

#### Injector install procedure with photos

This is intended to assist you with an injector change to make it more visual along with the factory service manual. Please follow all directions and cautions in the factory service manual. One caution in the manual is that all injectors look the same, but are not necessarily interchangeable. Be sure you know what you are installing if not making a direct factory replacement. Also note all cautions working around high pressure fuel systems. Also note the photos and directions are taken from an 04 engine and the 04 factory service manual, and might be different from the truck you are working on. Use the appropriate adjustment specs from the proper year manual. Note that 2006 exhaust valve setting is different from 03-05. One final note, in addition to the special tools noted, this job can not be done without a quality inch pound and foot pound torque wrench which were not shown in the photos. Although the procedure shown used all the factory supplied special tools, the job can be completed without them if need be. That being said, when the injectors are \$400+ each, the investment in the tools is probably a good idea. All of the special tools can be purchased at Miller special tool, an SPX company.

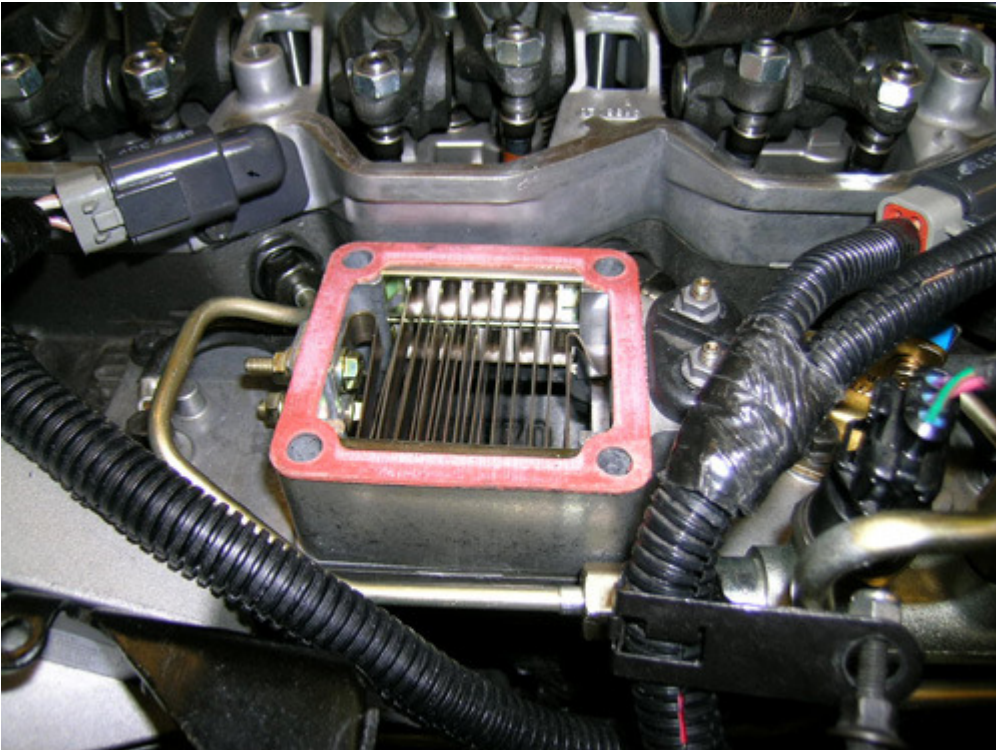
The following hand tools are required.

- 24mm or 15/16 end wrench
- 19mm end wrench
- 24mm or 15/16 socket
- 8mm, 10mm socket
- T15 Torx driver
- Screw driver
- Inch pound torque wrench
- Foot pound torque wrench

Some gaskets might be required, so read the entire procedure in the service manual so you know what gaskets they recommend replacing. From my experience, most of the seals can be used many times as long as they are not damaged. I would suggest you have the seals and gaskets on hand unless you can obtain them quickly. Also see if they are returnable to the dealer if you do not need them. The valve cover gasket should almost never need to be replaced if it was not leaking before you removed it.



Disconnect both battery cables  
Remove 10mm bolts that hold intake, heater grid, dipstick, and wiring.  
Remove 11mm Intercooler boot clamp.





Remove 10mm bolts on plastic valve cover, cover.  
Remove hoses from breather box.  
Remove 10mm bolts holding upper valve cover.  
\*Note that there are rubber O-ring seals on the valve cover bolts



Disconnect 19mm high pressure lines from injector connector tubes.  
Loosen 13mm bolts on back of head that hold bracket just behind last injector line.  
Remove 13mm bolt from rear fuel line holder. (04.5 and up only)  
Remove 10mm fuel line hold down brackets.  
Remove 15mm rear engine lift bracket bolts and bracket.  
Remove map sensor from intake with T15 torx.  
Remove 24mm nuts holding high pressure connector tubes.



Using Miller 9015 connector tube puller, thread the tool into the connector tube and pry/pull the tube straight out. The nut is still in place in the photo, but obviously needs to be removed first. If you don't have the 9015, you really risk damaging the connector tube threads if the tube sticks in the head.





Remove 10mm bolts holding exhaust rocker arms, these are in the middle of the rocker, and sometimes covered in oil. Make sure to keep track of which cylinder these came from.  
Remove 8mm injector wires.  
Remove 8mm injector hold down bolts.



Using Miller 9010, assemble tool per the service manual procedure and pull the injector up and out of the bore

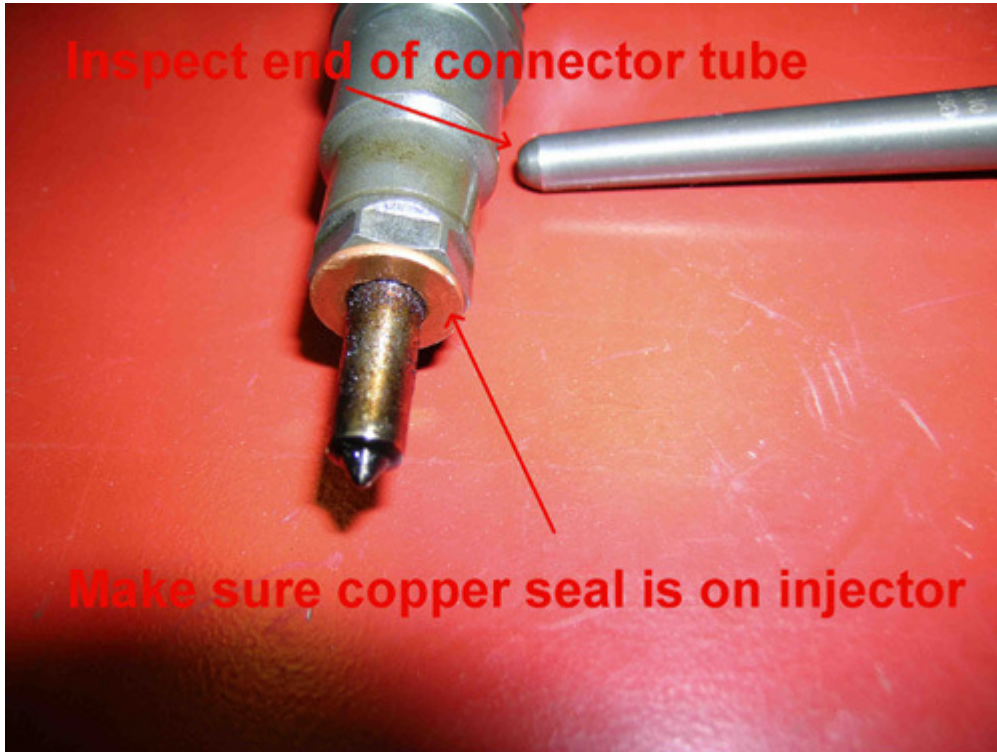


If you do not have the special tool, be very careful as you pry the injector out by prying on each side of the hold down a little at a time





Inspect the injector and connector tube end for any damage as detailed in the service manual. Remove and discard the copper seal ring (be sure it did not stay in the bore) and clean the tip of any carbon with clean diesel fuel and a soft brush. The connector tube crushes into a hole in the injector to seal the tube. There can not be any deformation of the connector tube, or it will not seal properly. Also the connector tube has an edge filter built into it that breaks up small particles of debris into particles that will not harm the injector. I always tap the tube on a piece of white paper to dislodge and inspect for any debris. Also look at the tube for any corrosion from contaminants in the fuel.



Clean the injector bore in the head and blow it out.



These are the parts removed from the head





If everything has been inspected/cleaned/replaced, it is time to reinstall the injector. Replace the O-ring on the injector and lube it with some engine oil. Replace the copper seal ring with the appropriate thickness (as directed in service manual) and put a dab of oil on it to keep it on the injector as you install. The injector is installed with the hole facing the intake manifold. The retainer is pinned on the injector to hold it in the proper orientation to the connector tube. Ensure that the injector "clicks" into place. If using the special Miller tool 9010, install the supplied nut to the top of the threaded bolt to change its use to an installing tool, allowing you to use the lever to pry the injector into the bore without damaging it.

Tighten the injector carefully following the service manual. From the 04 service manual, torque the injector bolts to 44 inch pounds, then back off the bolts.



Install the connector tube with the balls facing up. The balls will go into a slot in the head, and keep the tube from rotating in the head when you loosen/tighten the nut. Ensure that the connector tube "clicks" into place.



Tighten the connector tube to 11 foot pounds. This is the step most technicians' short cut by using a box end wrench to tighten the connector tube. By not correctly installing the tube, you risk leaks internal to the engine that can cause hard starting, stalling, and rough running etc.





Tighten the injector hold down bolts alternately to 89 inch pounds. Then tighten the connector tube to 37 foot pounds. Tighten the injector wire connector nuts to 11 inch pounds. Be very careful to not over tighten.

Install the rocker arm (the elephant foot that connects the two exhaust valves can go on either way) and torque to 27 foot pounds. Make sure the pushrod is properly seated into the lifter. Set the valve lash per the service manual.

Install the fuel lines (be careful not to bend the lines) and tighten using a back up wrench on the connector tube nut. Torque the fuel line fittings to 22 foot pounds. Install fuel line hold down brackets and torque to 18 foot pounds. Reinstall map sensor.





Reinstall safety bracket behind the #6 injector. This is a bracket designed to keep the occupants safe from fuel in a crash. Do not discard!

Install upper valve cover, and torque to 18ft lbs.

Reinstall intake, and tighten to 18ft lbs.

Retighten intercooler boot.

Reinstall dip stick, and wiring onto intake.

Reinstall valve cover, cover.

Reconnect negative battery cables, and start truck. There will be some smoke at startup that should go away within 30 seconds or so. If the truck does not start check connector tube torque. Under no circumstances should the high pressure fuel lines be loosened to bleed. The system is self bleeding. You can be maimed or killed.

