

303-01 Engine - 2.3L EcoBoost (201kW/273PS)  
Removal and Installation

2019 Ranger  
Procedure revision date: 01/8/2019

## Cylinder Head

Base Part Number: 6051

### Special Tool(s) / General Equipment

|                              |
|------------------------------|
| Oil Drain Equipment          |
| Hose Clamp Remover/Installer |

### Materials

| Name                                                    | Specification |
|---------------------------------------------------------|---------------|
| Motorcraft® High Performance Engine RTV Silicone TA-357 | WSE-M4G323-A6 |
| Motorcraft® Metal Brake Parts Cleaner PM-4-A, PM-4-B    | -             |

### Removal

**NOTICE:** Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

**NOTICE:** During engine repair procedures, cleanliness is extremely important. All parts must be thoroughly cleaned and any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

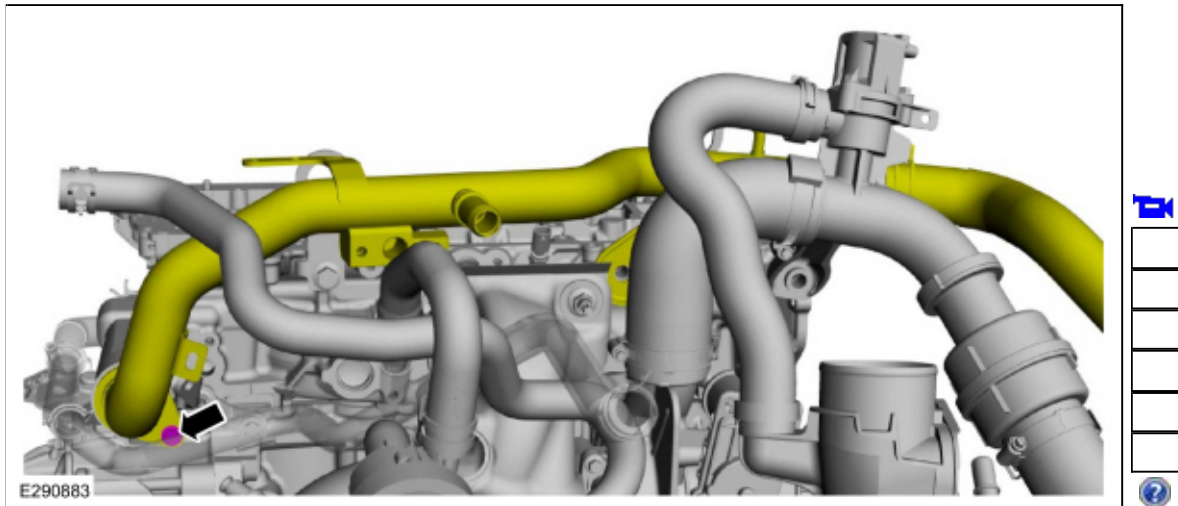
1. With the vehicle in NEUTRAL, position it on a hoist.  
Refer to: [Jacking and Lifting](#) (100-02 Jacking and Lifting, Description and Operation).
2. Release the fuel system pressure.  
Refer to: [Fuel System Pressure Release](#) (310-00 Fuel System - General Information - 2.3L EcoBoost (201kW/273PS), General Procedures).
3. Drain the cooling system.  
Refer to: [Cooling System Draining, Vacuum Filling and Bleeding](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), General Procedures).
4. Remove the following items:
  1. Remove the valve tappets.  
Refer to: [Valve Tappets](#) (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
  2. Remove EGR valve.  
Refer to: [Exhaust Gas Recirculation \(EGR\) Valve](#) (303-08 Engine Emission Control - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
  3. Remove EGR cooler.

Refer to: [Exhaust Gas Recirculation \(EGR\) Cooler](#) (303-08 Engine Emission Control - 2.3L EcoBoost (201kW/273PS), Removal and Installation).

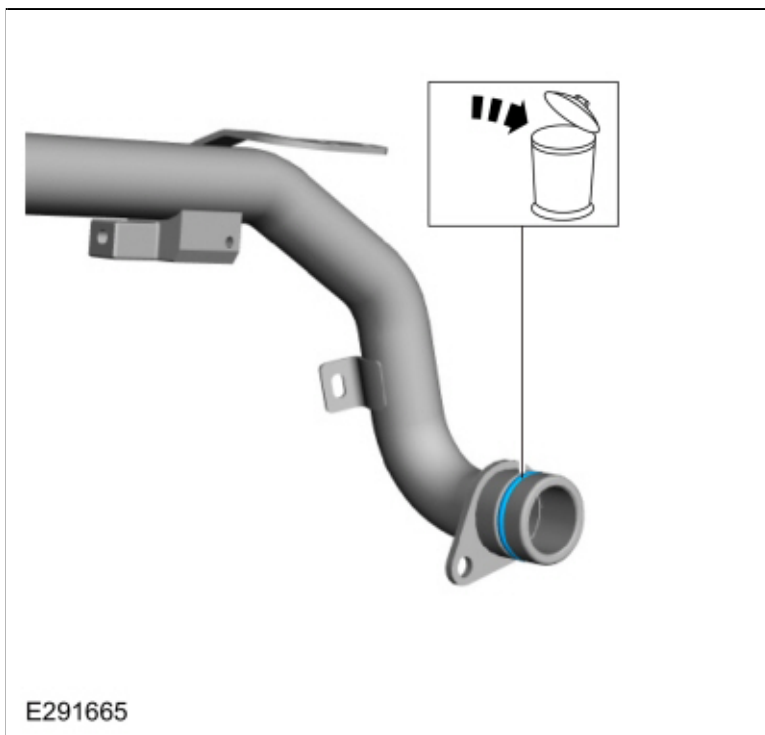
4. Remove EGR inlet tube.

Refer to: [Exhaust Gas Recirculation \(EGR\) Inlet Tube](#) (303-08 Engine Emission Control - 2.3L EcoBoost (201kW/273PS), Removal and Installation).

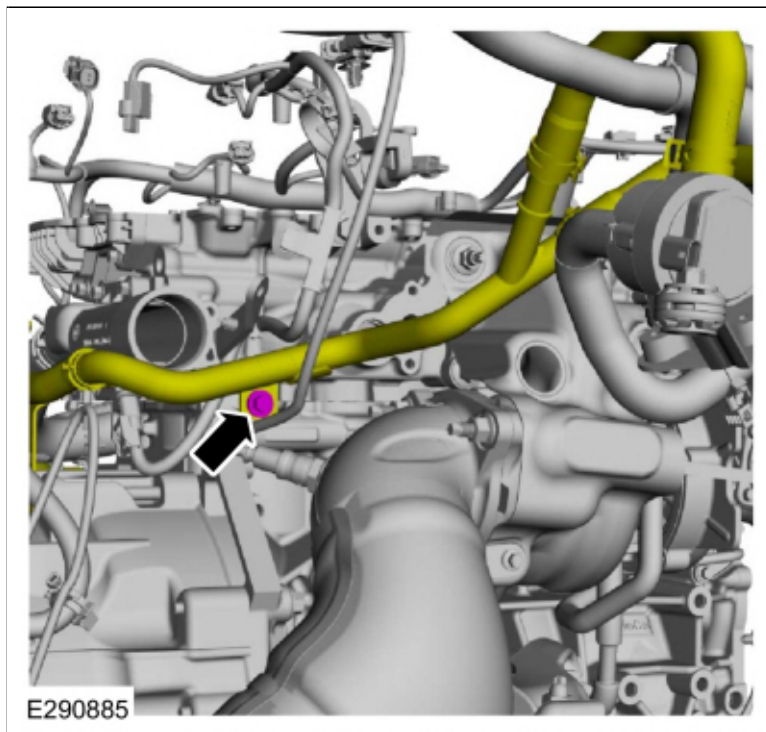
5. Remove the bolt and position the coolant tube aside.



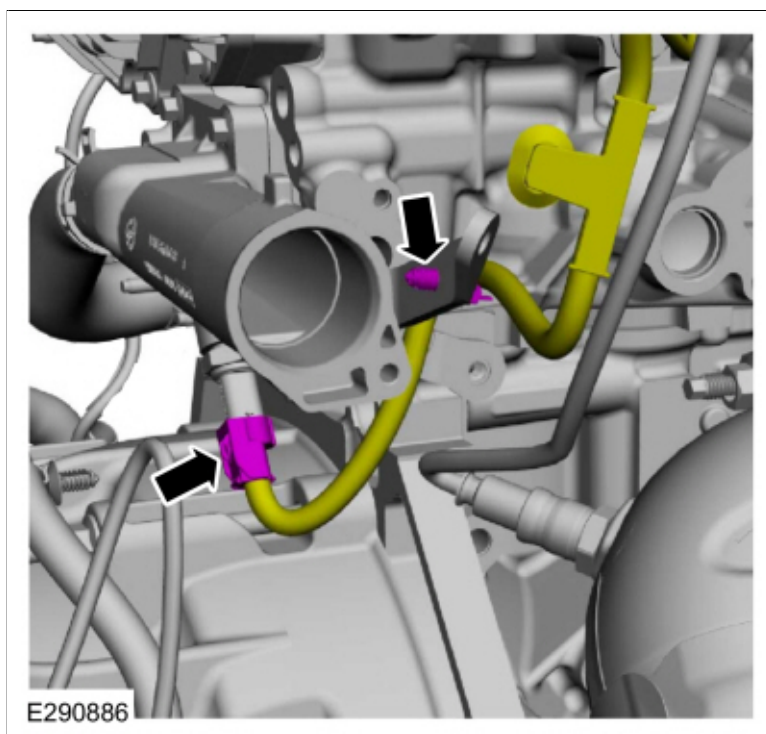
6. Remove and discard the coolant tube O-ring seal.



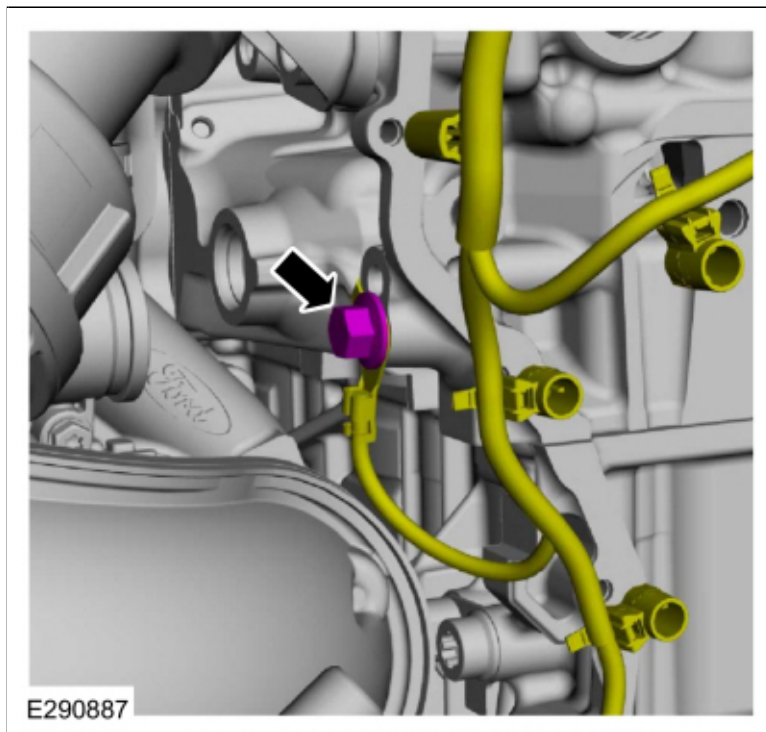
7. Remove the coolant tube bolt from the cylinder head.



8. Disconnect the ECT sensor wiring harness electrical connector and the retainer.

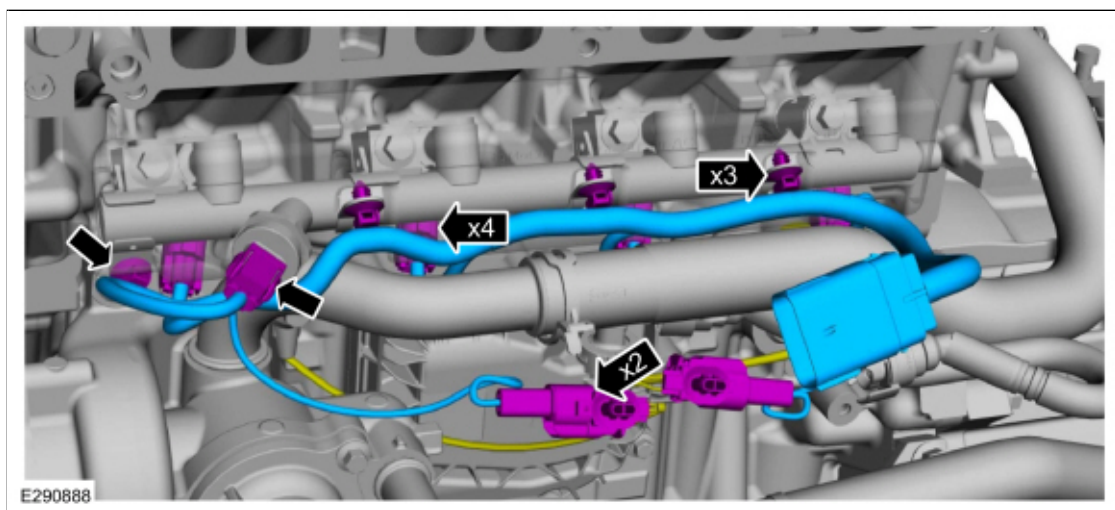


9. Remove the bolt and ground wire.

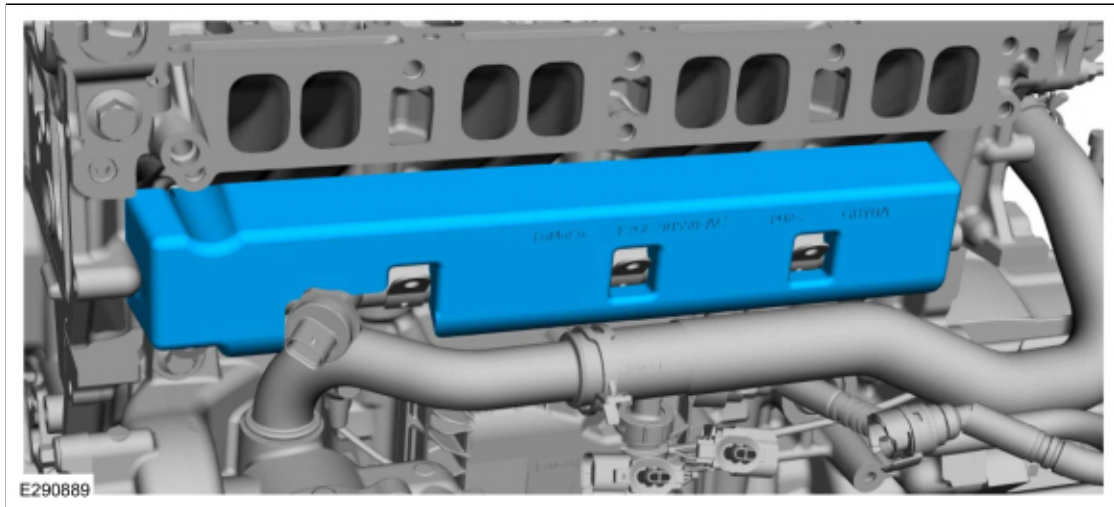


10.

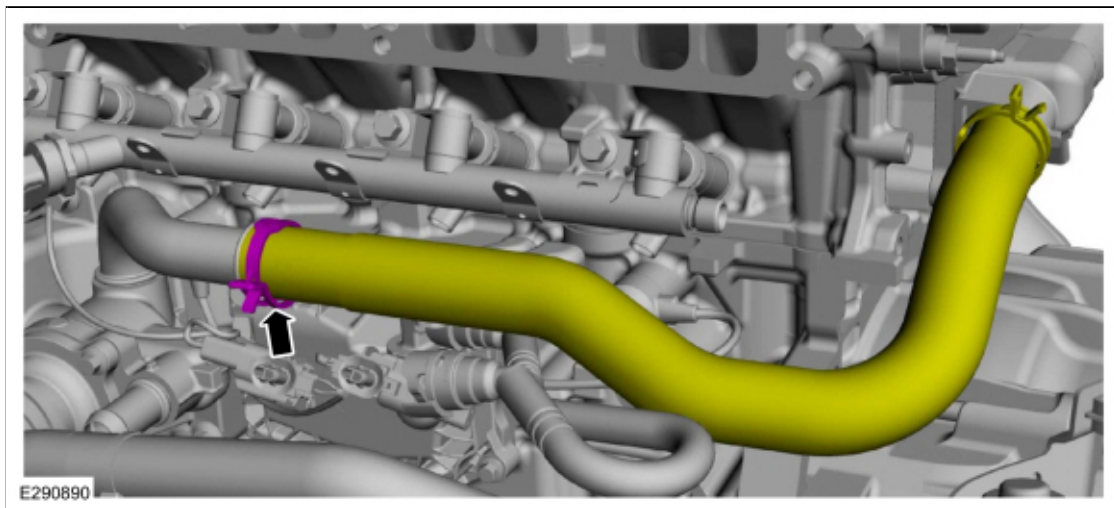
- Disconnect the KS wiring harness electrical connectors.
- Disconnect the fuel rail wiring harness electrical connectors.
- Detach the wiring harness retainers and remove the wiring harness.



11. Remove the fuel rail insulator shield.

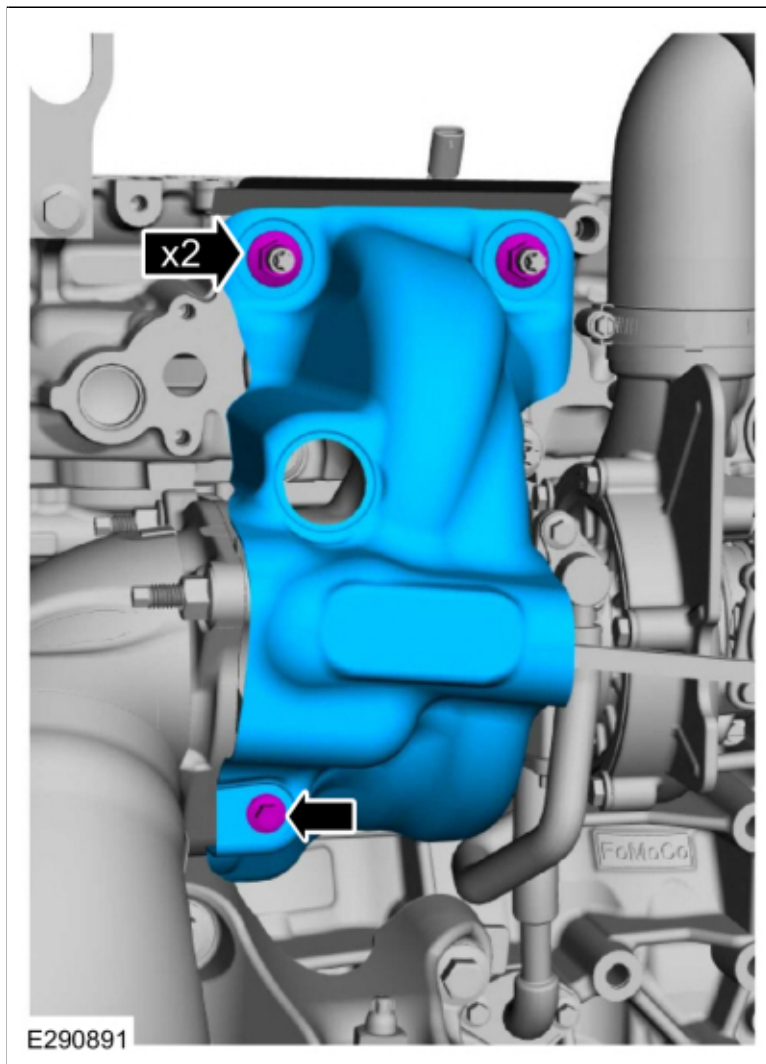


12. Release the clamp and position the coolant hose aside.  
Use the General Equipment: Hose Clamp Remover/Installer

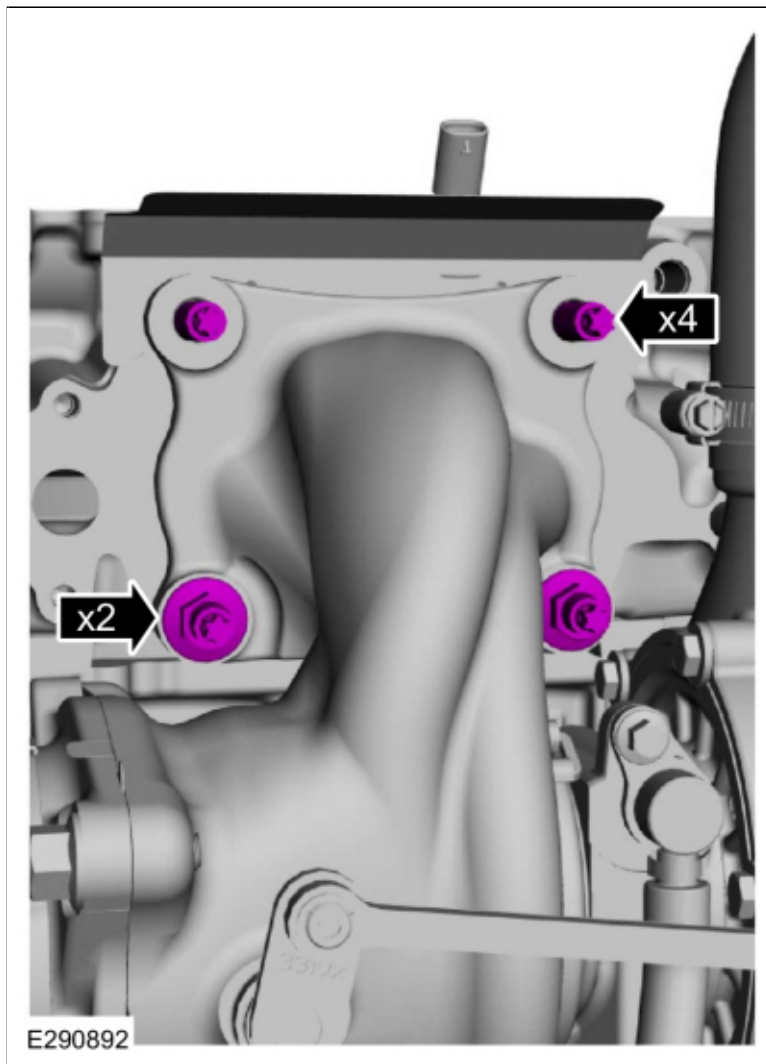


13. Remove the nuts, bolt and the turbocharger heat shield.



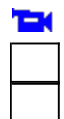


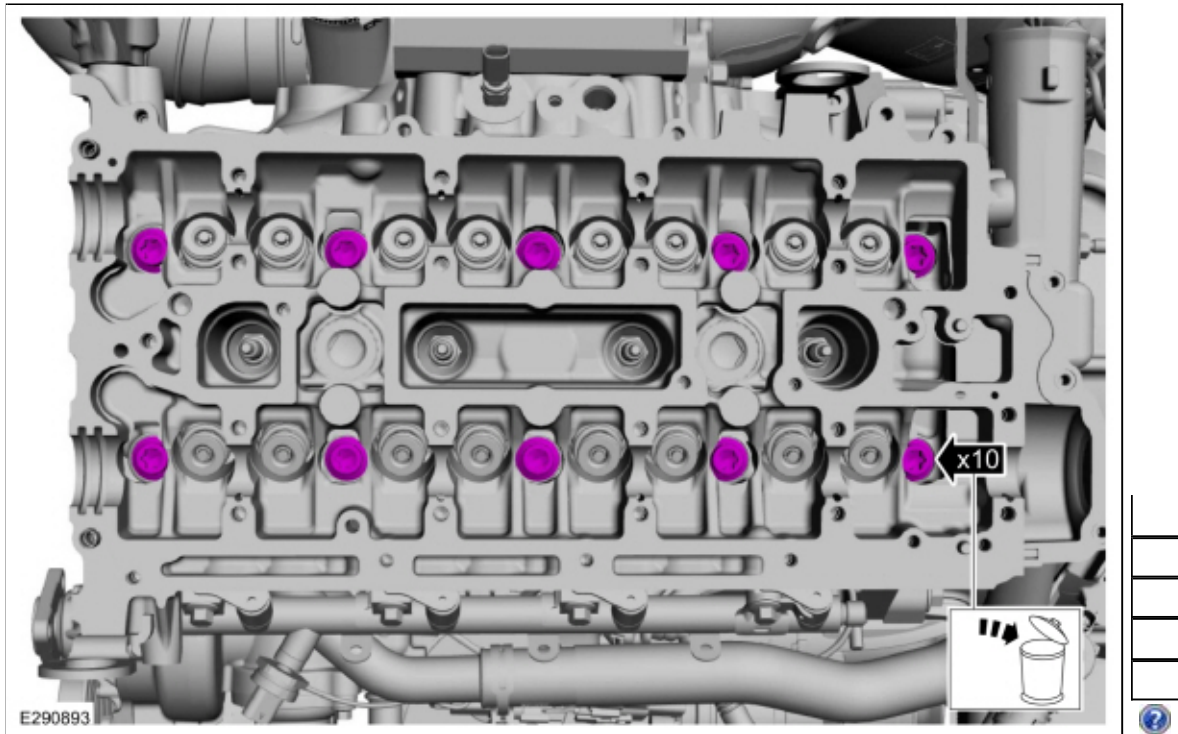
14. Remove the turbocharger nuts and the studs.



15.

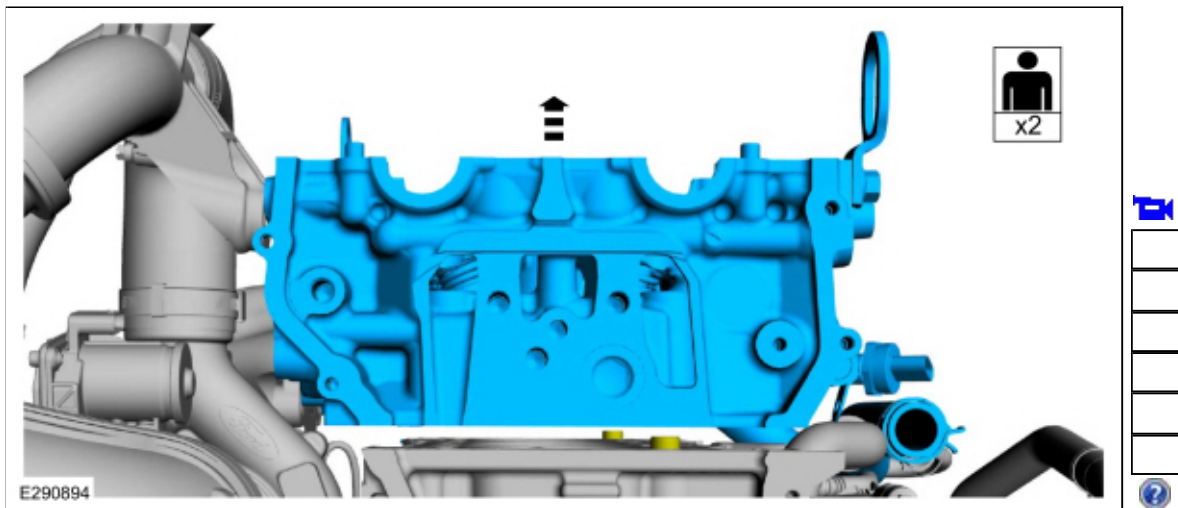
- Remove the cylinder head bolts.
- Discard the bolts.





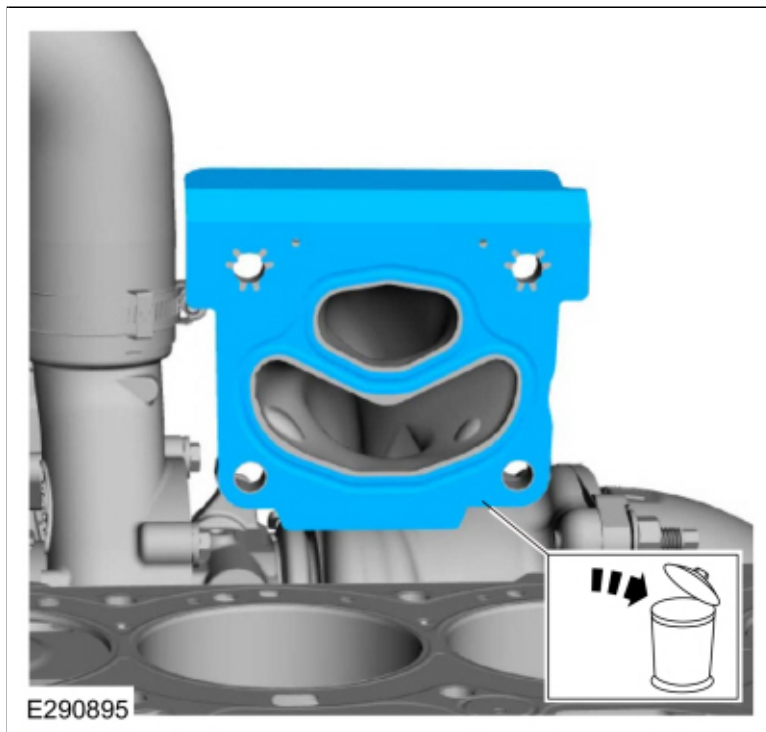
16. **NOTICE:** When removing or installing the cylinder head, use care to prevent excessive movement of the turbocharger. Excessive movement may cause damage to the turbocharger oil return tube resulting in an engine oil leak.

With the aid of an assistant, lift the cylinder head to clear the locating dowels in the cylinder block and remove the cylinder head.

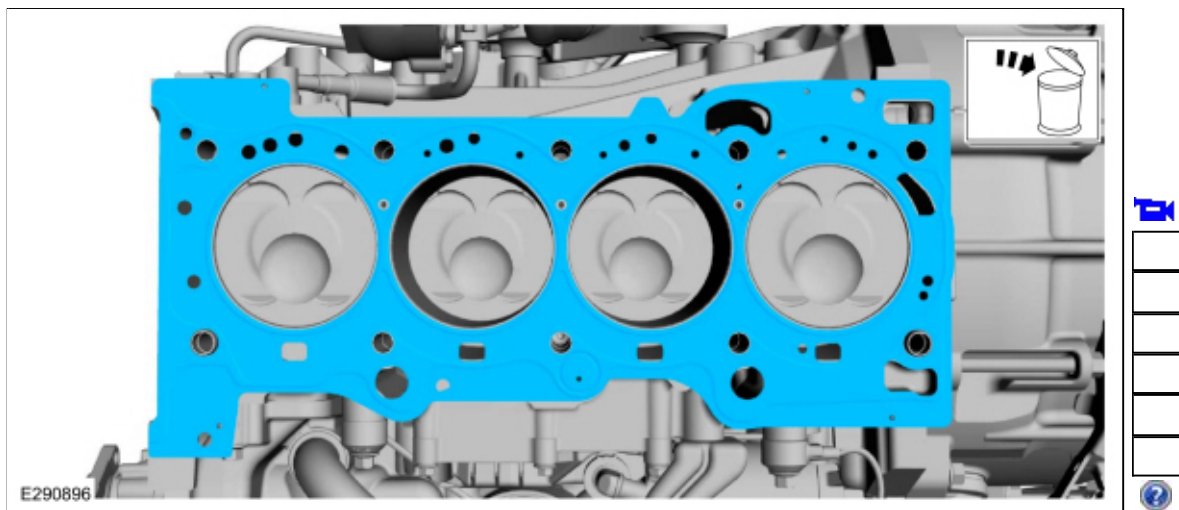


17. Remove and discard the turbocharger gasket.



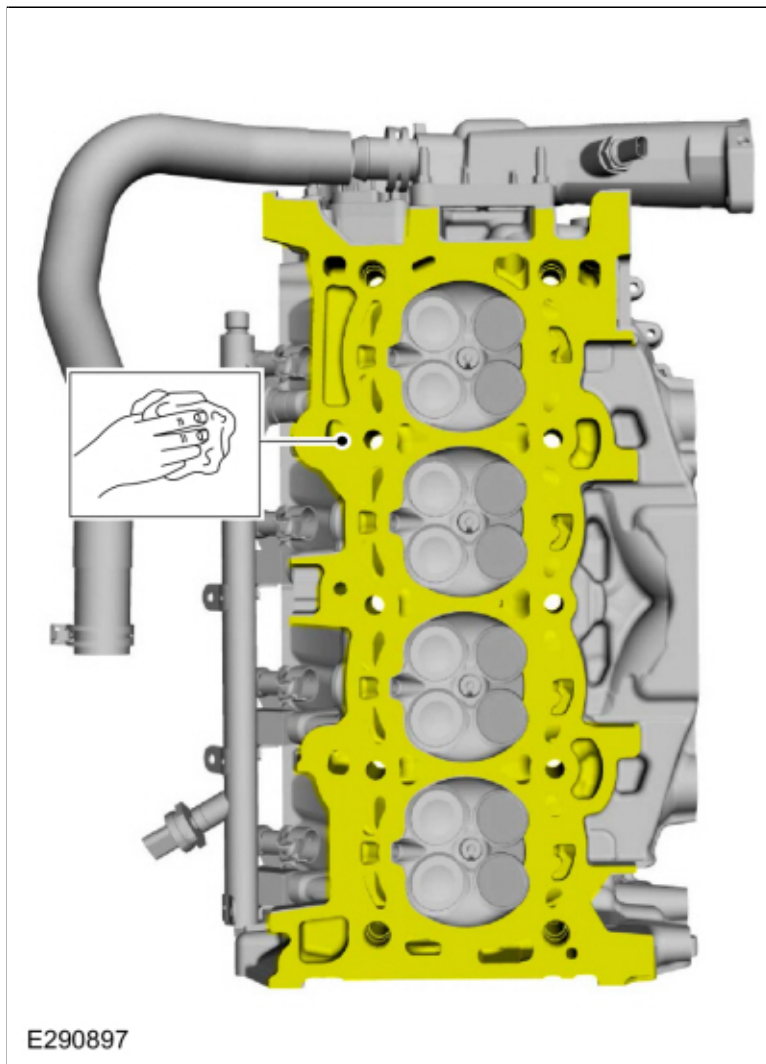


18. Remove and discard the cylinder head gasket.



19. **NOTICE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

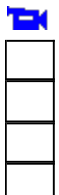
Clean the cylinder head sealing surfaces.

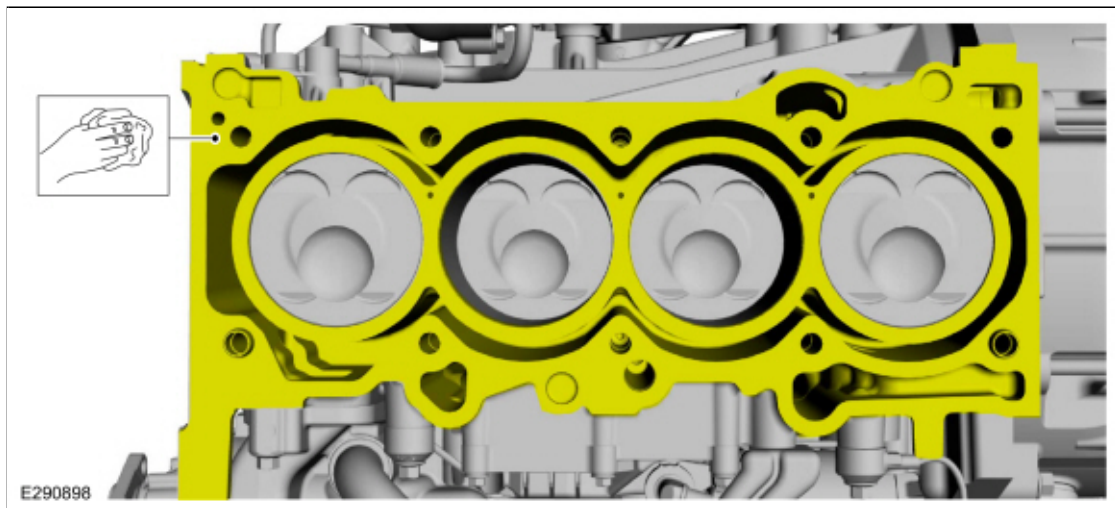


20. **NOTICE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

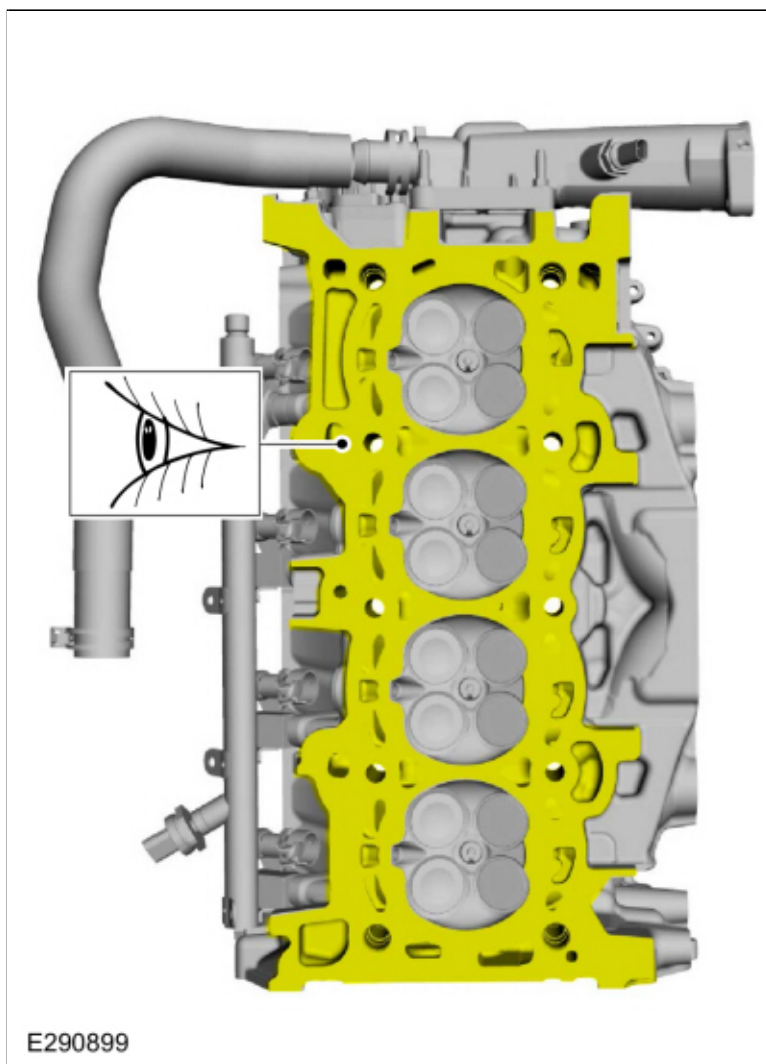
**NOTE:** Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

Clean the cylinder block sealing surfaces.





21. Inspect the cylinder head sealing surfaces.

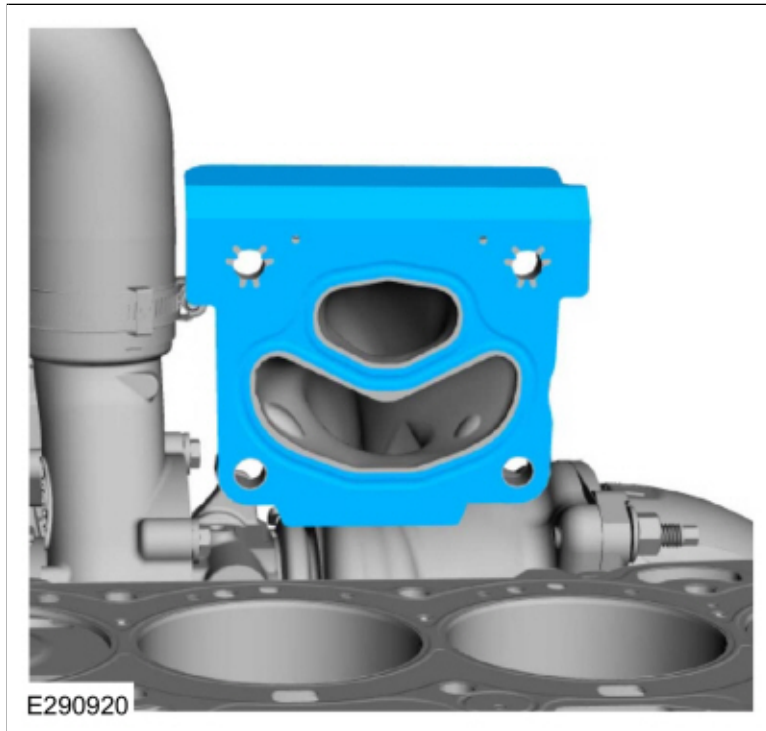


22.

- Check the cylinder head distortion.  
Refer to: [Cylinder Head Distortion](#) (303-00 Engine System - General Information, General Procedures).
- Check the cylinder block distortion.  
Refer to: [Cylinder Head Distortion](#) (303-00 Engine System - General Information, General Procedures).

## Installation

1. Install a new turbocharger gasket.

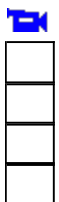


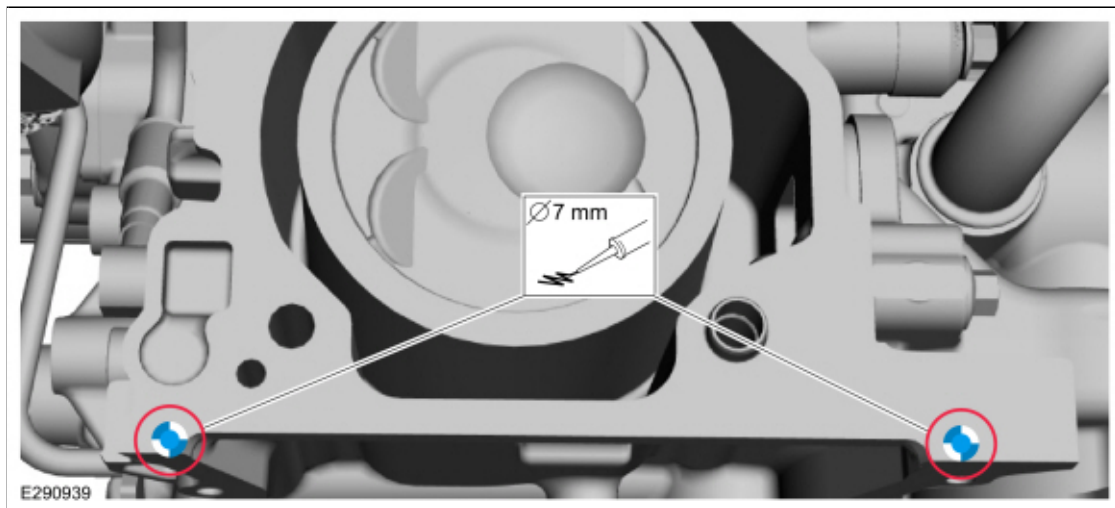
2. **NOTICE:** Do not allow silicone sealant in or near the high-pressure oil feed hole. Any restriction in the high-pressure oil feed may result in engine damage.

**NOTE:** The cylinder head must be installed within 10 minutes of applying the sealant.

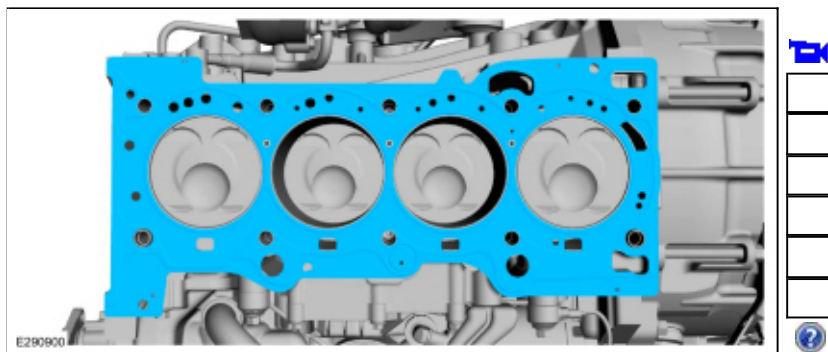
Apply a 7 mm (0.28 in) drop of silicone sealant at positions shown on the cylinder block.

**Material:** Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)





3. Install the new cylinder head gasket.



4. **NOTICE:** Do not allow silicone sealant in or near the high-pressure oil feed hole. Any restriction in the high-pressure oil feed may result in engine damage.

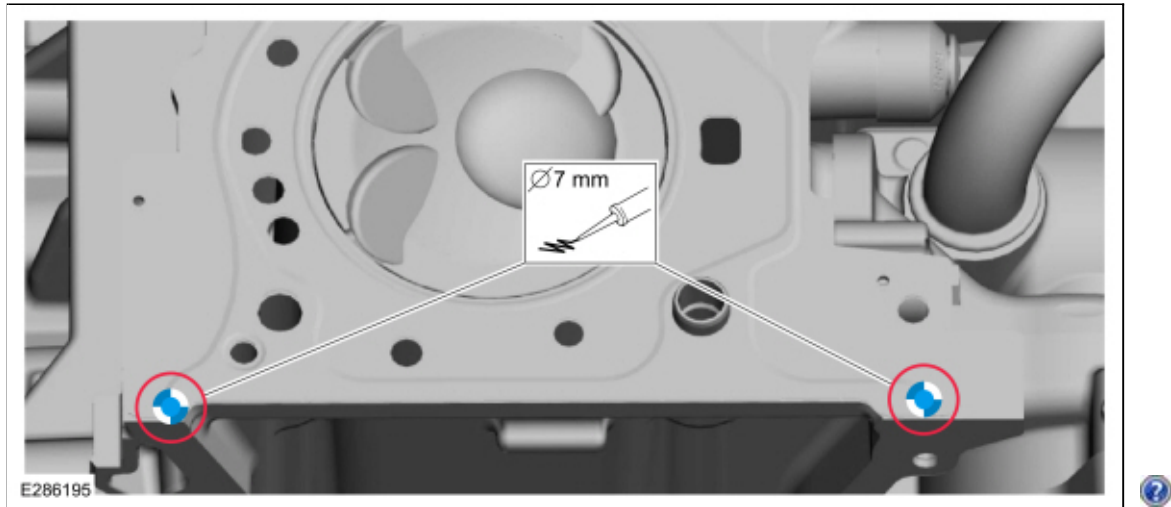
**NOTE:** The cylinder head must be installed within 10 minutes of applying the sealant.

Apply a 7 mm (0.28 in) drop of silicone sealant at positions shown on the cylinder head gasket.

**Material:** Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

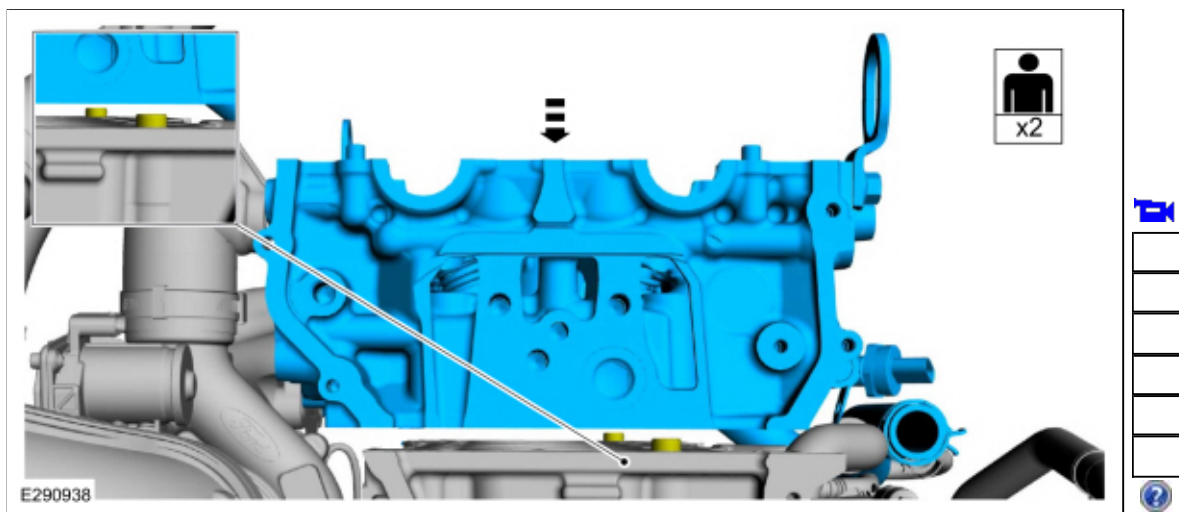






5. **NOTICE:** When removing or installing the cylinder head, use care to prevent excessive movement of the turbocharger. Excessive movement may cause damage to the turbocharger oil return tube resulting in an engine oil leak.

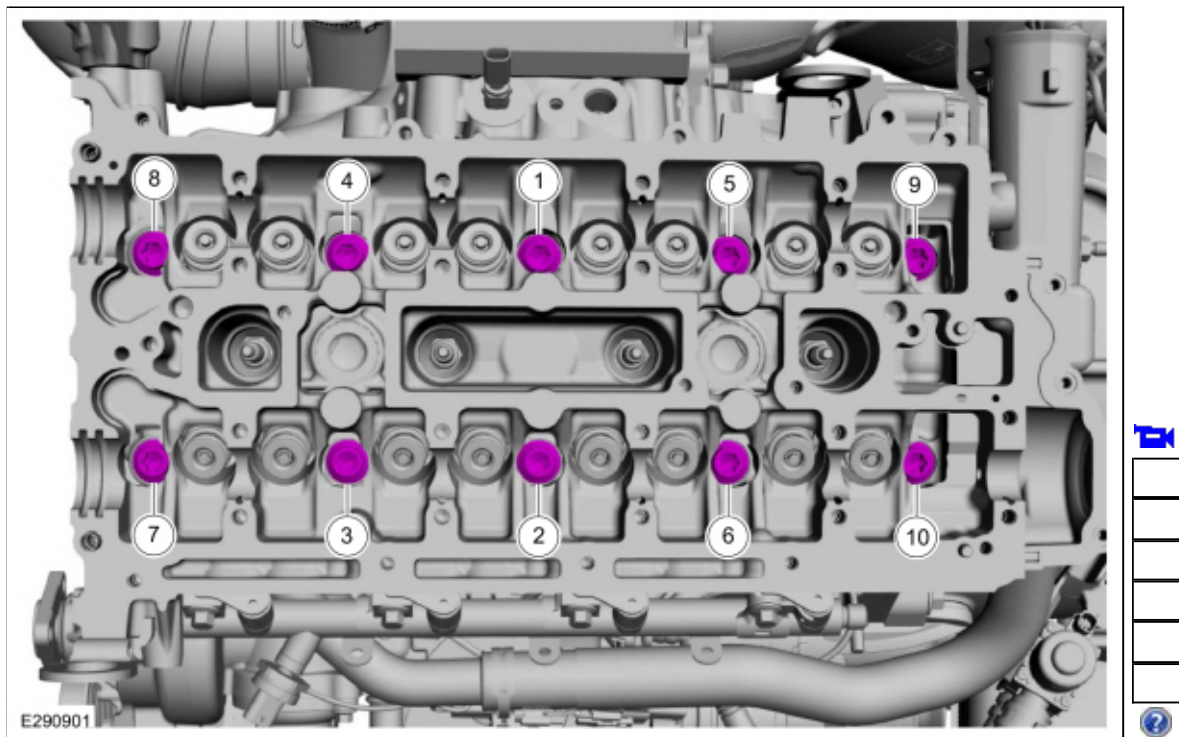
With the aid of an assistant, align the cylinder head to the locating dowels in the cylinder block and install.



6. Install the new cylinder head bolts and tighten in sequence shown.

*Torque:*

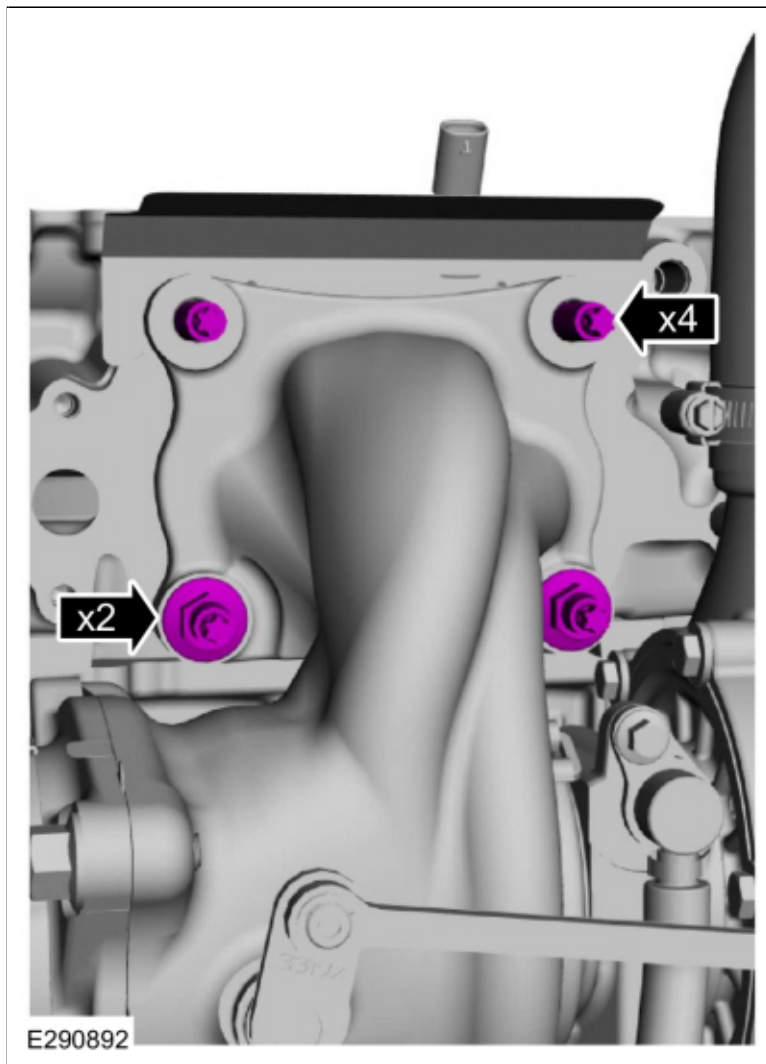
- Stage 1: 62 lb.in (7 Nm)
- Stage 2: 133 lb.in (15 Nm)
- Stage 3: 41 lb.ft (55 Nm)
- Stage 4: 90°
- Stage 5: 90°



7.

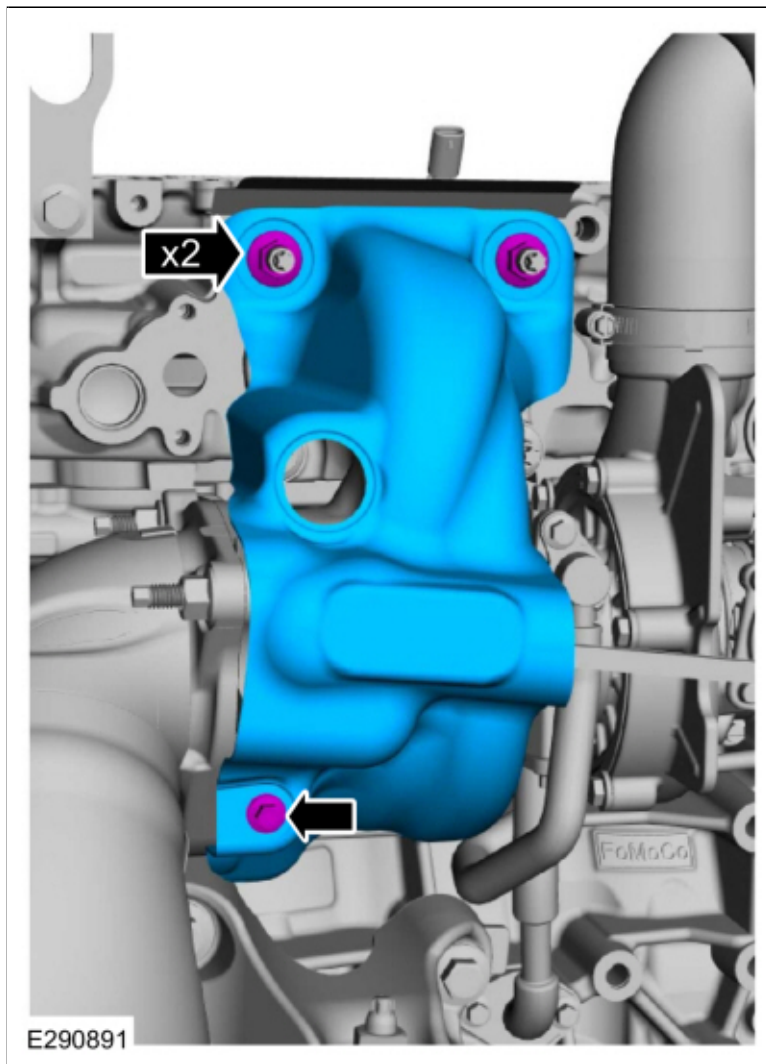
- Install the studs.  
*Torque:* 159 lb.in (18 Nm)
- Install the turbocharger nuts.  
*Torque:* 39 lb.ft (53 Nm)



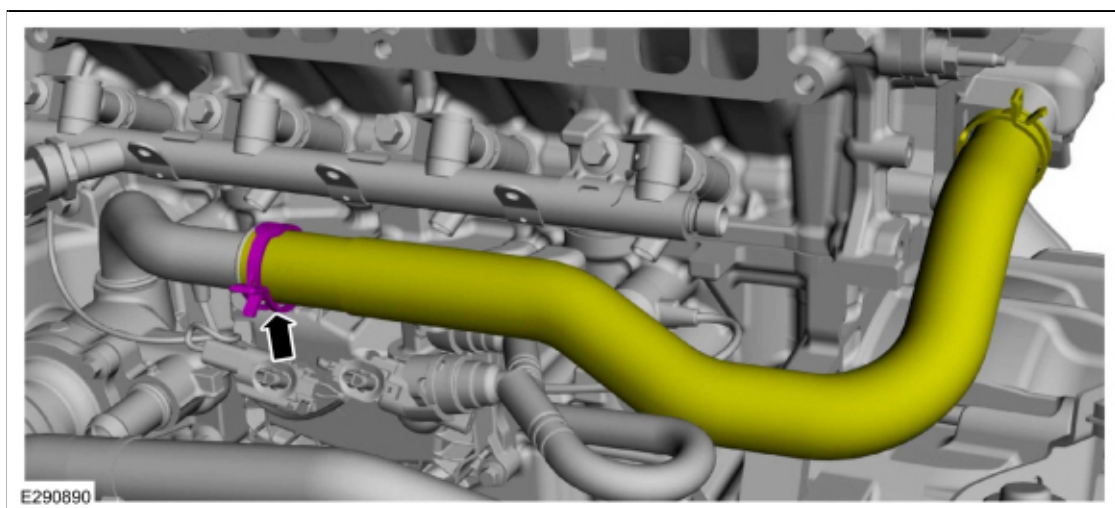


8.

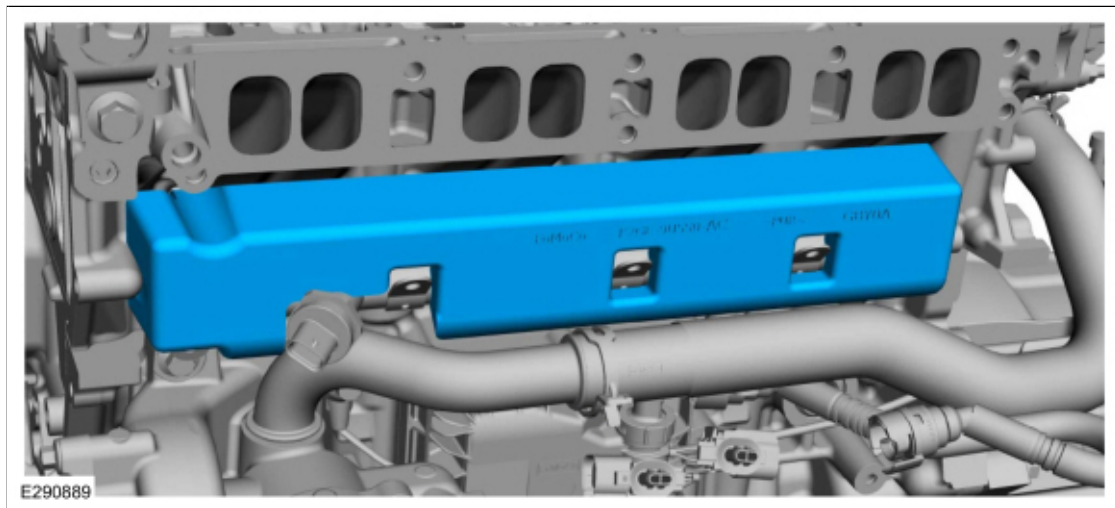
- Install the turbocharger heat shield and the nuts.  
*Torque: 39 lb.ft (53 Nm)*
- Install the turbocharger heat shield bolt.  
*Torque: 97 lb.in (11 Nm)*



9. Position the coolant hose and install the clamp.  
Use the General Equipment: Hose Clamp Remover/Installer

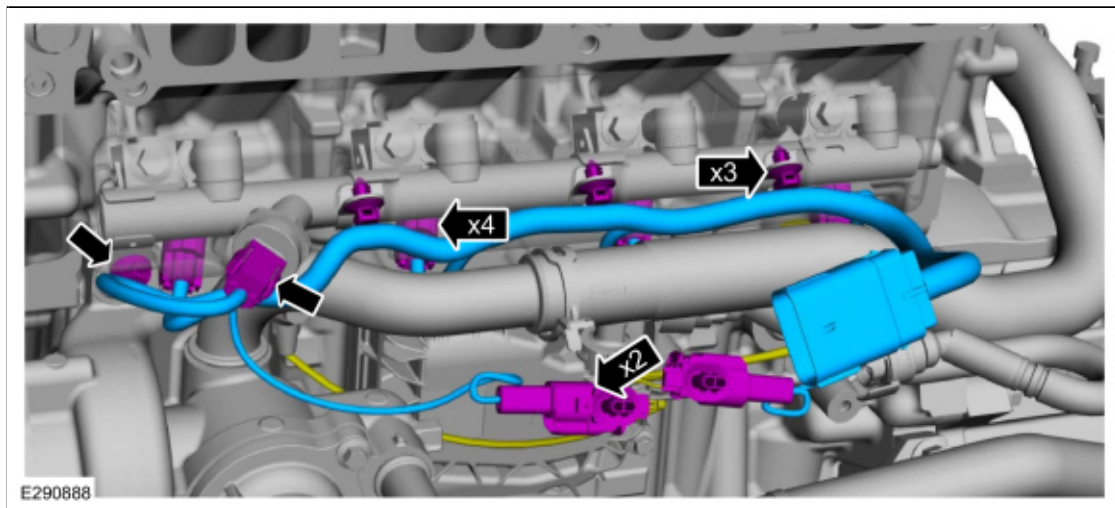


10. Install the fuel rail insulator shield.



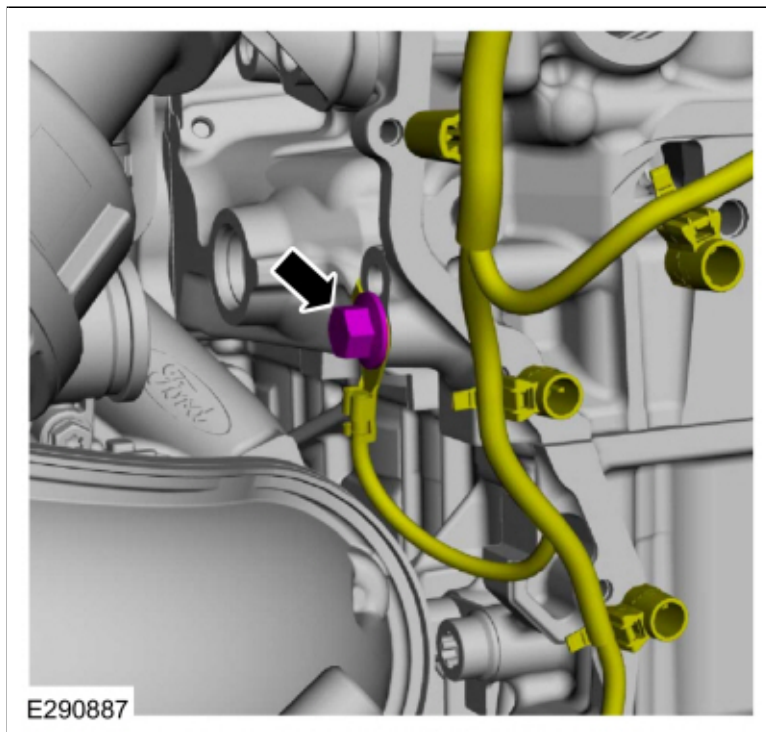
- 11.

- Install the harness and attach the wiring harness retainers.
- Connect the fuel rail wiring harness electrical connectors.
- Connect the KS wiring harness electrical connectors.

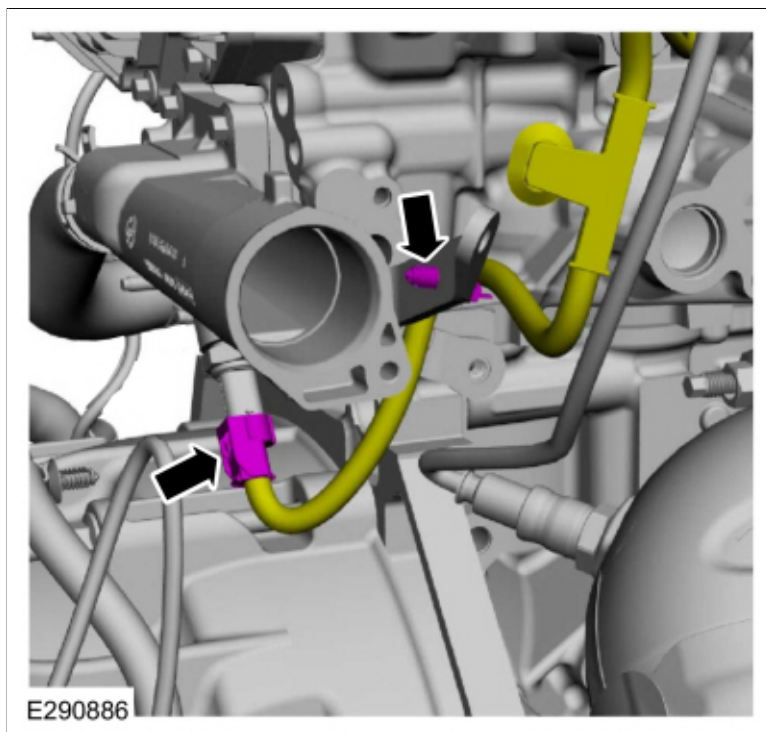


12. Position the ground wire and install the bolt.  
Torque: 106 lb.in (12 Nm)

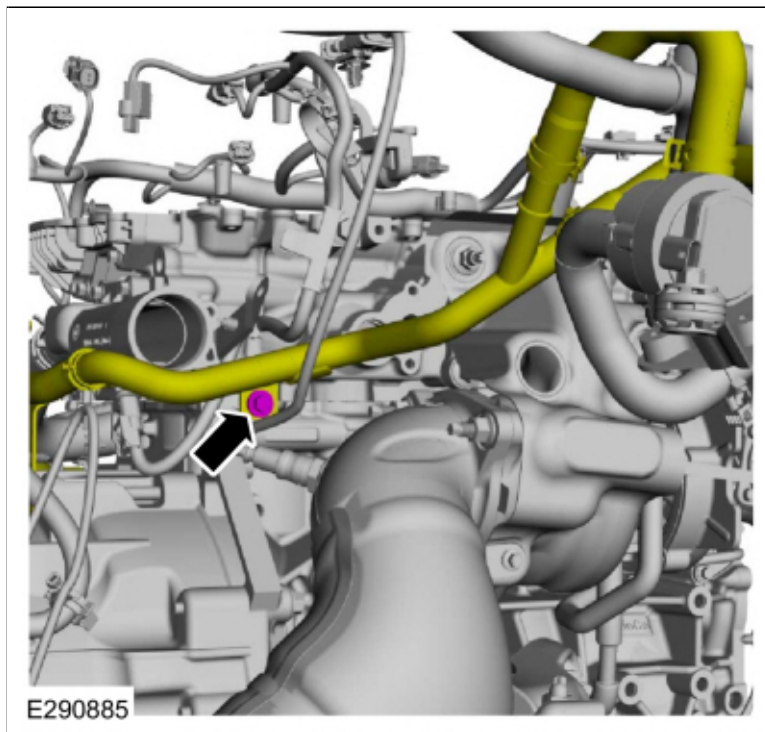




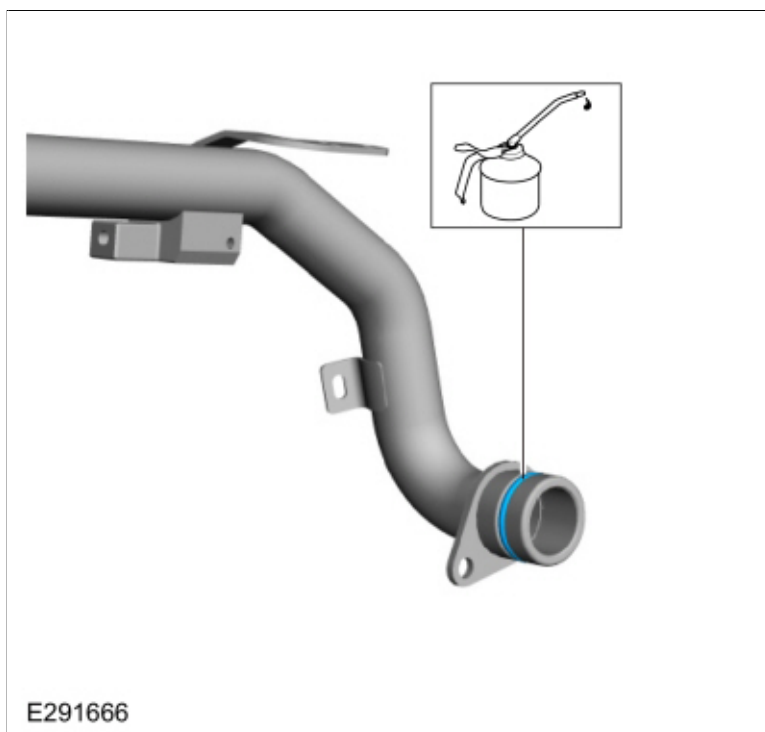
13. Connect the ECT sensor wiring harness electrical connector and the retainer.



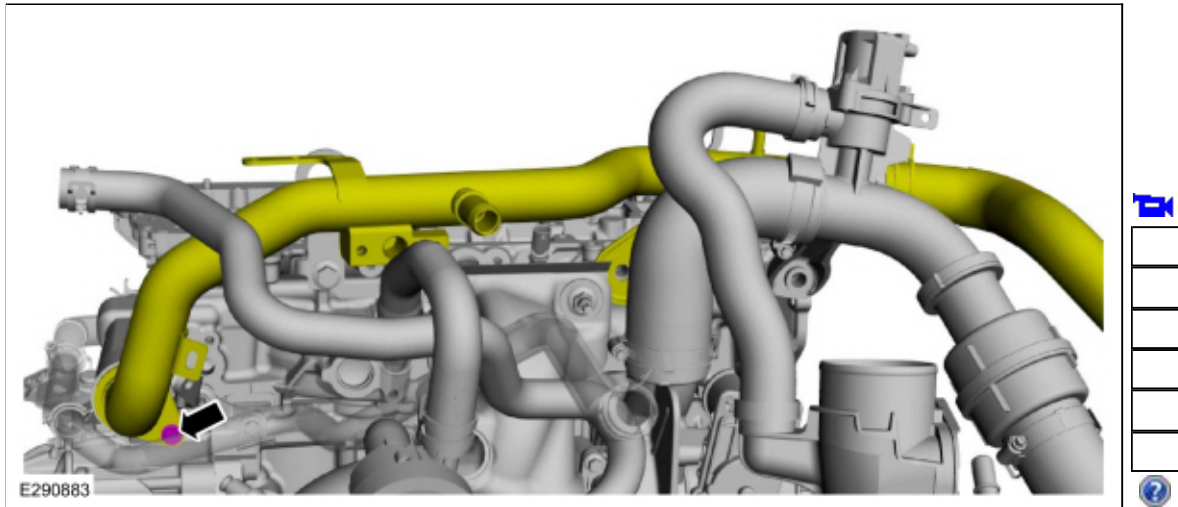
14. Install the coolant tube bolt to the cylinder head.  
*Torque: 97 lb.in (11 Nm)*



15. Install a new coolant tube O-ring seal and lubricate with clean engine coolant.



16. Position the coolant tube and install the bolt.  
*Torque: 97 lb.in (11 Nm)*



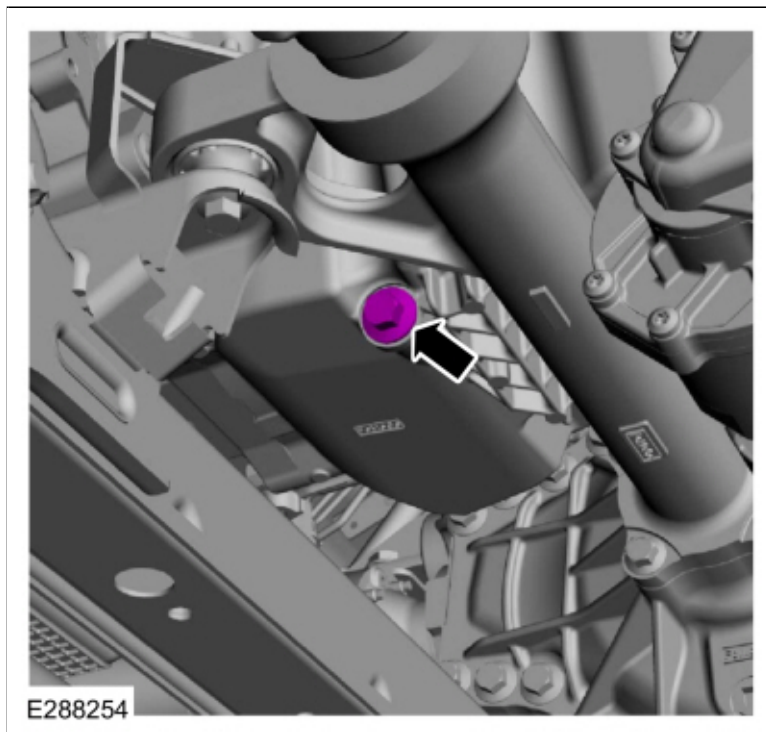
17. Install the following items:

1. Install EGR inlet tube.  
Refer to: [Exhaust Gas Recirculation \(EGR\) Inlet Tube](#) (303-08 Engine Emission Control - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
2. Install EGR cooler.  
Refer to: [Exhaust Gas Recirculation \(EGR\) Cooler](#) (303-08 Engine Emission Control - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
3. Install EGR valve.  
Refer to: [Exhaust Gas Recirculation \(EGR\) Valve](#) (303-08 Engine Emission Control - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
4. Install the valve tappets.  
Refer to: [Valve Tappets](#) (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal and Installation).

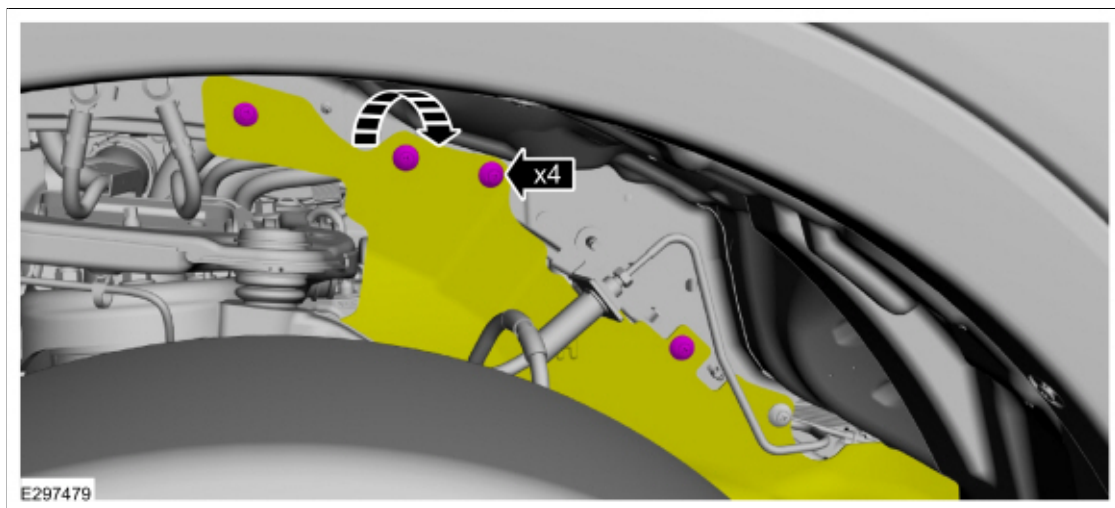
18.

- Remove the oil pan drain bolt and drain the engine oil.  
Use the General Equipment: Oil Drain Equipment
- Install the oil pan drain bolt.  
*Torque: 20 lb.ft (27 Nm)*



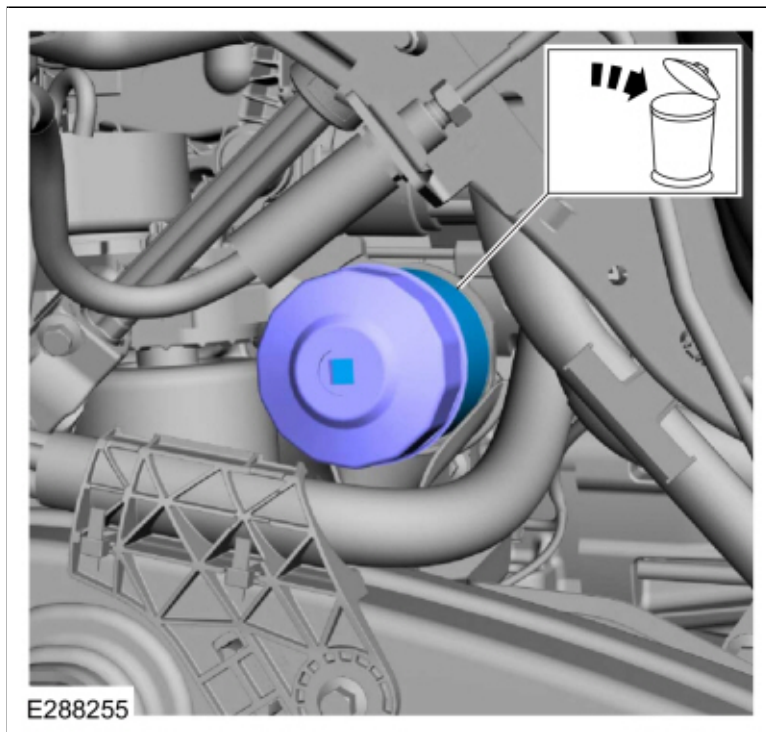


19. Remove the retainers and the position the LH side splash shield down for access to the oil filter.



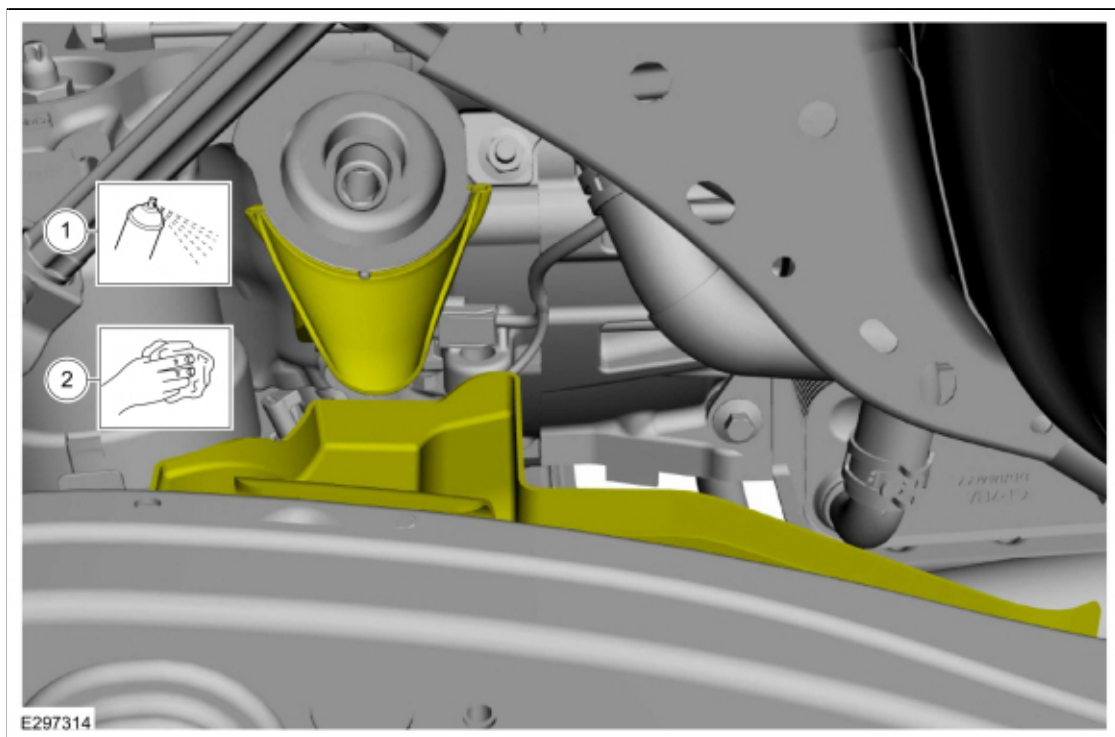
20. **NOTE:** Use a commercially available end cap oil filter wrench.

Remove and discard the engine oil filter.  
Use the General Equipment: Oil Drain Equipment



21.

1. Using brake cleaner, clean the drain troughs.  
Use the General Equipment: Oil Drain Equipment  
*Material:* Motorcraft® Metal Brake Parts Cleaner / PM-4-A, PM-4-B
2. Wipe the drain troughs clean.



22. **NOTE:** Use a commercially available end cap oil filter wrench.

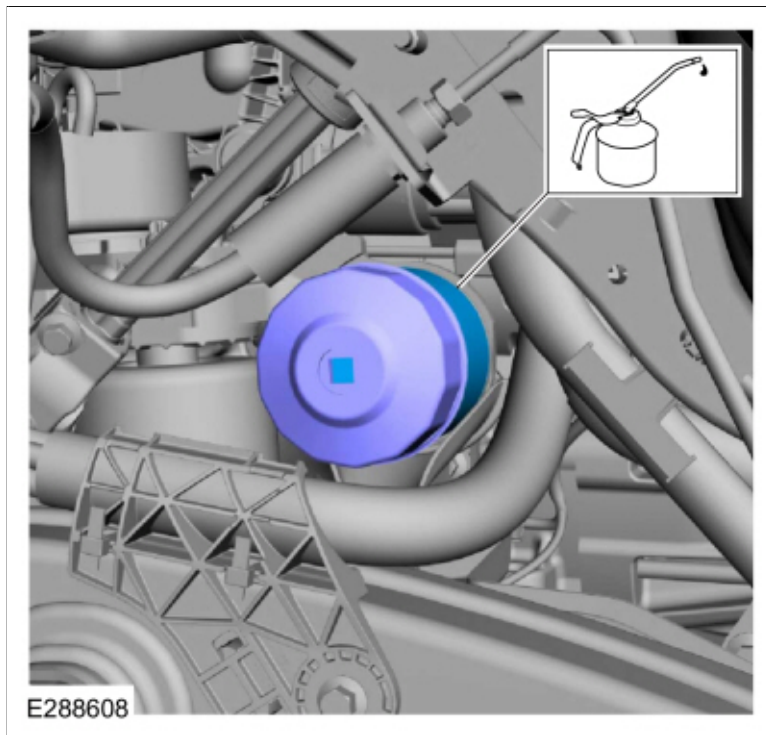


Lubricate the oil filter seal with clean engine oil and install.

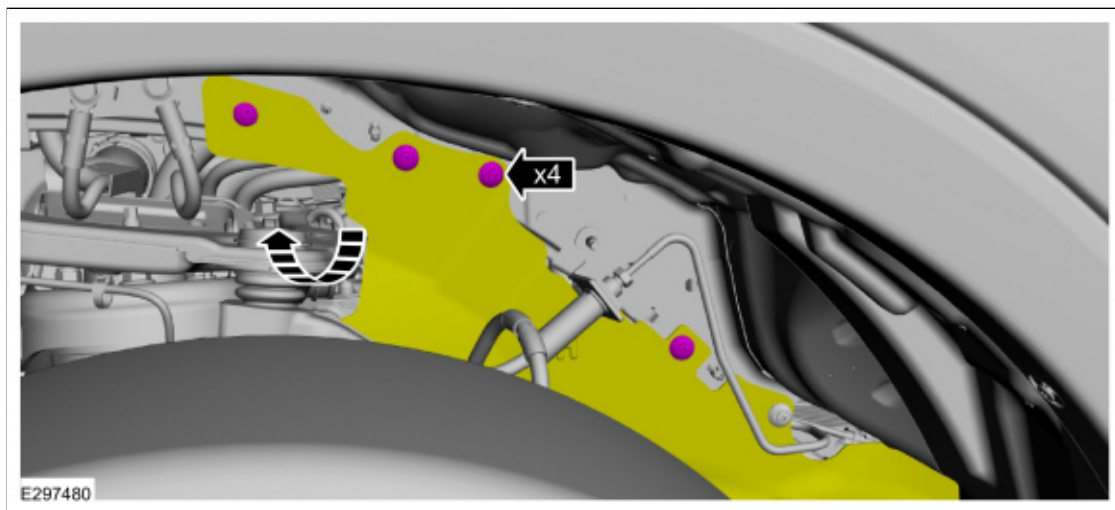
*Torque:*

Stage 1: 71 lb.in (8 Nm)

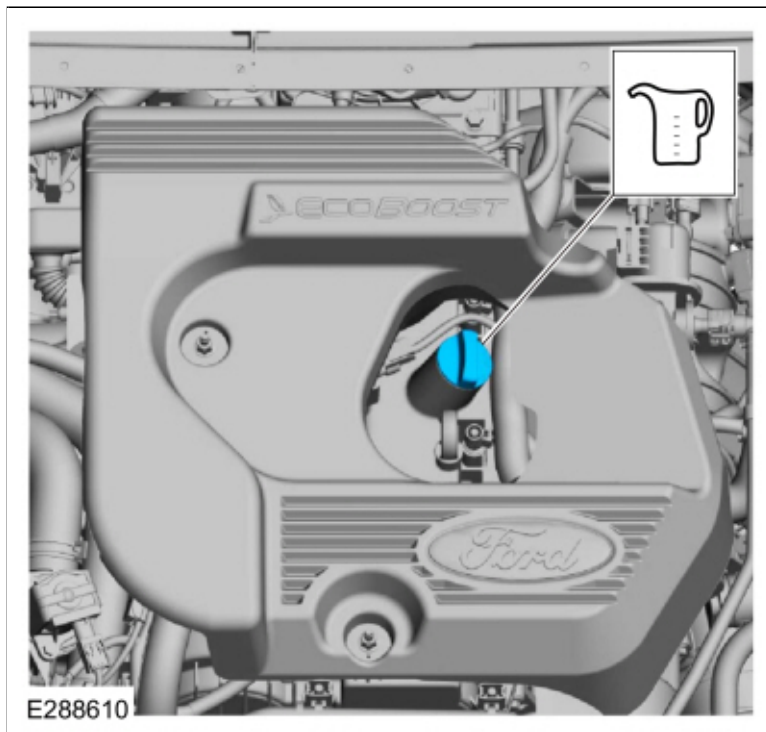
Stage 2: 180°



23. Position the LH side splash shield and install the retainers.



24. Fill the engine with clean engine oil.  
Refer to: [Specifications](#) (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Specifications).



25. Fill the cooling system.  
Refer to: [Cooling System Draining, Vacuum Filling and Bleeding](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), General Procedures).
26. Pressurize the fuel system pressure.  
Refer to: [Fuel System Pressure Release](#) (310-00 Fuel System - General Information - 2.3L EcoBoost (201kW/273PS), General Procedures).

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