
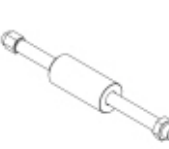
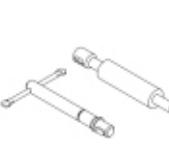

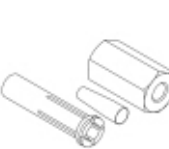


303-04A Fuel Charging and Controls - 2.3L EcoBoost (201kW/273PS)
Removal and Installation

2019 Ranger
Procedure revision date: 12/5/2018

Fuel Rail

Special Tool(s) / General Equipment

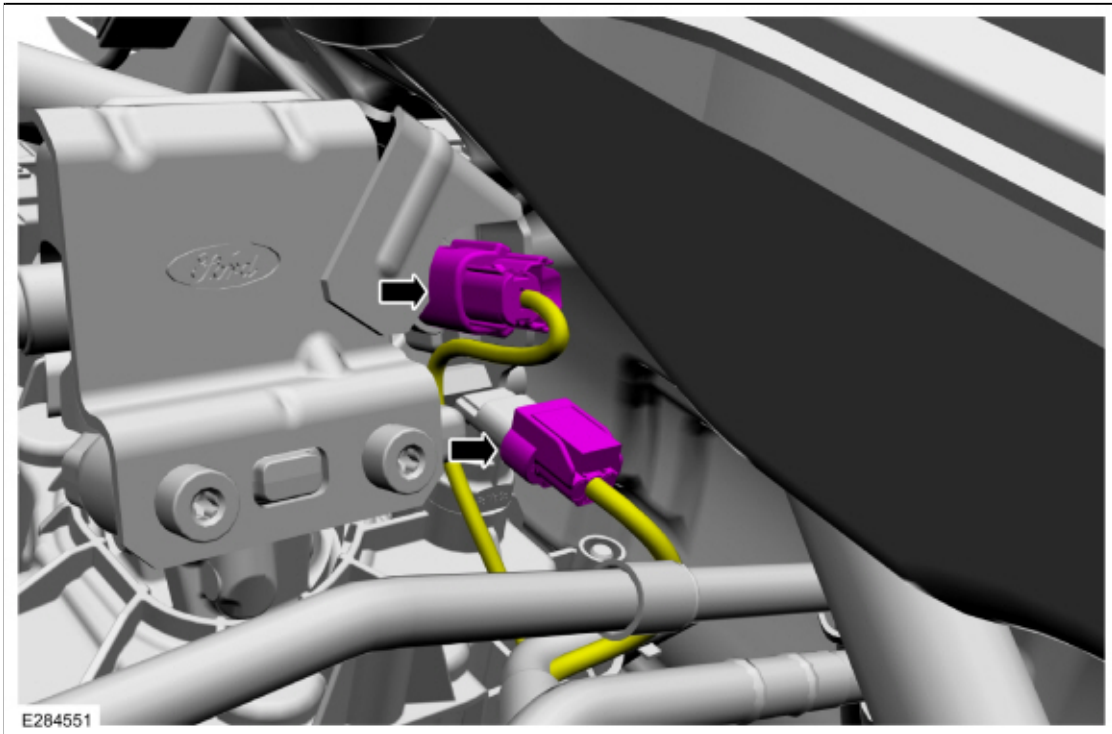
 E222987	303-1567 Sizer, Teflon Seal TKIT-2010C-FLM
 E222982	307-005 (T59L-100-B) Slide Hammer
 E223046	310-205 Fuel Injector Brush
 E168032	310-206 Remover, Fuel Injector TKIT-2009A-FLM
 E223047	310-207 Installer, Fuel Injector Seal Assembly TKIT-2009A-FLM

Removal

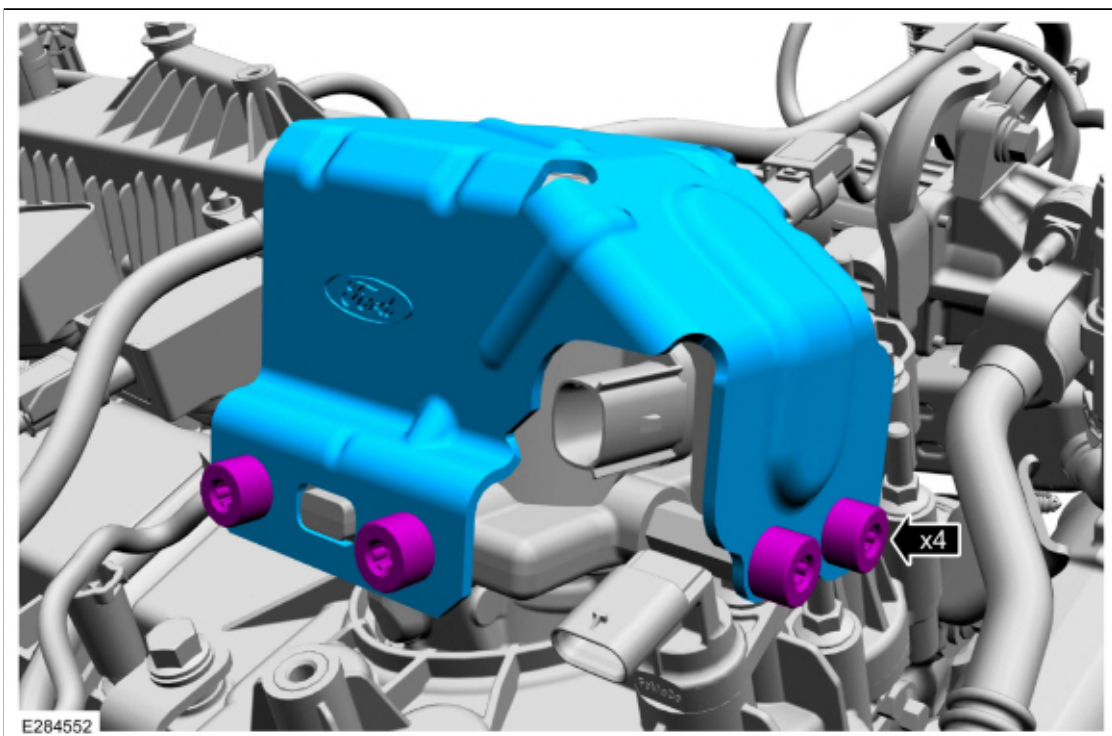
NOTICE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. To prevent fuel system damage, it is essential that absolute cleanliness is observed when working with these components.

1. Release the fuel system pressure.
Refer to: [Fuel System Pressure Release](#) (310-00 Fuel System - General Information - 2.3L EcoBoost (201kW/273PS), General Procedures).
2. Disconnect the battery negative cable.
Refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).

3. Remove the intake manifold.
Refer to: [Intake Manifold](#) (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
4. Disconnect the high-pressure fuel pump and the camshaft position sensor electrical connectors.

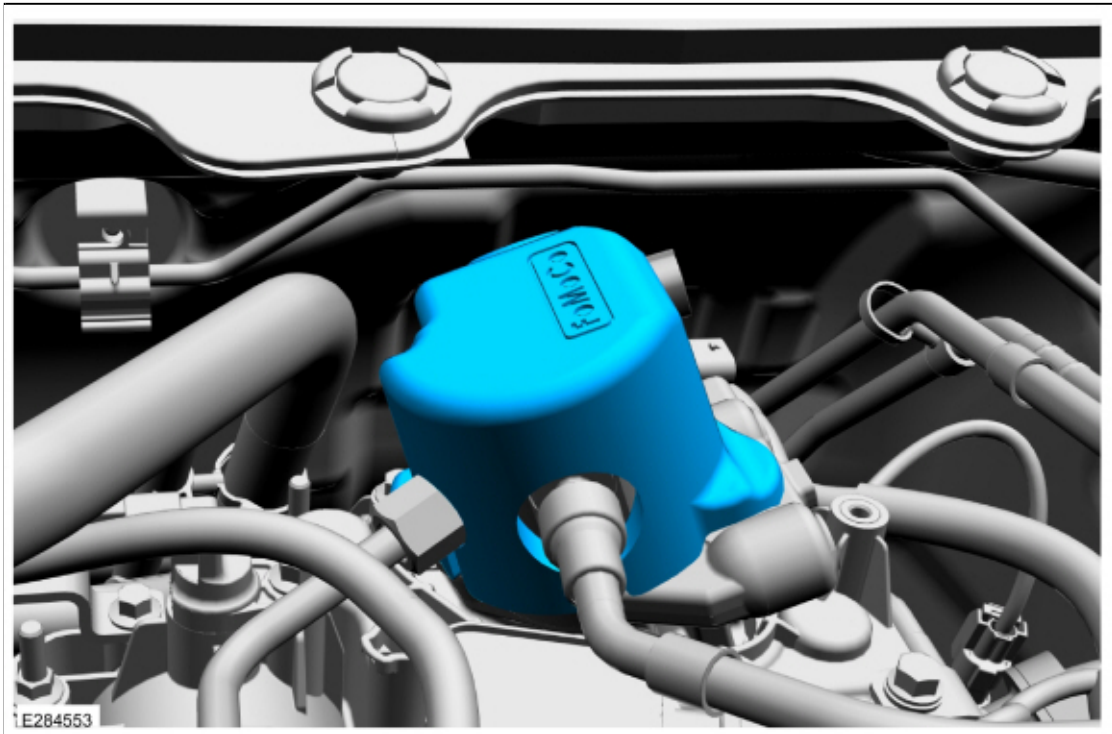


5. Remove the high-pressure fuel pump bracket bolts, then remove the bracket.

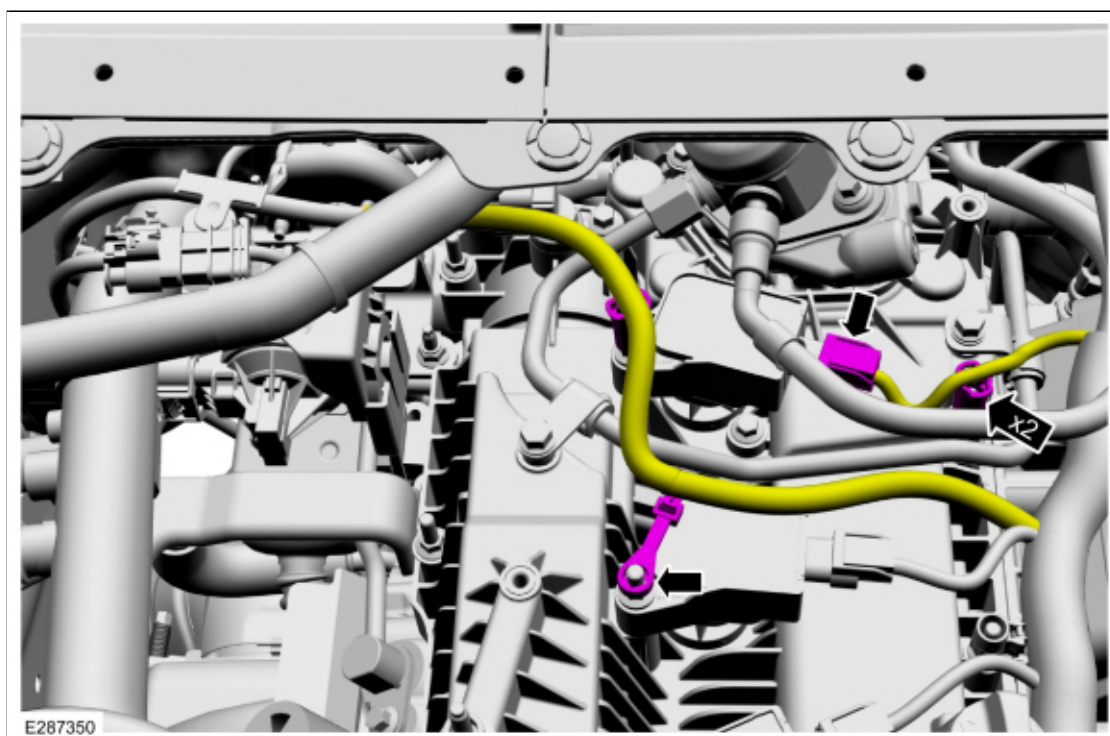


6. **NOTE:** When removing or installing the high-pressure fuel pump noise insulator, spreading the openings will reduce the risk of damage.

Remove the high-pressure fuel pump noise insulator.

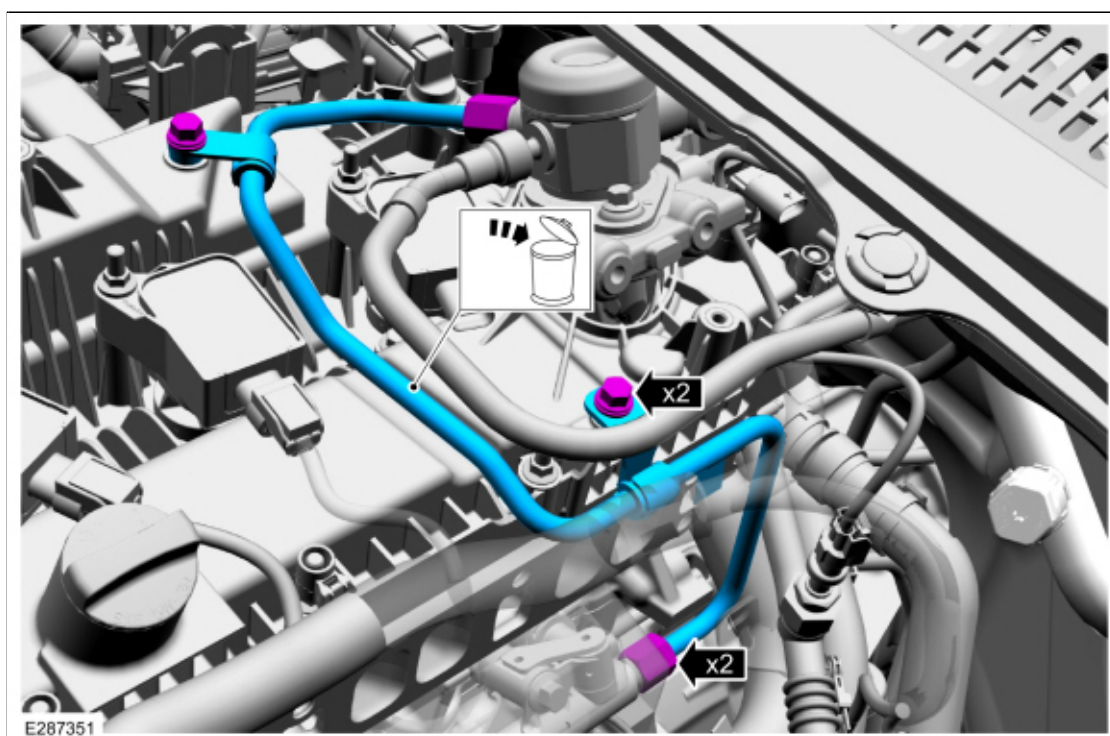


7. Disconnect the electrical connector, then detach the wiring harness retainers and move the wire harness out of the way.



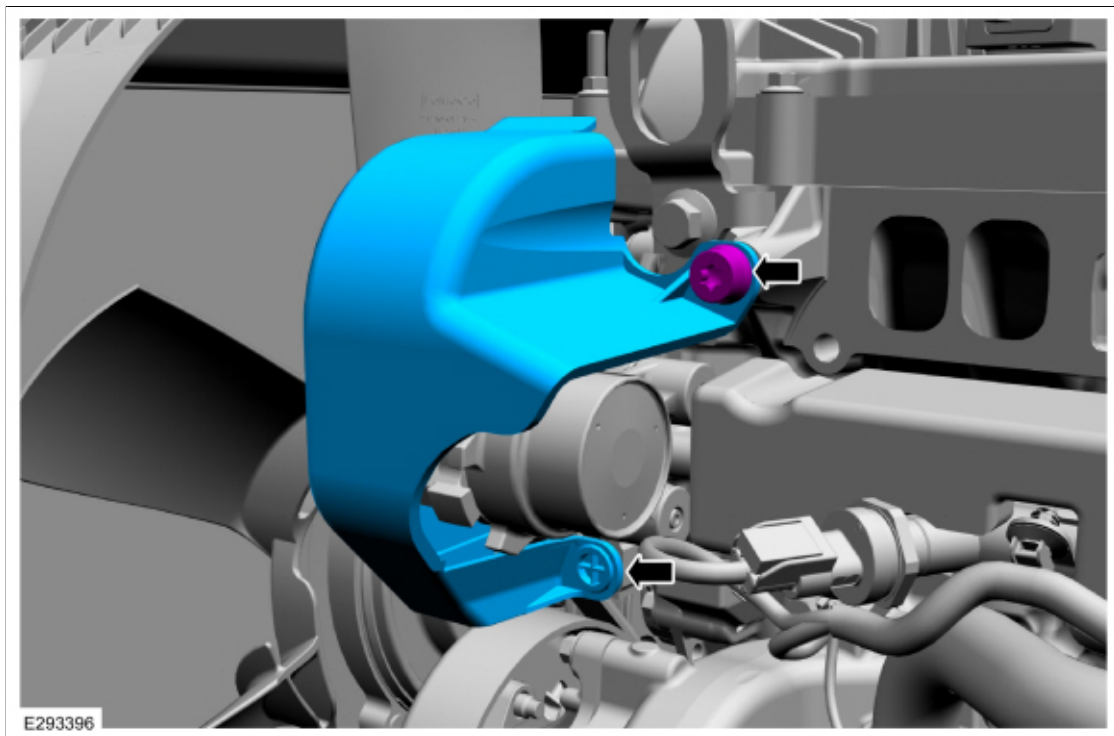
8. **NOTICE:** To release the fuel pressure in the high-pressure fuel tube, wrap the high-pressure fuel pump flare nut with a shop towel to absorb any residual fuel pressure during the loosening of high-pressure fuel pump flare nut.

Remove the high-pressure fuel tube bracket bolts. Loosen the high-pressure fuel tube flare nuts, then disconnect, remove and discard the high-pressure fuel tube.



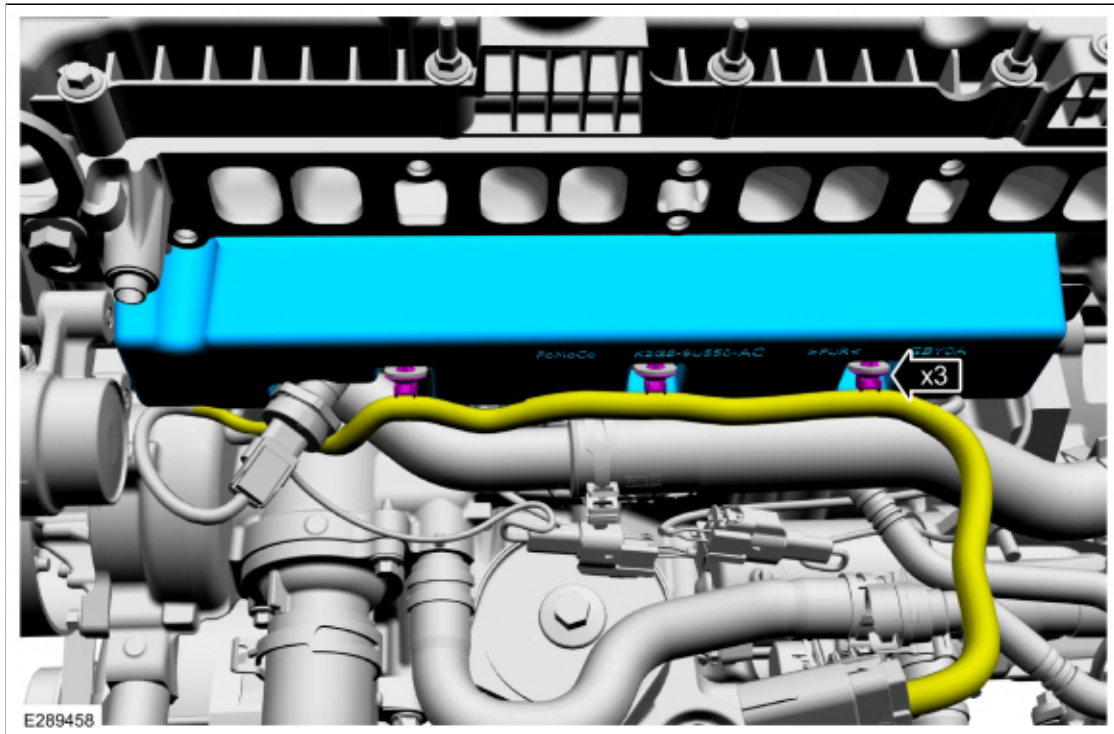
9. **NOTE:** An enhanced hexalobular or torx plus bit must be used.

Remove the bolt, then remove the shield.



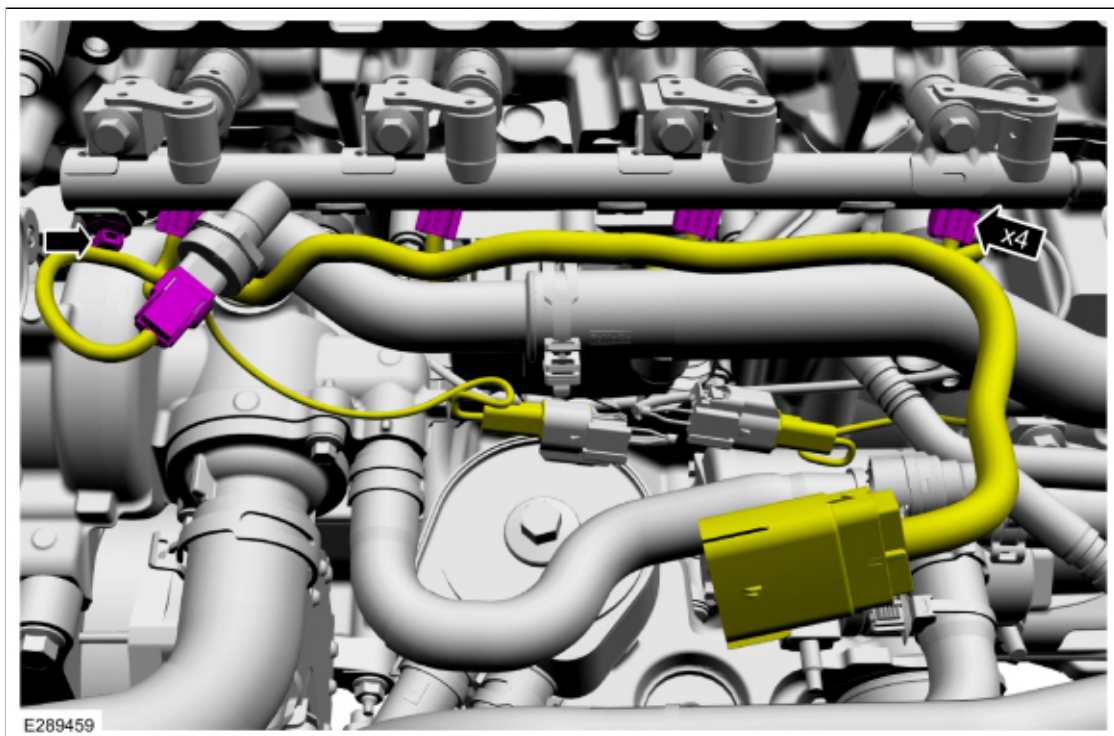
- 10.
- Detach the wire harness retainers from the fuel rail.
 - Remove the fuel rail insulator.





11.

- Disconnect the wire harness retainer from the fuel rail.
- Disconnect the fuel rail pressure sensor electrical connector.
- Move the fuel rail wire harness out of the way.

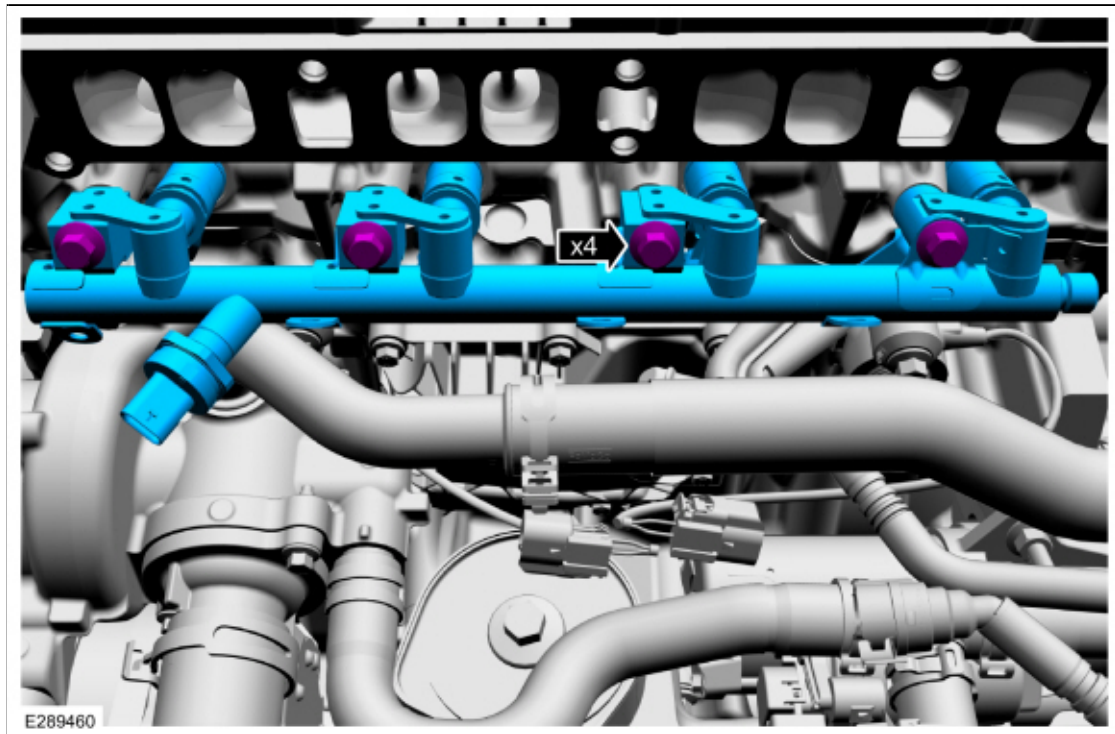


12. **NOTICE:** Pull out the fuel rails in the direction of the fuel injector axis or damage may occur to the

fuel injectors.

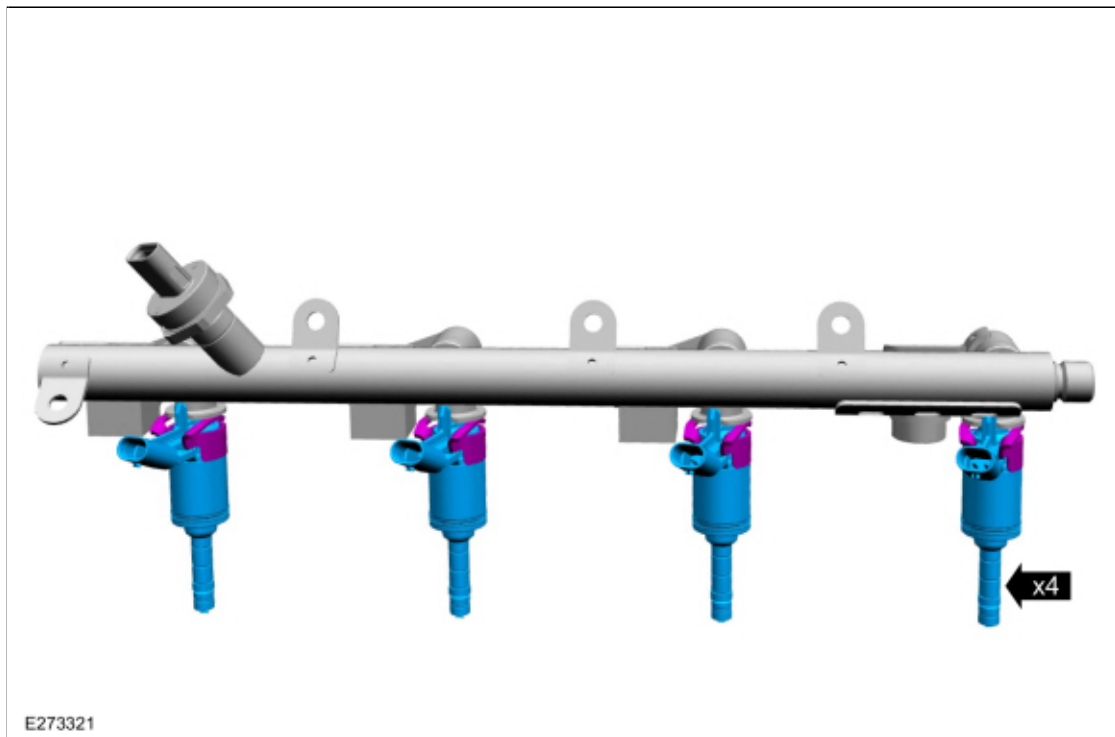
NOTE: When removing the fuel rails, the fuel injectors may remain in the cylinder head and require the use of a Fuel Injector Remover tool to extract.

- Use compressed air to remove any dirt or foreign material from the cylinder head, the engine block and the general surrounding area of the fuel rail and the injectors.
- Remove the fuel rail bolts, then remove the fuel rail.

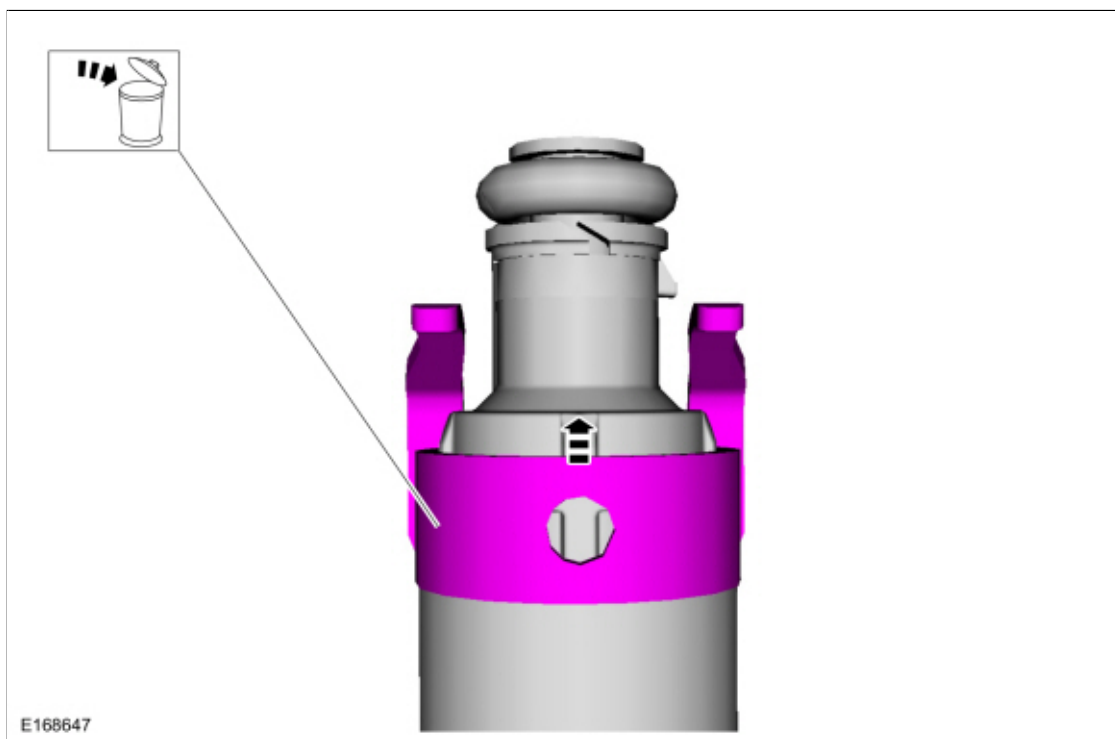


13. Remove the fuel injectors from the fuel rail.





14. Remove and discard the fuel injector clips.

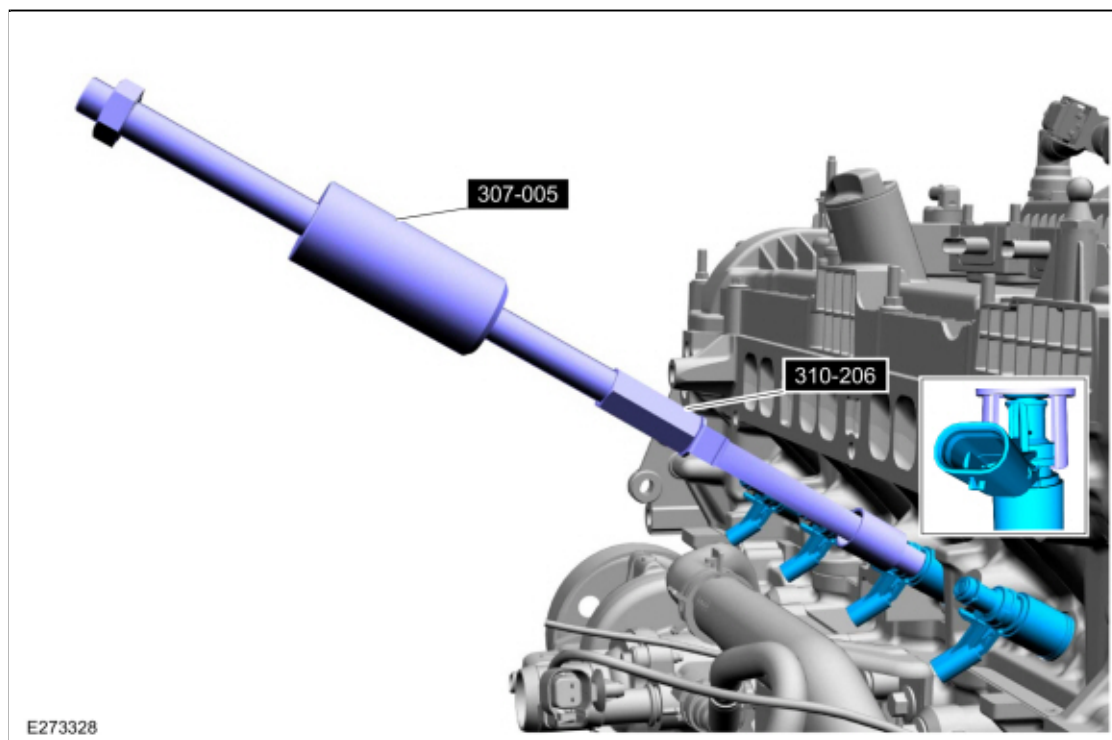


15. **NOTICE:** Use minimal force to remove the fuel injectors with the Fuel Injector Remover tool or damage to the fuel injector assembly may occur.

Using the special tools, remove any of the fuel injectors that remained in the cylinder head. Wiggling the

injector and twisting by hand to break it loose may allow the injector to be removed.

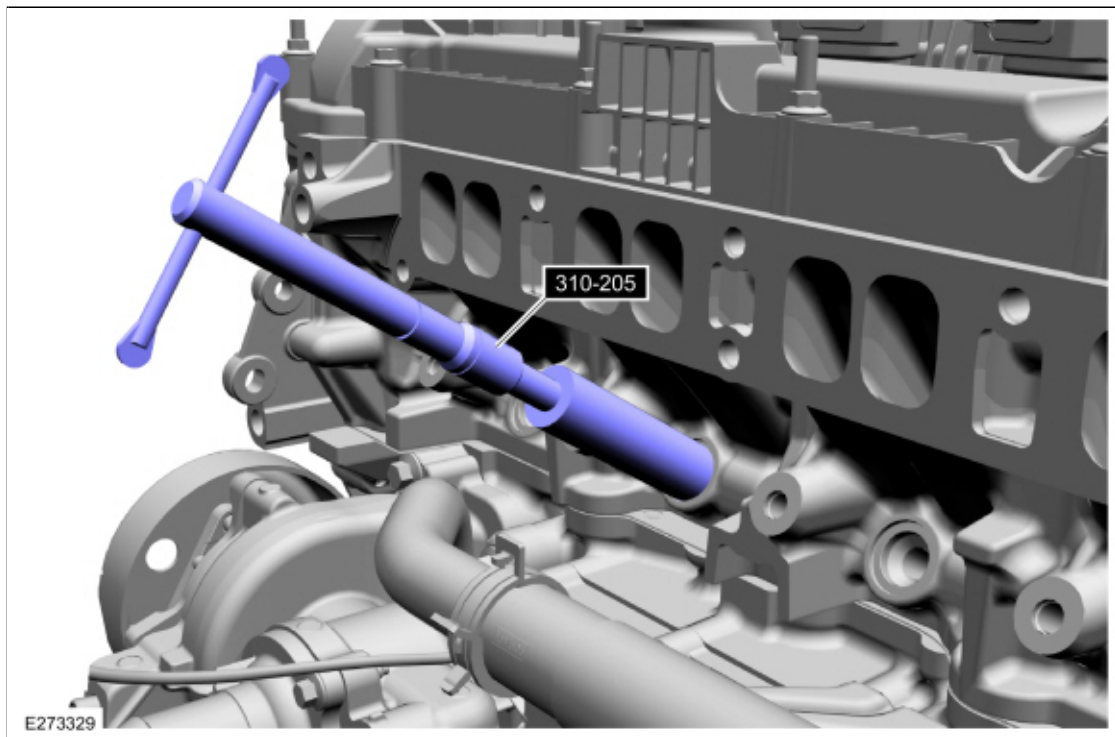
Use Special Service Tool: [307-005 \(T59L-100-B\) Slide Hammer](#), [310-206 Remover, Fuel Injector](#).



16. **NOTICE:** Do not use compressed air to clean the tip of the fuel injector.

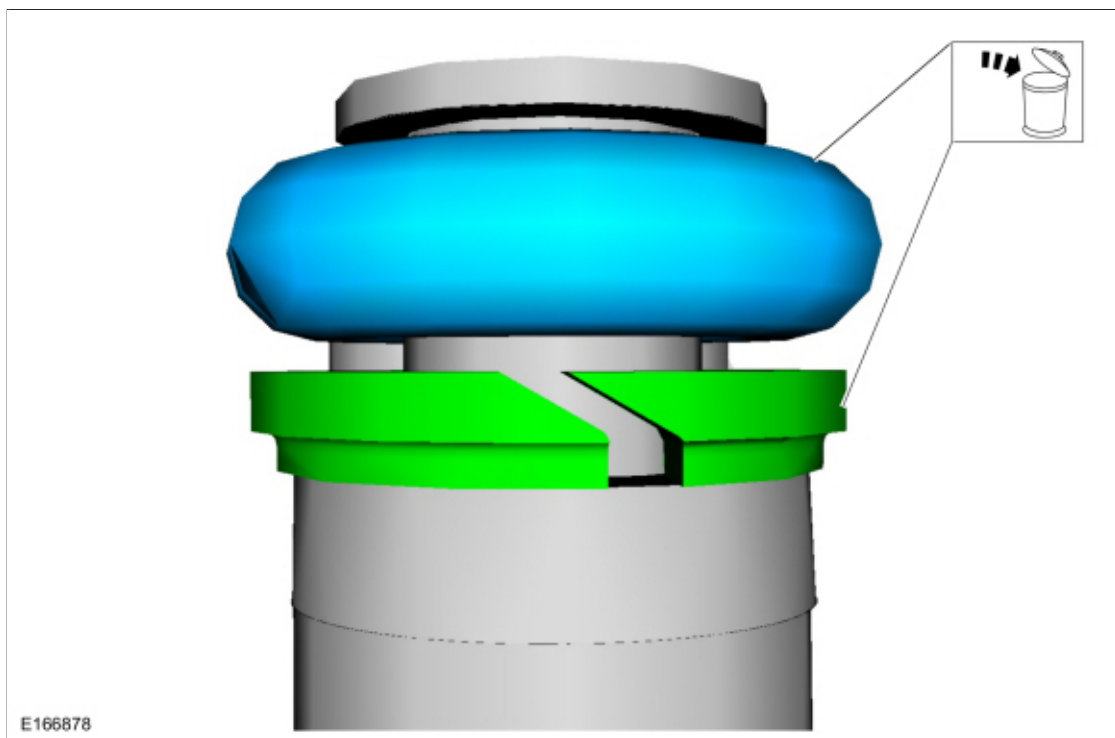
NOTICE: Do not use a brush to clean the tip of the fuel injector.

- Thoroughly clean any residual fuel or foreign material from the cylinder head, the engine block and the general surrounding area of the fuel rails and the injectors.
- Using the special tool, clean the cylinder head fuel injector bores.
Use Special Service Tool: [310-205 Fuel Injector Brush](#).



17. **NOTE:** Note the correct orientation of the fuel injector support rings for correct installation.

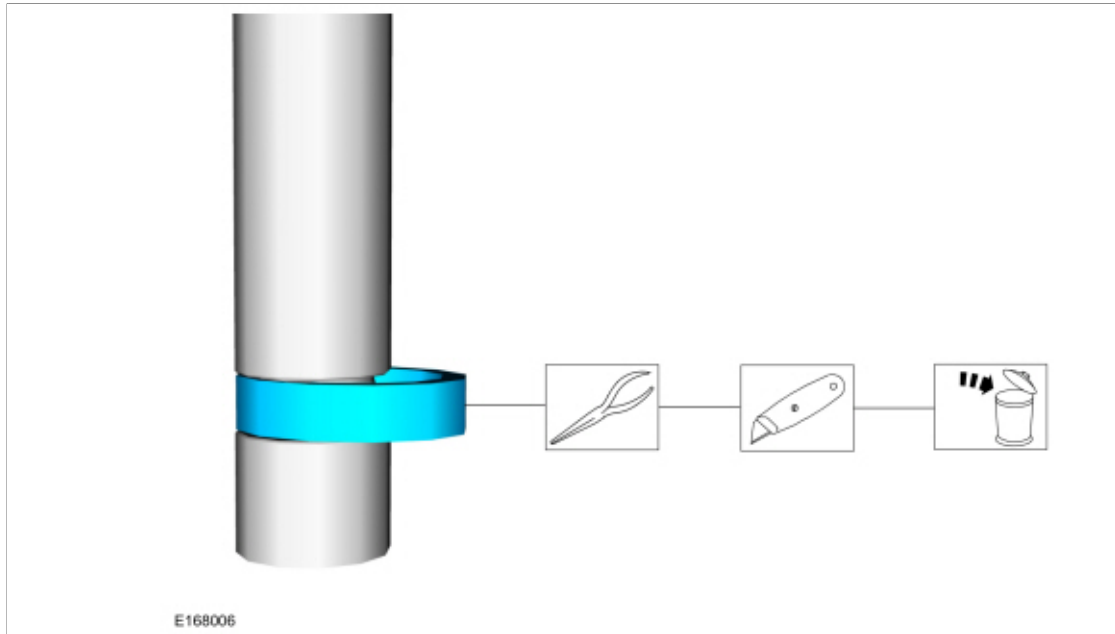
Remove and discard the fuel injector O-rings. Remove and discard the fuel injector support rings.



18. **NOTICE:** Use care when removing the lower Teflon® seals, not to scratch, nick or gouge the fuel injectors.

NOTICE: Do not attempt to cut the lower Teflon® seal without first pulling it away from the fuel injector or damage to the injector may occur.

1. Pull the lower Teflon® seal away from the injector.
2. Carefully cut and discard the lower fuel injector Teflon® seal.



Installation

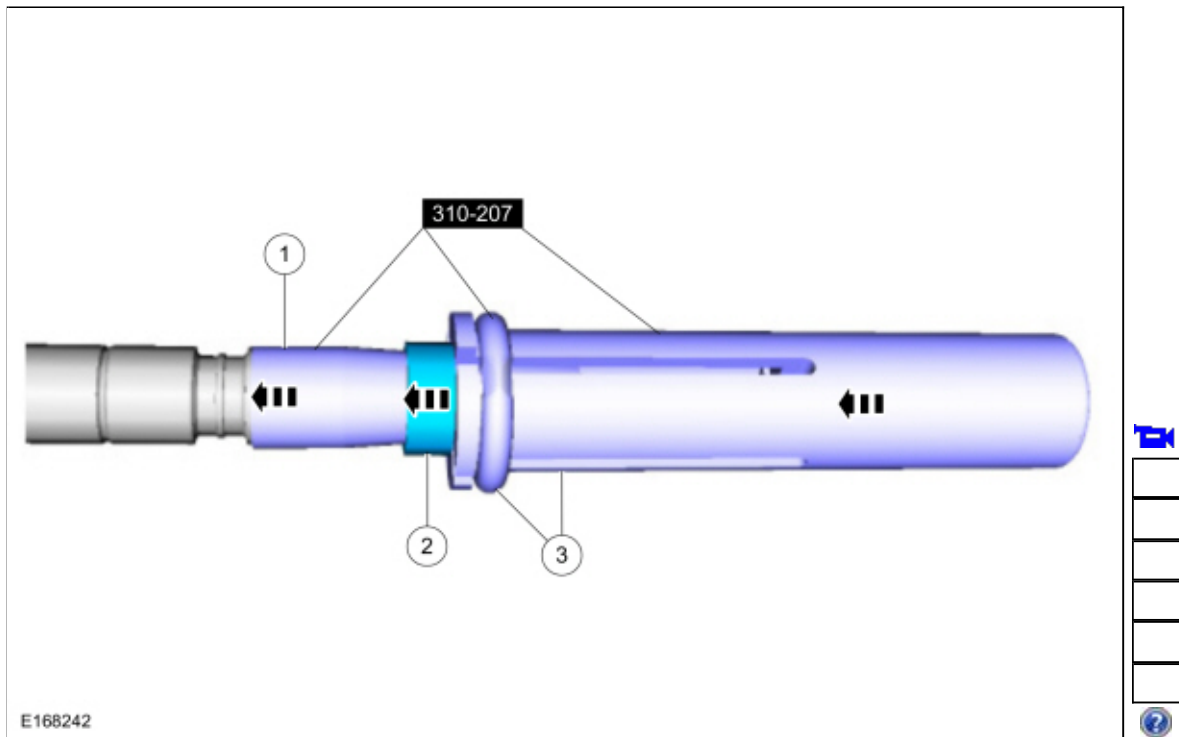
1. **NOTICE:** Do not lubricate the new lower Teflon® fuel injector seals.

1. Install the Teflon® Seal Guide onto the fuel injector tip.
Use Special Service Tool: [310-207 Installer, Fuel Injector Seal Assembly](#).
2. **NOTICE:** Once the Teflon® seal is installed on the Teflon® Seal Guide, it should immediately be installed onto the fuel injector to avoid excessive expansion of the Teflon® seal.

NOTE: Make sure that new lower fuel injector Teflon® seals are installed.

Install the new Teflon® seals onto the Teflon® Seal Guide, using the Pusher Tool, slide the Teflon® seals along the Teflon® Seal Guide.

3. Using the Pusher Tool, slide the Teflon® seals off of the Teflon® Seal Guide and into the groove on the fuel injectors.
Use Special Service Tool: [310-207 Installer, Fuel Injector Seal Assembly](#).
4. Remove the special tools.



2. **NOTE:** Make sure the Teflon® seal is fully seated in the groove on the fuel injector before sizing the Teflon® seal.

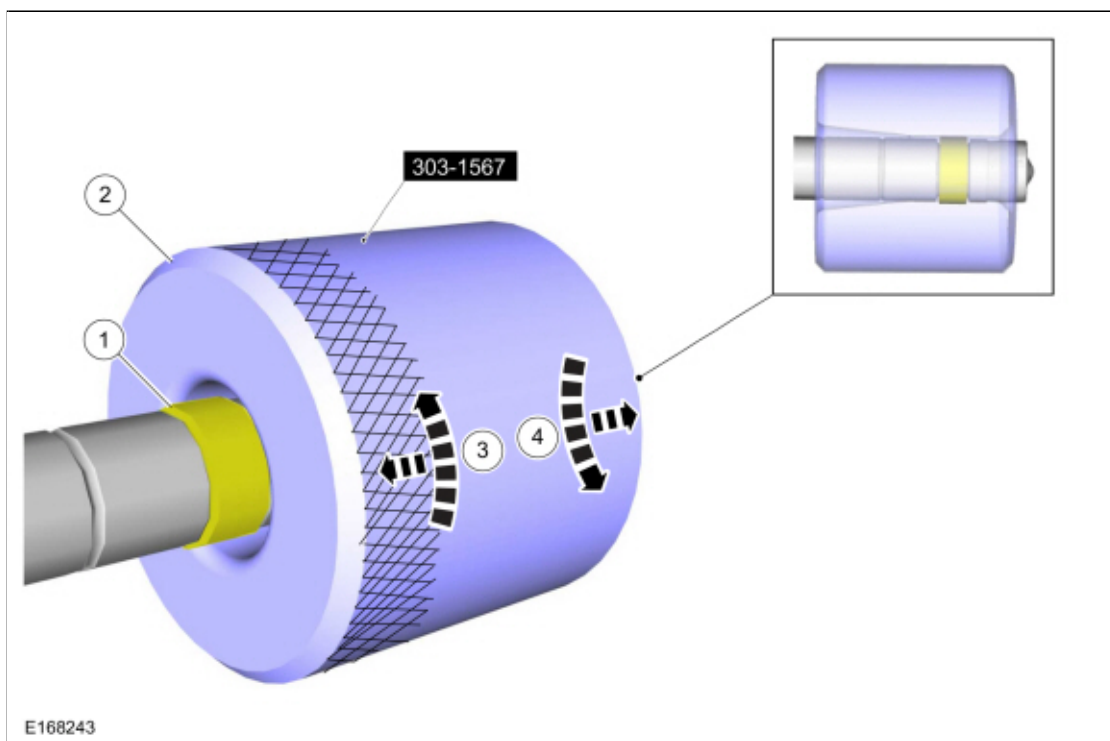
1. Massage and warm the Teflon® seal with your fingers before the Teflon® seal sizer tool is installed. This will aid in installing the Teflon® seal sizer tool.
2. **NOTE:** The beveled opening of the Teflon® seal sizer tool goes away from the seal.

Position the Teflon® seal sizer tool with the larger opening towards the Teflon® seal. Push while turning the Teflon® seal sizer tool 180 degrees.

Use Special Service Tool: [303-1567 Sizer, Teflon Seal](#).

3. Once the Teflon® seal sizer tool is installed, check and make sure the Teflon® seal is in the sizing portion of the Teflon® seal sizer tool.
4. After one minute, turn the Teflon® seal sizer tool back 180 degrees and remove.



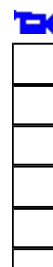


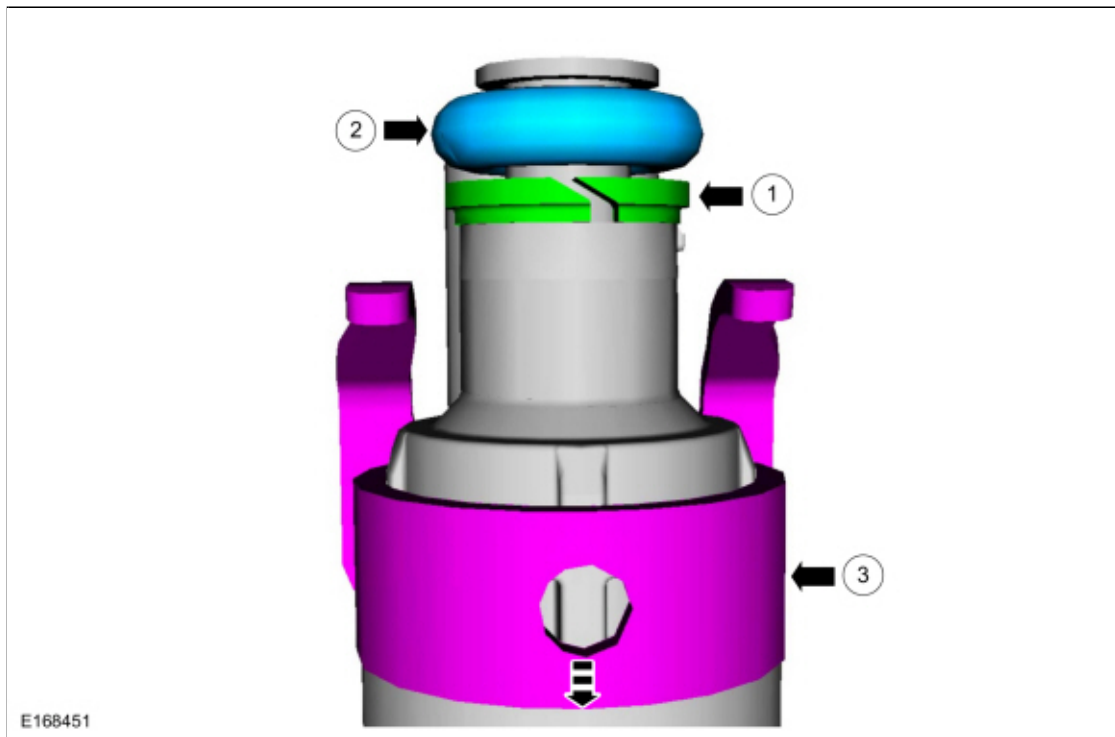
3. **NOTE:** Make sure that new fuel injector support rings and new fuel injector O-ring seals are installed.

1. **NOTICE:** The new the fuel injector support rings must be installed in the correct orientation with the wide surface area facing up against the fuel injector O-ring seals. Improperly installed support rings may cause the fuel system to leak.

Install the new the fuel injector support rings.

2. Install the new fuel injector O-rings.
3. Install the new the fuel injector clips.

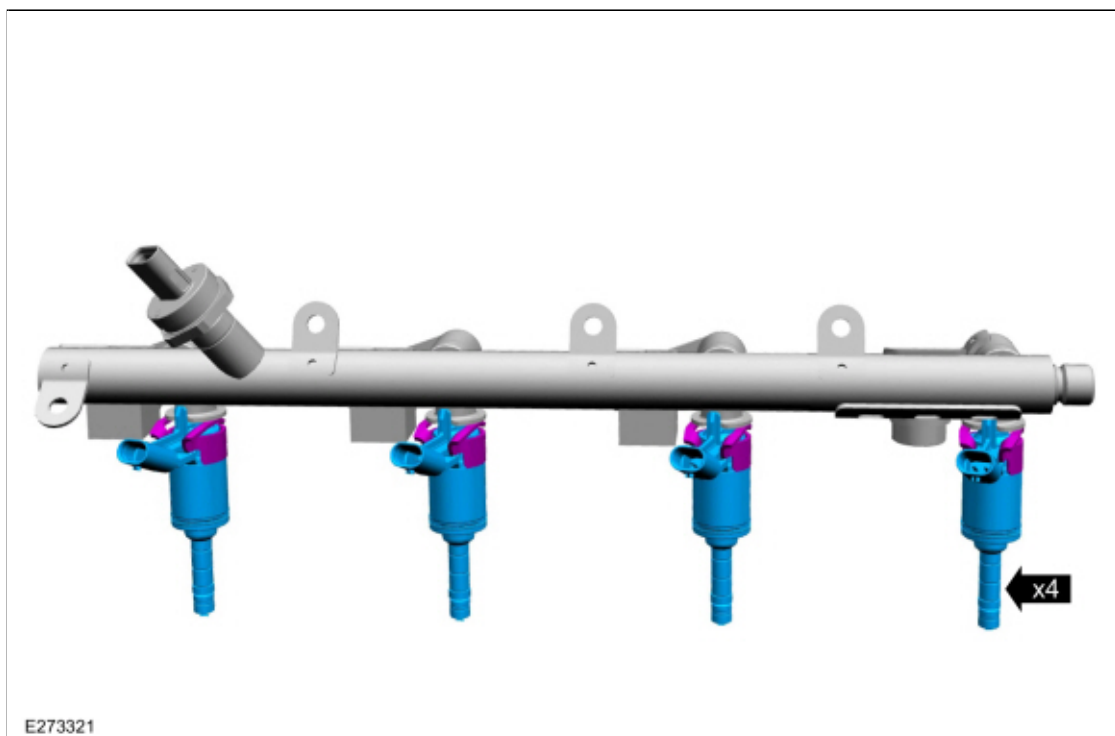




4. **NOTICE:** The FRP sensor must be replaced if it is removed from the fuel rail.

NOTE: The anti-rotation finger of the fuel injector clip must slip into the groove of the fuel rail cup.

Install the fuel injectors to the fuel rail.



5. **NOTE:** Do not lubricate the new lower Teflon® fuel injector seals.

- **NOTE:** No sudden impact force is allowed.

Press the fuel rail down into the cylinder head injector bores by hand, then install and hand start fuel rail bolts 3 and 4.

- Release the force before tightening.
- Install the remaining fuel rail bolts. Tighten all of the fuel rail bolts in the sequence shown and in the following 5 stages.

Torque:

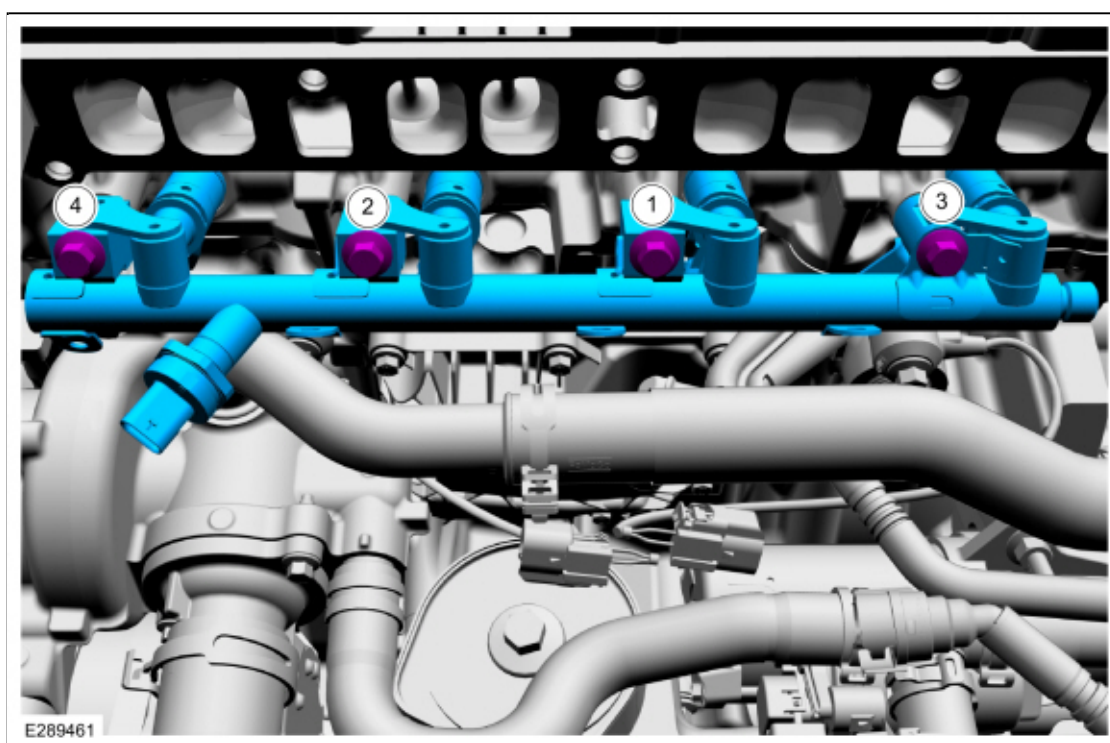
Stage 1: Tighten to: : 89 lb.in (10 Nm)

Stage 2: Back off to: : 0 lb.in (0 Nm)

Stage 3: Wait 5 s

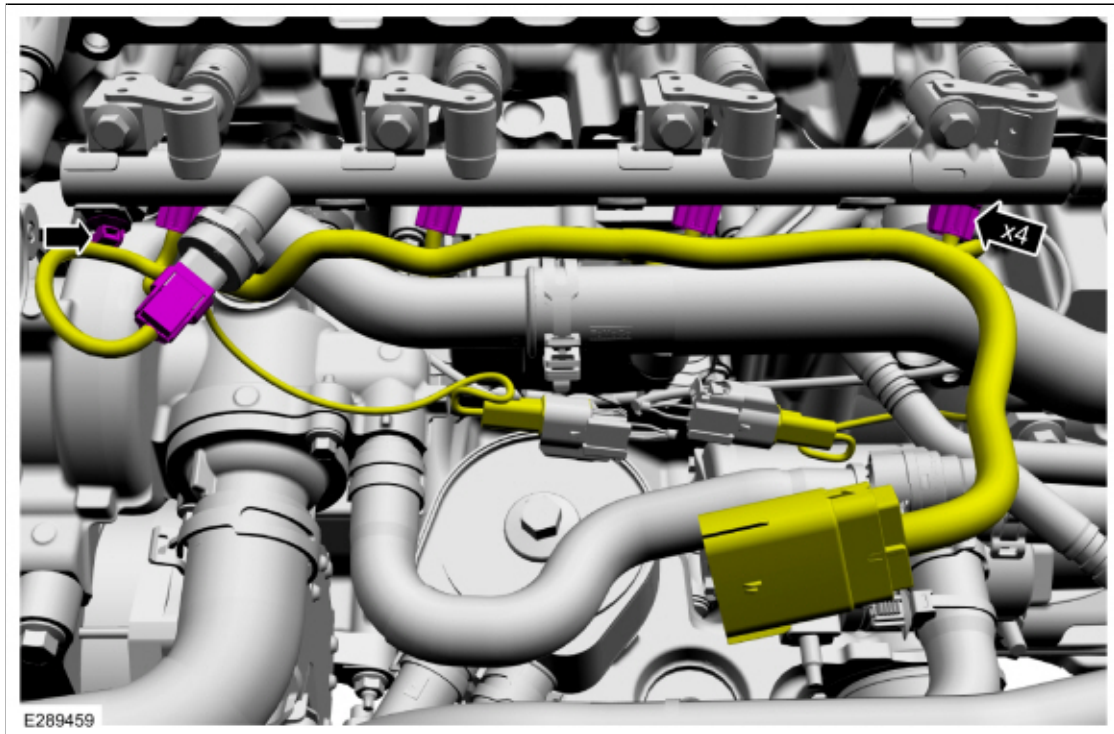
Stage 4: Tighten to: : 124 lb.in (14 Nm)

Stage 5: Tighten an additional: : 30°



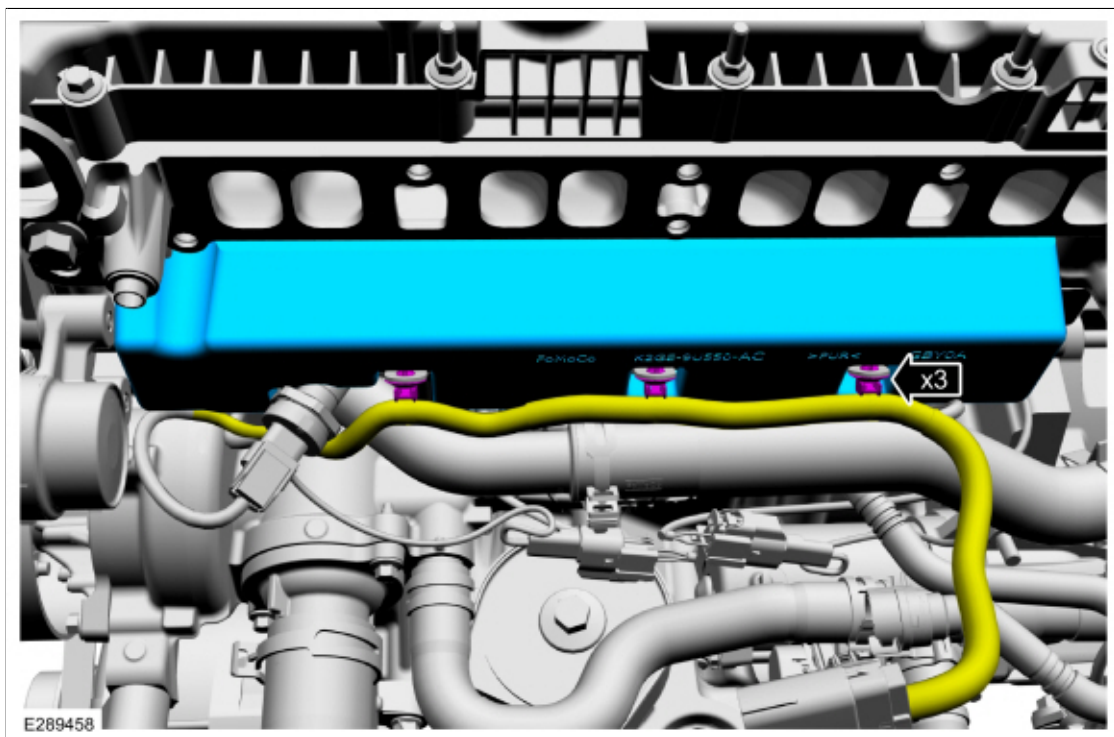
6.

- Install the fuel rail wire harness, connect the wire harness retainer to the fuel rail.
- Connect the fuel rail pressure sensor electrical connector.



7.

- Install the fuel rail insulator.
- Attach the wire harness retainers to the fuel rail.

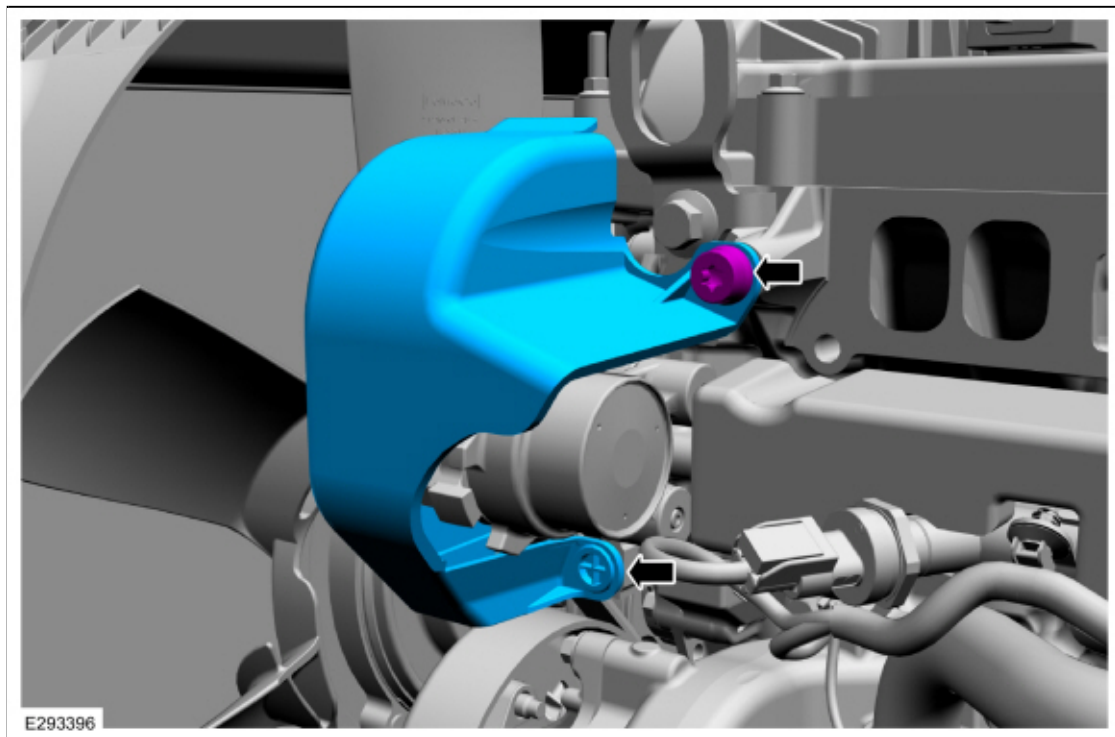


8. **NOTE:** Align molded pin on bottom of the shield and install into boss in location.

NOTE: An enhanced hexalobular or torx plus bit must be used.

Install the shield, then install and tighten the bolt.

Torque: 18 lb.ft (25 Nm)



9. **NOTE:** Make sure that a new high-pressure fuel tube is installed.

1. Install the new high-pressure fuel tube and the bracket bolts, then tighten the high pressure fuel tube flare nuts and the bracket bolts only finger tight at this stage.
2. Calculate the correct torque wrench setting for the following torque using the Torque Wrench Adapter Formulas.

Torque:

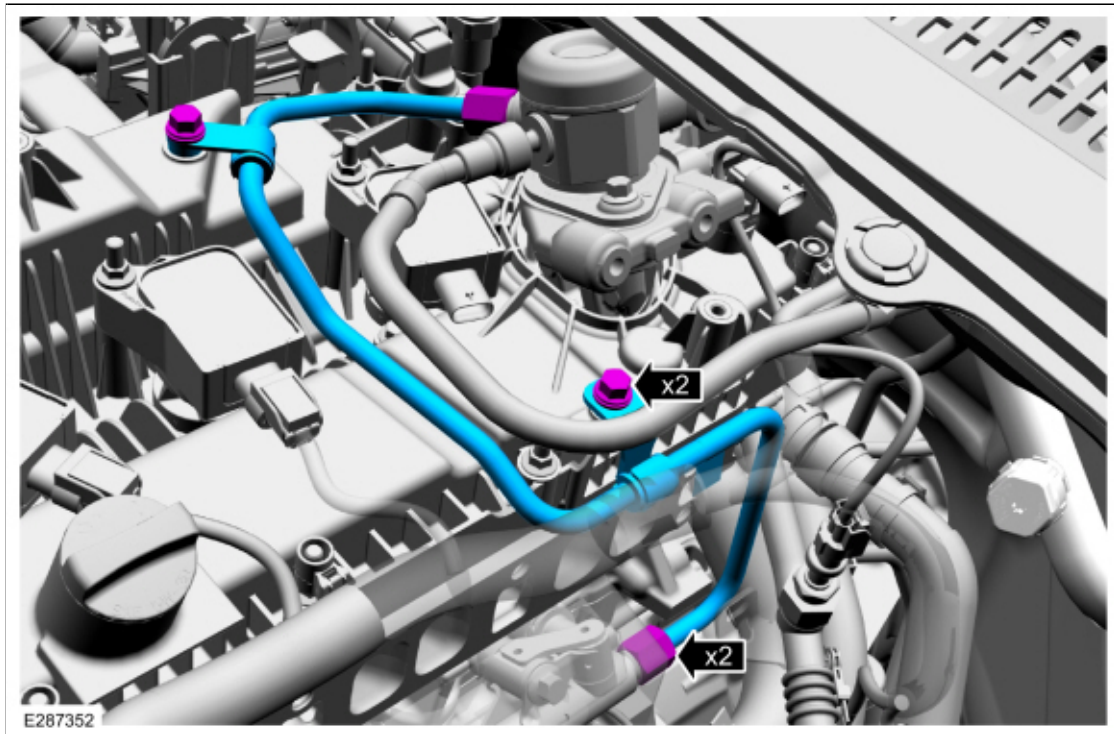
High pressure fuel tube flare nuts, :

Stage 1: Tighten to: : 62 lb.in (7 Nm)

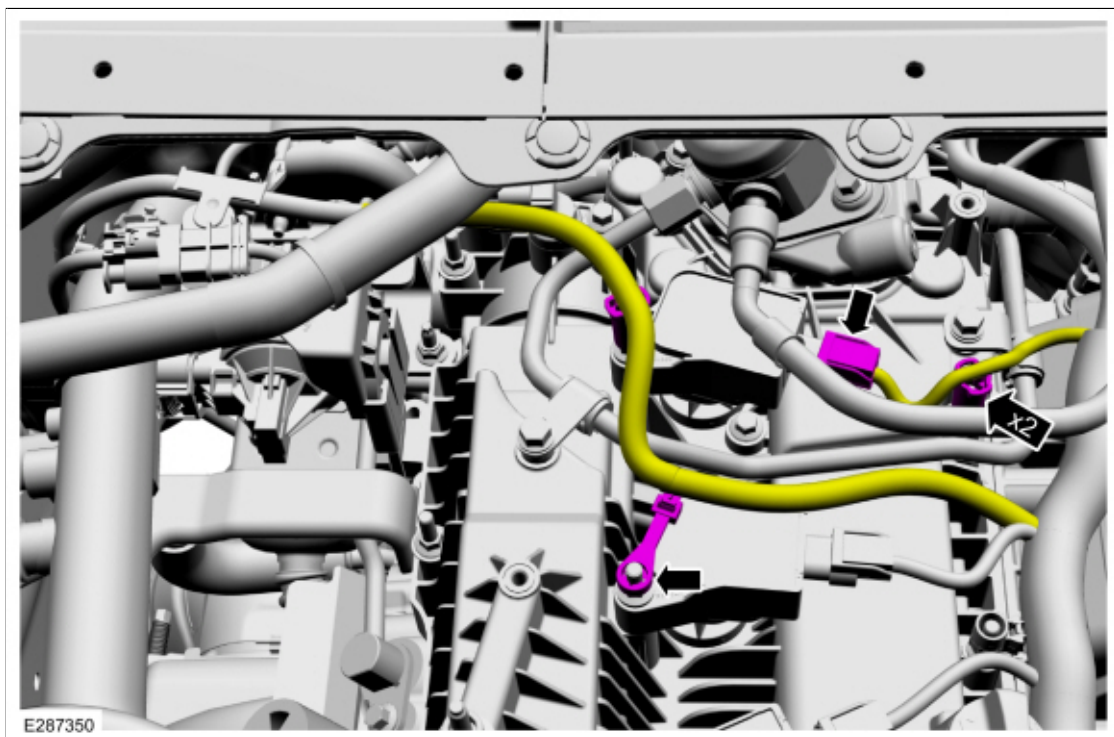
Stage 2: Tighten to: : 89 lb.in (10 Nm)

Stage 3: Tighten an additional: : 38°

High-pressure fuel tube bracket bolts, tighten to: : 97 lb.in (11 Nm)

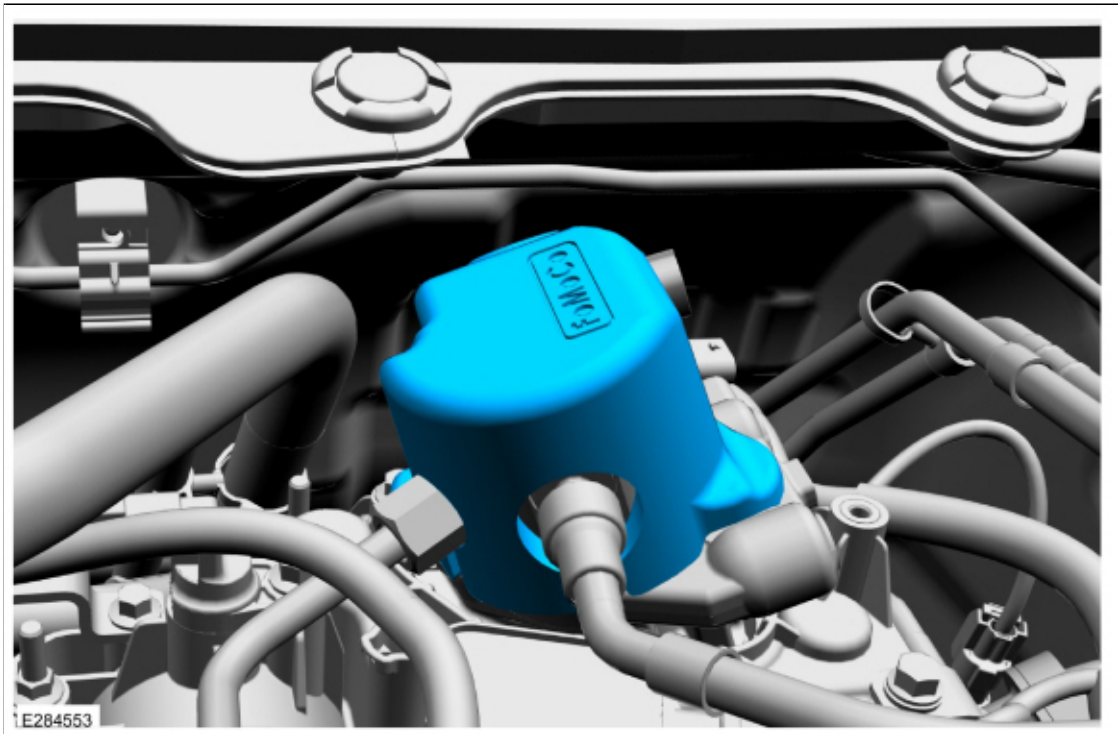


10. Connect the electrical connector, then attach the wiring harness retainers.

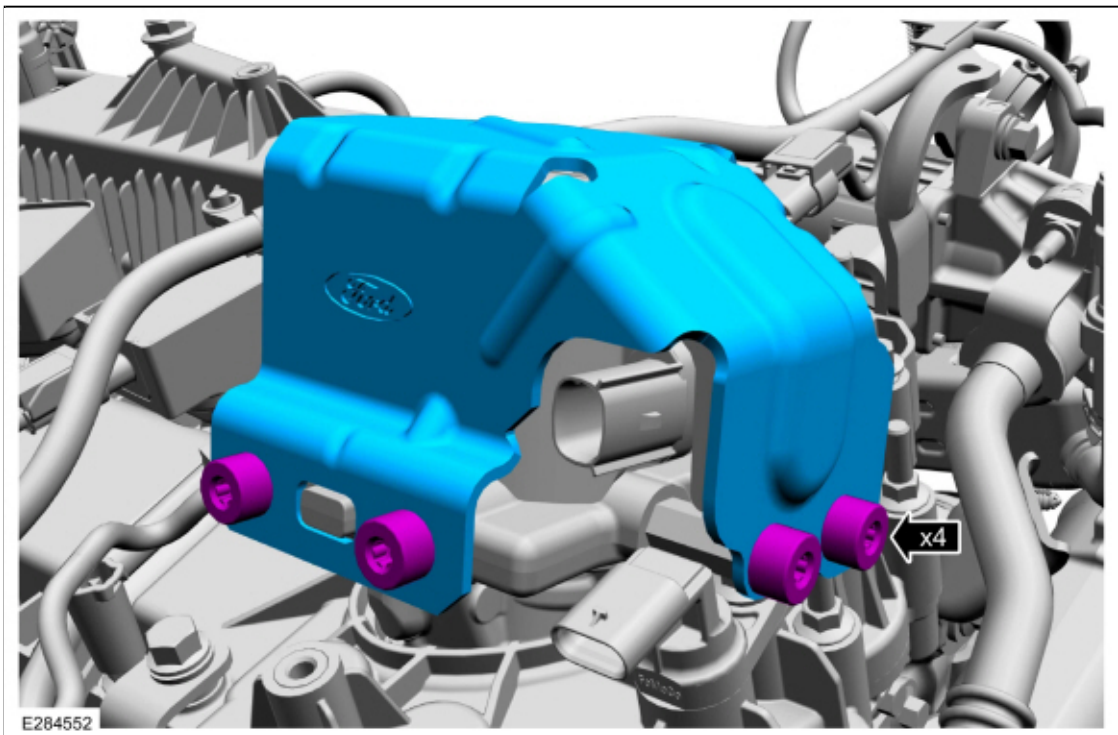


11. **NOTE:** When removing or installing the high-pressure fuel pump noise insulator, spreading the openings will reduce the risk of damage.

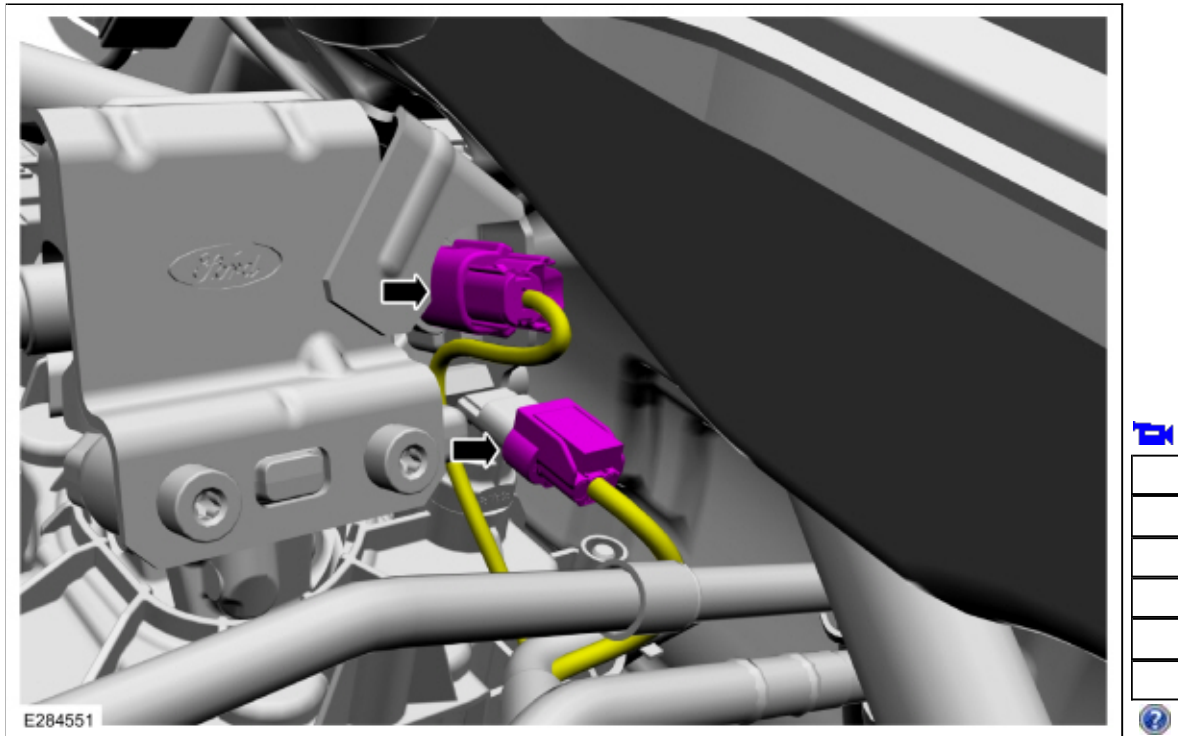
Install the high-pressure fuel pump noise insulator.



12. Install the high-pressure fuel pump bracket, then install and tighten the bolts.
Torque: 97 lb.in (11 Nm)



13. Connect the high-pressure fuel pump and the camshaft position sensor electrical connectors.



14. Install the intake manifold.
Refer to: [Intake Manifold](#) (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
15. Connect the battery negative cable.
Refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).
16. Pressurize the fuel system.
Refer to: [Fuel System Pressure Release](#) (310-00 Fuel System - General Information - 2.3L EcoBoost (201kW/273PS), General Procedures).

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