



GROUP  
ENG

MODEL  
All Models  
equipped with GDI  
Fuel System

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## TECHNICAL SERVICE BULLETIN

SUBJECT: SPECIAL SERVICE INFORMATION & SPECIFICATIONS  
FOR GDI HIGH PRESSURE FUEL SYSTEM

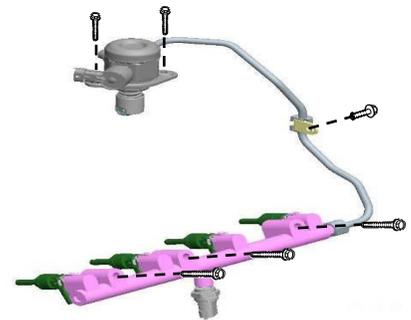
### \* NOTICE

This bulletin has been revised to include additional information. New/revised sections of this bulletin are indicated by a black bar in the margin area.

This bulletin provides information relating to all Kia vehicles equipped with Gasoline Direct Injection (GDI) engines. In these engines highly pressurized gasoline is injected via a common fuel rail and injectors that deliver fuel directly into the combustion chamber of each cylinder. In comparison, in a conventional Multi-Point Fuel Injection (MPI) engine, the gasoline is injected into the intake port of each cylinder at a relatively low pressure. **Due to high fuel pressure in a GDI system, servicing the GDI system requires special attention and handling procedures.**

This bulletin provides special service information and specifications for the GDI fuel system components. The following aspects of the GDI fuel system will be outlined:

- Fuel Pressure Specification Guideline
- High Pressure Fuel System Tightening Torque
- SST For Tightening High Pressure Fuel Pipe Flare Nuts
- High Pressure Fuel System Residual Pressure Warning
- High Pressure Fuel Pump Installation
- High Pressure Fuel Pipe Installation
- Delivery Pipe and Injector Installation



### ! WARNING

Whenever the high pressure fuel pump, fuel pipe, delivery pipe, or injector is removed immediately after shutting off the engine, an injury may be caused by the release of highly pressurized fuel. Therefore, release the residual pressure in the high pressure fuel line by referring to the “**Residual Fuel Pressure Release Procedure**” on page 2 **before** removing any high pressure fuel system components.

File Under: <Engine>

Circulate To:  General Manager  Service Manager  Parts Manager  
 Service Advisors  Technicians  Body Shop Manager  Fleet Repair

SUBJECT:

## SPECIAL SERVICE INFORMATION & SPECIFICATIONS FOR GDI HIGH PRESSURE FUEL SYSTEM



### WARNING

If the following parts have been uninstalled, they **MUST** be replaced as they are one-time-use components. **DO NOT REUSE!** Failure to replace these components may result in fuel leaks.

- High Pressure Fuel Pump Bolts
- High Pressure Fuel Line
- Fuel Rail (Delivery Pipe) Bolts

### Service Procedure:

#### Fuel Pressure Specification Comparison (MPI vs GDI)

MPI (Low Pressure)	GDI (High Pressure)
43-64 psi (3.0~4.5 kgf/cm <sup>2</sup> ) (Regulated by Fuel Pressure Regulator)	569-2133 psi (40~150 kgf/cm <sup>2</sup> ) (High Pressure Fuel Line)

### \* NOTICE

The GDI High Pressure Fuel system operates at considerably higher fuel pressure than the conventional MPI Fuel System.

### Special Cautions When Servicing High Pressure Fuel System



### WARNING

Whenever the High Pressure Fuel Pump, Fuel Pipe, Delivery Pipe, or injector is removed immediately after shutting off the engine, an injury may be caused by the release of highly pressurized fuel. Therefore, release the residual pressure in the high pressure fuel line by referring to the “Residual Fuel Pressure Release Procedure” below before removing any high pressure fuel system components.

#### Residual Fuel Pressure Release Procedure

Wear safety glasses and fuel resistant gloves.

1. Turn the ignition off and disconnect the battery negative (-) cable.
2. Remove the fuel pump relay and the electrical connector to the High Pressure Fuel Pump.
3. Reconnect the battery negative (-) cable.
4. Run the engine for about twenty (20) seconds to lower the pressure in both the high or low pressure lines. The engine may shut off itself within twenty (20) seconds. If it does not shut off, turn the engine off.
5. Proceed with the service or repair. Use rags to cover the opening and catch spills when opening up either fuel line. Follow the installation procedure on page 3.
6. Reinstall / reconnect all components in the reverse order of removal. Start engine to confirm proper operation and make sure there is no fuel leak.
7. After completing, clear DTC(s) using the KDS as this procedure may set a DTC(s).

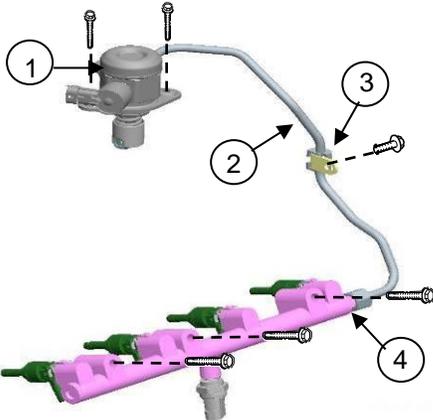
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## SPECIAL SERVICE INFORMATION & SPECIFICATIONS FOR GDI HIGH PRESSURE FUEL SYSTEM

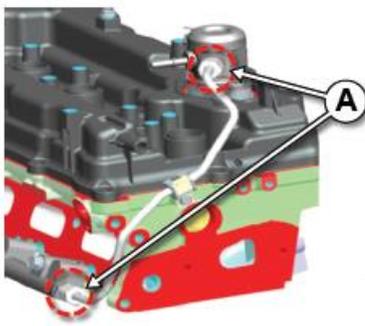
### High Pressure Fuel System Tightening Torque

#### ! CAUTION

When installing the High Pressure Fuel Pump, Fuel Pipe, or Fuel Rail (Delivery Pipe), be sure to follow the tightening torque specifications listed in the applicable Shop Manual on KGIS using a torque wrench. Failure to do so may cause damage to the fuel line connections and may result in fuel leaks.

	1. High Pressure Fuel Pump	<p><b>Tightening Torques:</b> Refer to the applicable Shop manual on KGIS: Engine Control / Fuel System → Fuel Delivery System → “Component” → Repair procedures</p>
	2. High Pressure Fuel Pipe	
	3. Clamp	
	4. Delivery Pipe	

### SST for Tightening High Pressure Fuel Pipe Flare Nuts

Tool Name & Number	Figure	Tool Usage	Flare Nuts (A)
Torque Wrench Socket (09314-3Q100)		 Used for <u>both</u> Flare Nuts of Fuel Pipe	

### High Pressure Fuel System Installation Procedure

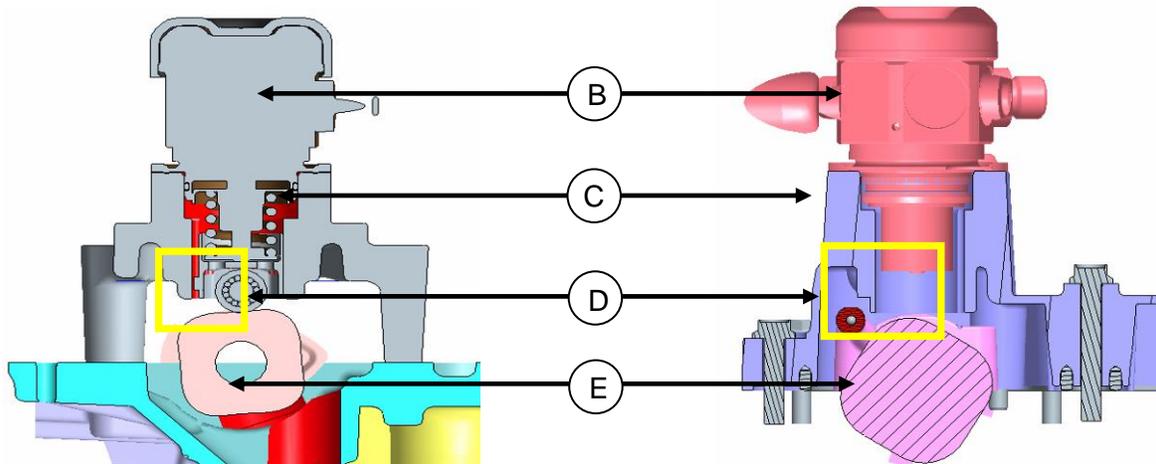
Perform the steps below in the following order to install the high pressure fuel system. Refer to pages 4-5 for more details.

[Click here to see a video tutorial.](#)

1. Install the Roller Tappet.
2. Install the High Pressure Fuel Pump and NEW Bolts and torque to specifications.
3. Position Fuel Pipe properly and then hand-tighten the Flare Nuts.
4. Transfer the retaining bracket from the old Fuel Pipe.
5. Install the retaining bracket bolt and torque to specifications.
6. Using the Torque Wrench Socket (09314-3Q100), torque both Flare Nuts.

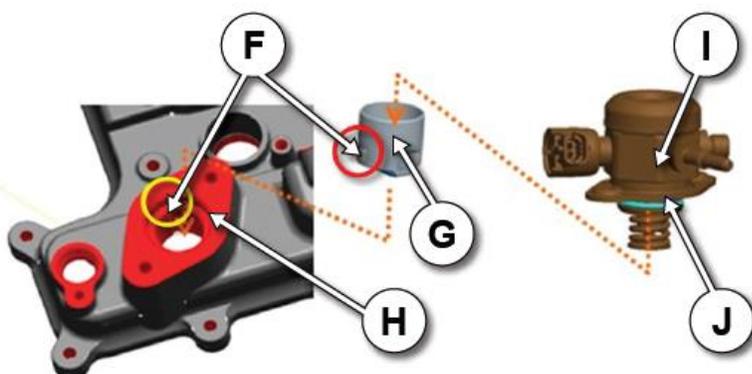
## SPECIAL SERVICE INFORMATION & SPECIFICATIONS FOR GDI HIGH PRESSURE FUEL SYSTEM

Before installing the high pressure fuel pump, be sure to place the roller tappet to the lowest position, and then position the fuel pump drive cam to the flat part of the lobe (as shown below) by rotating the crankshaft. If the roller tappet of the fuel pump is not placed in the lowest position during installation, the fuel pump may be positioned improperly, which may result in fuel pump piston damage, broken bolt threads, damaged O-ring, etc.



**B)** Fuel Pump, **C)** Adapter Bracket (Cylinder Head Cover), **D)** Roller Tappet, **E)** Fuel Pump Drive

- During a repair requiring fuel pump removal, cover the exposed fuel pump mounting hole in the adapter bracket to prevent any foreign substance or debris contamination.
- **Do not reuse the fuel pump mounting bolts. Once a fuel pump is removed, the removed bolts must be replaced with new ones.**
- When fastening the fuel pump mounting bolts, hand-thread the fasteners first, then gradually tighten  $\frac{1}{2}$  turn at a time to the specified torque while alternating between the two bolts in several cycles using a torque wrench. Failure to follow this procedure will cause misalignment to the assembly due to internal spring tension of the fuel pump and can result in damage to the adapter bracket.
- Do not drop the fuel pump. External impacts may damage the internal components of the fuel pump. If this has occurred, confirm proper operation through performance tests prior to reuse.
- Before installing the fuel pump into the adapter bracket, be sure to apply clean engine oil evenly over the entire surface of the O-ring, roller tappet, and fuel pump mounting hole. When installing the fuel pump, align the protrusion on the roller tappet to the groove in the fuel pump mounting hole.

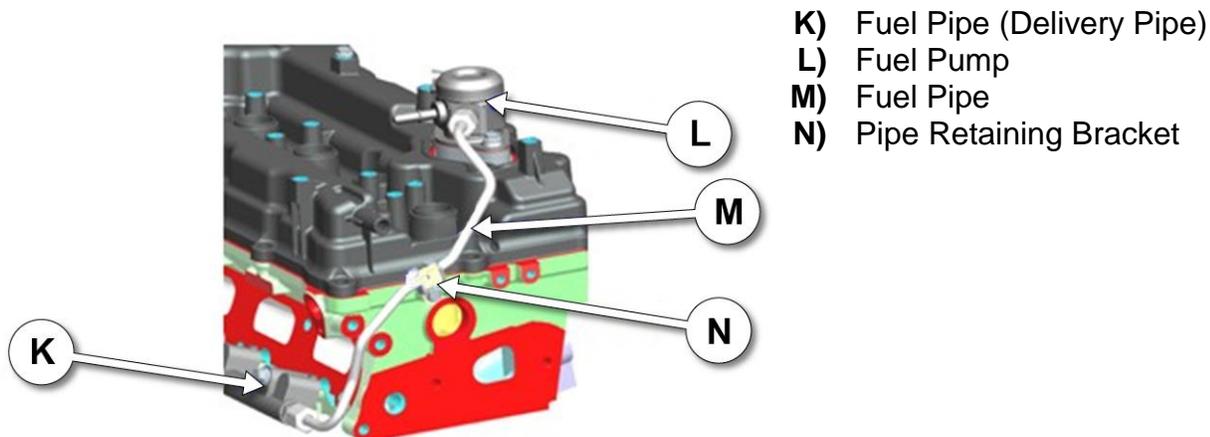


- F)** Align protrusion to groove.
- G)** Roller tappet (apply oil)
- H)** Fuel Pump mounting hole (apply oil)
- I)** Fuel Pump
- J)** O-ring (apply oil)

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- Do not reuse the fuel pipe. Once the fuel pipe is removed, it must be replaced with a new one.
- There are protective caps on both ends of the replacement fuel pipe to prevent foreign substances from entering into the fuel pipe. Remove the caps prior to installing the fuel pipe to the fuel pump and the delivery pipe.
- Refer to the “High Pressure Fuel System Tightening Torque” section on page 3 of this TSB for details regarding proper installation of the High Pressure Fuel Pipe.



### WARNING

If the following parts have been uninstalled, they **MUST** be replaced as they are one-time-use components. **DO NOT REUSE!** Failure to replace these components may result in fuel leaks.

- High Pressure Fuel Pump Bolts
- High Pressure Fuel Line
- Fuel Rail (Delivery Pipe) Bolts



### WARNING

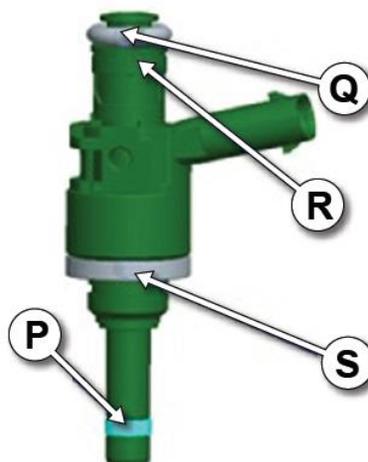
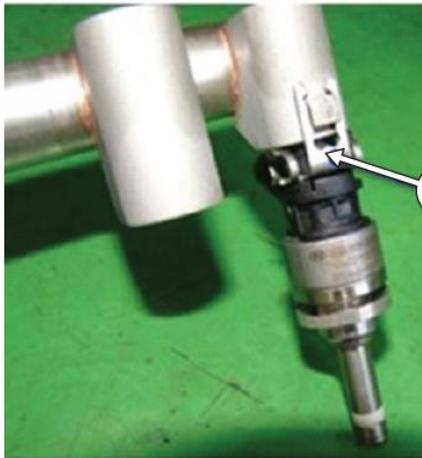
Do not release any vehicle after GDI component related repairs without verifying that the system is leak free; once all components are reinstalled/reconnected, start the engine to confirm proper operation and make sure there is/are no fuel leak(s), especially at the high pressure lines/connections.

### Fuel Pipe (Delivery Pipe) & Injector Installation

- Do not reuse the fuel pipe mounting bolts. Once the fuel pipe is removed, the bolts must be replaced with new ones.
- Do not reuse the injector retaining clip, O-ring, backup ring, washer seal, and combustion seal. Once an injector is removed, the five components must be replaced with new ones.

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- O) Injector Retaining Clip
- P) Injector Combustion Seal Ring
- Q) Injector O-Ring
- R) Backup Ring
- S) Injector Washer Seal

Note: Items P, Q, and R are supplied in a single kit.

When installing the combustion seal ring into the injector, use the SST 09353-2B000 (as shown below) and refer to the "Fuel System – Engine Control System – Injector" section in the appropriate Service Manual.

Tool Name	Tool Number	Components
Injector Combustion Seal Ring Installer	09353-2B000	<ul style="list-style-type: none"> <li>① Sizing Tool</li> <li>② Guide</li> <li>③ Pushing Tool</li> </ul>

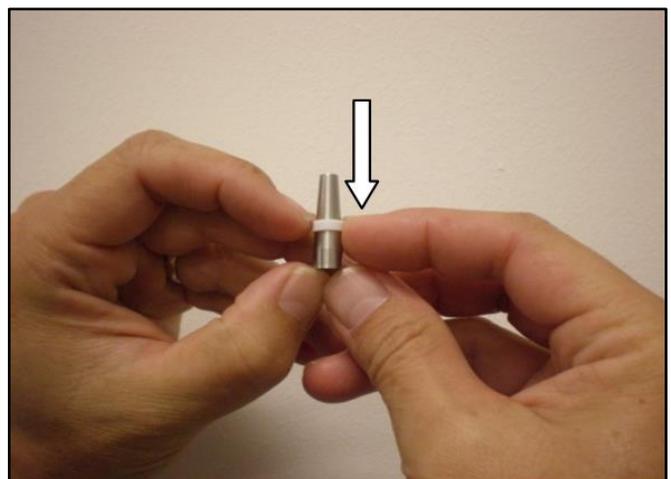
**\* NOTICE**

The combustion seal is a one-time use part and **MUST** be replaced if the injector is uninstalled.

- Place the Combustion Seal on the cone and pull downward on the seal as indicated in the photo.

**\* NOTICE**

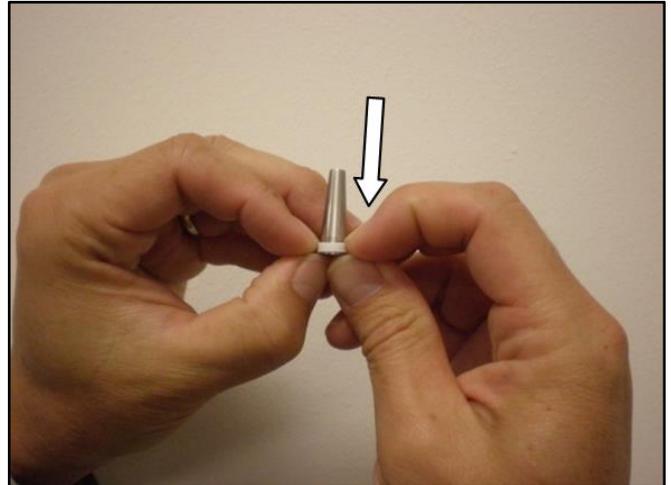
Using bare fingers without gloves will work better for installing the Combustion Seal over the cone.



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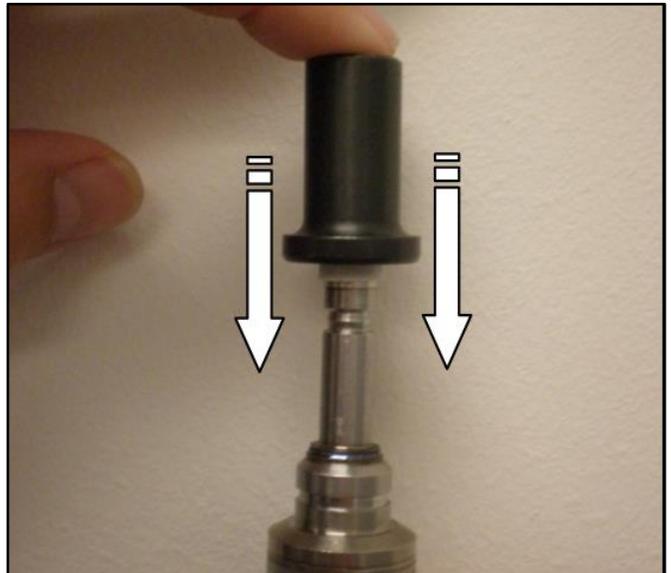
2. Pull the seal downward until it is near the bottom of the cone as shown in the photo.



3. Place the cone (with seal) on the end of the injector.

Place the sizing tool (09353-2B000) over the cone. Make sure the tool flange is toward the seal as shown.

Press down on the tool to work the seal over the injector and into the groove.



4. Because the seal will stretch as it goes over the end of the injector, it will be a bit oversize after installation.

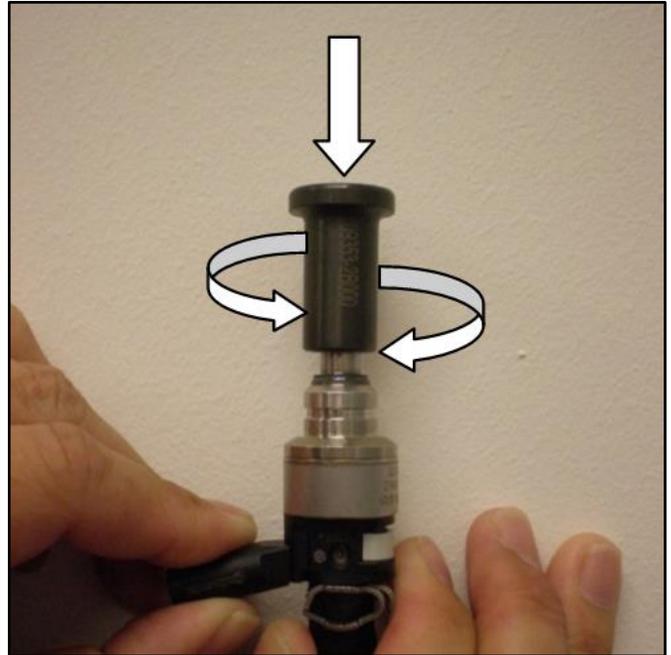
By letting the injector and seal set for a few minutes, the seal may reduce in size.

Inspect the seal for damage before continuing.



5. Place the resizing tool (flange up) over the seal. Twist the tool slightly while pushing down over the seal. This should reduce the size of the seal.

Be careful not to apply engine oil on the combustion seal ring.



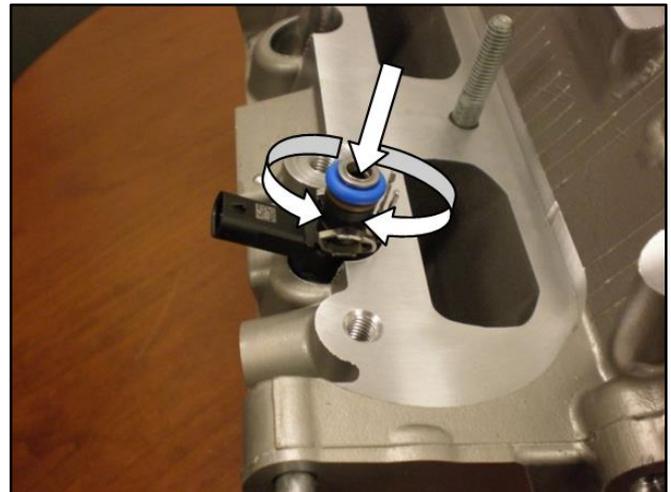
6. Place the injector into the head as shown.



7. Twist slightly while pressing the injector into position in the head.

This should complete the resizing of the seal.

Remove the injector and inspect the seal before completing the injector installation process.



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8. If the injector comes with a protective steel washer held in place by a spring clip, both steel washer and spring clip will have to be removed before installation.



9. Install the washer seal onto the injector with the rubber side (stepped) toward the injector.



10. The stepped rubber side of the seal goes towards the injector.

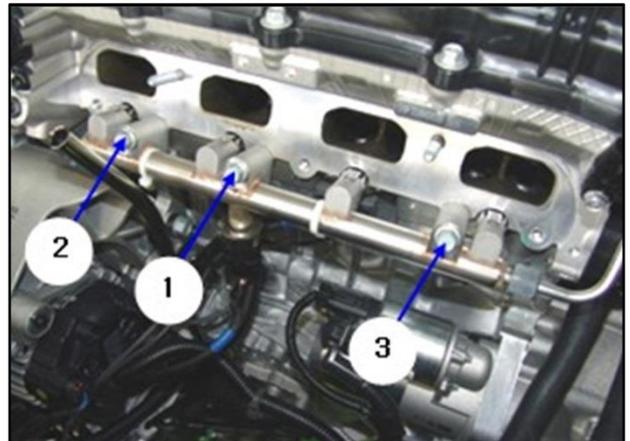


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11. The flat washer side of the seal goes towards the head.



- Before installing the injectors into the delivery pipe, be sure to apply clean engine oil evenly over the entire surface of the injector O-ring. Be careful not to apply engine oil over the combustion seal ring.
- Avoid dropping the fuel pipe (including injectors) or bumping it into any hard objects since damage to the internal components may occur. If necessary, visually inspect and confirm proper operation with performance tests prior to reuse.
- Before installing the injector into the cylinder head, clean the injector hole and avoid contaminants from entering inside the injector hole. When installing the injector, avoid bumping the injector tip into any of the surrounding components since the tip may become damaged from the impact.
- When fastening the three fuel delivery pipe mounting bolts, fully hand-tighten first, and then tighten in the proper sequence (see photo on the right) in several cycles up to the specified torque. The delivery pipe should move less than 1/8 inch (3mm), whenever each bolt is tightened.



Refer to EPC for the latest part number information concerning mandatory replacement / “no reuse” parts.

**WARNING**

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