

**Warning:** The ignition must be in the off position and all electrical loads must be turned off before servicing any electrical component. Failure to do so may result in personal injury or damage to the vehicle.



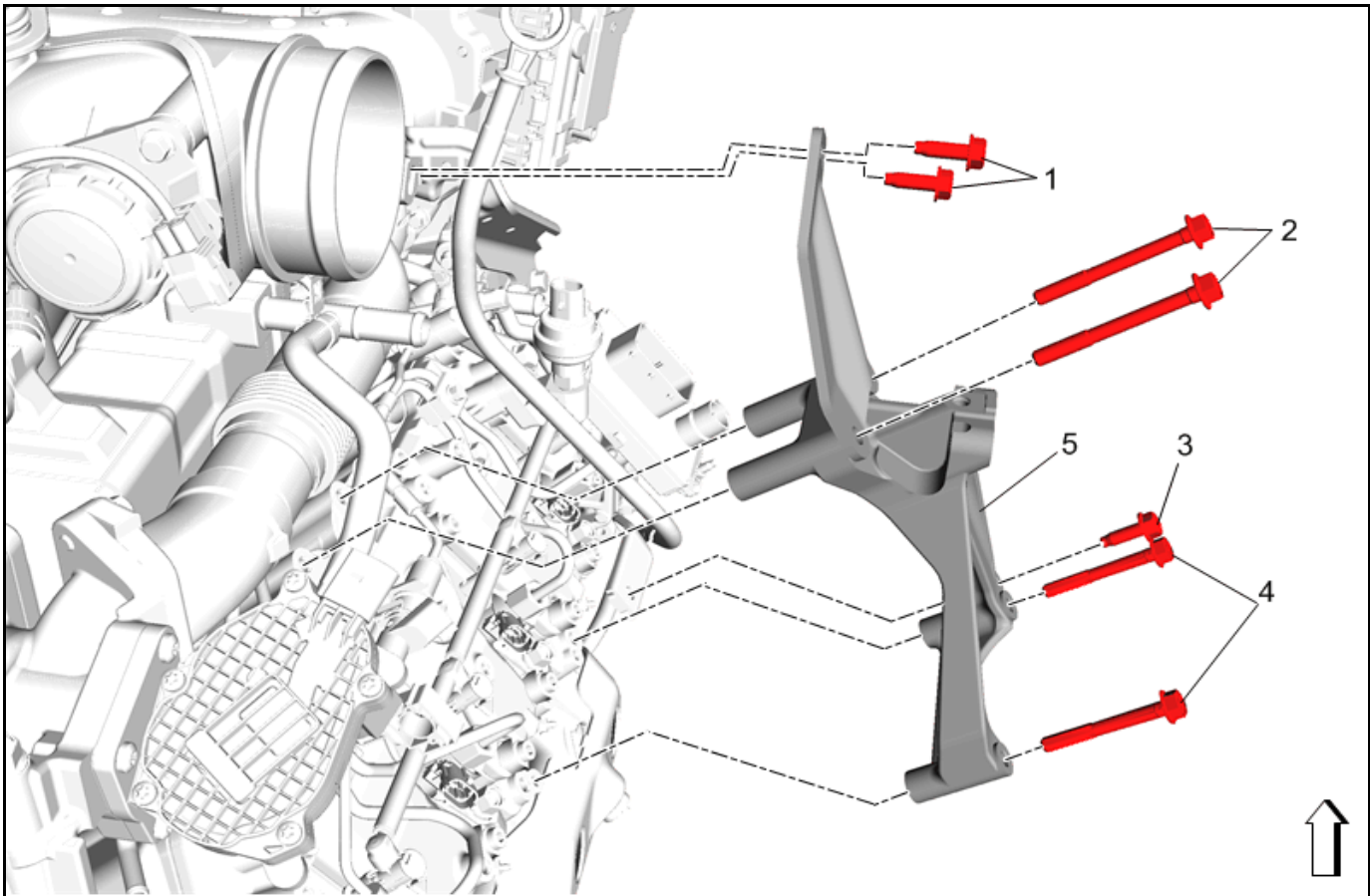
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1. Disconnect the water in fuel sensor wiring pigtail (2) from the engine wiring harness electrical connector.



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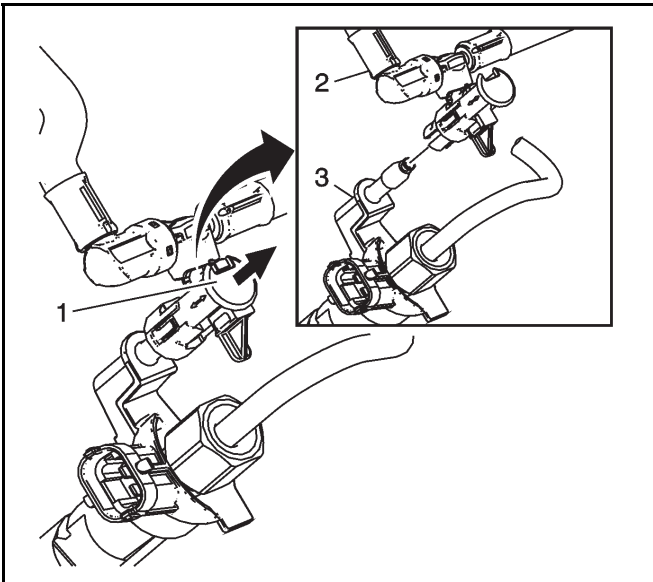
2. Remove the fuel filter assembly (2). Refer to *Fuel Filter Assembly Replacement* in SI.



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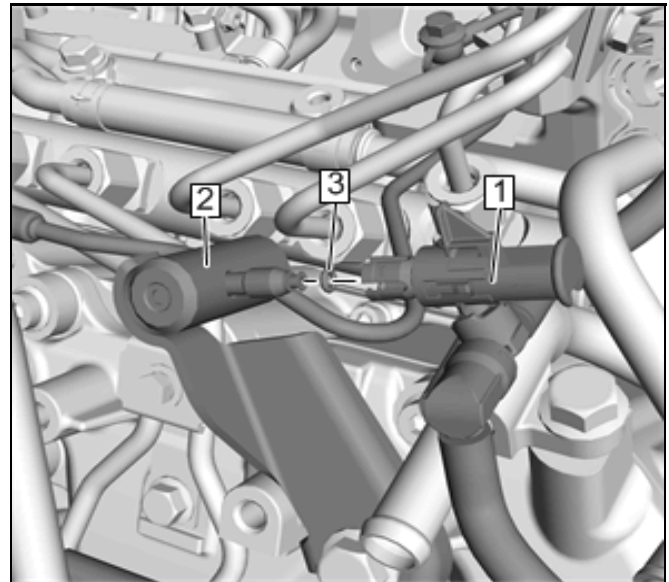
3. Remove the fuel filter bracket (5). Refer to *Fuel Filter Bracket Replacement* in SI.

7. Remove the fuel return pipe bracket bolt from left valve cover.



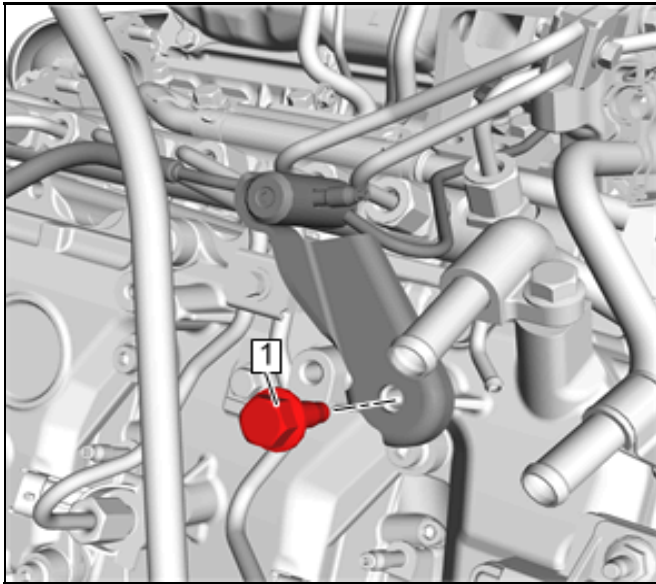
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4. Disengage the fuel return line by pulling upward on the cylindrical locking sleeve (1).
5. Remove the fuel return line (2) from the fuel injectors (3).
6. Repeat step 5 for the remaining injectors.



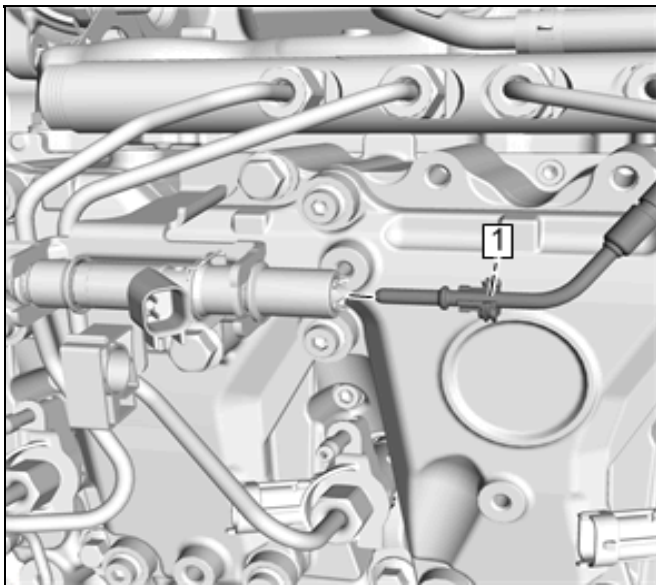
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8. Disconnect the fuel return hose from the fuel feed pipe.
9. Remove the fuel injector fuel return line assembly (1) and discard.



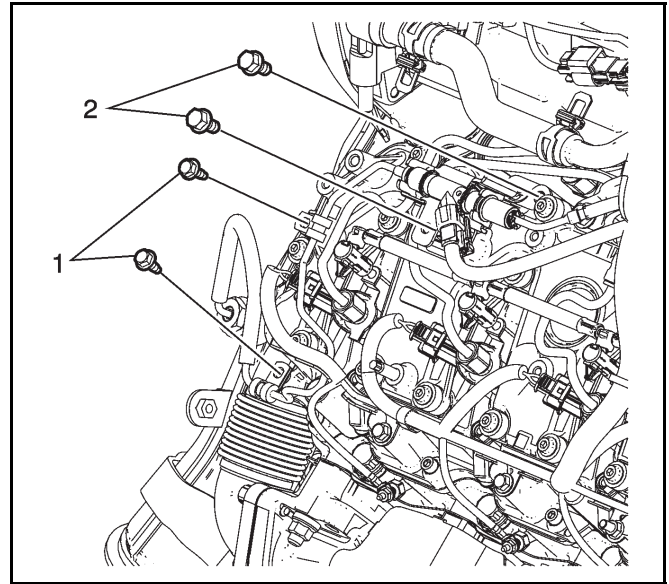
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10. Remove the bolt (1) that secures the fuel feed pipe bracket.



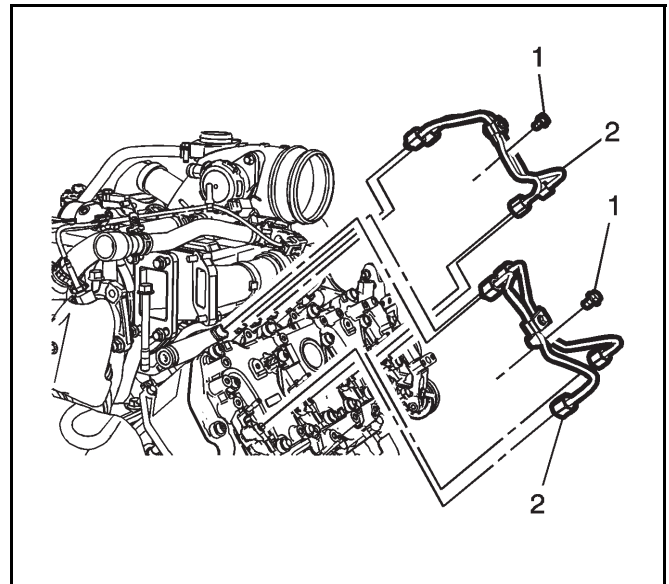
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11. Remove the fuel line at the quick connect fitting (1).
12. Remove the fuel feed pipe and discard.



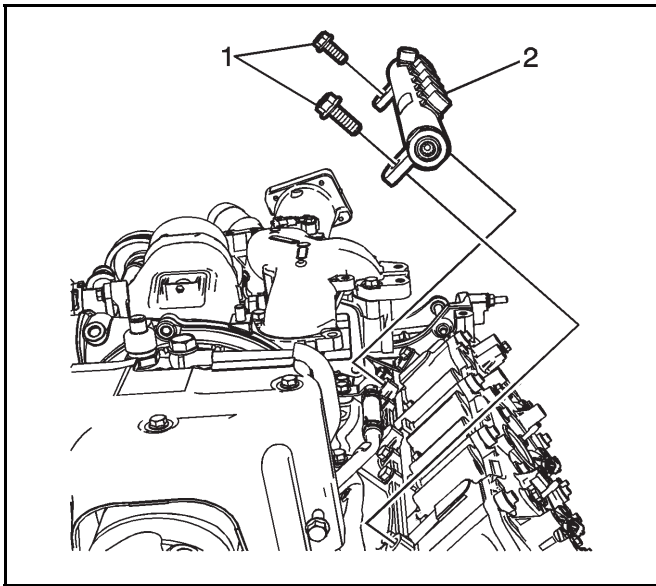
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13. Remove the indirect fuel injector fasteners (1, 2).
14. Remove the indirect injector fitting.
15. Remove and discard the indirect injector using the CH-49736 tool.



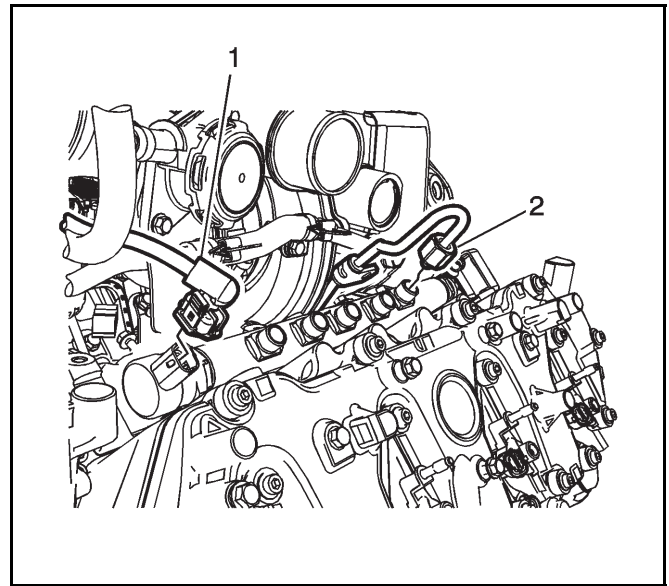
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16. Remove the two right bank fuel injection fuel feed pipe bracket fasteners (1).
17. Remove and discard the four fuel injection fuel feed pipes (2).



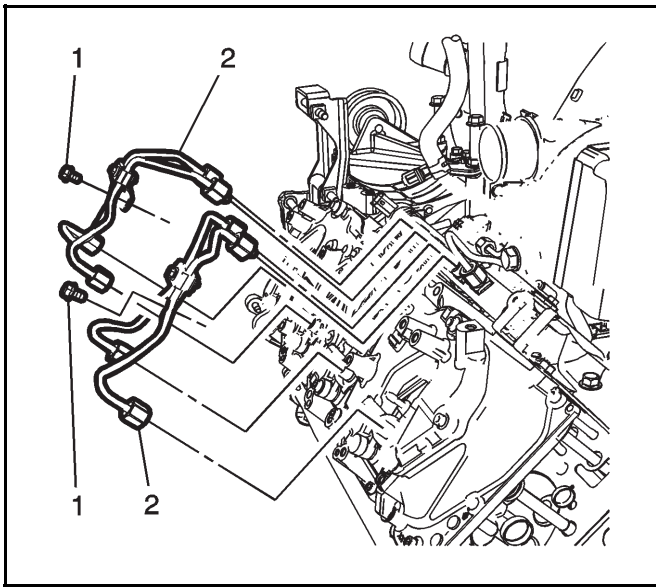
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- 18. Remove the right bank fuel rail fasteners (1).
- 19. Remove and discard the right bank fuel injection fuel rail assembly (2).



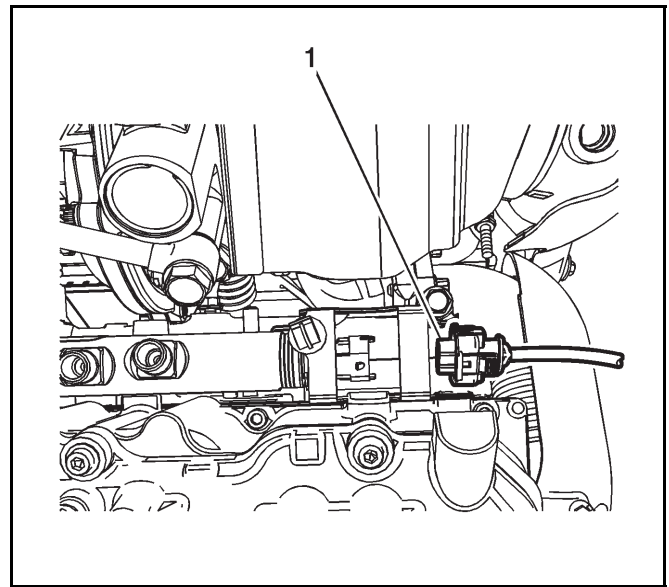
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- 22. Disconnect the fuel pressure relief valve electrical connector (1).



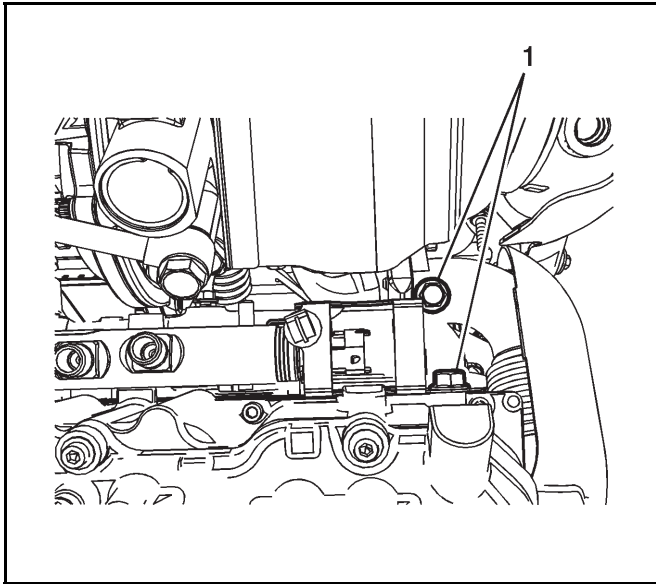
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- 20. Remove the two left bank fuel injection fuel feed pipe bracket fasteners (1).
- 21. Remove and discard the four fuel injection fuel feed pipes (2).



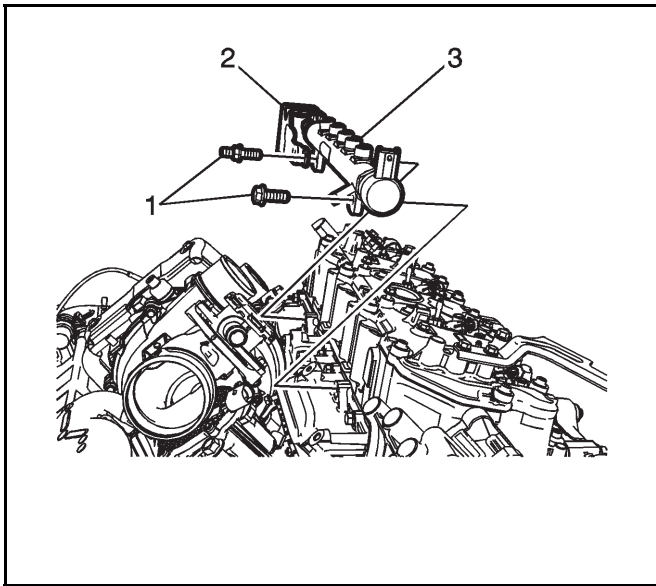
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- 23. Disconnect the fuel pressure sensor electrical connector (1).



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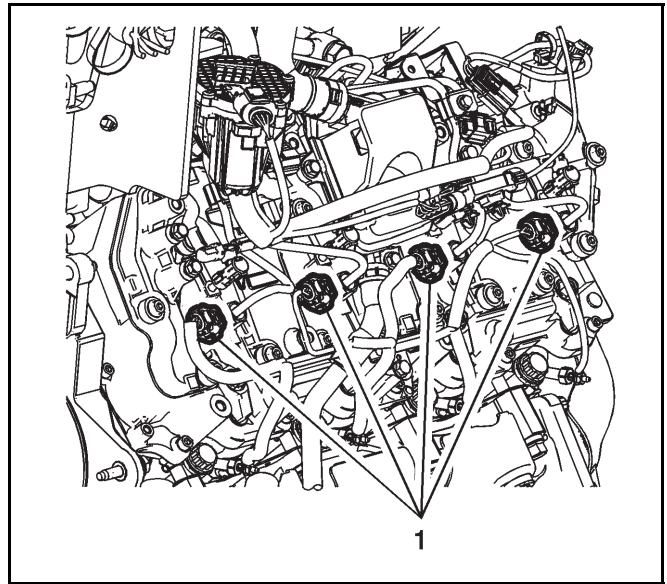
24. Remove the fuel rail heat shield fasteners (1).



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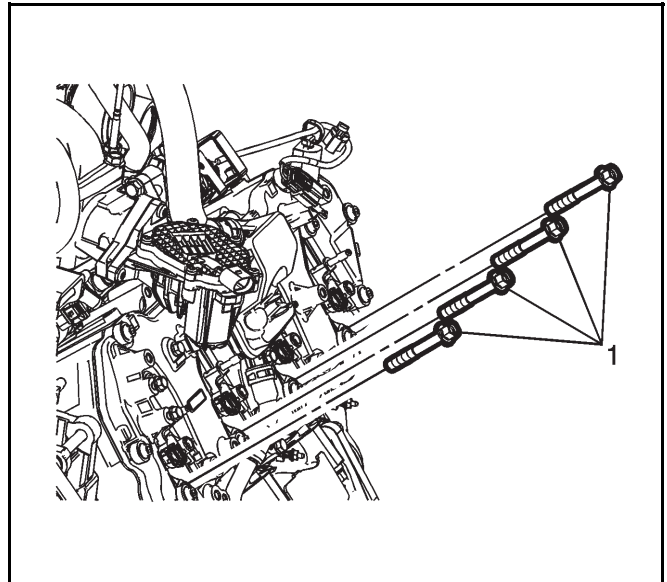
- 25. Remove the left bank fuel injection rail fasteners (1).
- 26. Remove the heat shield (2).
- 27. Remove and discard the left bank fuel injection fuel rail assembly (3).

**Caution:** Label all the injector electrical connectors before the connectors are removed in order to prevent reconnecting to the wrong injector. Failure to properly connect the injectors in the correct sequence will cause severe engine damage.



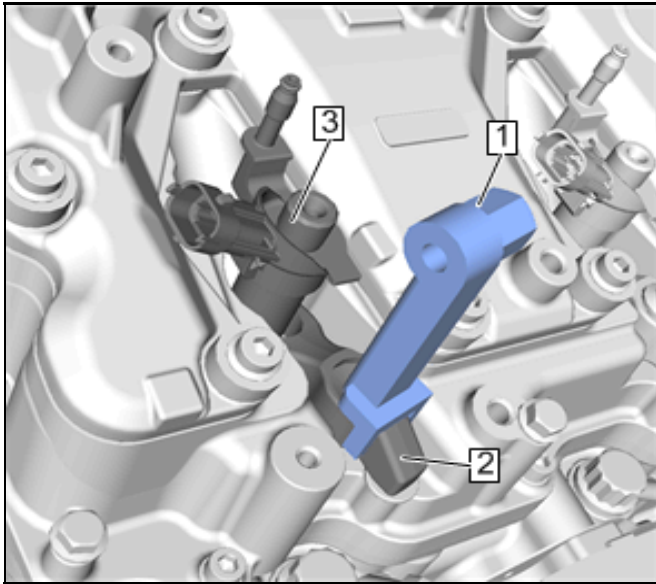
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28. Disconnect the fuel injector electrical connectors (1).



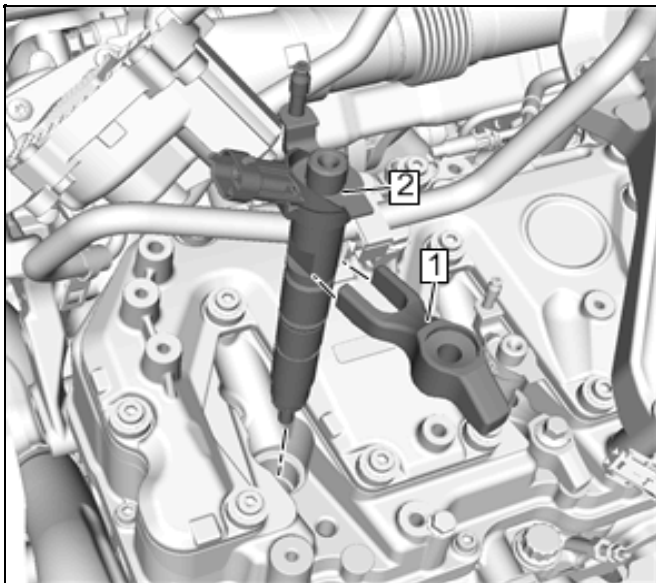
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29. Remove the fuel injector bracket bolts (1).



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30. Using one of the fuel injector brackets (2), install *EN-49774 Fuel Injector Puller* (1) into the bolt hole in the fuel injector bracket.
31. Install a suitable wrench onto *EN-49774 Fuel Injector Puller* and work the tool outward until the fuel injector (3) releases from its seat.
32. Remove the *EN-49774 Fuel Injector Puller*.



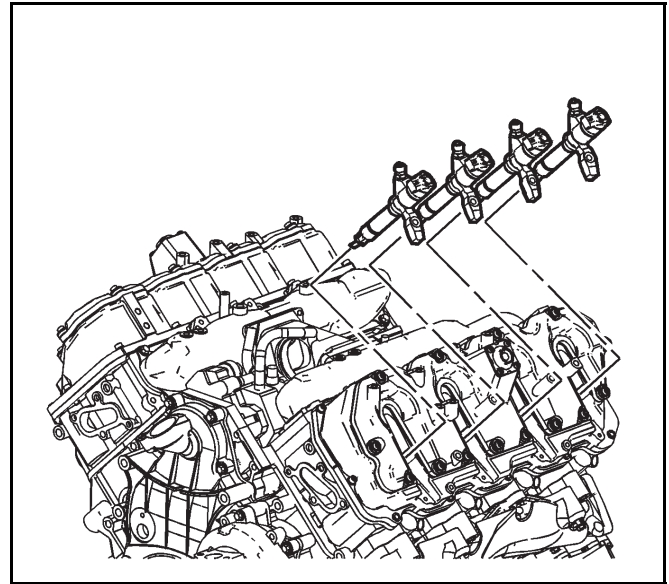
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33. Remove the fuel injector bracket (1) and fuel injector.
34. Discard the diesel fuel injector (2).
35. Repeat steps 30-34 for each injector.

## Injector Bore Cleaning Procedure

**Warning:** *Wear safety glasses to avoid eye damage.*

**Caution:** Do not allow excessive amounts of solvent to go into the cylinder during cleaning. Failure to do so may cause engine damage upon startup.



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1. Install the *EN - 47909-2 Radial Brush* to the *EN - 47909-1 T-Handle*.
2. Insert the *EN-47909-2 Radial Brush* into the injector bore and rotate the *EN-47909-1 T-Handle* to break loose any carbon deposits from the injector bore walls and the combustion deck hole.
3. Using compressed air, evacuate any debris from the injector bore.
4. Remove the *EN-47909-2 Radial Brush* from the *EN-47909-1 T-Handle*.
5. Install the *EN - 47909-3 Axial Brush* to the *EN- 47909-1 T-Handle*.
6. Insert the *EN-47909-3 Axial Brush* into the injector bore and rotate the *EN-47909-1 T-Handle* while also applying a slight downward pressure to force the brush ends into the bottom corners of the injector bore.
7. Using compressed air, evacuate any debris from the injector bore.
8. Lightly dampen *EN - 47909-20 Cotton Swab* with Top Engine Cleaner and wipe away any deposits from the injector bore. Refer to *Adhesives, Fluids, Lubricants, and Sealers* in SI.
9. Inspect the injector bore for any deposits and repeat brushing if necessary.

**Warning:** *Keep hands and face clear of glow plug holes while cranking. Hot liquid or gases may be expelled during cranking.*

10. If necessary, crank the engine to expel any solvent before starting the engine.

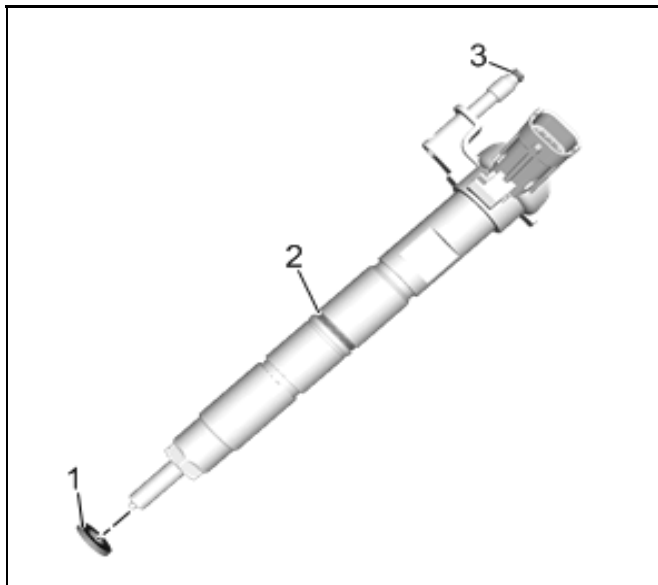


11. Remove the glow plugs;
  - Refer to *Glow Plug Replacement - Bank 1*
  - Refer to *Glow Plug Replacement - Bank 2*
12. Disable the fuel system.
13. Disconnect the Crank Shaft Position (CKP) sensor electrical connector.
14. Crank the engine to expel excessive solvent.
15. Using the *EN-47909-20 Cotton Swab* wipe the injector bore clean of any solvent and/or debris.
16. Connect the CKP sensor electrical connector.
17. Enable the fuel system.
18. Install the glow plugs;
  - Refer to *Glow Plug Replacement - Bank 1*
  - Refer to *Glow Plug Replacement - Bank 2*

### Installation Procedure

**Caution:** Refer to *Component Fastener Tightening Caution* in SI..

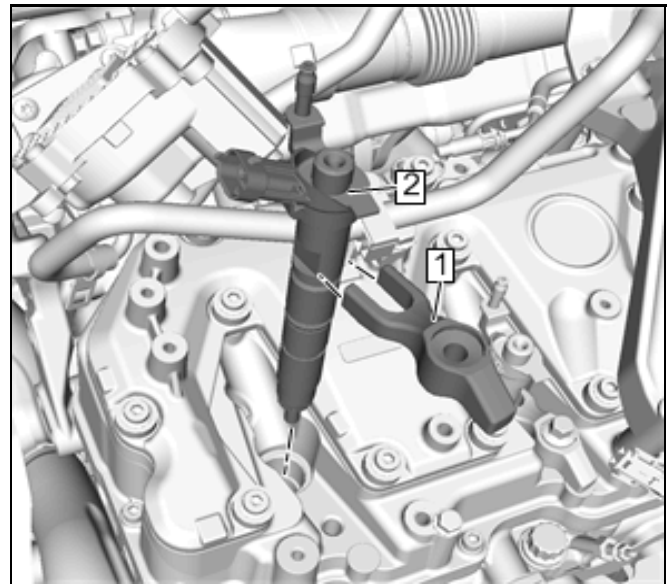
**Note:** It may be useful to take a photo of the Fuel Injector Flow Rate value on each injector prior to installation.



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**Note:** Lubricate the NEW fuel injector O-ring seals with clean engine oil.

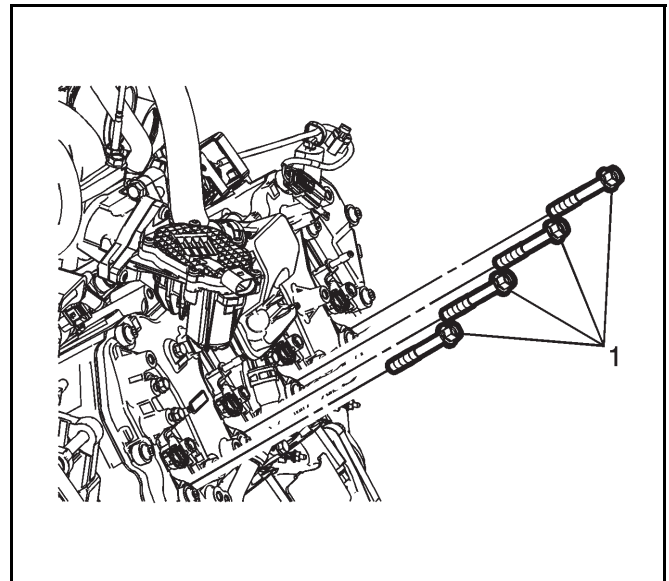
1. Install combustion Fuel Injector Seal (1).
2. Install fuel injector seal ring (2).
3. Install fuel injector seal ring (3).



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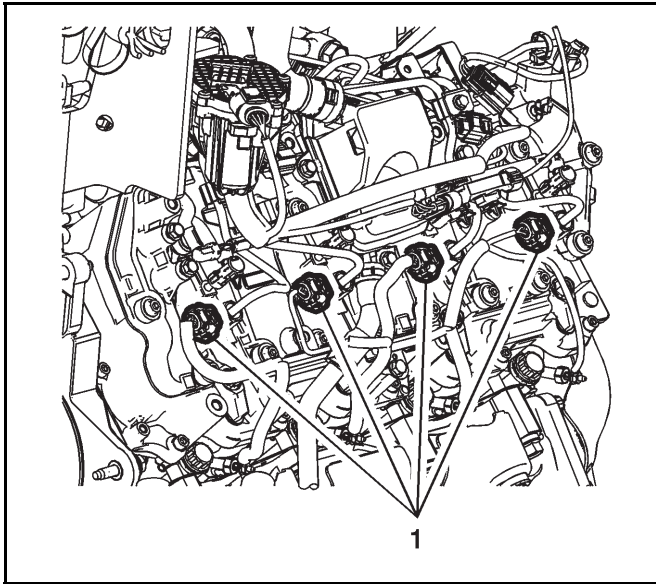
**Note:** Ensure the fuel injector valve pivot pin is in place in the lower rocker cover before installing the injector bracket.

4. Install high pressure diesel fuel injector (2).
5. Repeat steps 1-4 for the remaining injectors.



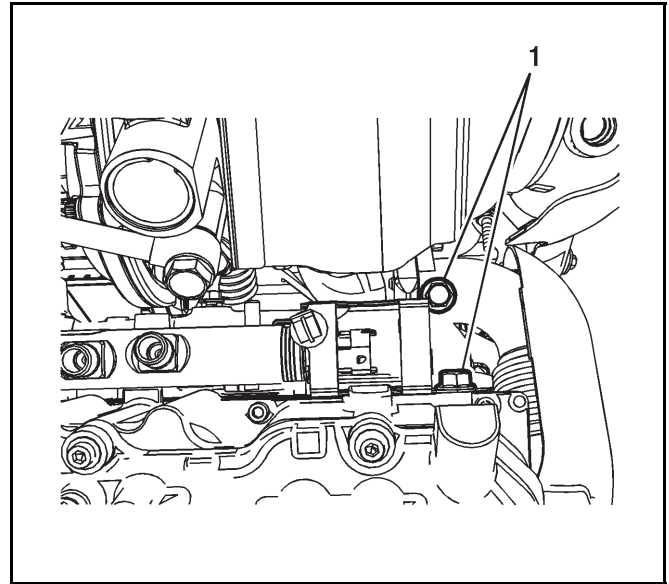
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6. Install fuel injector bolts (1) .
  - ⇒ Torque the fuel injector bracket bolts to 30N•m (22 ft lbs).



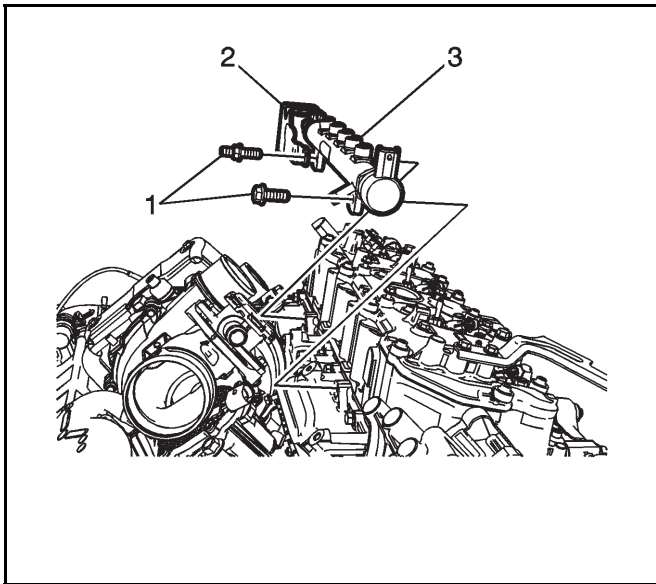
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7. Connect the fuel injector electrical connectors (1).
- Note:** It is recommended to insert the High Pressure Fuel Pipe, Rail to Rail under the turbocharger prior to installing the left fuel rail. Also, leave the line end caps in place while inserting this pipe.



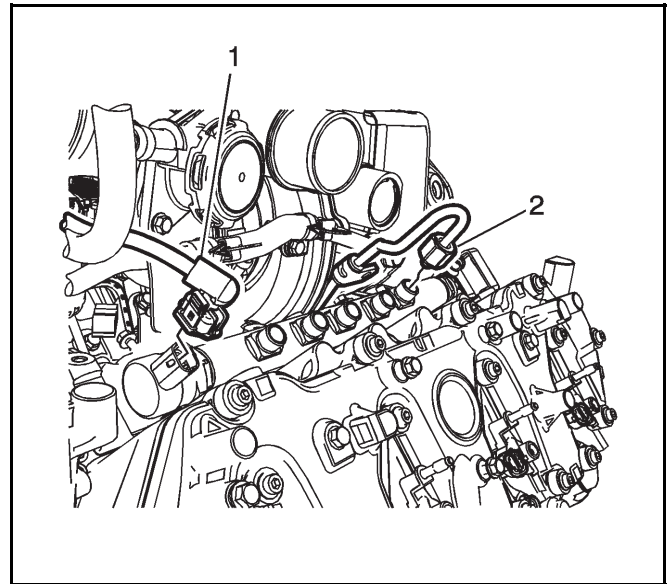
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10. Install the left side fuel rail heat shield fasteners (1).
- ⇒ Torque the fuel rail heat shield fasteners to 25 N•m (18 ft lbs).



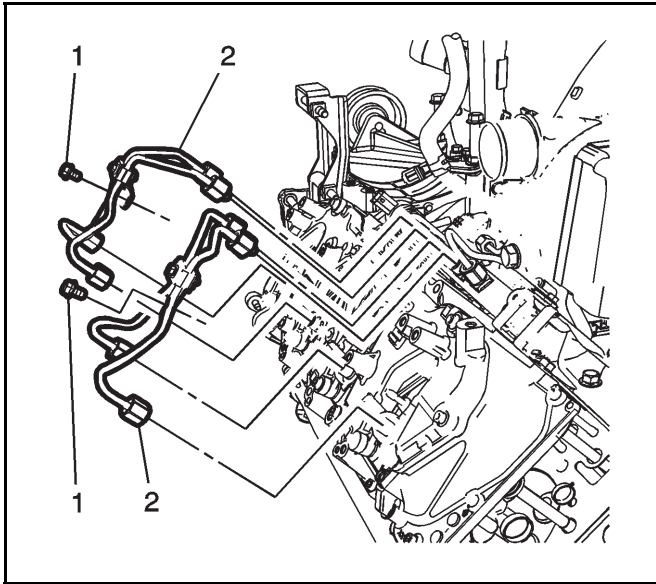
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8. Install the left side fuel injection fuel rail assembly (3) and heat shield (2).
9. Install the left side fuel injection rail fasteners (1).
- ⇒ Torque the fuel injector bracket bolts to 25 N•m (18 ft lbs).



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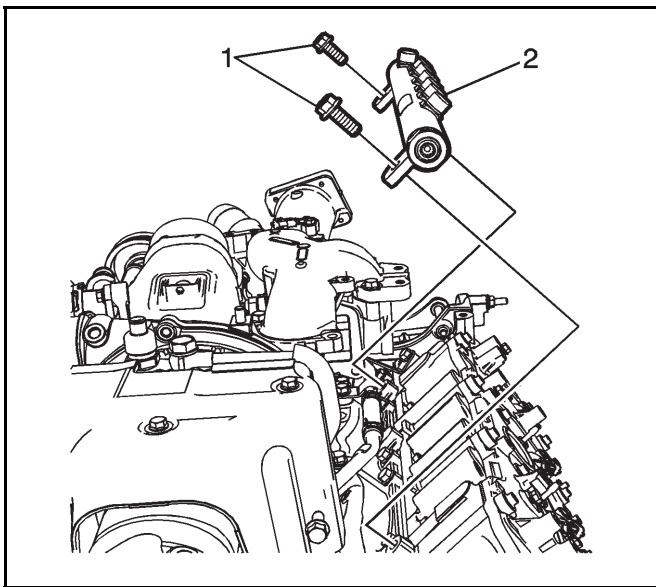
11. Connector the left side fuel pressure relief valve electrical connector (1) and pressure sensor electrical connector.
12. Ensure all lines, injectors and rail fittings are clean and dry prior to assembly.



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**Caution:** Ensure proper torque of the fuel injector lines. An under-torqued fuel injector line will not seal properly and an over-torqued fuel injector line may damage the fuel injector fitting. An improperly sealed or damaged fuel injector line or fuel injector fitting, will cause a fuel leak.

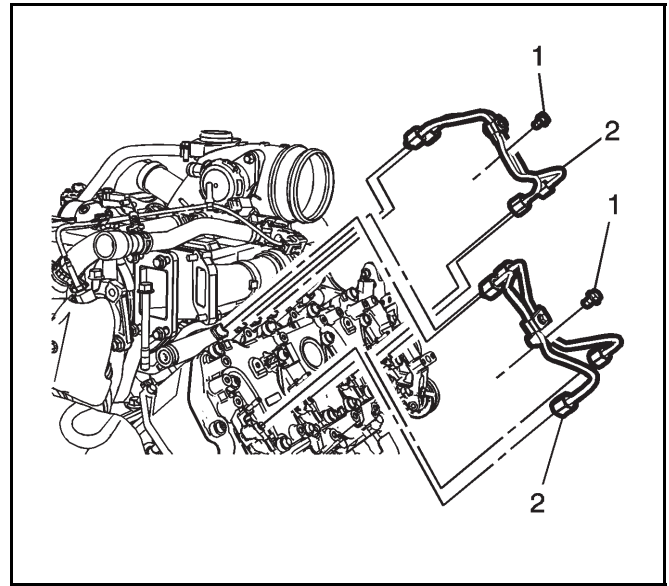
13. Install the left side fuel injection fuel feed pipes (2).
  - ⇒ Torque the fuel injection fuel feed pipes fittings in alternating increments to 30 N•m (22 ft lbs).
14. Install the left side fuel injection fuel feed pipe bracket fasteners (1).
  - ⇒ Torque the fuel injection fuel feed pipes bracket fasteners to 10 N•m (89 in lbs).



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15. Position the right side fuel injection fuel rail assembly (2) and install the fuel rail fasteners (1).
  - ⇒ Torque the fuel rail fasteners to 25 N•m (18 ft lbs).

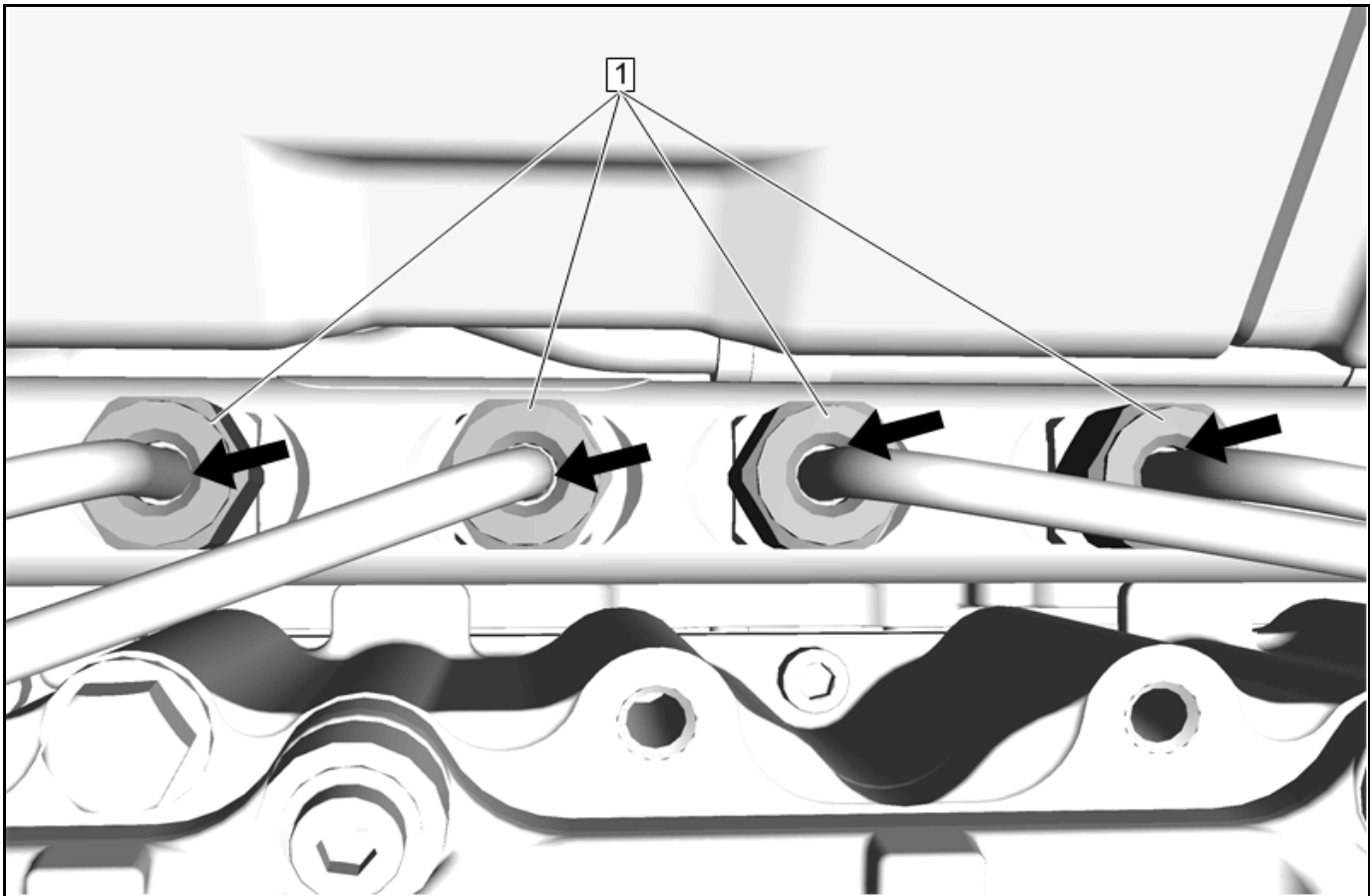
16. Ensure right side lines, injectors and rail fittings are clean and dry prior to assembly.



2407046

**Caution:** Ensure proper torquing of the fuel injector line. An under-torqued fuel injector line will not seal properly and an over-torqued fuel injector line may damage the fuel injector fitting. An improperly sealed or damaged fuel injector line or fuel injector fitting will cause a fuel leak.

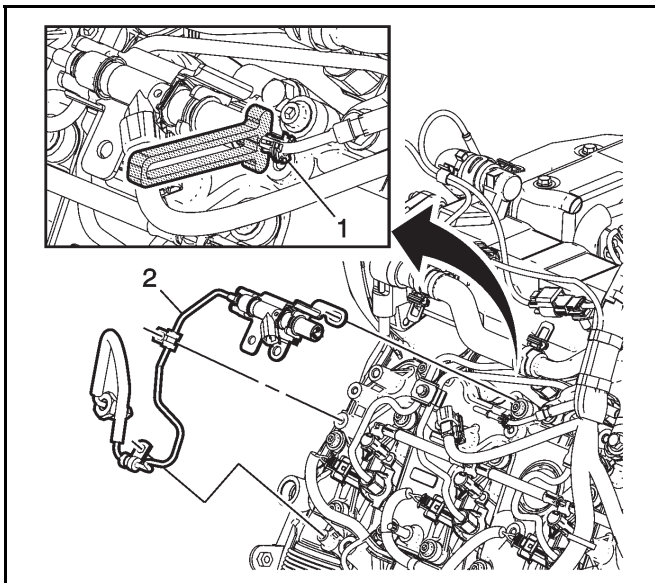
17. Install the right side fuel injection fuel feed pipes (2).
  - ⇒ Torque the fuel injection fuel feed pipes fittings in alternating increments to 30 N•m (22 ft lbs).
18. Install the right side fuel injection fuel feed pipe bracket fasteners (1).
  - ⇒ Torque the fuel injection fuel feed pipes bracket fasteners to 10 N•m (89 in lbs).



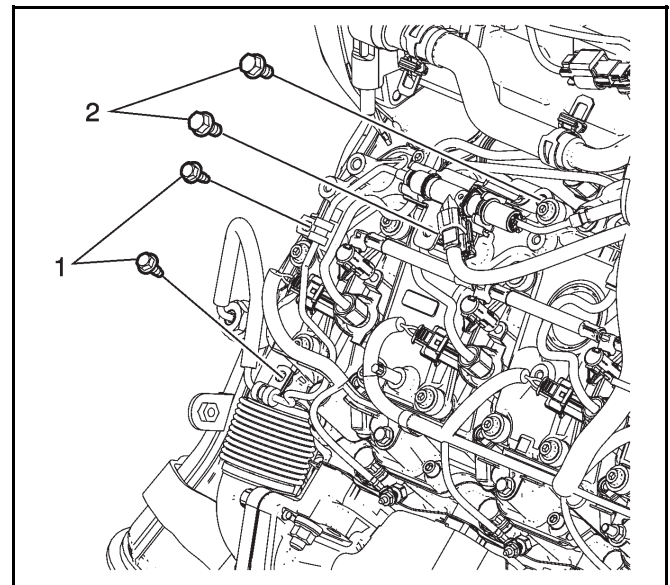
19. Clean the fuel injection fuel feed pipes and fittings for all 8 cylinders and apply sealant at the fittings (1) to prevent moisture and debris from collecting. Refer to *Adhesives, Fluids, Lubricants, and Sealers* in SI.

20. Install the indirect fuel injector (2).  
 ⇒ Torque the indirect fuel injector fittings to 45 N•m (33 ft lbs).

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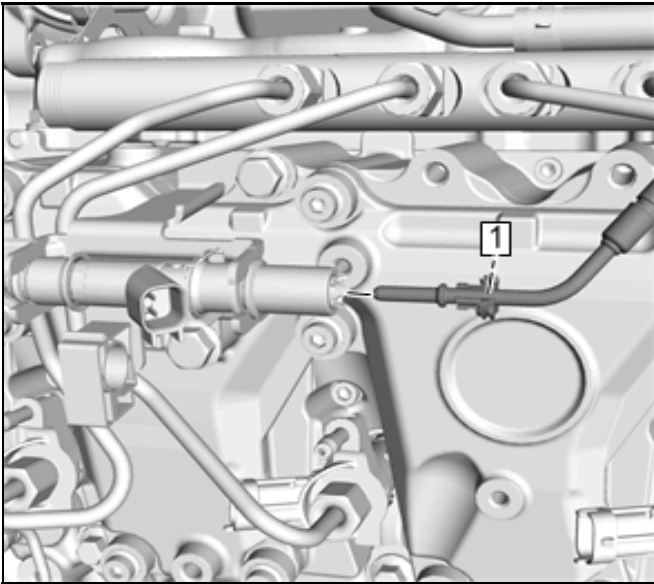


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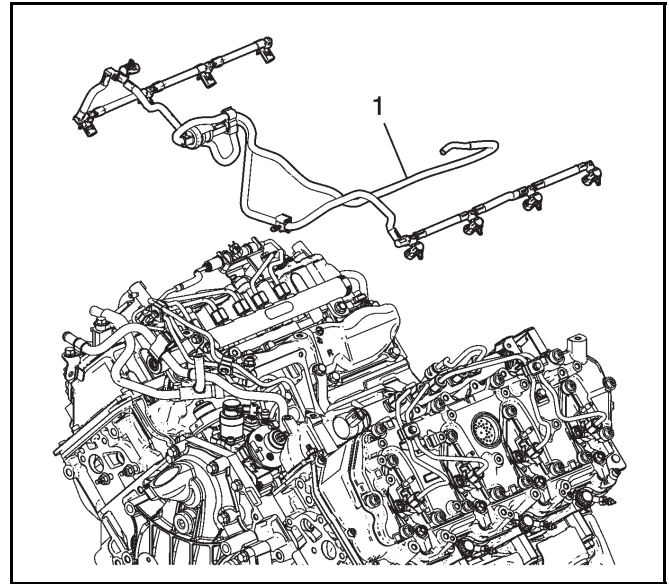
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21. Install the two indirect fuel injector fasteners (1, 2).  
 ⇒ Torque the indirect fuel injector fasteners to 25 N•m (18 ft lbs).



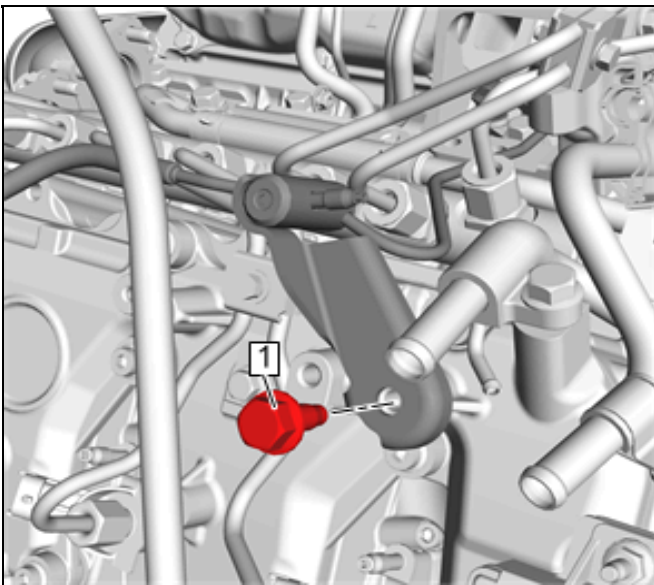
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22. Connect the fuel feed pipe Quick Connect Fitting (1).



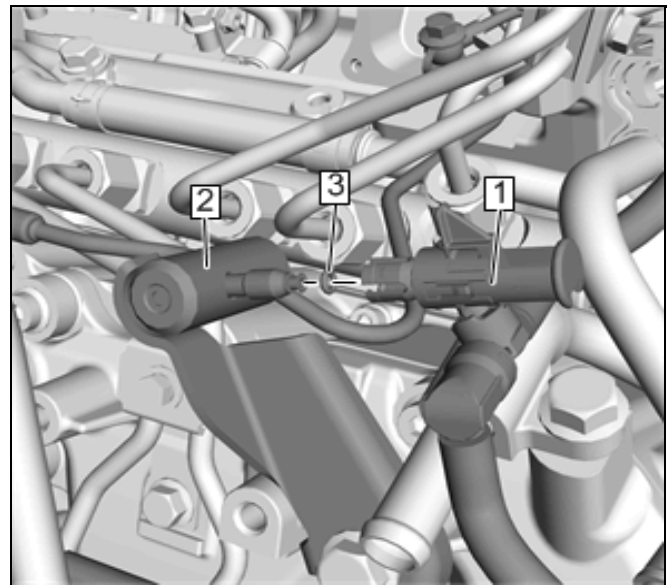
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24. Install the NEW fuel injector fuel return line assembly (1).



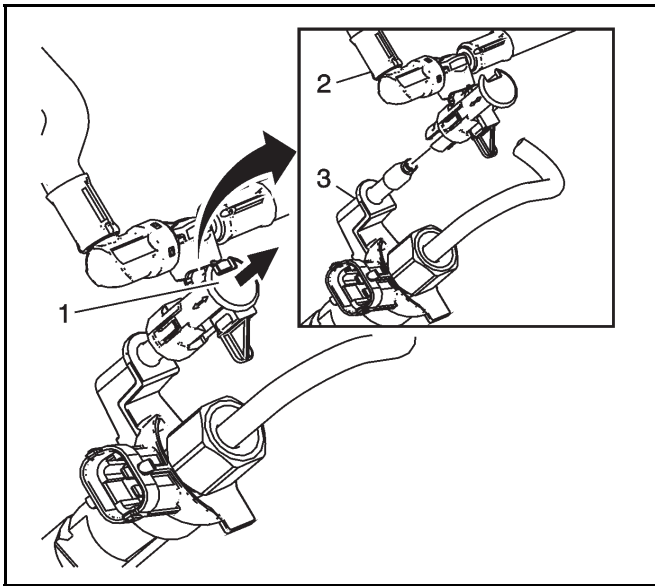
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23. Install the fuel feed bracket bolt (1).  
 ⇒ Torque the fuel feed bracket bolt to 25 N•m (18 ft lbs).



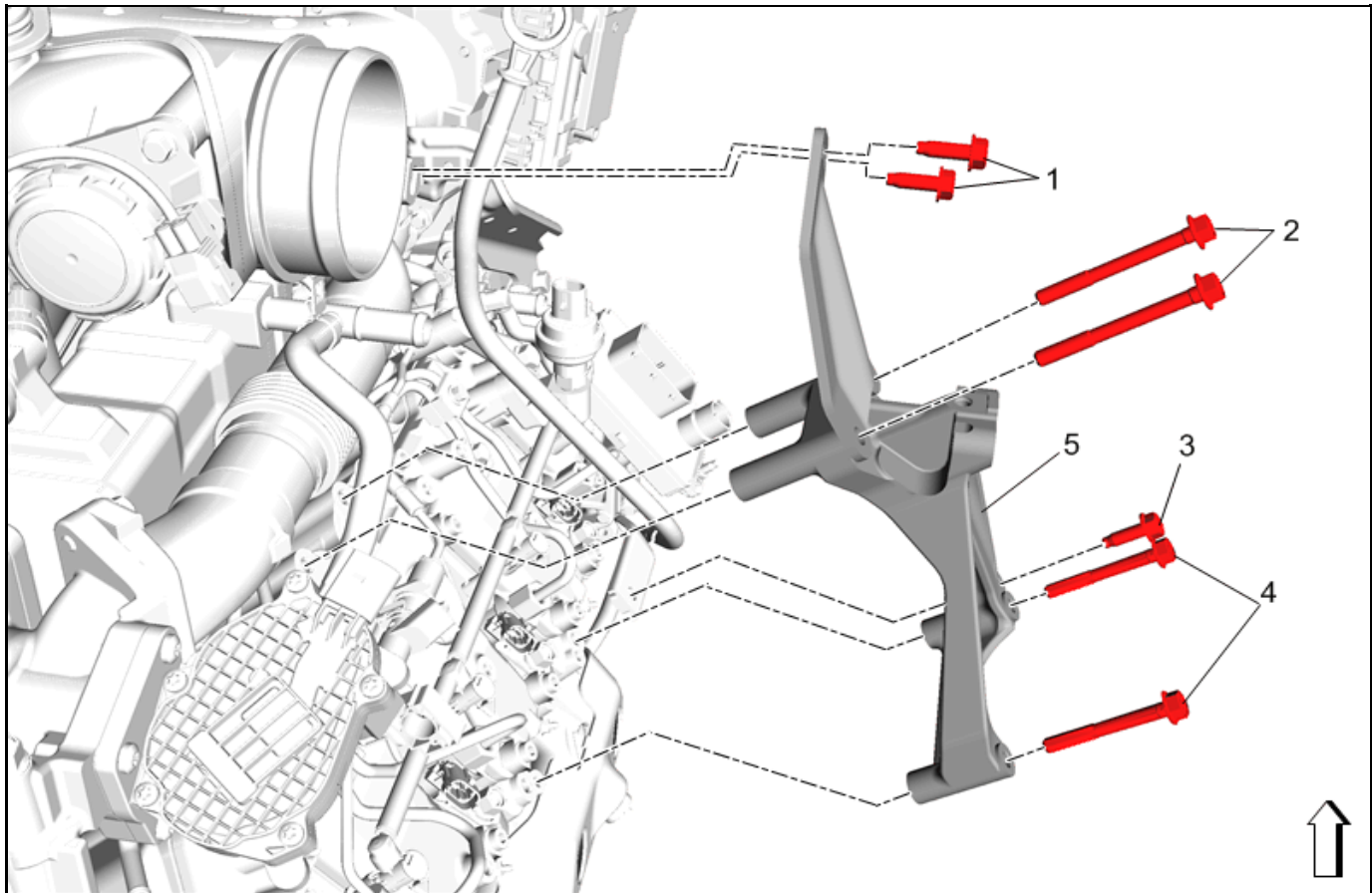
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- Note:** After connecting the fuel return hose to the fuel feed pipe, lock the fuel return line by pushing the cylindrical locking sleeve towards the connection point.
25. Connect the fuel return hose (1) to the fuel feed pipe (2).

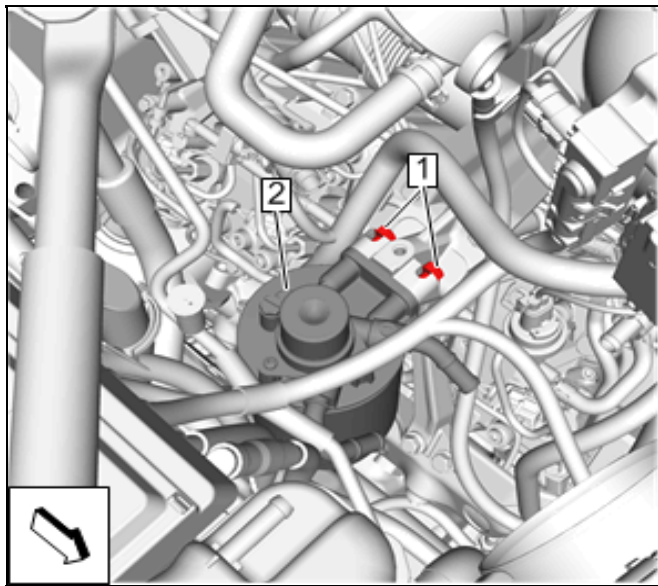


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26. With the cylindrical locking sleeve (1) released in the upward position, install the fuel return line to the fuel injector.
27. Press down on the locking sleeve (1) to secure the connection on all the injectors.
28. Install the fuel return pipe bracket bolt to left valve cover.



29. Install the fuel filter bracket. Refer to *Fuel Filter Bracket Replacement* in SI.



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- 30. Install the fuel filter housing assembly. Refer to *Fuel Filter Housing Assembly Replacement* in SI.
- 31. Prior to installing fuel injection pump replace the Fuel Feed hose on the back of the injection pump. Refer to *Fuel Feed Hose Replacement* in SI.
- 32. Install the fuel injection pump. Refer to *Fuel Injection Pump Replacement* in SI.

**Cleaning and Flushing Procedure**

1. Clean and flush all fuel chassis lines, filter pipes, and other engine mounted fuel system pipes that are not being replaced.
2. The fuel filter housing must be cleaned with a new fuel filter installed.
3. The fuel tank and fuel sender must be cleaned and flushed.

**Note:** The Indirect Fuel Injector (Hydrocarbon Injector) and its fuel lines must be purged of air any time it is removed or replaced. Failure to do so may damage the injector. Perform the Diesel Particulate Filter (DPF) Regeneration Enable any time the indirect injector or its fuel lines are opened/removed or replaced. This will force regeneration as soon as conditions allow and will purge any air from the system. Refer to *Diesel Particulate Filter (DPF) Regeneration Enable* in SI.

**TIP**

After repairs, the following may help with fuel system priming:

- Prime fuel to the fuel filter housing.
- Relieve air by opening the bleed screw at the filter housing.
- Pump the priming ball again until no more air escapes and close the bleed screw.
- Prime until the priming ball is hard.
- There should be at least 10 psi fuel pressure on the fuel system pressure gauge attached to the fuel system service port (Schrader valve).
- Crank the engine for up to 15 seconds.
- Key off for one minute.

Repeat the above steps until the engine starts. It is normal for the engine to start and then stall when the fuel system loses prime. Repeated priming will alleviate this concern.

**Parts Information**

Part Number	Description	Qty.	Silverado / Sierra (LML)							Silverado / Sierra (LGH)		Express / Savana (LGH)						
			2011	2012	2013	2014	2015	2016	2011	2012	2010	2011	2012	2013	2014	2015	2016	
12664429	FILTER KIT, FUEL	1	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
88917036	FILTER, OIL	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
97363570	GASKET, CTR INT MANIF	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12635466	GASKET, EGR VLV (LOCR A)	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
98062923	GASKET, EGR VLV (LOCR B)	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
97223686	GASKET, ENG COOL THERM HSG	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15126137	GASKET, EXH MANIF PIPE	1										X	X	X	X	X	X	X
97188685	GASKET, EXH TURBO INL PIPE	2										X	X	X	X	X	X	X
97192618	GASKET, EXH TURBO INL PIPE	2										X	X	X	X	X	X	X
12627897	GASKET-TURBO OIL FEED PIPE	1										X	X	X	X	X	X	X

12637218	GASKET-TURBO OIL RTN PIPE	1									X	X	X	X	X	X	X
12639312	HOSE ASM-FUEL FEED (RH SIDE OF PUMP, W/ BANJ)	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12639000	HOSE ASM-FUEL RTN	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12661071	INJECTOR ASM-INDIRECT FUEL	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12656313	PIPE ASM-FUEL FEED	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
94011618	SEAL, COLD START FUEL FEED VLV (O RING)	1									X	X	X	X	X	X	X
12625100	SEAL, COLD START FUEL FEED VLV (O RING)	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
94036238	SEAL, OIL LVL IND TUBE (O RING)	1									X	X	X	X	X	X	X
94011603	SEAL, THERM BYPASS PIPE (O RING)	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12670466	PIPE ASM-FUEL HIGH PRESS	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12641590	SWITCH ASM, ENG FUEL VAC	1									X	X	X	X	X	X	X
12631851	SEAL-TURBO AIR INL ADAP	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
97224993	SENSOR ASM, FUEL TEMP	1							X		X	X	X	X	X	X	X
12676436	SENSOR ASM-WAT IN FUEL IND	1										X	X	X	X	X	X
98065521	GASKET-EGR VLV CLR	1	X	X	X	X	X	X	X	X							
12670460	PIPE ASM-FUEL HIGH PRESS (CYL 2 & 7)	2	X	X	X	X	X	X	X	X							
12670468	PIPE ASM-FUEL HIGH PRESS (CYL 1 & 8)	2	X	X	X	X	X	X	X	X							
12670469	PIPE ASM-FUEL HIGH PRESS (CYL 3 & 6)	2	X	X	X	X	X	X	X	X							
12670471	PIPE ASM-FUEL HIGH PRESS (CYL 4 & 5)	2	X	X	X	X	X	X	X	X							
12670474	PIPE ASM-FUEL HIGH PRESS (LEFT SIDE OF PUMP)	1	X	X	X	X	X	X	X	X							
12670475	PIPE ASM-FUEL HIGH PRESS (RIGHT SIDE OF PUMP)	1	X	X	X	X	X	X	X	X							
12629458	SEAL-TURBO AIR INL ADAP	1	X	X	X	X	X	X	X	X							
12627913	SEAL-UPR INT MANIF	1	X	X	X	X	X	X	X	X							
12645582	HOSE ASM-FUEL RTN (LEFT RAIL TO FEED PIPE)	1		X	X	X	X	X	X	X							
98065523	GASKET-EGR PIPE	1	X	X	X	X	X	X	X	X							
12672028	PUMP KIT-FUEL (CONTAINS FUEL PUMP INJECTORS & RAILS)	1	X	X	X	X	X	X	X	X							
98070023	GASKET-EGR VLV CLR	1						X	X	X	X	X	X	X	X	X	X
12672027	PUMP KIT-FUEL (CONTAINS FUEL PUMP, INJECTORS & RAILS)	1						X	X	X	X	X	X	X	X	X	X
12636266	HOSE-FUEL RTN	1									X	X	X	X	X	X	X



12641356	PIPE ASM-FUEL FEED	1									X	X	X	X	X	X	X
12670457	PIPE ASM-FUEL HIGH PRESS (CYL 6)	1									X	X	X	X	X	X	X
12670463	PIPE ASM-FUEL HIGH PRESS (CYL 7)	1									X	X	X	X	X	X	X
12670456	PIPE ASM-FUEL HIGH PRESS (CYL 8)	1									X	X	X	X	X	X	X
12670454	PIPE ASM-FUEL HIGH PRESS	1									X	X	X	X	X	X	X
12670465	PIPE ASM-FUEL HIGH PRESS (CYL 1)	1									X	X	X	X	X	X	X
12670460	PIPE ASM-FUEL HIGH PRESS (CYL 2)	1									X	X	X	X	X	X	X
12670464	PIPE ASM-FUEL HIGH PRESS (CYL 3)	1									X	X	X	X	X	X	X
12670459	PIPE ASM-FUEL HIGH PRESS (CYL 4 OR 5)	2									X	X	X	X	X	X	X
12670453	PIPE ASM-FUEL HIGH PRESS	1									X	X	X	X	X	X	X
12639101	PIPE ASM-FUEL RTN	1									X	X	X	X	X	X	X
26020642	SEAL P/S PUMP RSVR (O RING)	1									X	X	X	X	X	X	X
97368325	GASKET-CTR INT MANIF	1									X	X	X	X	X	X	X

**Warranty Information**

For vehicles repaired under the Powertrain coverage, use the following labor operation. Reference the Applicable Warranties section of Investigate Vehicle History (IVH) for coverage information.

Labor Operation	Description	Model	Labor Time
4080558*	Diagnose and Clean/Repair Complete Fuel System	For all P/U Trucks	12.9 hrs
		For all Vans	21.0 hrs
*This is a unique Labor Operation for bulletin use only.			

<b>Version</b>	7
<b>Modified</b>	Released March 31, 2016 Revised April 11, 2016 – Updating the Qty. column of the Parts Information table. Revised April 29, 2016 – Updating the Parts Information table. Revised October 26, 2016 – Updating the Parts Information table. Revised February 03, 2017 – Updating the Service Procedure. Revised March 2, 2017 – Updating the Service Procedure. Revised August 19, 2019 - Removed information in regard to turbocharger removal and installation for the p/u trucks, update the labor time for p/u trucks in the Warranty Information section and update the Parts Information section.

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