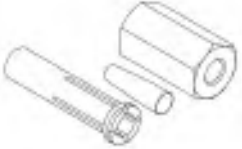


Direct Injection Fuel Rail RH

Special Tool(s) / General Equipment

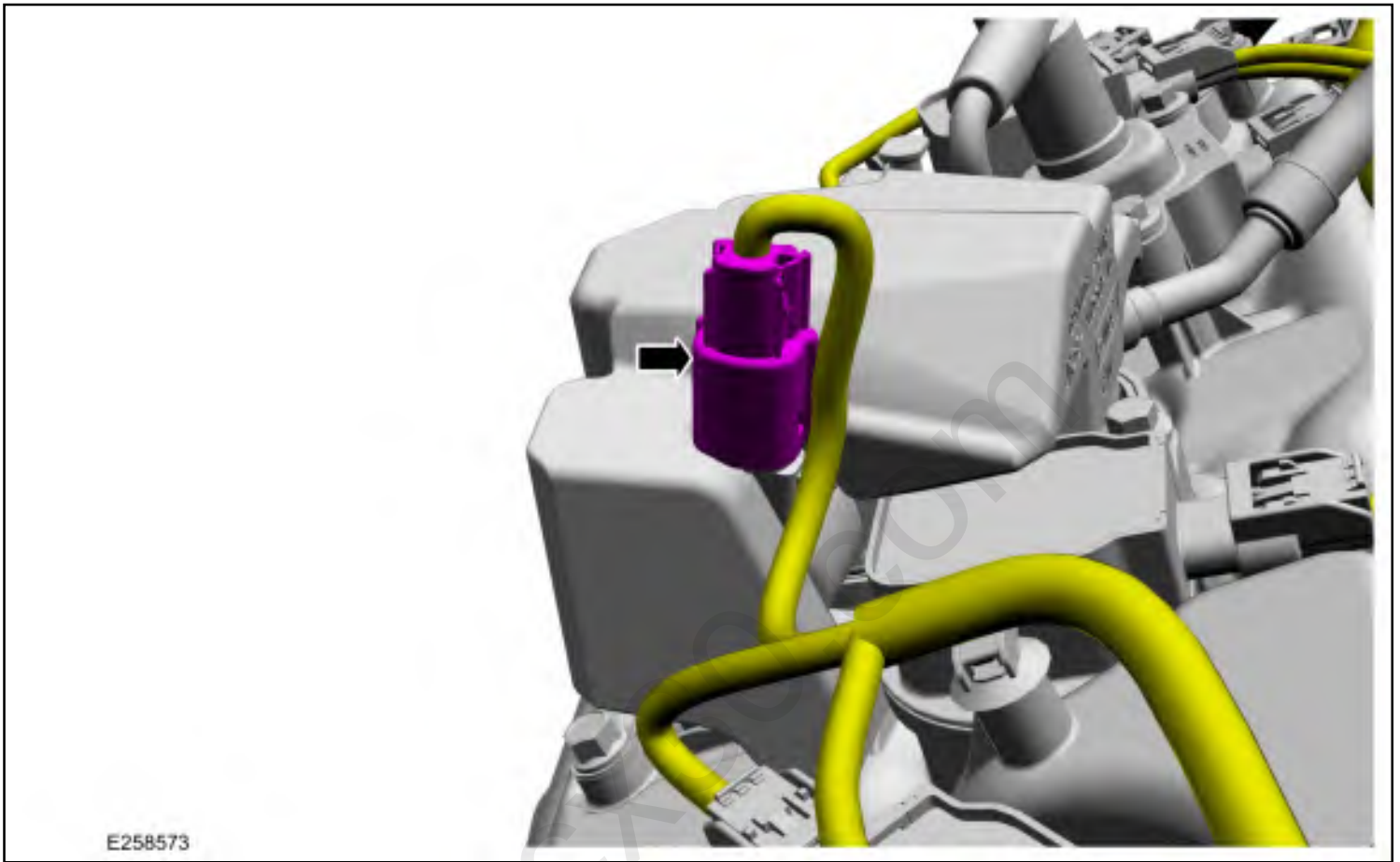
 E222987	303-1567 Sizer, Teflon Seal TKIT-2010C-FLM
 E222982	307-005 (T59L-100-B) Slide Hammer
 E223046	310-205 Fuel Injector Brush
 E168032	310-206 Remover, Fuel Injector TKIT-2009A-FLM
 E223047	310-207 Installer, Fuel Injector Seal Assembly TKIT-2009A-FLM

Removal

1. Remove the intake manifold.

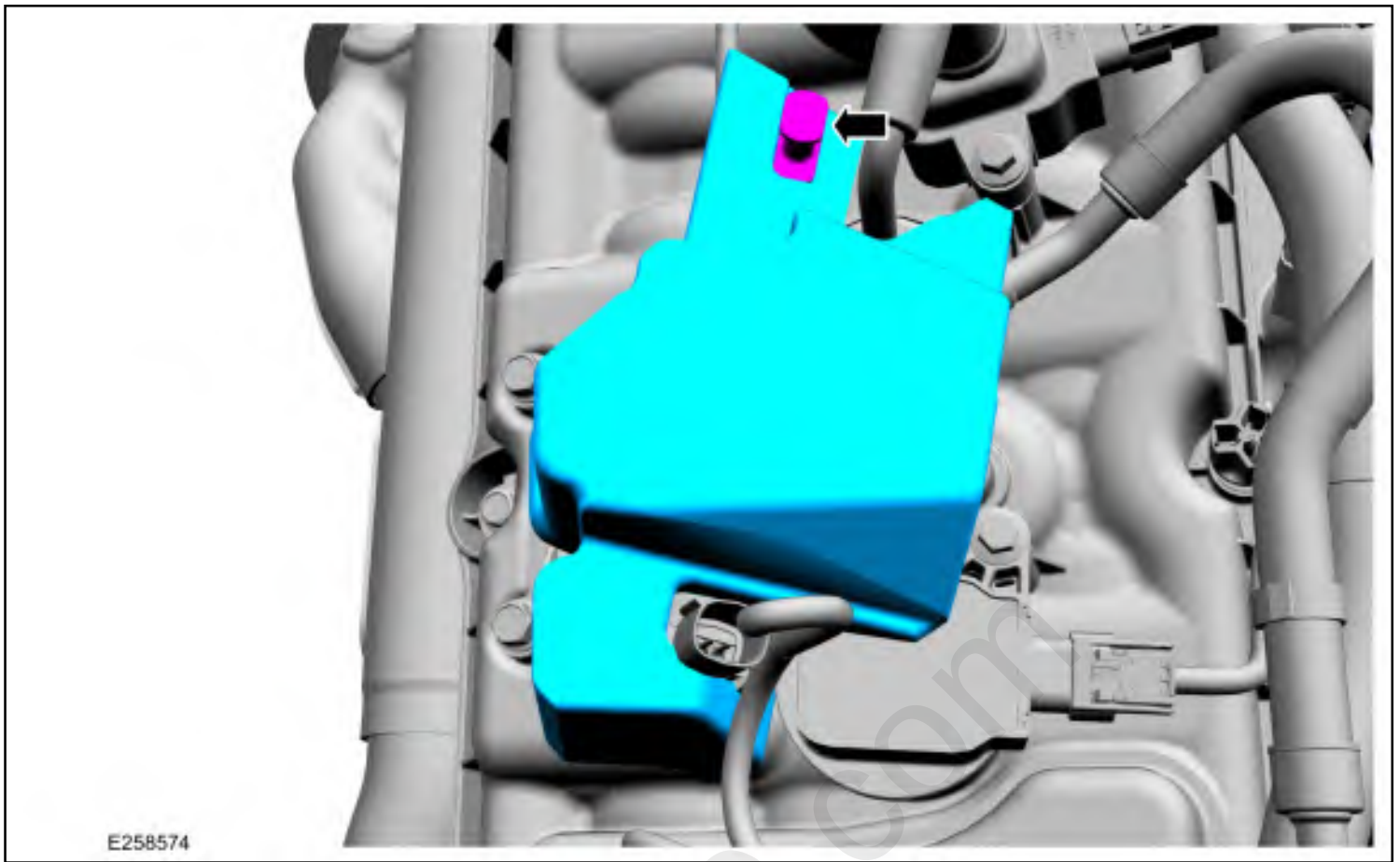
Refer to: [Intake Manifold](#) (303-01D Engine - 5.0L 32V Ti-VCT, Removal and Installation).

2. Disconnect the high-pressure fuel pump electrical connector.

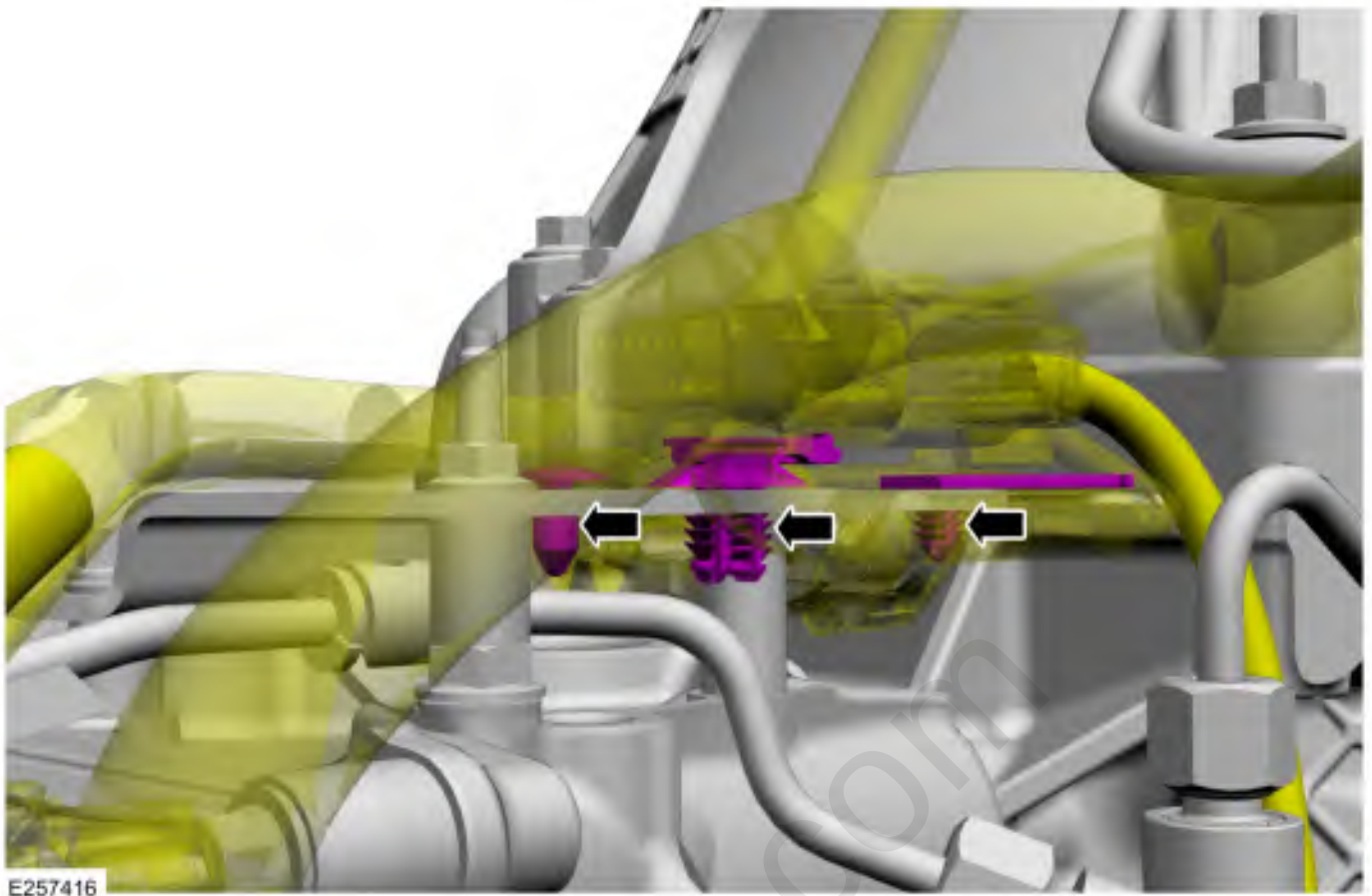


3. **NOTE:** When removing or installing the fuel injection pump noise insulator, spreading the openings will reduce the risk of damage.

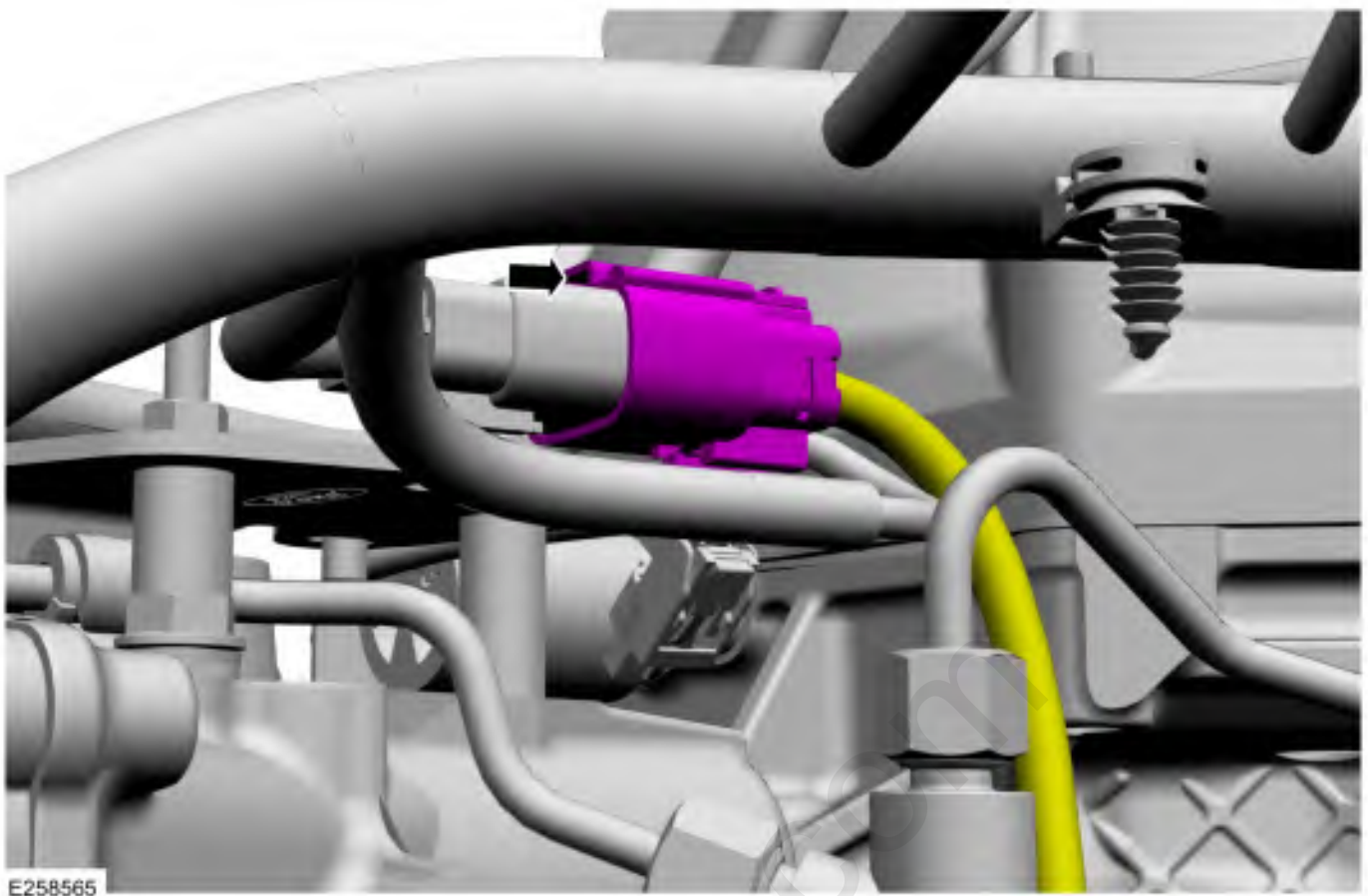
Release the retainer, then remove the fuel injection pump noise insulator.



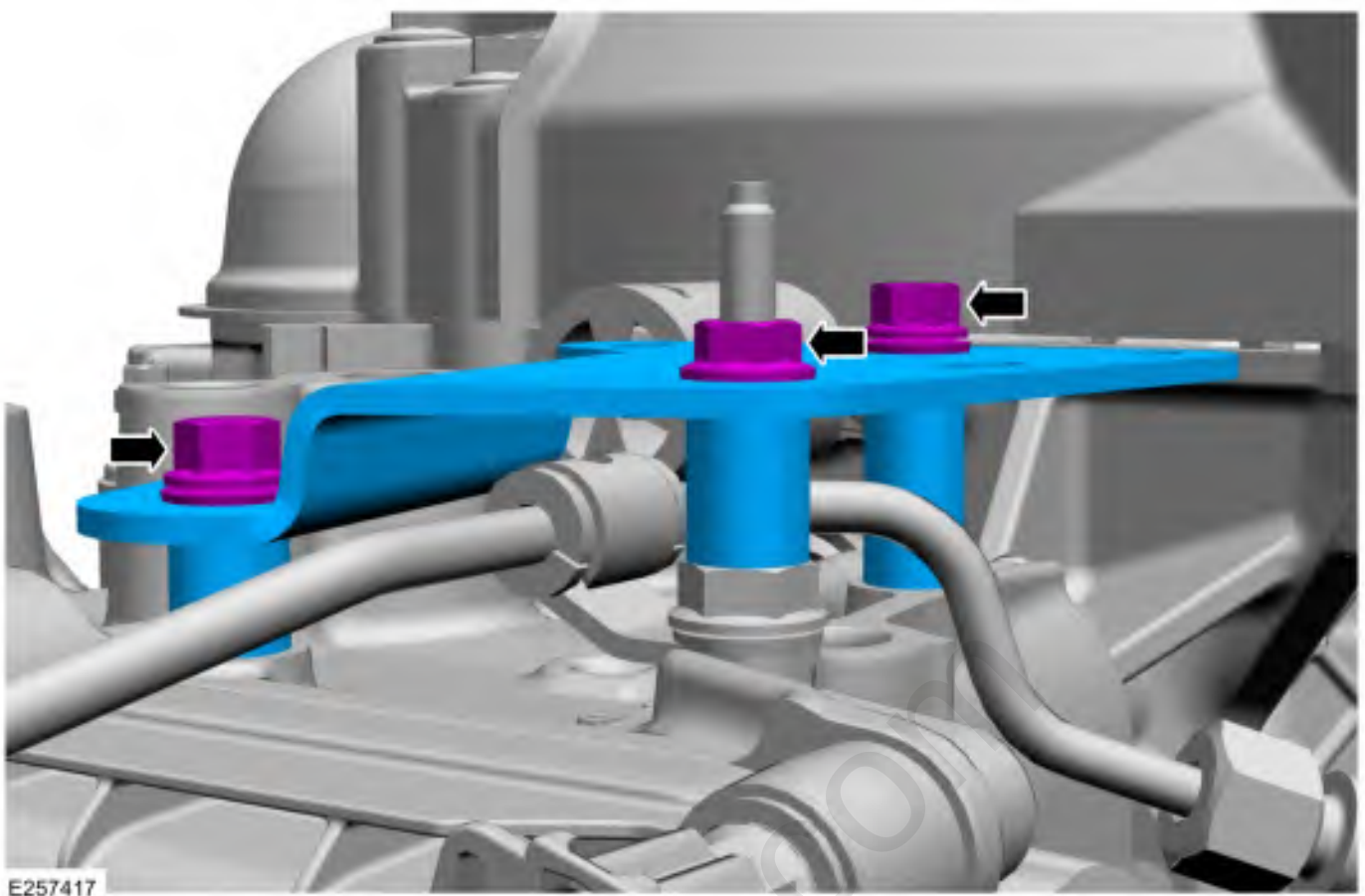
4. Detach the wiring harness retainers from high-pressure fuel line shield.



5. Disconnect the fuel injector main harness electrical connector.

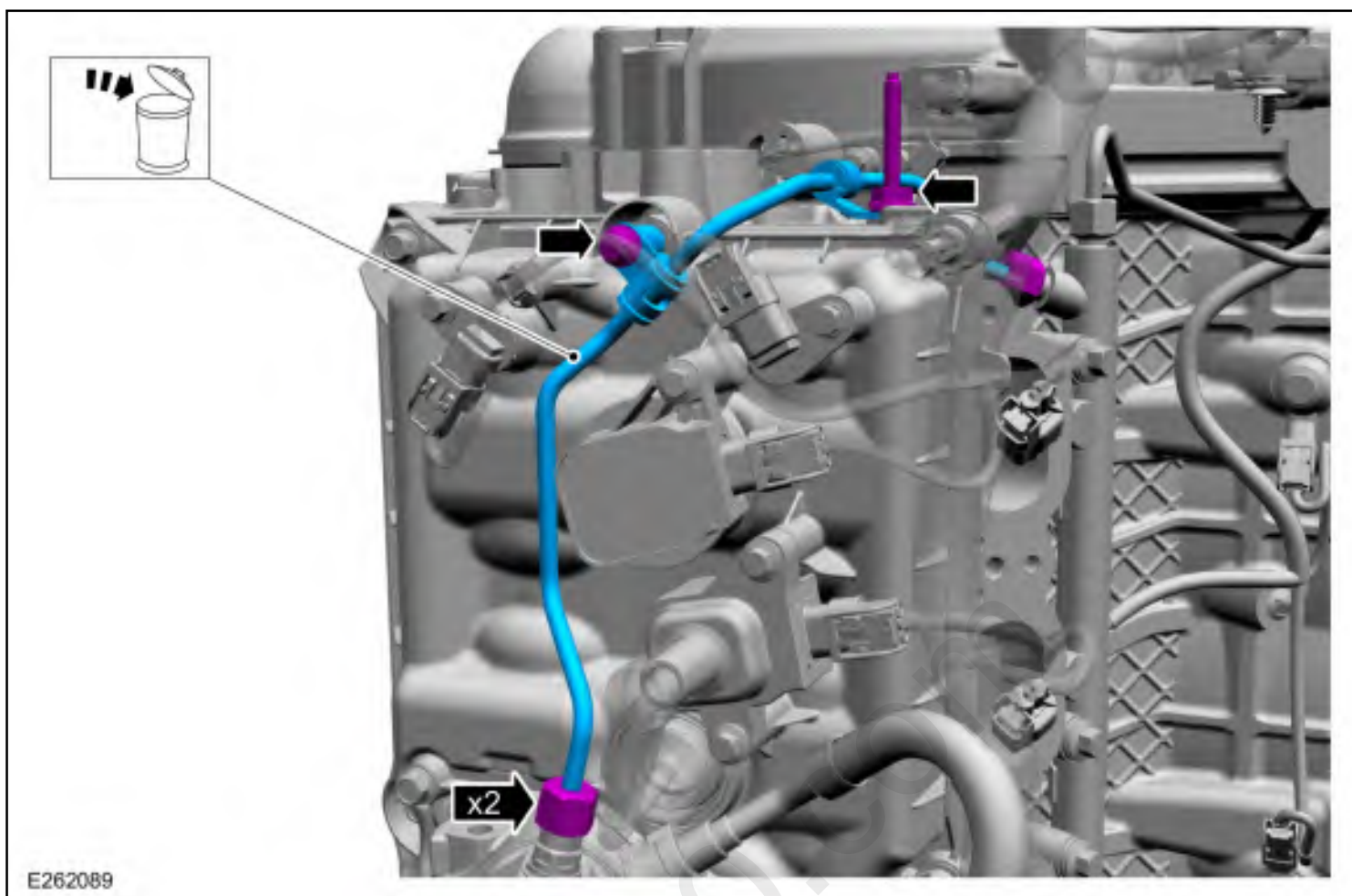


6. Remove the high-pressure fuel line shield retainers, then remove high-pressure fuel line shield.

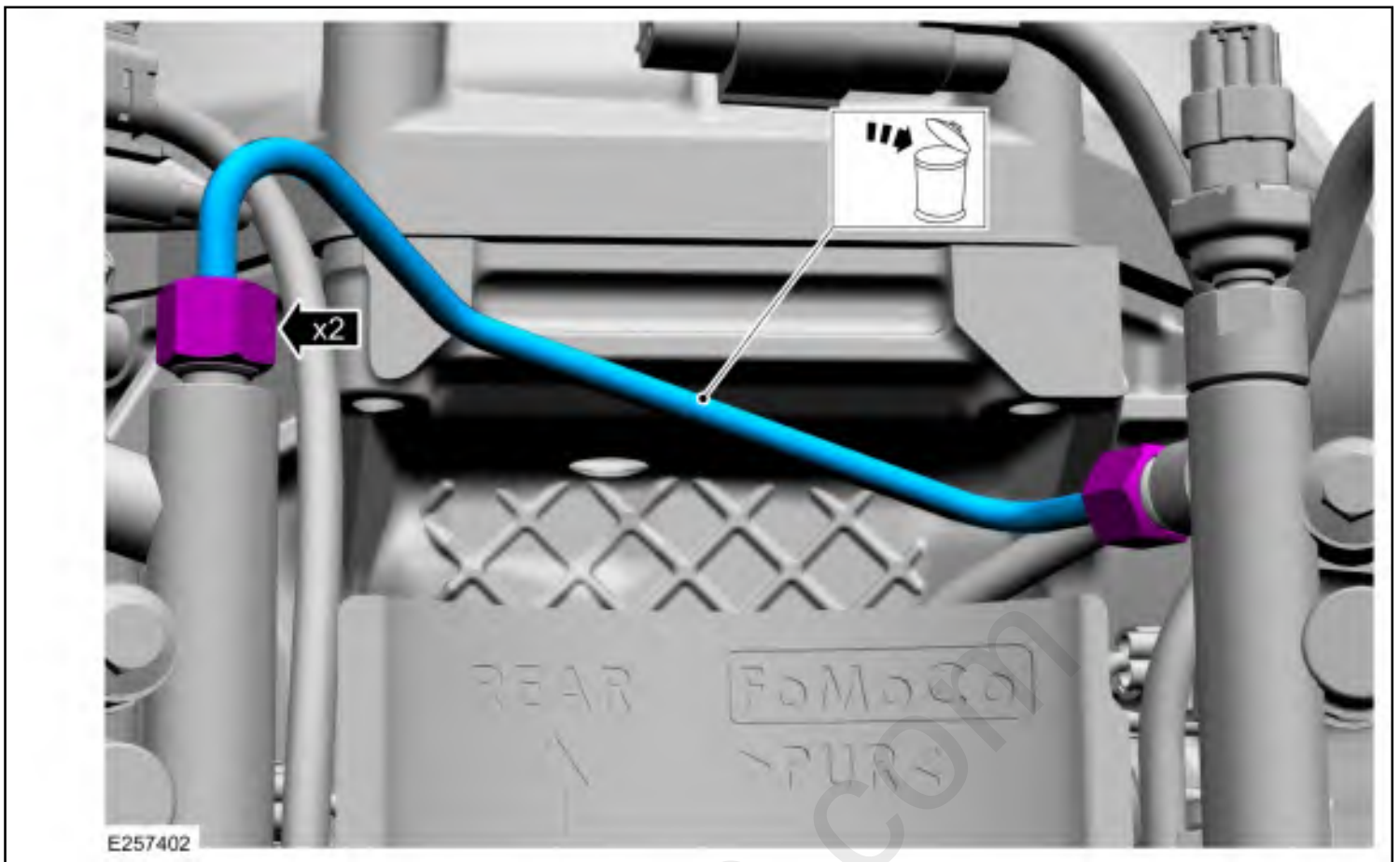


7. **NOTICE:** To release the fuel pressure in the high-pressure fuel tube, wrap the high-pressure fuel tube flare nuts with a shop towel to absorb any residual fuel pressure during the loosening of the high-pressure fuel tube flare nuts.

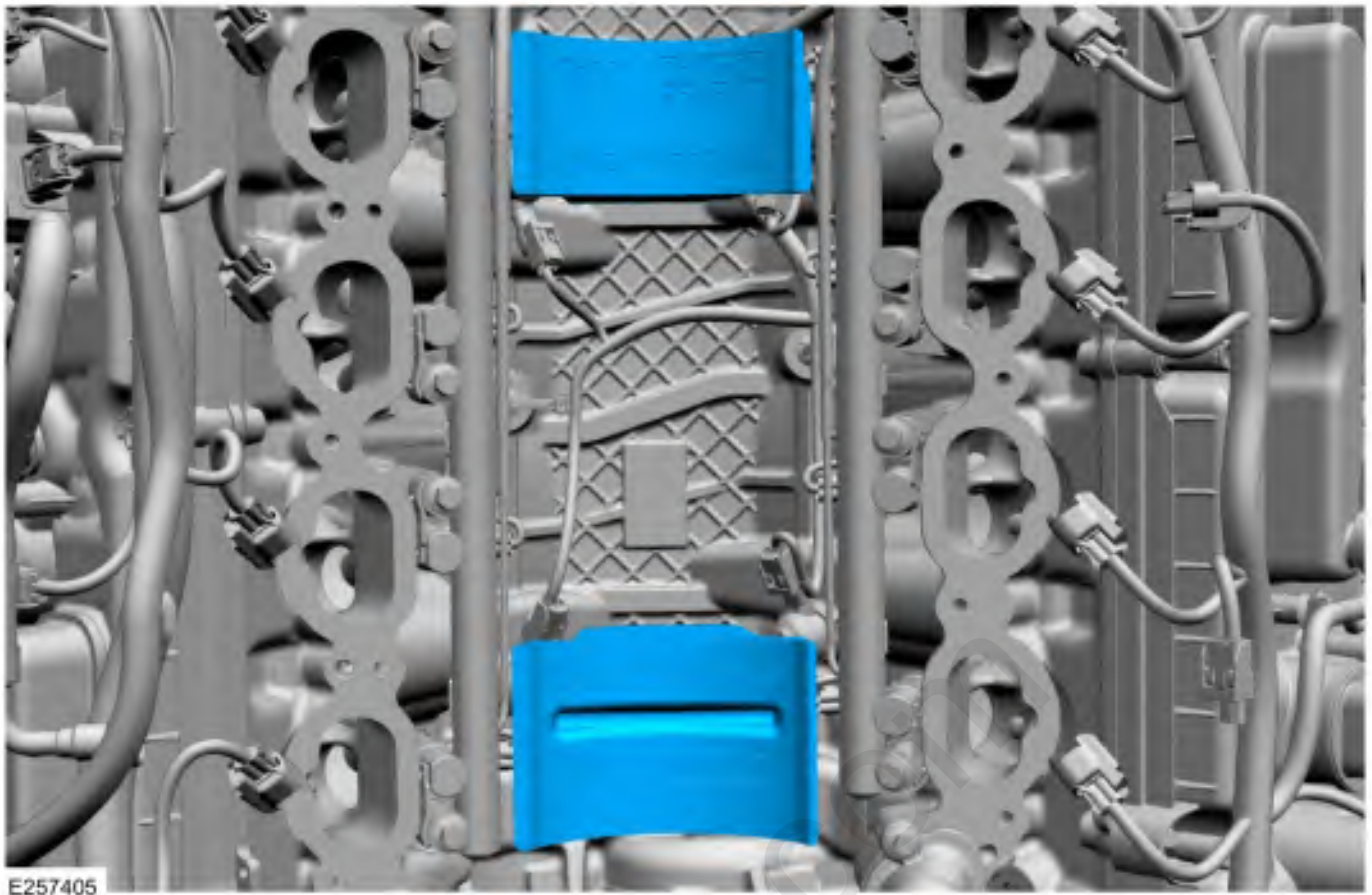
Remove the high-pressure fuel tube retainers. Disconnect the high-pressure fuel tube flare nuts, then remove and discard the high-pressure fuel tube.



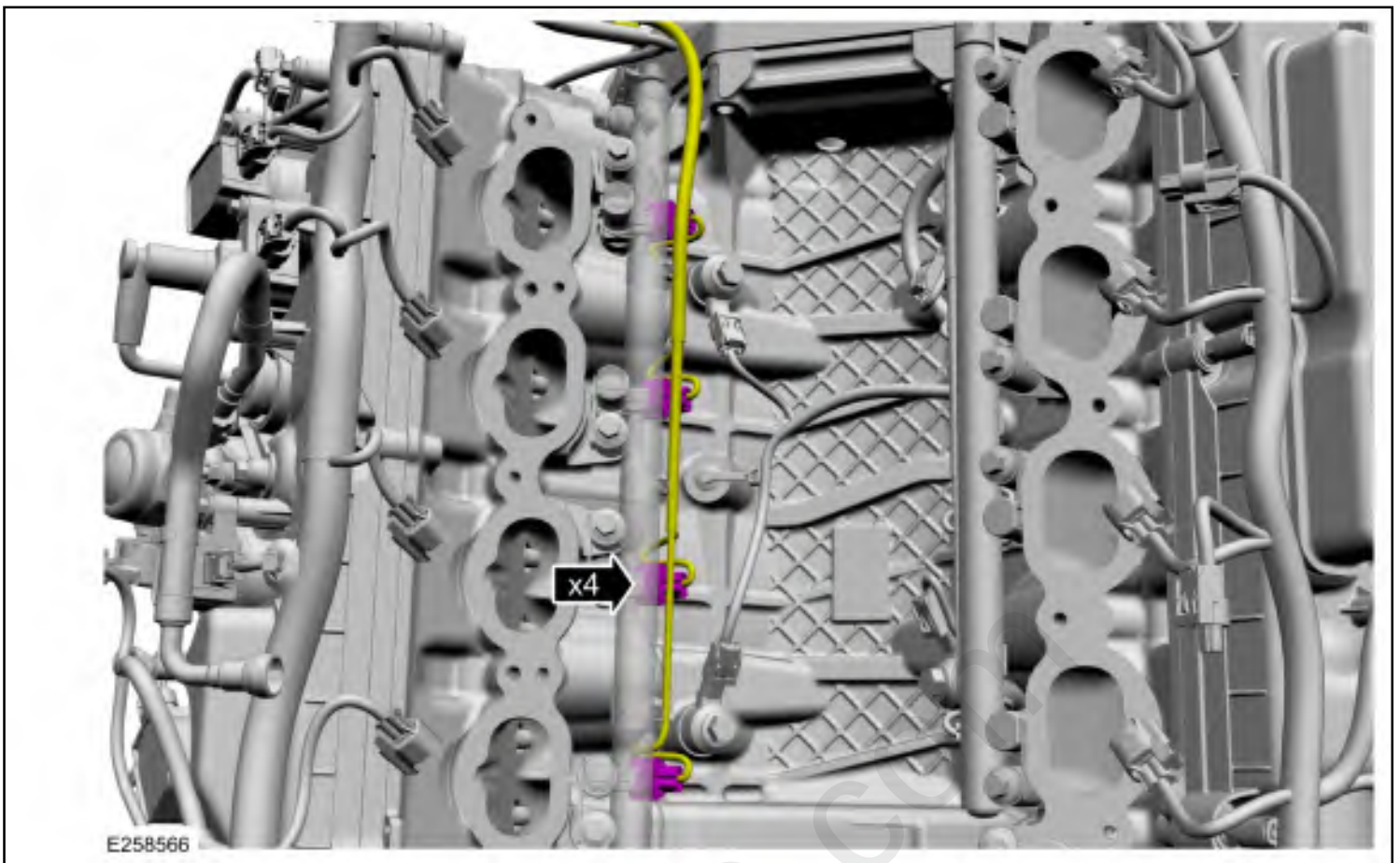
8. Disconnect the high-pressure fuel tube flare nuts, then remove and discard the high-pressure fuel tube.



9. Remove the insulators.



10. Disconnect the fuel injector electrical connectors.



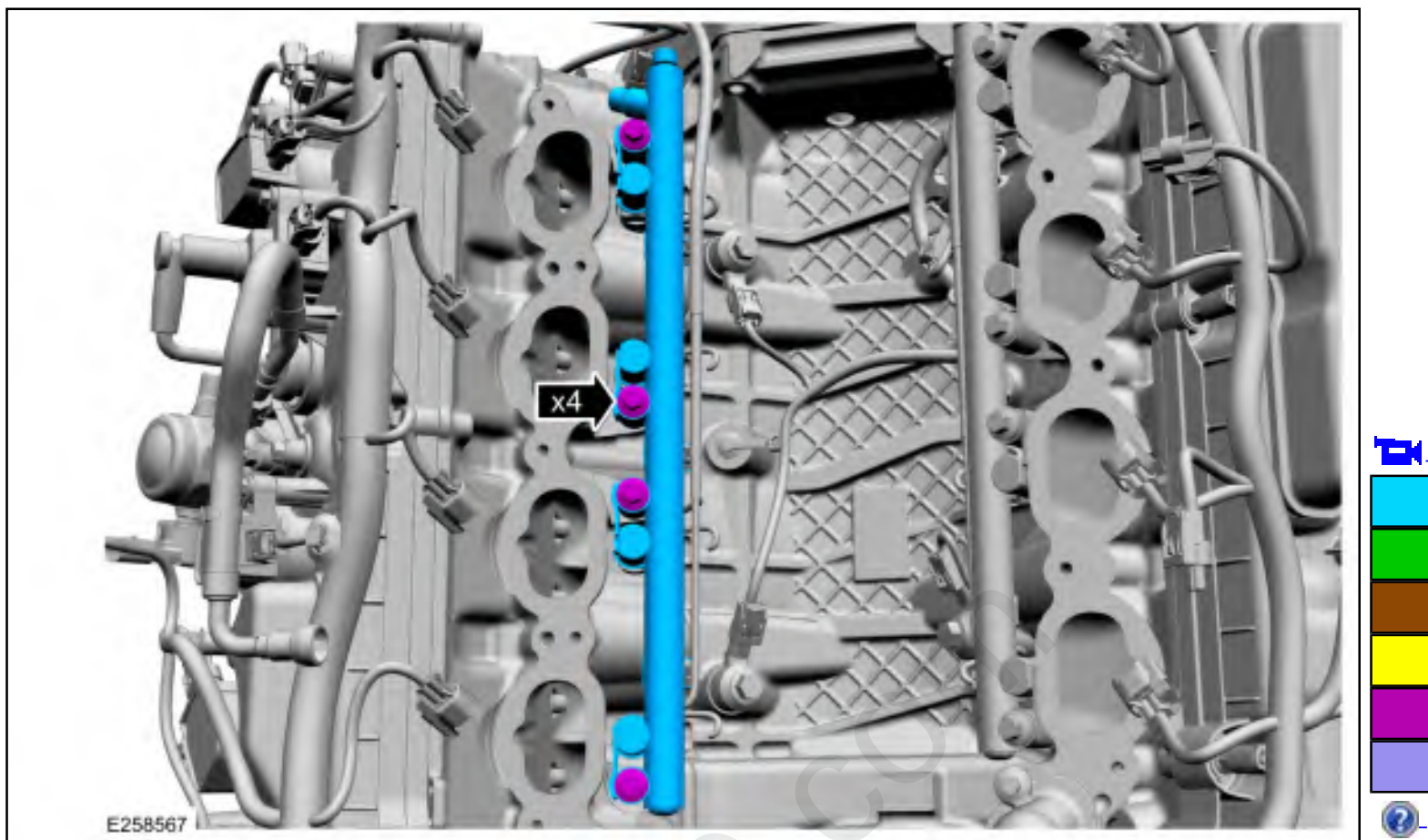
11. **NOTICE:** Pull out the fuel rails in the direction of the fuel injector axis or damage may occur to the fuel injectors.

NOTE: Use compressed air and remove any dirt or foreign material from the cylinder head, block and general surrounding area of the fuel rail and injectors.

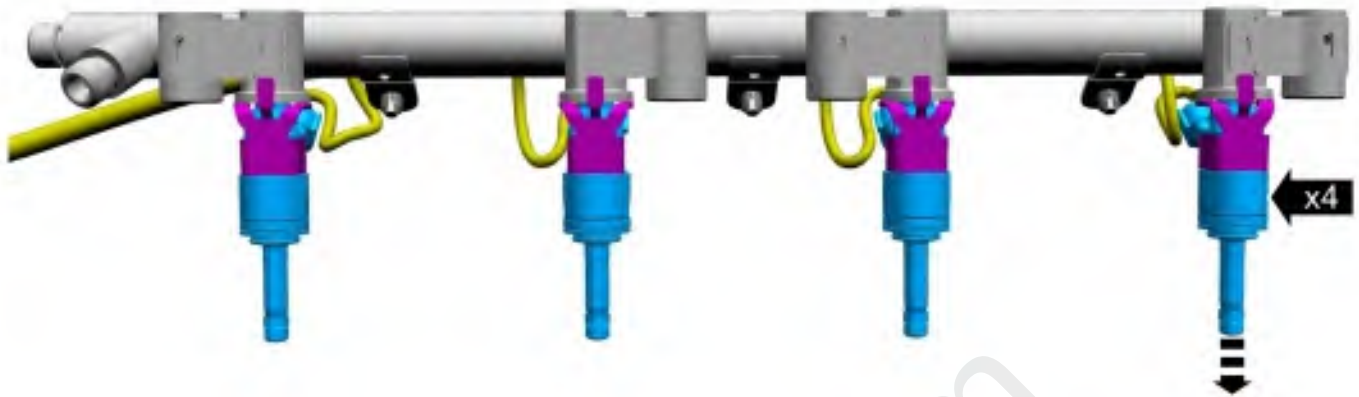
NOTE: When removing the fuel rails, the fuel injectors may remain in the cylinder heads and require the use of a Fuel Injector Remover tool to extract. Wiggling the injector by hand to break it loose may allow the injector to be removed by hand.

NOTE: Should any of the fuel injectors remain in the head, then the fuel injector electrical connectors will need to be disconnected as the fuel rail is being removed.

Remove the fuel rail bolts, then remove the fuel rail.

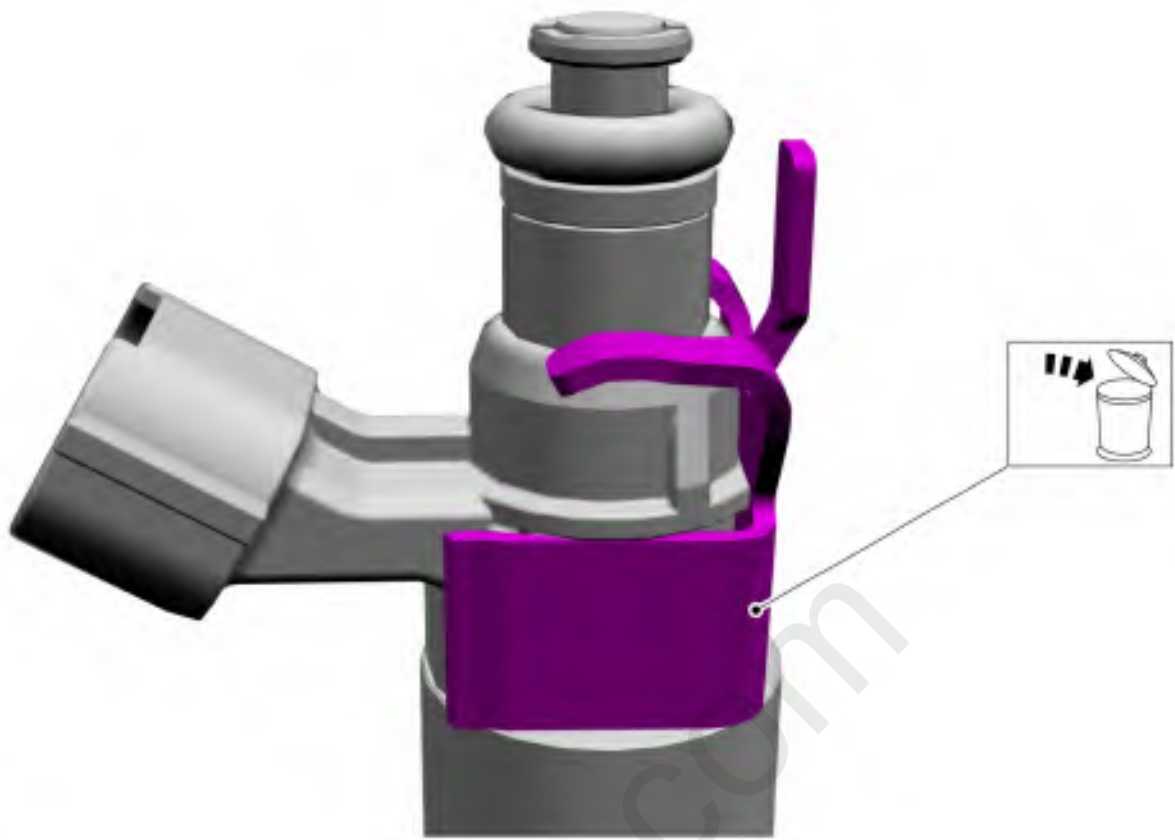


12. Remove the fuel injectors from the fuel rail.



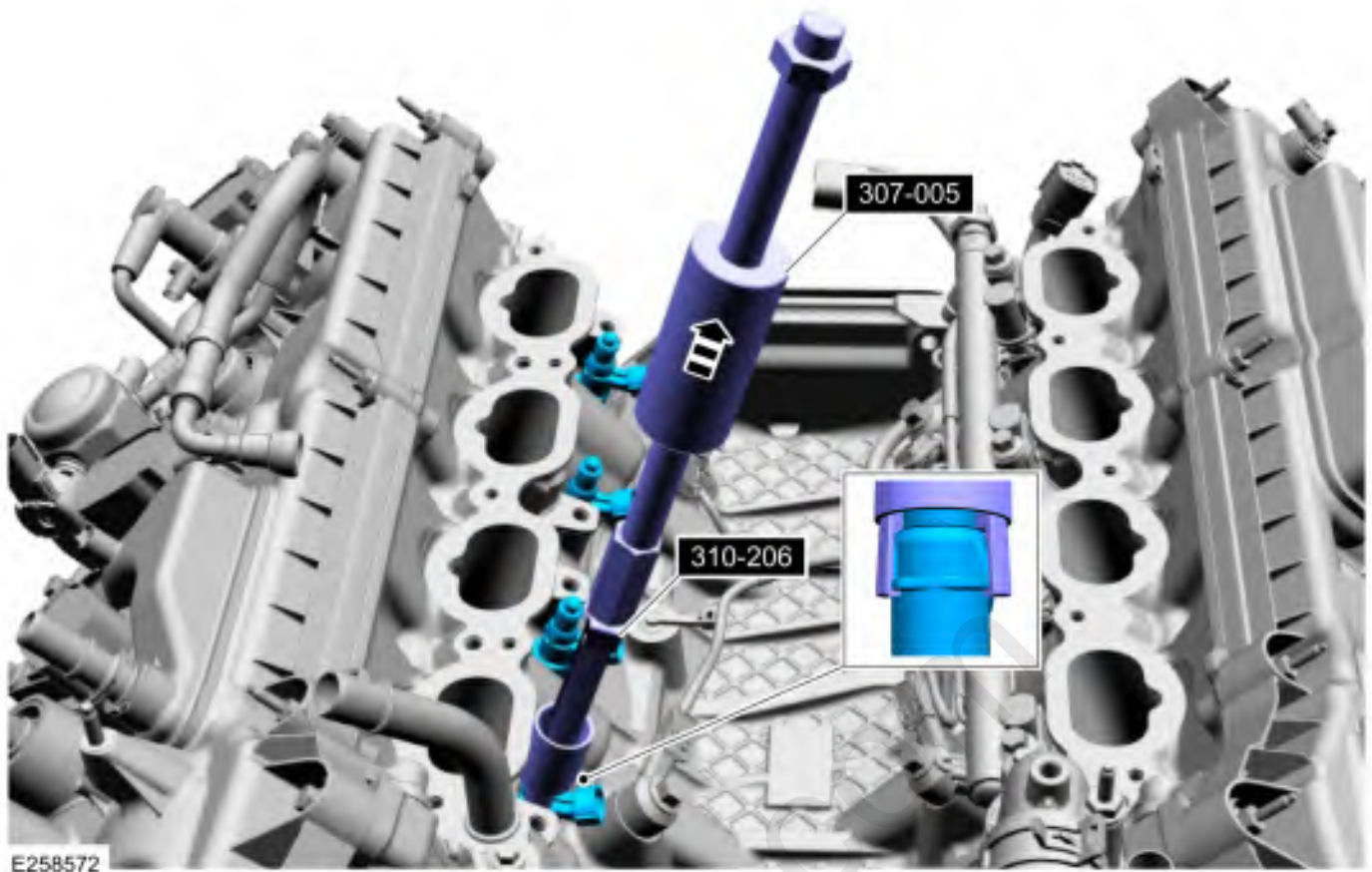
E258569

13. Remove and discard the fuel injector clips.



14. **NOTICE:** Use minimal force to remove the fuel injectors that remained in the cylinder head with the Fuel Injector Remover tool or damage to the fuel injector assembly may occur. Wiggling the injector by hand to break it loose may allow the injector to be removed by hand.

Using the special tools, remove any of the fuel injectors that remained in the cylinder head.
Use Special Service Tool: 307-005 (T59L-100-B) Slide Hammer. , 310-206 Remover, Fuel Injector.

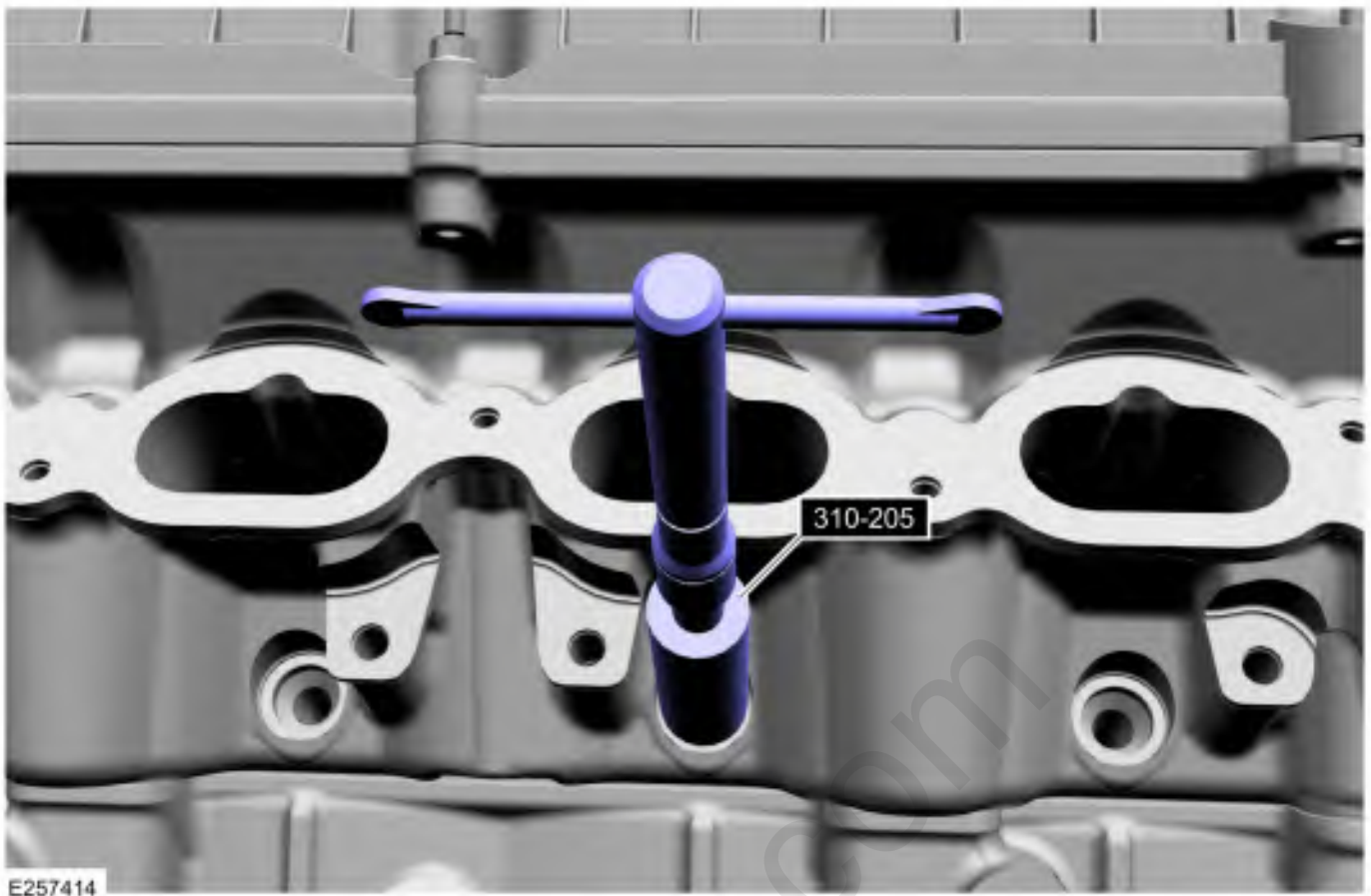


15. **NOTICE:** Make sure to thoroughly clean any residual fuel or foreign material from the cylinder head, block and the general surrounding area of the fuel rails and injectors.

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.

Using the special tool, clean the cylinder head fuel injector bores.
Use Special Service Tool: 310-205 Fuel Injector Brush.

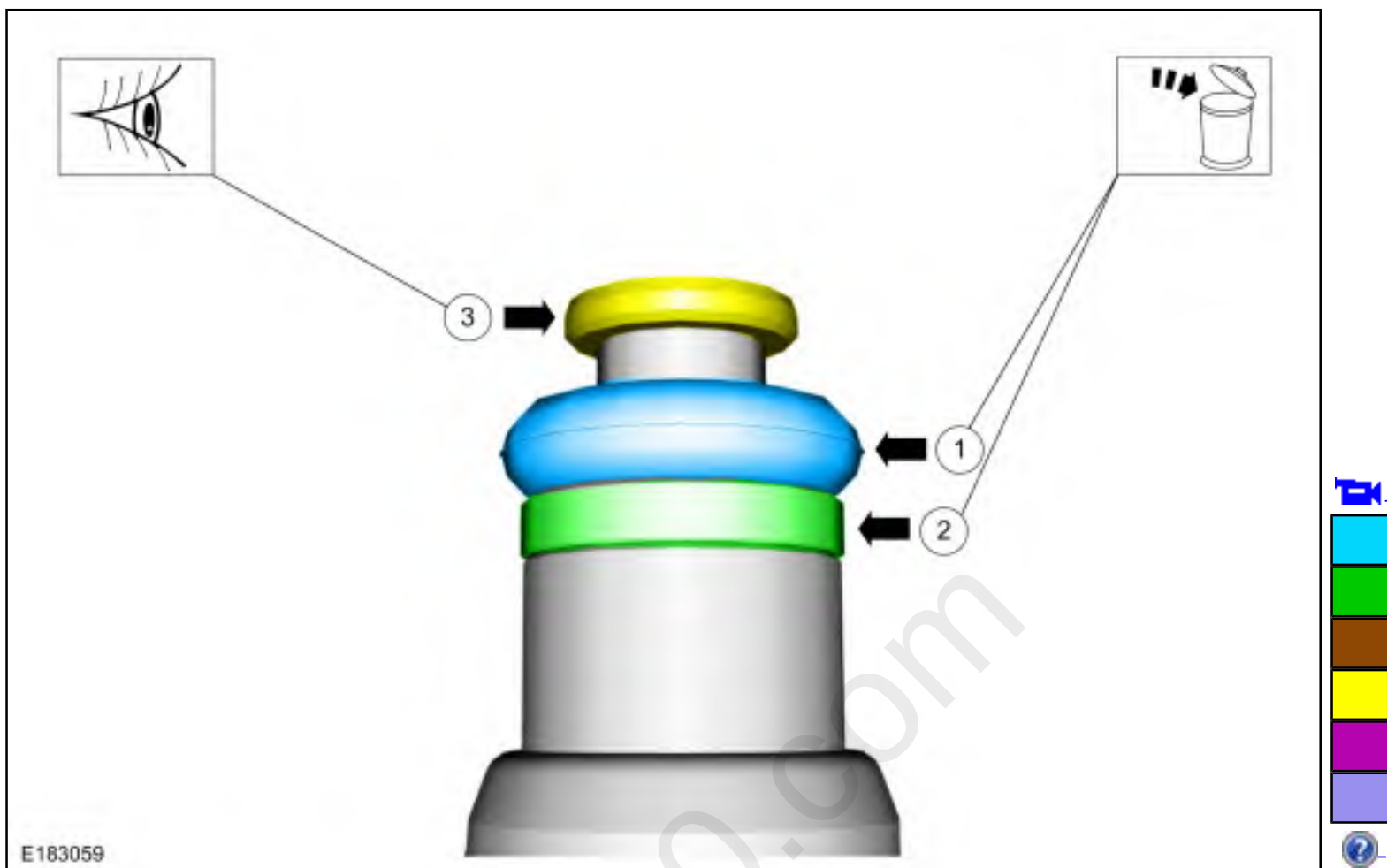


Installation

1. Remove and discard the fuel injector O-ring seals.
2. **NOTE:** *Note the correct orientation of the fuel injector support rings for correct installation of the NEW fuel injector support rings.*

Remove and discard the fuel injector support rings.

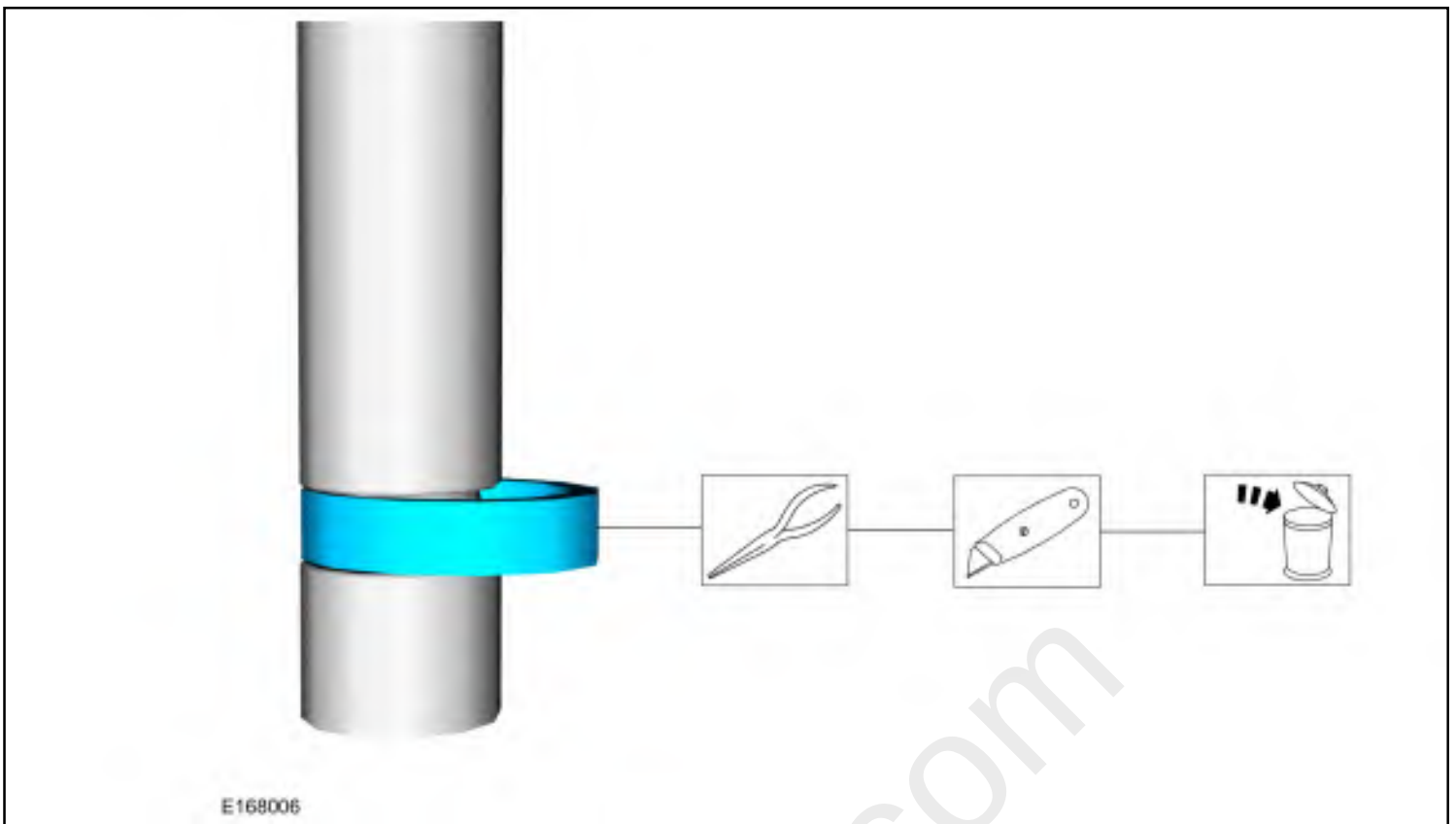
3. Inspect the inlet stopper, if it is damaged or comes off then discard the inlet stopper. The inlet stopper is not needed for proper function. Ensure that any debris from the inlet stopper are removed. If the inlet stopper is intact and undamaged do not remove the inlet stopper from the fuel injector.



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

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.



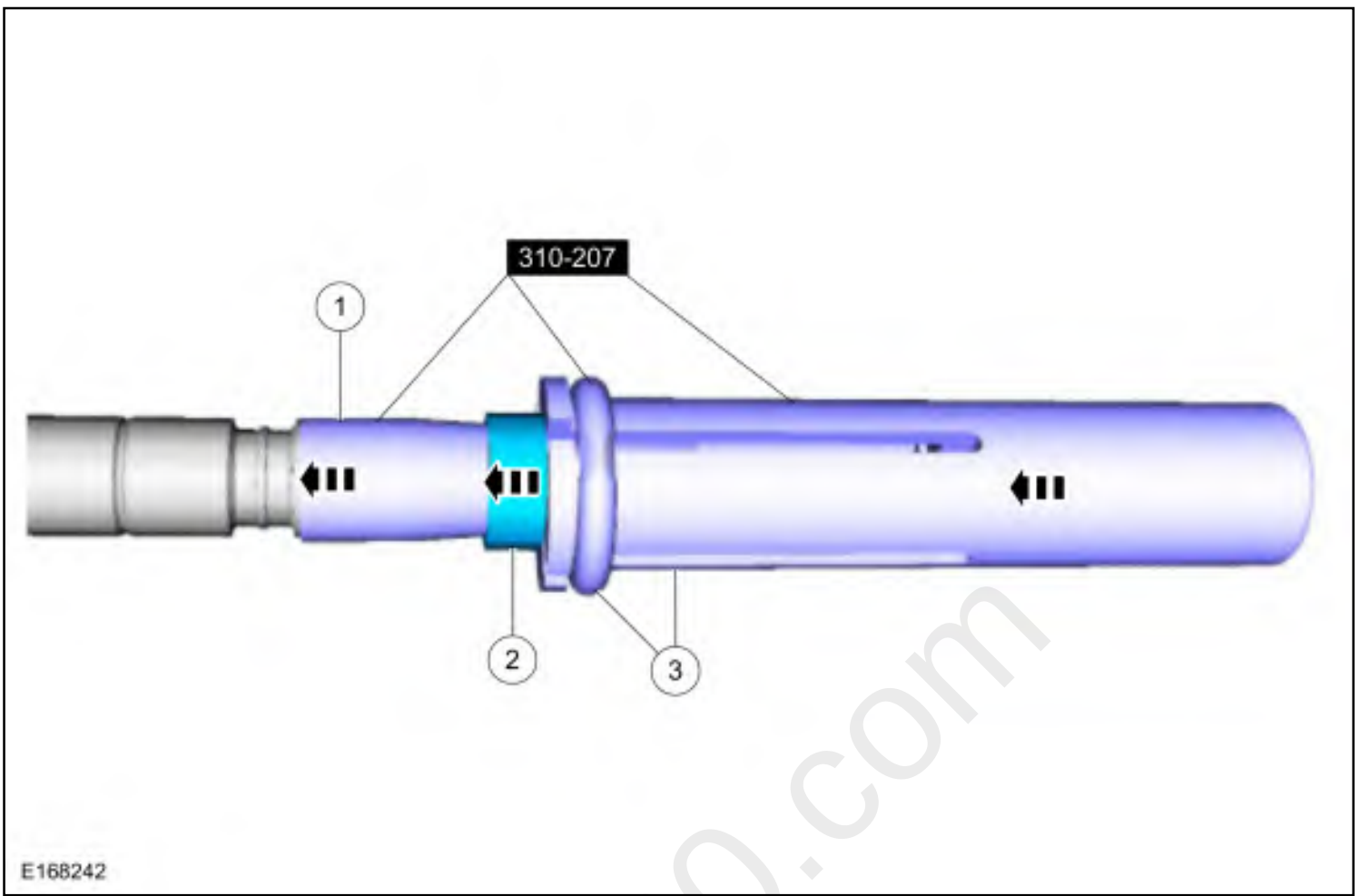
3. **NOTICE: Do not lubricate the NEW lower Teflon® fuel injector seals.**

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.



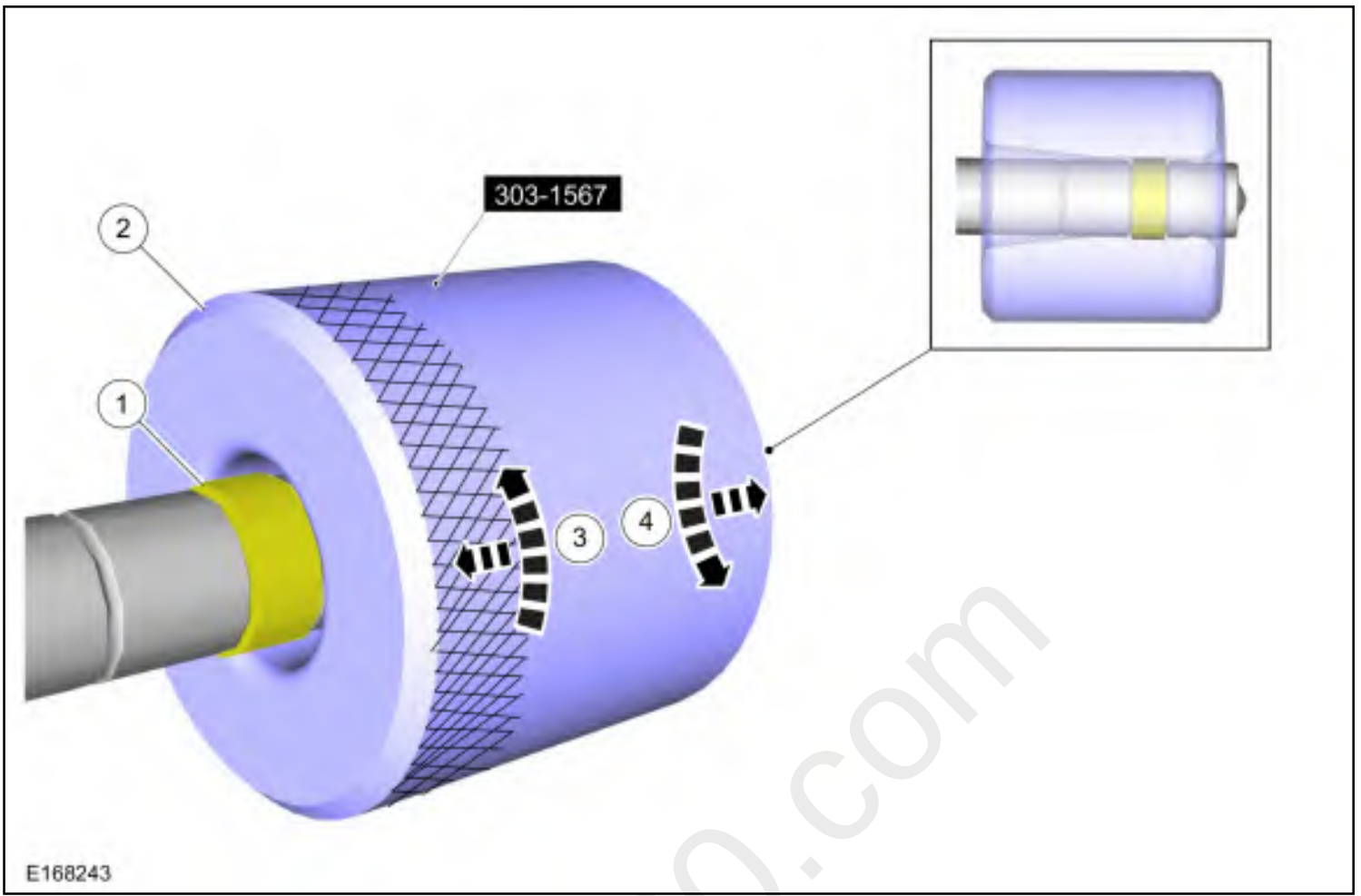
4. **NOTE:** Make sure the Teflon® seal is fully seated in the groove on the fuel injector before sizing the Teflon® seal.

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.

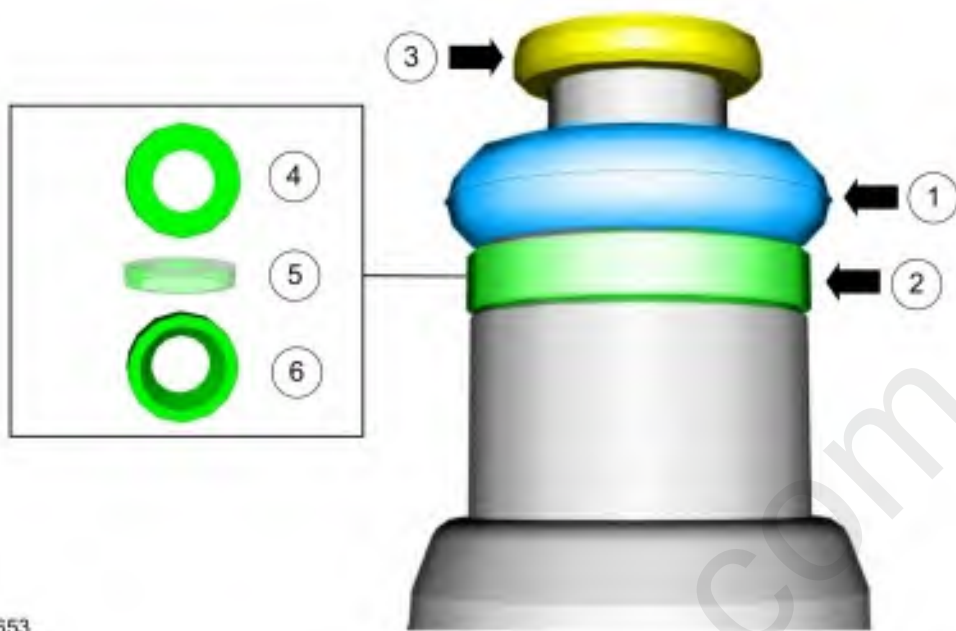


5. **NOTE:** Make sure that *NEW* fuel injector support rings and *NEW* fuel injector O-ring seals are installed.

1. Install the new fuel injector O-rings. The O-rings are pre-lubricated, NO ADDITIONAL lubricant is required.
2. **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.

3. Inspect the inlet stopper, if it is damaged or comes off then discard the inlet stopper. The inlet stopper is not needed for proper function. Ensure that any debris from the inlet stopper are removed. If the inlet stopper is intact and undamaged do not remove the inlet stopper from the fuel injector.
4. The upper side of the support ring has the wide surface area.
5. Fuel injector support ring.
6. The lower side of the support ring has the narrow surface area.



E199653

6. Install the NEW fuel injector clips.

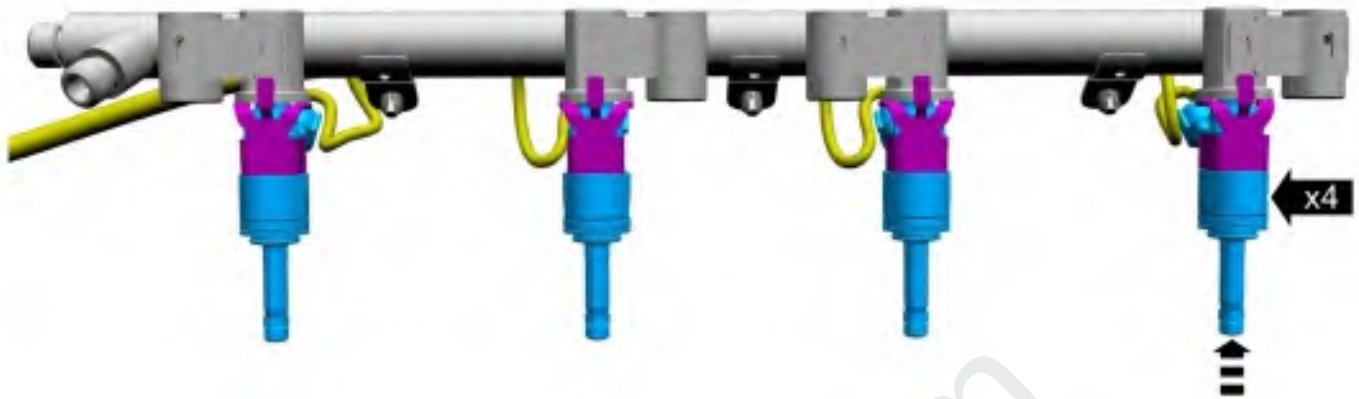


E257412



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

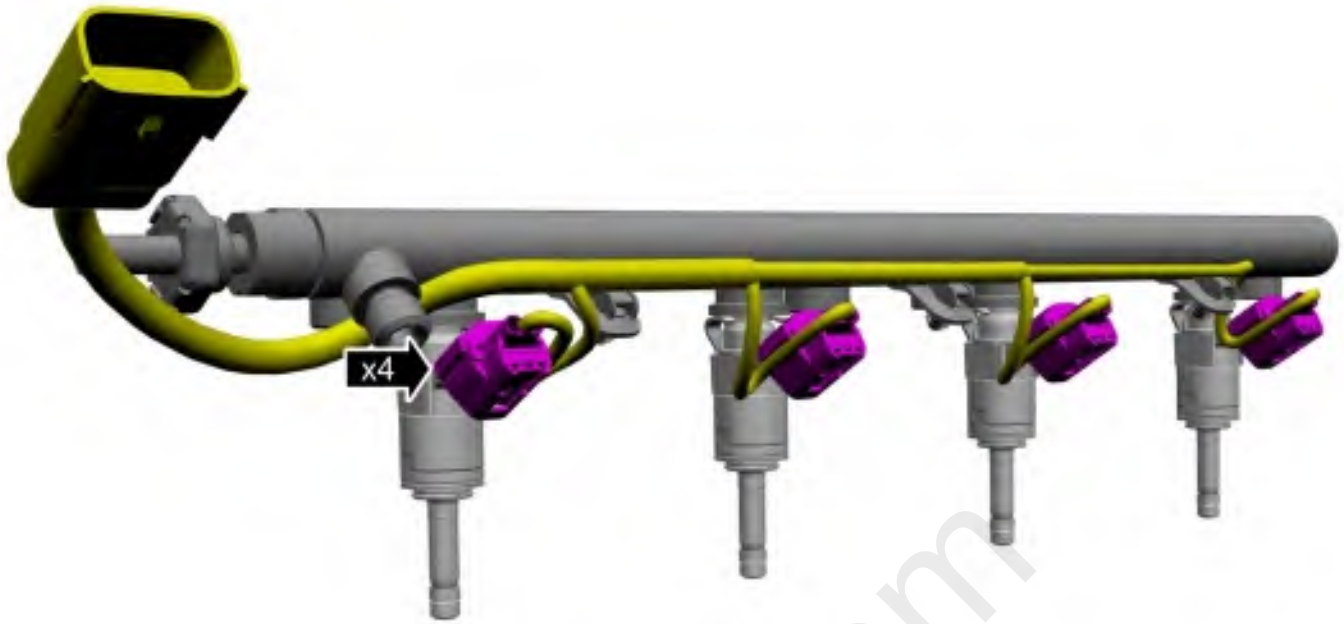
Install the fuel injectors to the fuel rail and then connect the fuel injector electrical connectors.



E258570



8. Connect the fuel injector electrical connectors.



E257411

- **NOTE:** Do not lubricate the NEW lower Teflon® fuel injector seals.

Install the fuel rail, push down on the fuel rail above the injectors.

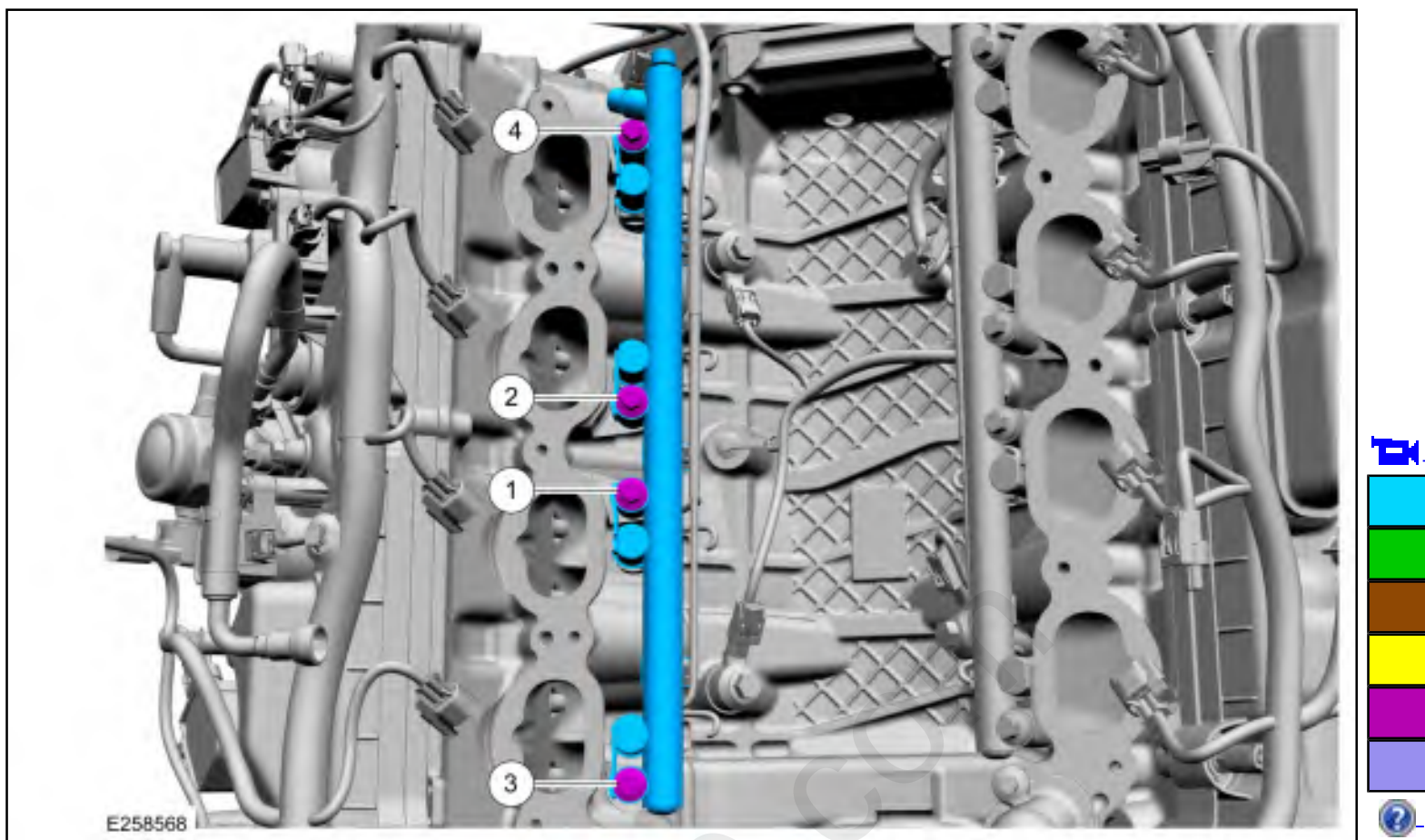
- Hand start all of the fuel rail bolts and finger tighten the fuel rail bolts so they are uniformly in light contact with fuel rail bosses.
- Tighten the fuel rail bolts approximately 90 degrees, in the sequence shown. Repeat to evenly draw down the fuel rail, until the fuel rail bosses are in contact with the cylinder head.

Torque:

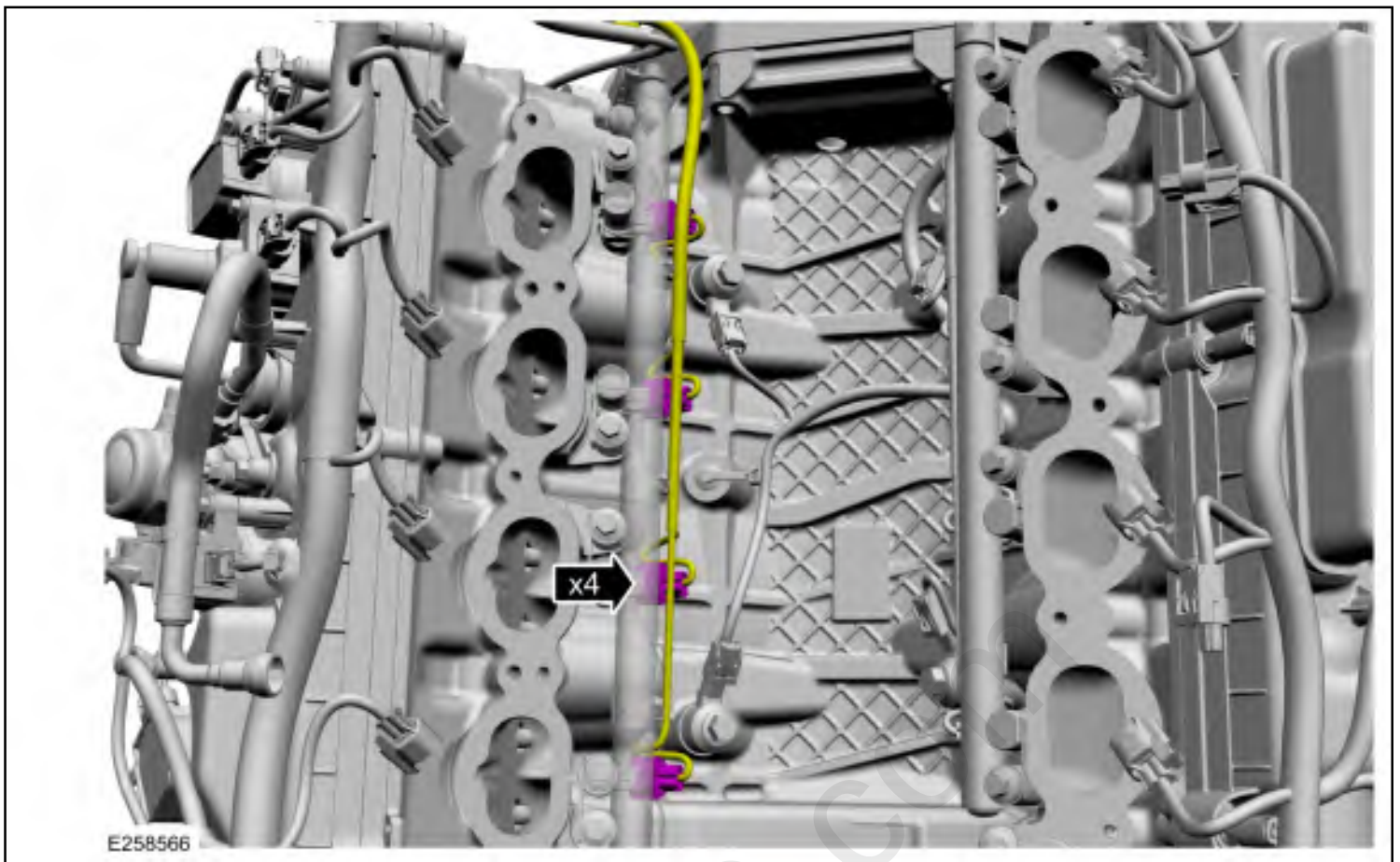
Stage 1: Tighten the fuel rail bolts in the sequence shown to : 89 lb.in (10 Nm)

Stage 2: Tighten the fuel rail bolts in the sequence shown to : 21 lb.ft (28 Nm)

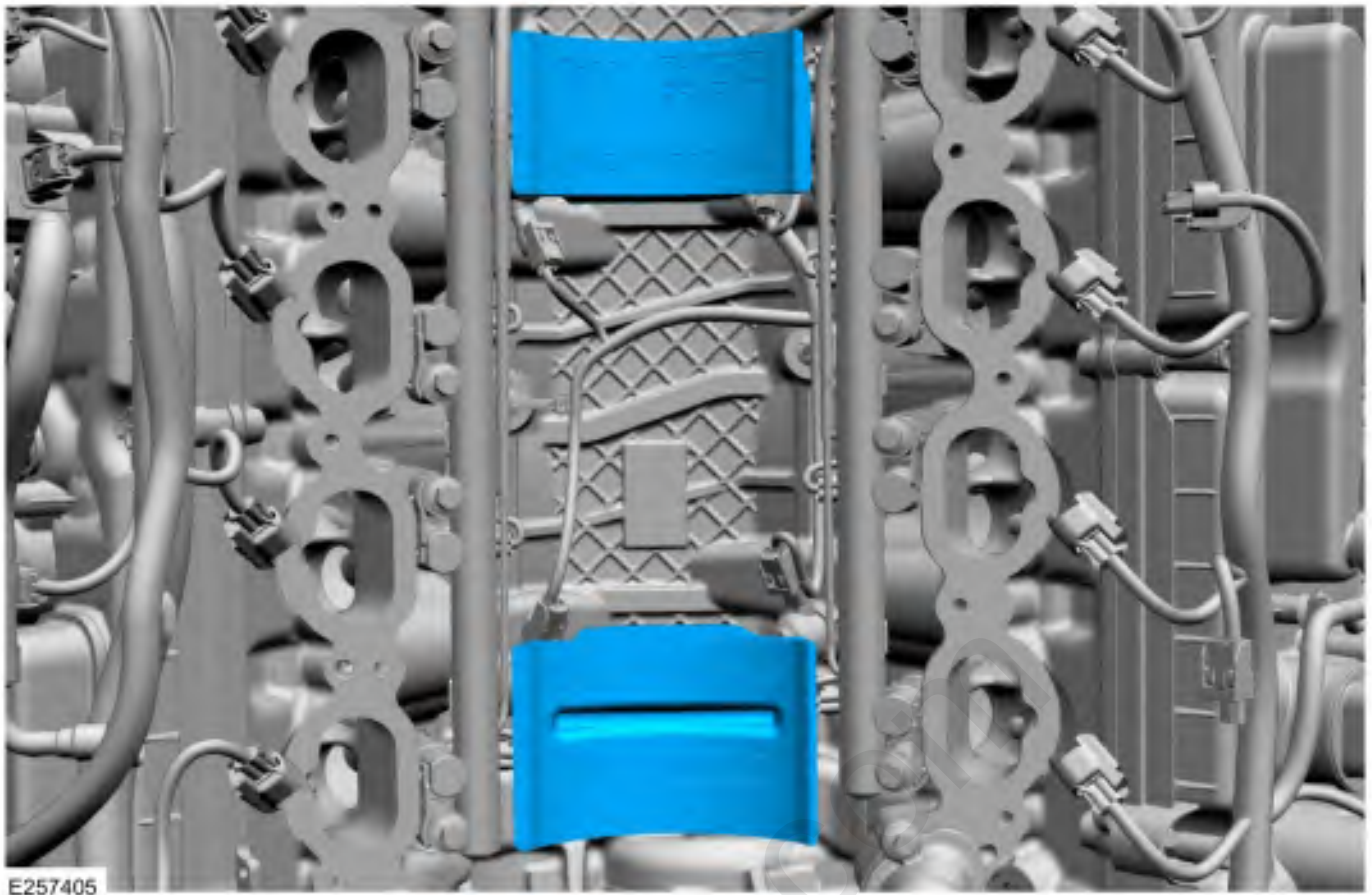
Stage 3: Tighten the fuel rail bolts in the sequence shown an additional : 25°



10. Connect the fuel injector electrical connectors.



11. Install the insulators.



12. **NOTICE:** In stage 3, if the torque required to tighten any flare nut on the new high-pressure fuel tube reaches or exceeds 55 lb.ft (50 Nm), then that high pressure fuel tube must be discarded and replaced with another new high-pressure fuel tube.

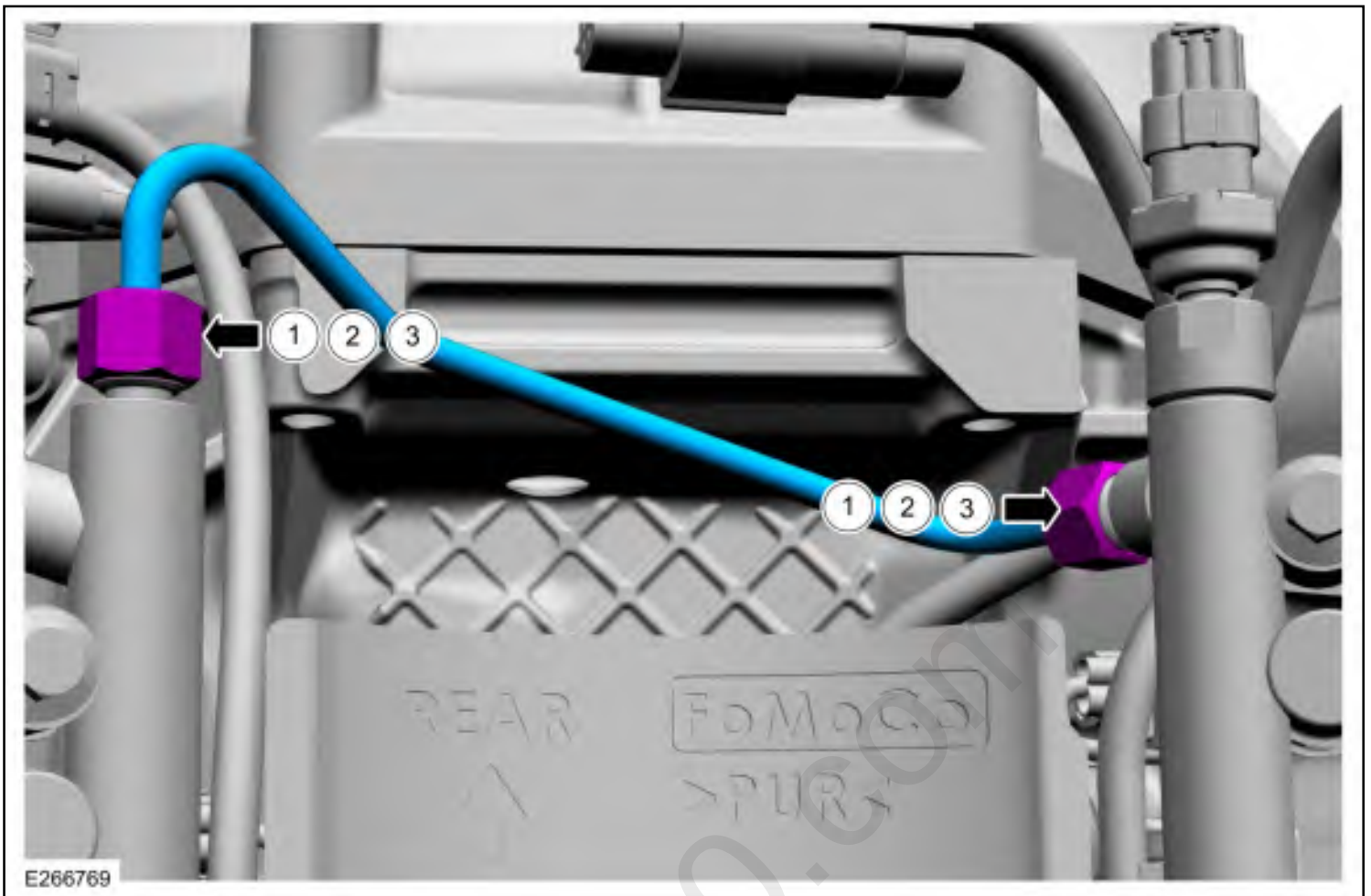
NOTE: Make sure that a new high-pressure fuel tube is installed.

NOTE: Calculate the correct torque wrench setting for the following torque using the Torque Wrench Adapter Formulas.

Install the high-pressure fuel tube and tighten the flare nuts finger tight, then tighten the flare nuts in the following 3 stages.

Torque:

- Stage 1: Tighten the high-pressure fuel tube flare nuts to : 71 lb.in (8 Nm)
- Stage 2: Tighten the high-pressure fuel tube flare nuts to : 89 lb.in (10 Nm)
- Stage 3: Tighten the high-pressure fuel tube flare nuts an additional : 25°



13. **NOTICE:** In stage 6, if the torque required to tighten any flare nut on the new high-pressure fuel tube reaches or exceeds 37 lb.ft (50 Nm), then that high pressure fuel tube must be discarded and replaced with another new high-pressure fuel tube.

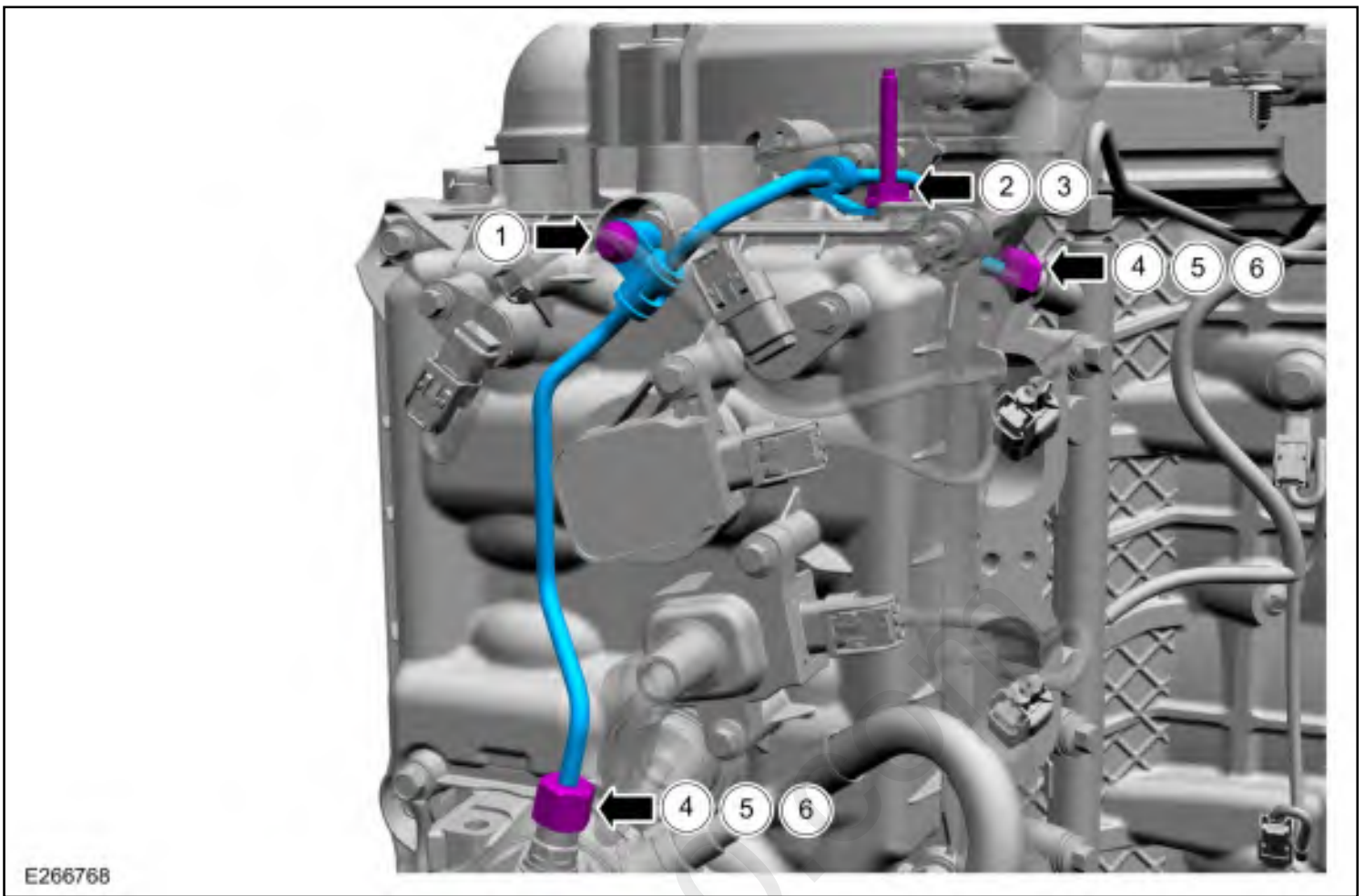
NOTE: Calculate the correct torque wrench setting for the following torque using the Torque Wrench Adapter Formulas.

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

Install the high-pressure fuel tube and retainers, tighten the high-pressure fuel tube flare nuts and retainers finger tight.

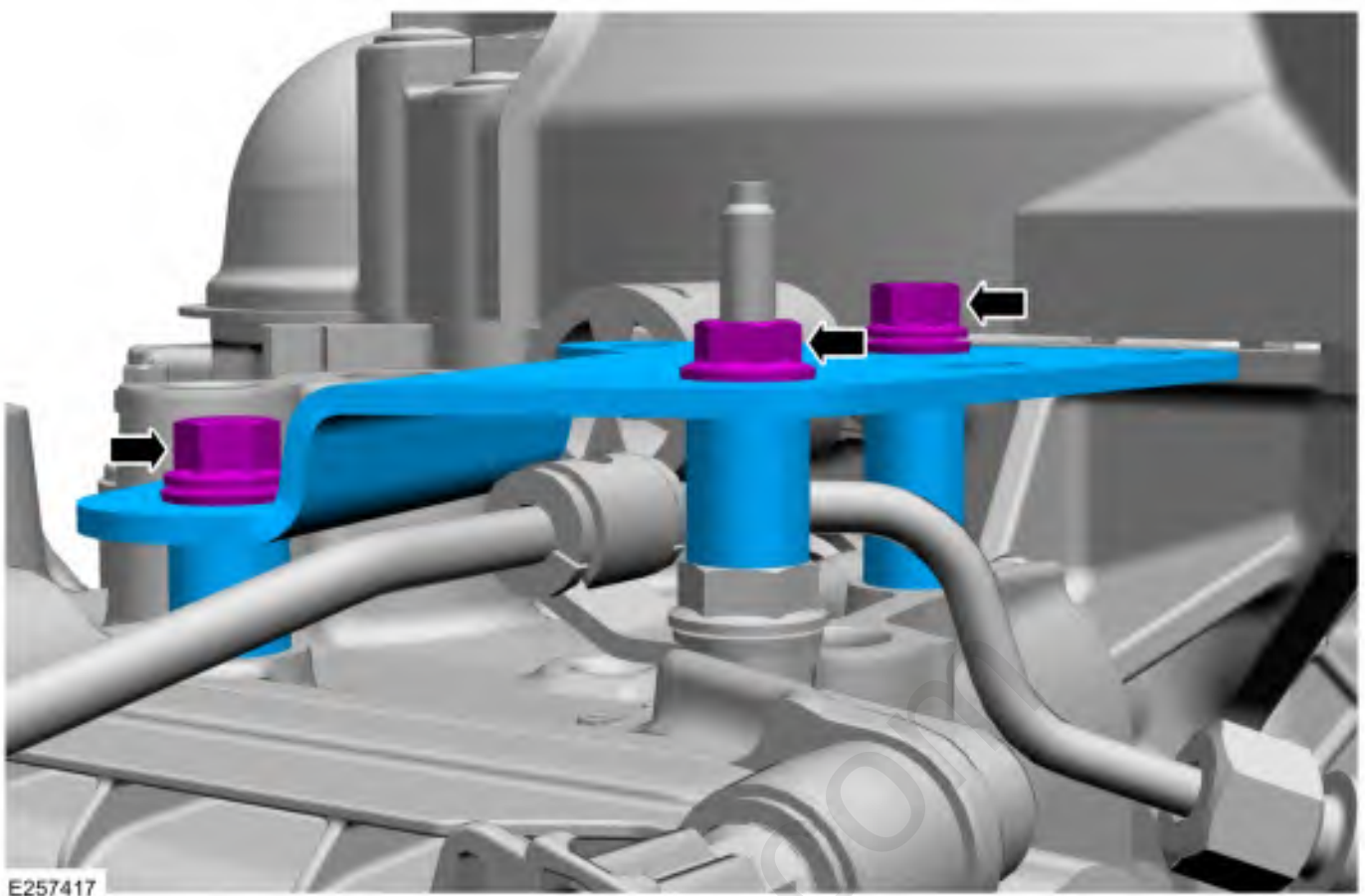
Torque:

- Stage 1: Tighten the high-pressure fuel tube bolt to : 89 lb.in (10 Nm)
- Stage 2: Tighten the high-pressure fuel tube stud-bolt to : 89 lb.in (10 Nm)
- Stage 3: Tighten the high-pressure fuel tube stud-bolt an additional : 30°
- Stage 4: Tighten the high-pressure fuel tube flare nuts to : 71 lb.in (8 Nm)
- Stage 5: Tighten the high-pressure fuel tube flare nuts to : 89 lb.in (10 Nm)
- Stage 6: Tighten the high-pressure fuel tube flare nuts an additional : 25°

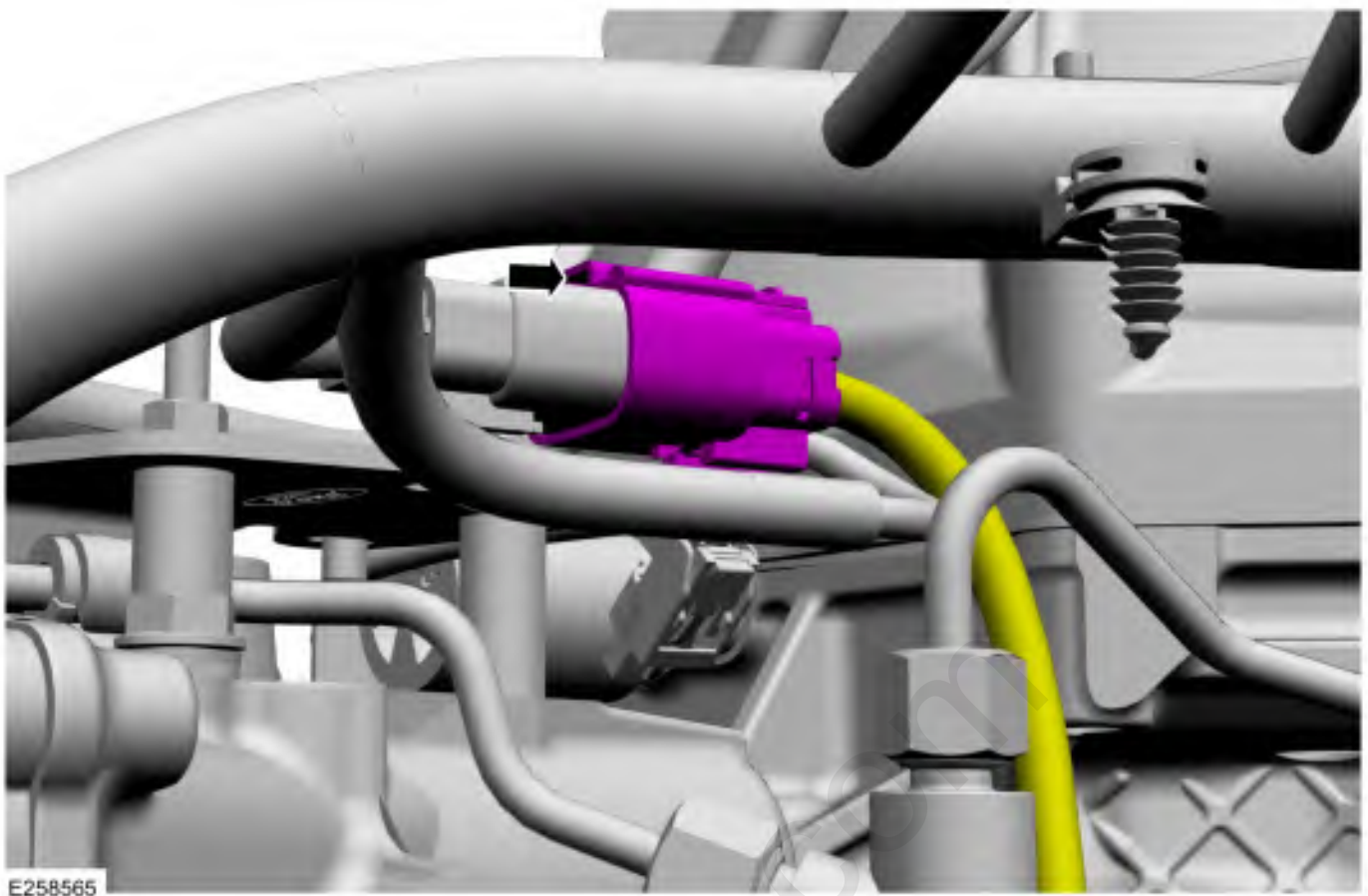


14. Install the high-pressure fuel line shield, then install and tighten the high-pressure fuel line shield retainers.

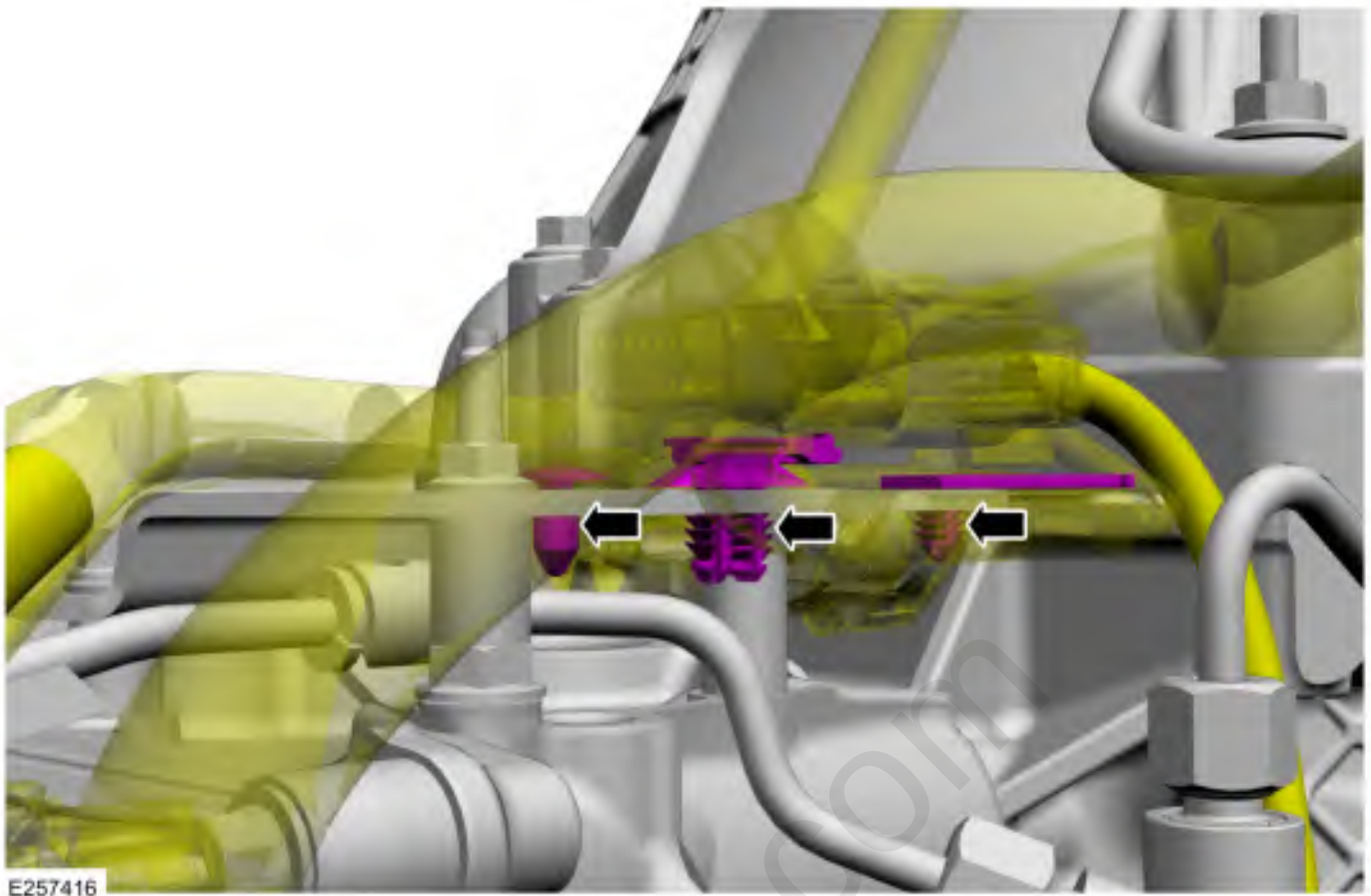
Torque: 89 lb.in (10 Nm)



15. Connect the fuel injector main harness electrical connector.

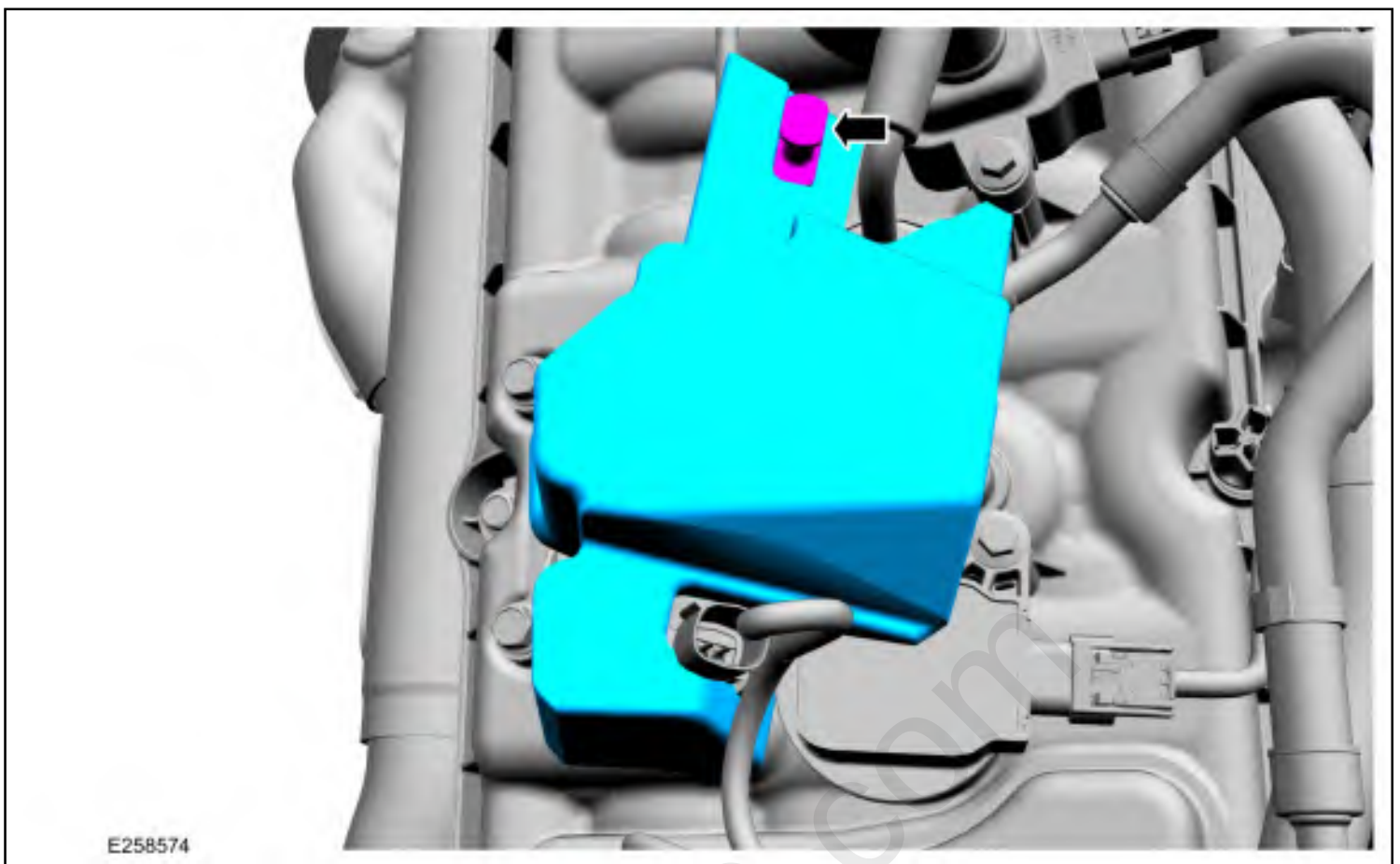


16. Attach the wiring harness retainers to high-pressure fuel line shield.

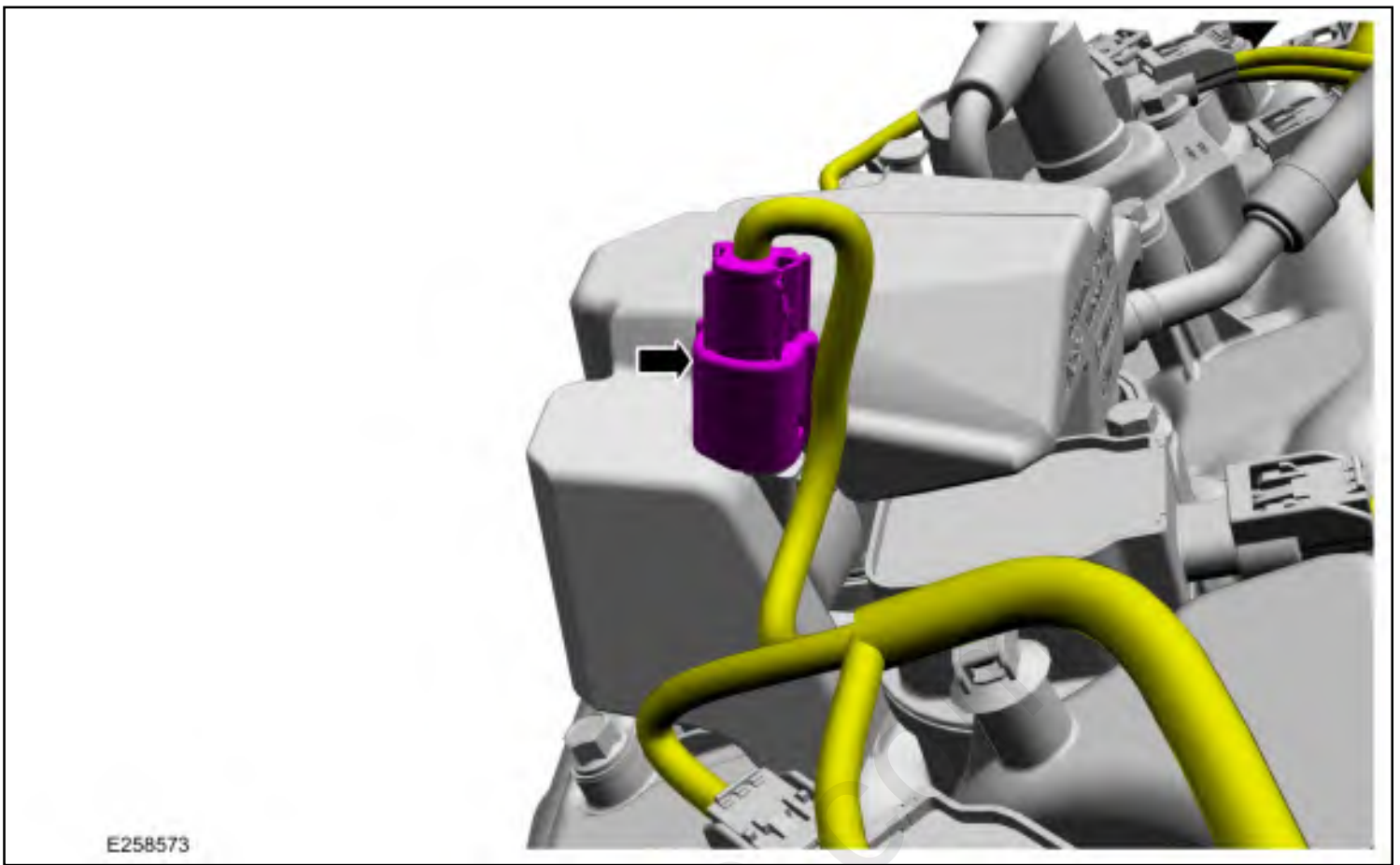


17. **NOTE:** When removing or installing the fuel injection pump noise insulator, spreading the openings will reduce the risk of damage.

Install the fuel injection pump noise insulator, then engage the retainer.



18. Connect the high-pressure fuel pump electrical connector.



19. Install the intake manifold.

Refer to: [Intake Manifold](#) (303-01D Engine - 5.0L 32V Ti-VCT, Removal and Installation).