Turbocharger

Special Tool(s) / General Equipment

Oil Drain Equipment

Materials

Name	Specification
MotorcraftÂ® Metal Brake Parts Cleaner PM-4-A, PM-4-B	-

Removal

NOTICE: The engine oil must be changed any time the turbocharger is removed from the engine. The passages in the block underneath the turbocharger are direct passages to the lubrication system. Debris and or coolant may enter the lubrication system and engine damage may occur.

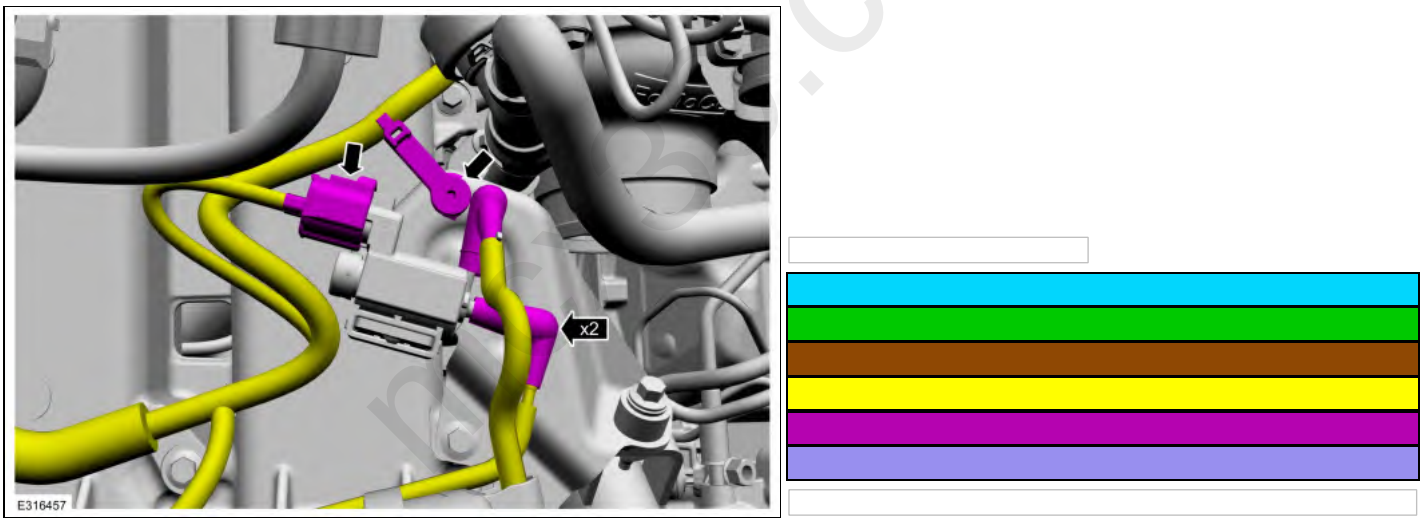
NOTICE: The turbocharger can be damaged by even the smallest particles. When removing any turbocharger or engine air intake system component, ensure that no debris enters the system. Failure to do so may result in damage to the turbocharger.

NOTICE: Special attention needs to be given to the sealing ports for the coolant lines, on turbocharged engines. The sealing ports must be totally clean and free from O-ring residue, have no damage to the sealing surface and the lines to ensure that there are no leaks or repeat repairs.

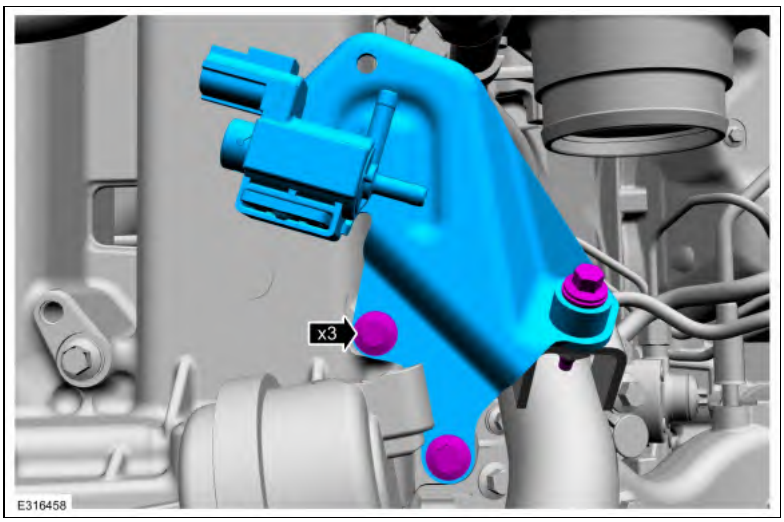
1. Drain the engine cooling system.
   Refer to: Engine Cooling System Draining, Vacuum Filling and Bleeding (303-03B Engine Cooling - 6.7L Power Stroke Diesel, General Procedures).

2. Remove the lower intake manifold.
   Refer to: Lower Intake Manifold (303-01B Engine - 6.7L Power Stroke Diesel, Removal and Installation).

3. Disconnect the electrical connector and the vacuum hoses from the exhaust gas recirculation bypass valve solenoid. Detach the wire harness retainer.

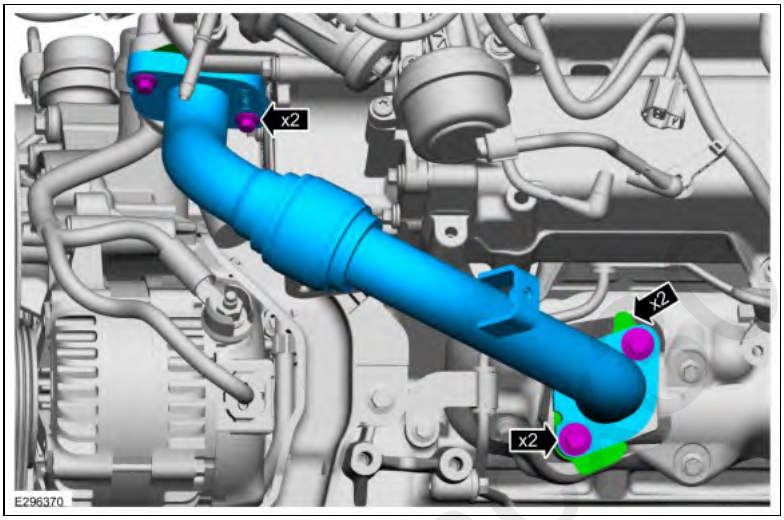


4. Remove the bolts, then remove the exhaust gas recirculation cooler inlet pipe bracket.

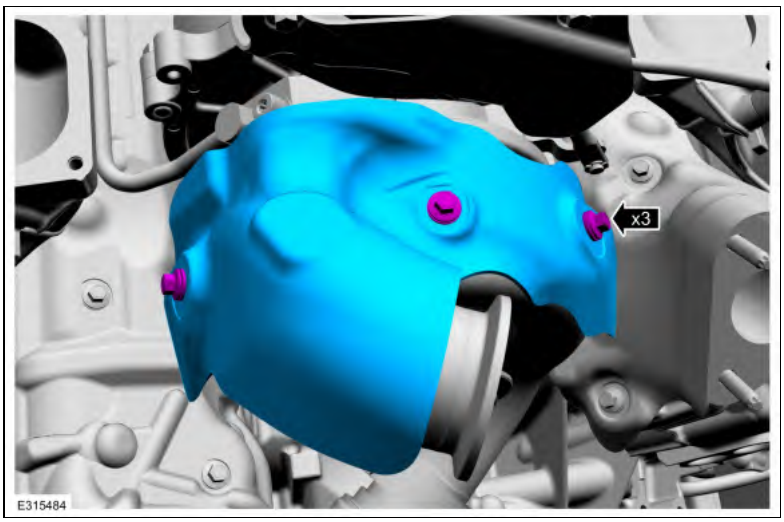


5.

1. Remove the bolts, then remove the exhaust gas recirculation cooler inlet pipe.
2. Remove and discard the gaskets.

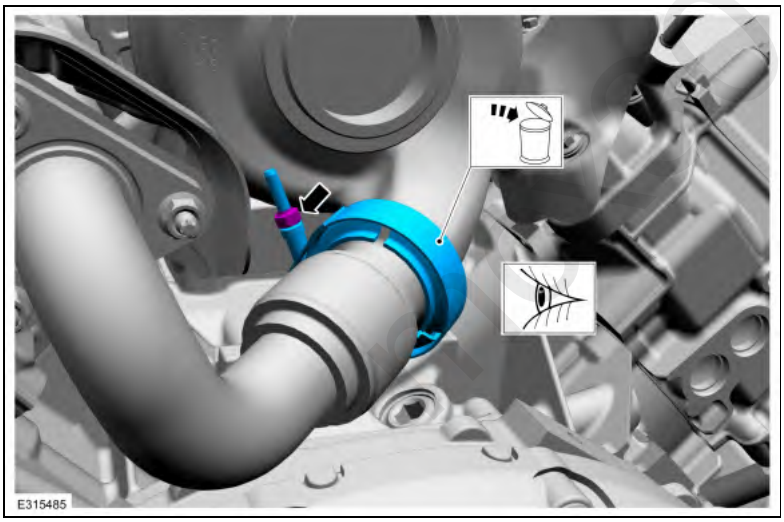


6. Remove the exhaust downpipe.
7. Remove the turbocharger heat shield bolts, then remove the turbocharger heat shield.

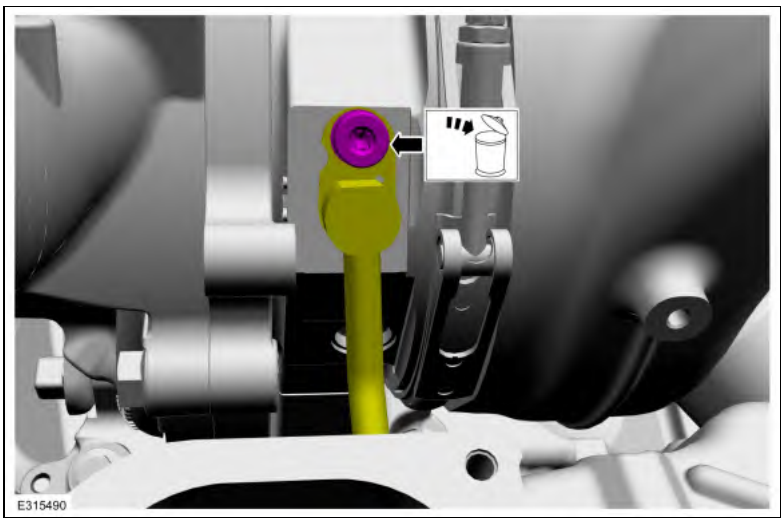


8. **NOTE:** *Note the turbocharger inlet pipe clamp orientation to aid in the proper installation of the clamp.*

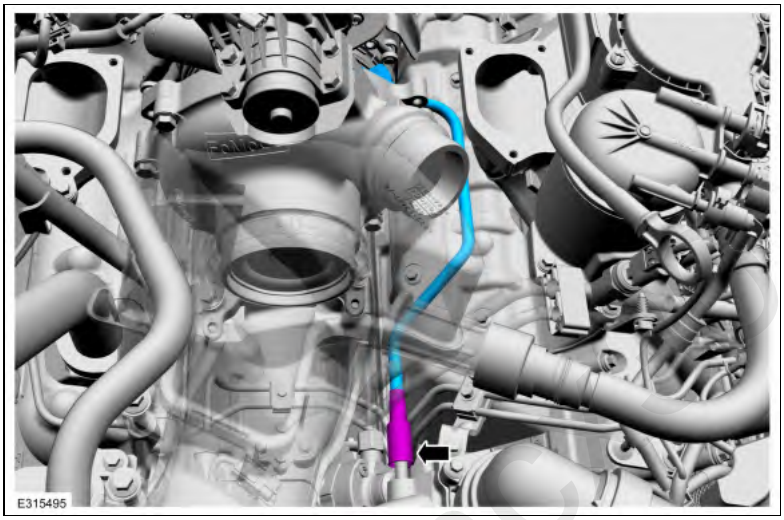
   Remove and discard the left turbocharger inlet pipe clamp.



9. Remove and discard the turbocharger coolant return tube bolt, then disconnect the turbocharger coolant return tube.



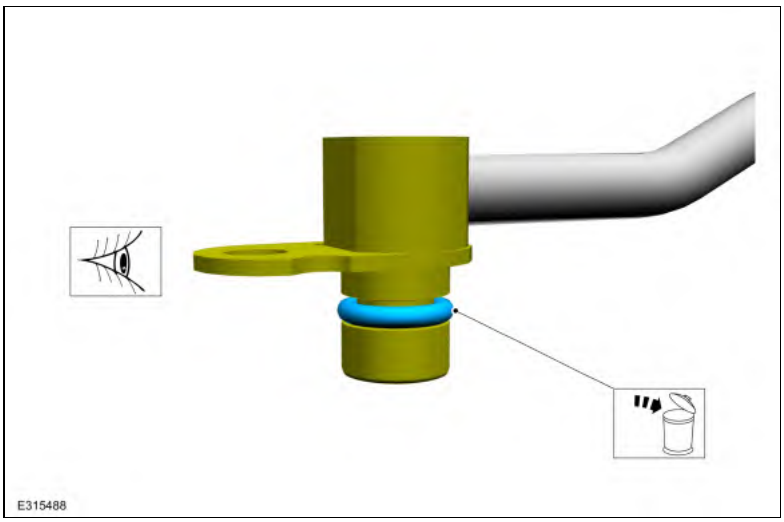
10. Disconnect and remove the turbocharger coolant return tube.



11.

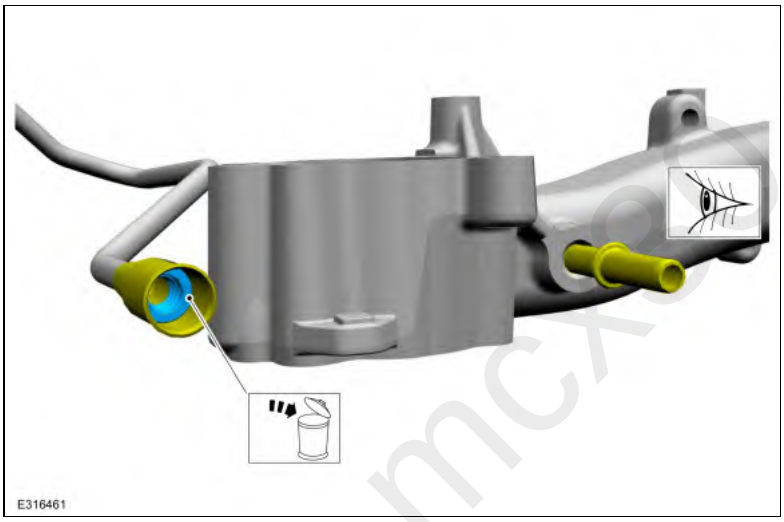
1. Remove and discard the turbocharger coolant return tube O-ring seal.
   Material: MotorcraftÂ® Metal Brake Parts Cleaner / PM-4-A, PM-4-B
2. **NOTICE: Use brake cleaner and a nylon brush to clean. Do not use a metal brush, damage to sealing area will result in leaks.**

   Clean the turbocharger coolant tube sealing surfaces. Inspect the sealing surfaces for debris or damage and make sure the retaining bracket is not bent, check for squareness of the O-ring area. Install new components if necessary.

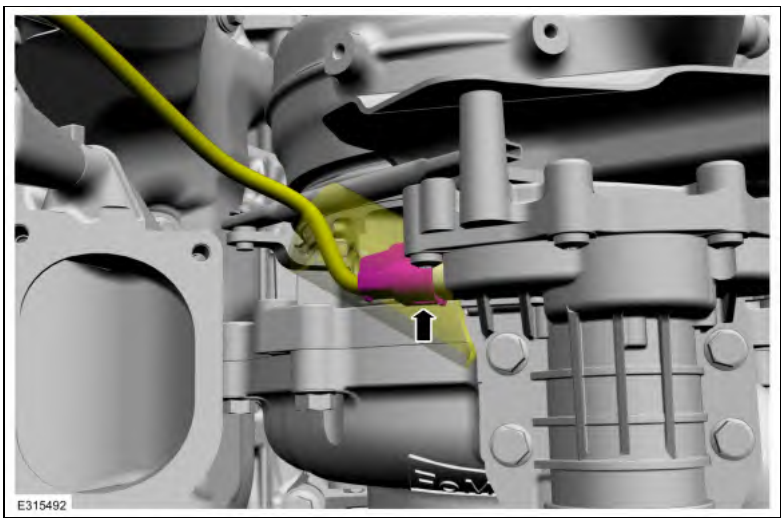


12. **NOTICE: Use brake cleaner and a nylon brush to clean. Do not use a metal brush, damage to sealing area will result in leaks.**

    Remove and discard the rubber gasket. Inspect and clean the turbocharger cooling tube sealing surfaces, install new components if necessary.
    Material: MotorcraftÂ® Metal Brake Parts Cleaner / PM-4-A, PM-4-B



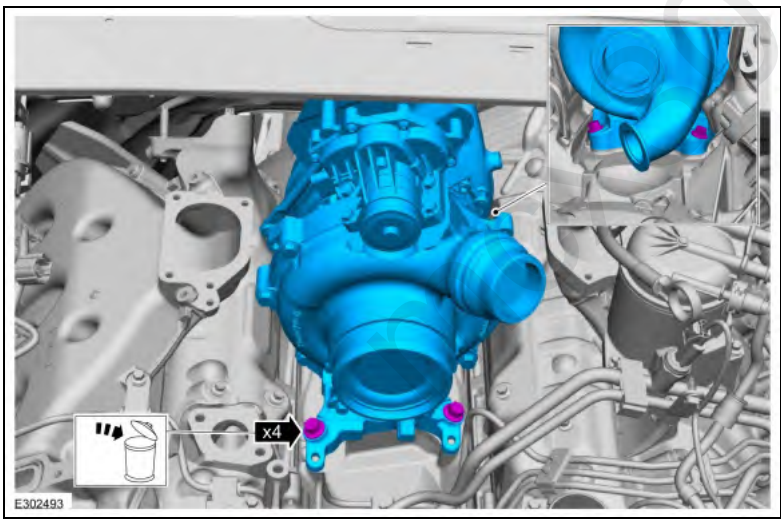
13. Slide the cover back out of the way, then disconnect the turbocharger actuator electrical connector.



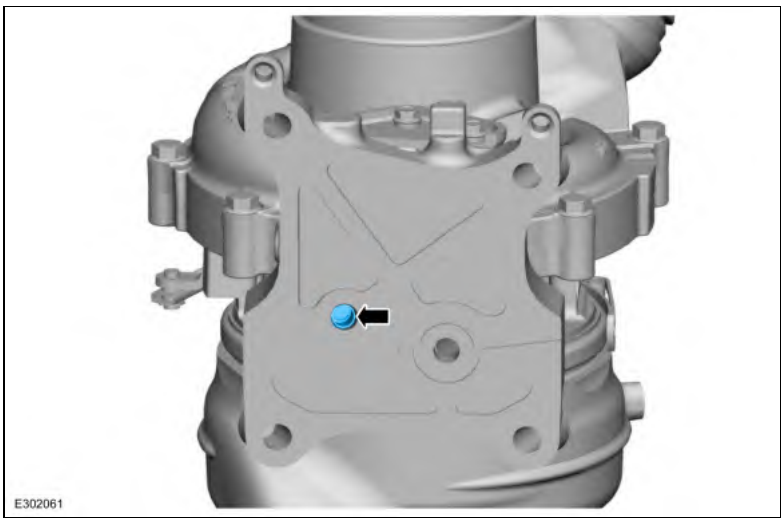
14.

1. Remove and discard the turbocharger mounting bolts.
2. **NOTE:** *Lift the turbocharger off the locating dowels while being careful not to allow the dowels to damage the sealing surfaces of the turbocharger while positioning the turbocharger forward for removal.*

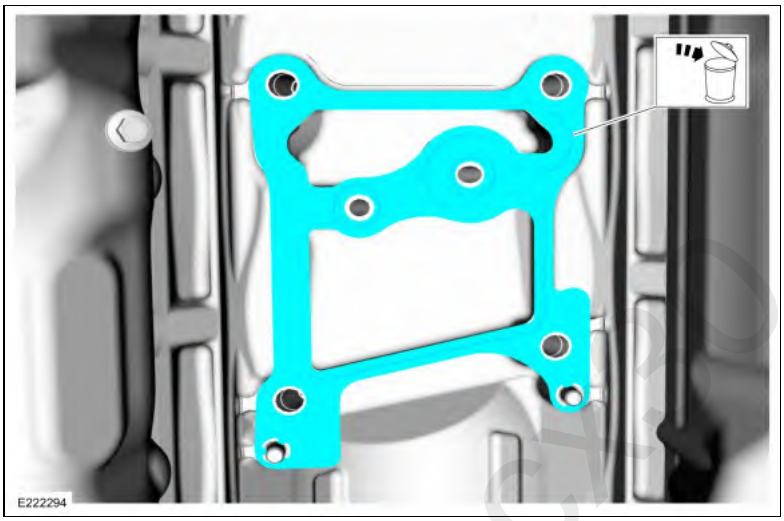
   Remove the turbocharger.



15. Remove and discard the turbocharger oil supply filter.



16. Remove and discard the turbocharger gasket.



Installation

NOTICE: Make sure that the mating faces are clean and free of foreign material.

1. **NOTICE: Failure to inspect the components for debris may result in repeat failures.**

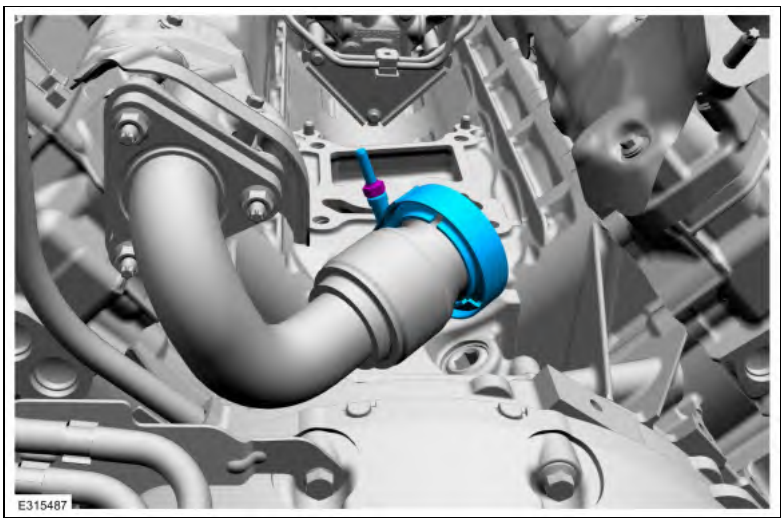
   NOTE: *It may be necessary to use a borescope to inspect the components.*

   When an engine or turbocharger is replaced due to a failure, inspect the following components for potential metal debris. If evidence of debris is found, clean or replace the components as needed.
   - CAC and the CAC tubes
   - Intake air system
   - Exhaust manifolds
   - EGR cooler and pipes
   - Diesel Oxidation Catalyst (DOC)
   - Turbocharger (on engine failure only)

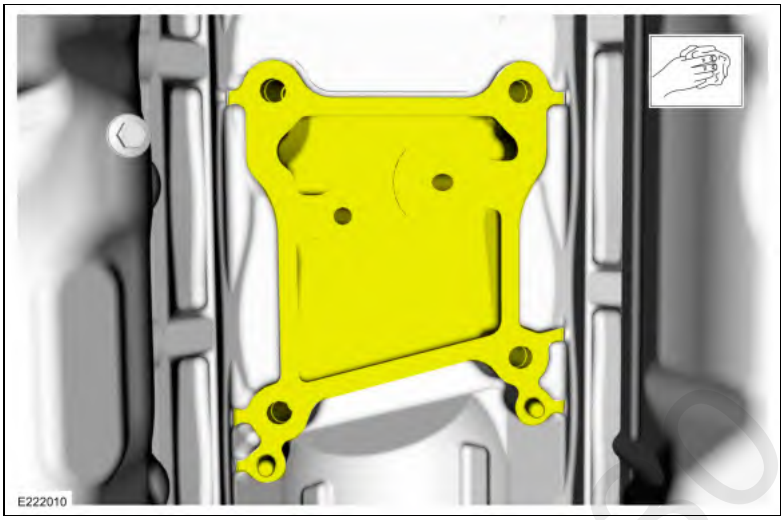
2. **NOTICE: Do not bend or twist the turbocharger inlet pipes or damage to the bellows on the turbocharger inlet pipes may occur.**

   NOTE: *Do not tighten the left turbocharger inlet pipe clamp at this time.*

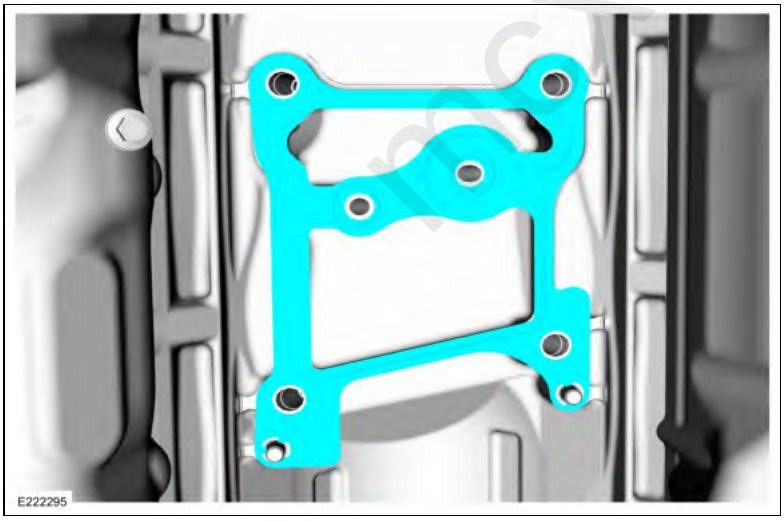
   Disengage the new left turbocharger inlet pipe clamp T-bolt and loosely install the new left turbocharger inlet pipe clamp on the left turbocharger inlet pipe.



3. Clean the turbocharger sealing surfaces and wipe the turbocharger valley clean of all oil and debris.

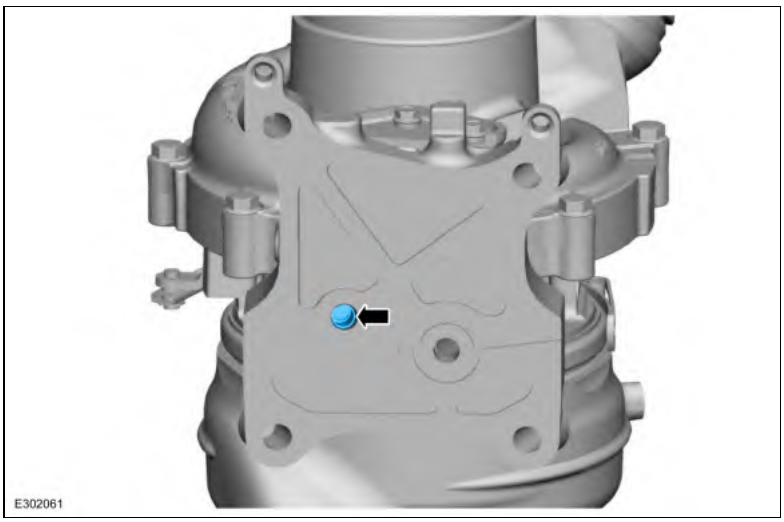


4. Install a new turbocharger gasket.



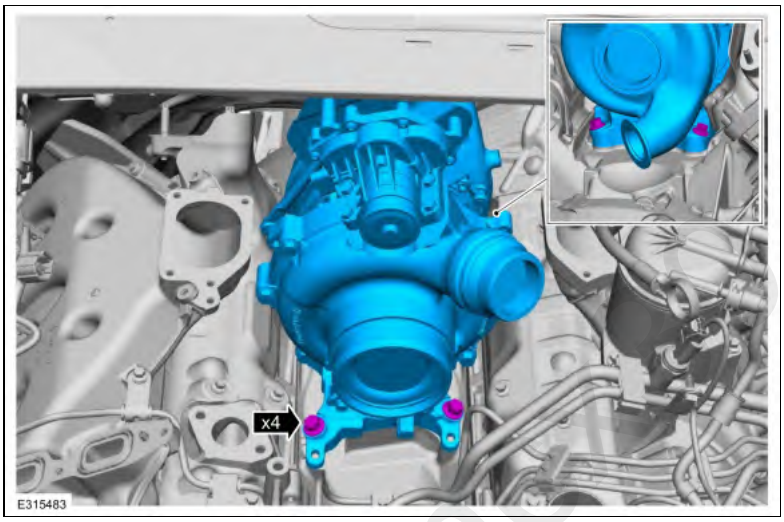
5. **NOTICE: Do not reuse the turbocharger oil filter, a new turbocharger oil filter must be installed.**

   Install a new turbocharger oil supply filter.



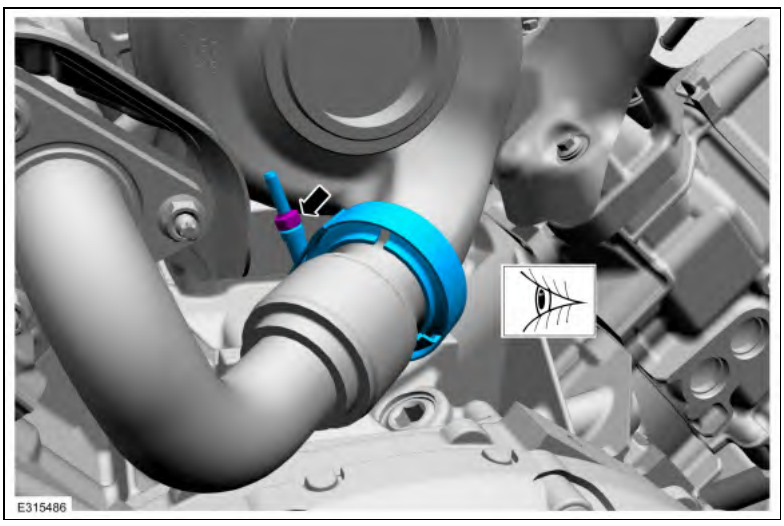
6. **NOTE:** *Position the turbocharger on the locating dowels while being careful not to allow the dowels to damage the sealing surfaces when installing the turbocharger.*

   Install the turbocharger, then install the new turbocharger mounting bolts finger tight at this stage.

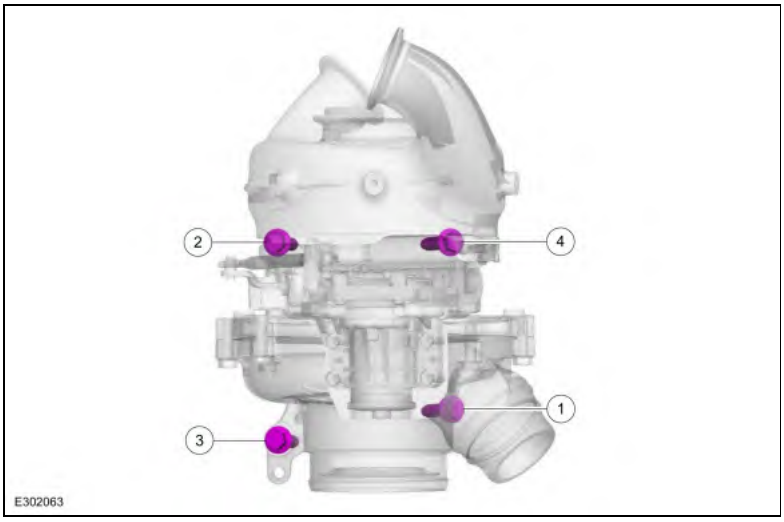


7. **NOTE:** *Do not tighten the left turbocharger inlet pipe clamp at this time.*

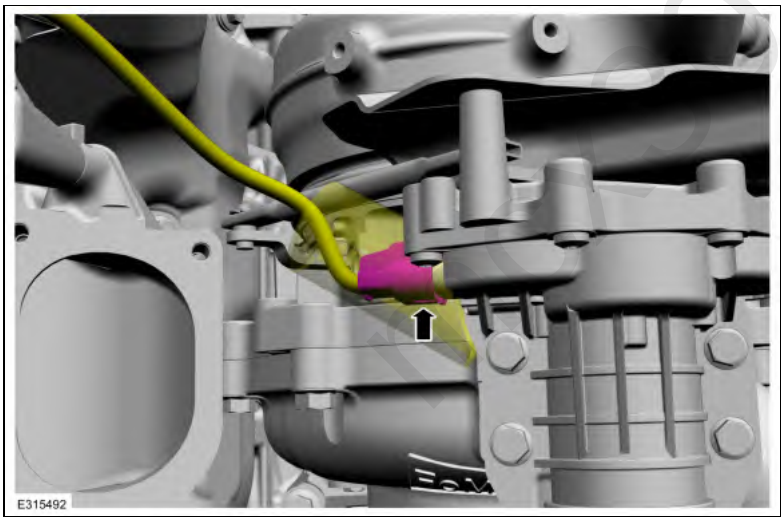
   Loosely position the left turbocharger inlet pipe clamp over both sealing flanges.



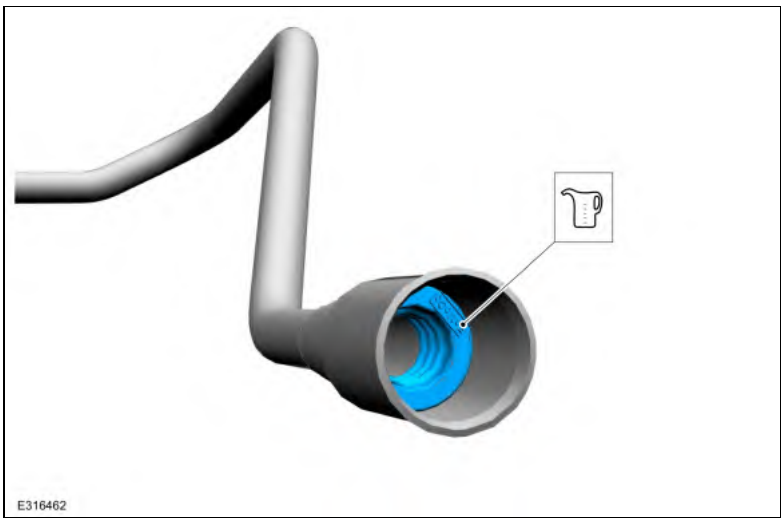
8. Tighten the new turbocharger mounting bolts in the following 2 stages and in the sequence shown.
   Torque:
   Stage 1: Tighten to: : 133 lb.in (15 Nm)
   Stage 2: Tighten an additional: : 41 lb.ft (55 Nm)



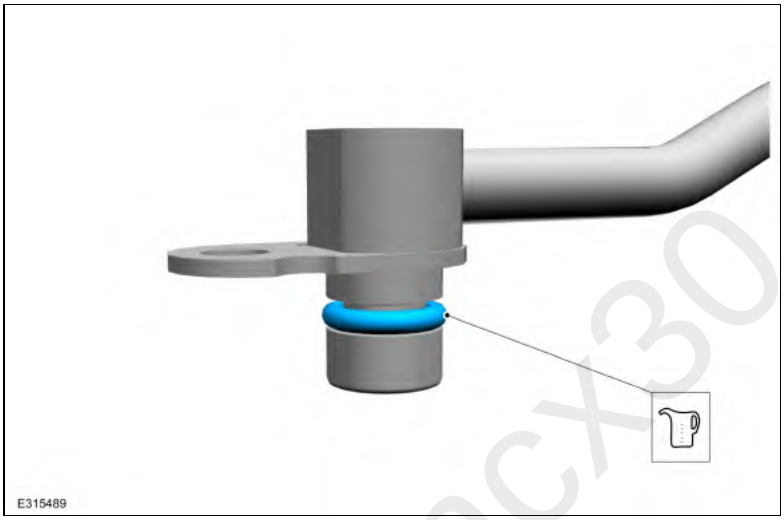
9. Connect the turbocharger actuator electrical connector, then slide the cover back into place.



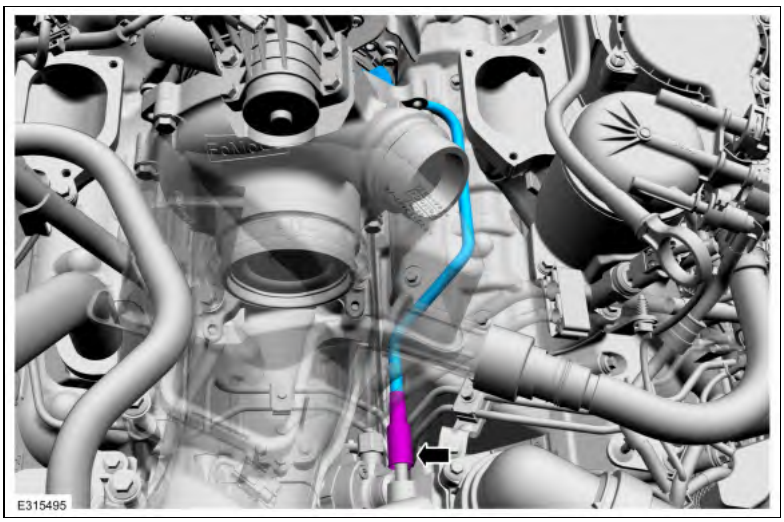
10. Install the new turbocharger cooling tube rubber gasket, then lubricate with clean engine coolant.
Refer to: Specifications (303-03B Engine Cooling - 6.7L Power Stroke Diesel, Specifications).



11. Install a new turbocharger coolant return tube O-ring seal, lubricate the O-ring seal with clean engine coolant. Refer to: Specifications (303-03B Engine Cooling - 6.7L Power Stroke Diesel, Specifications).



12. Install and connect the turbocharger coolant return tube.

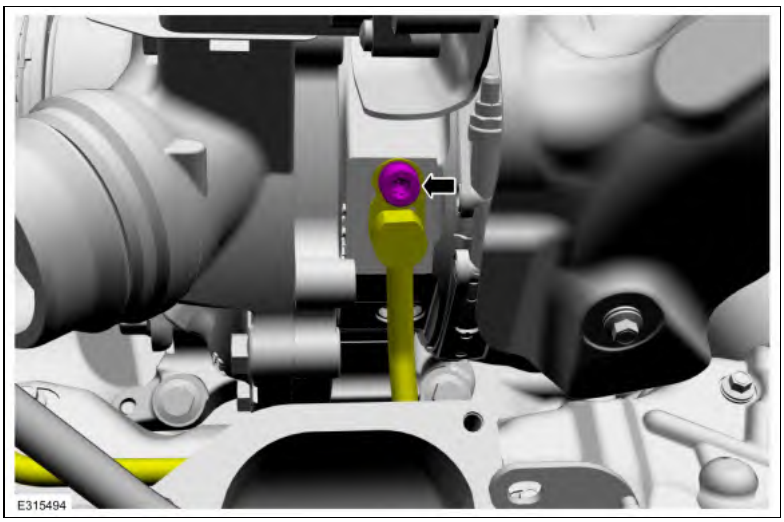


13. **NOTICE: Do not use a metal brush damage to sealing area will result in leaks.**

    NOTE: *When installing the turbocharger coolant return tube, the turbocharger coolant return tube must be fully engaged and seated into the turbocharger before the fastener is tightened.*

    - Carefully use a nylon brush to remove the old O-ring residue, use brake cleaner to rinse the O-ring residue out of the turbocharger tube to engine O-ring bore. Inspect the area for deep scratches and gouges. Install new components if necessary.

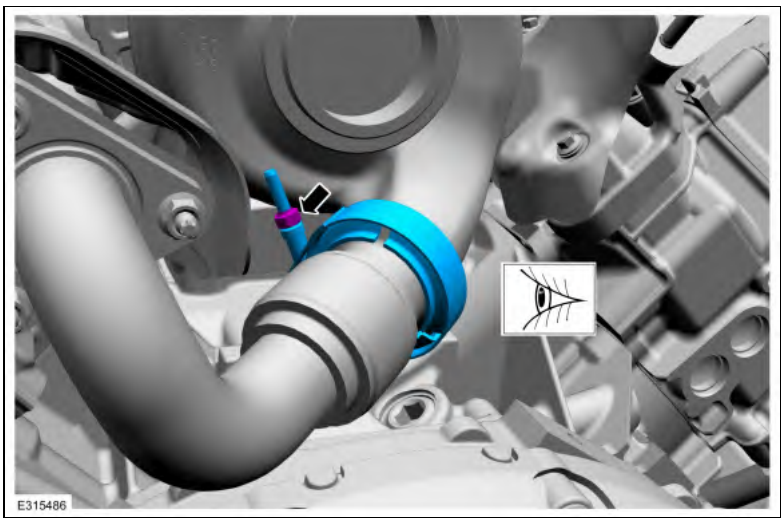
    1. Connect the turbocharger coolant return tube to the turbocharger, then install and tighten the bolt.
       Material: MotorcraftÂ® Metal Brake Parts Cleaner / PM-4-A, PM-4-B
       Torque:
       Stage 1: Tighten to: : 106 lb.in (12 Nm)
       Stage 2: Tighten an additional: : 30Â°



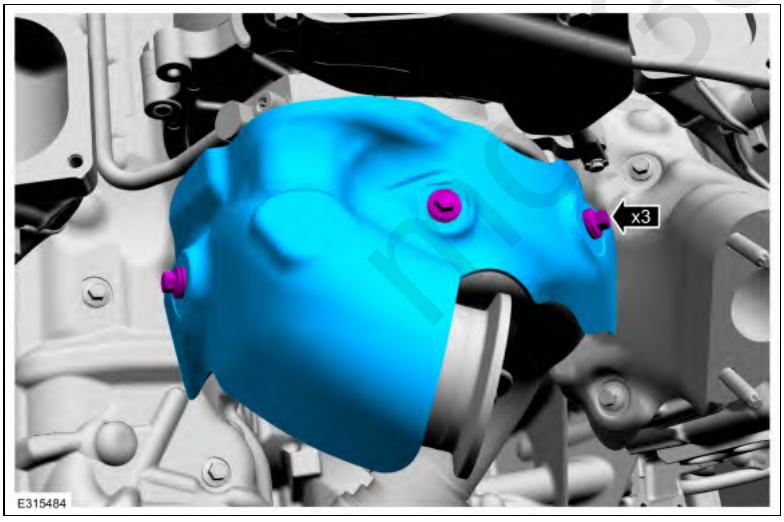
14. **NOTICE: Do not bend or twist the turbocharger inlet pipes or damage to the bellows on the turbocharger inlet pipes may occur.**

    NOTICE: Install the clamp positioned as noted during removal.

    Tighten the left turbocharger inlet pipe clamp in the following 2 stages.
    Torque:
    Stage 1: Tighten to: : 106 lb.in (12 Nm)
    Stage 2: Tighten an additional: : 159 lb.in (18 Nm)

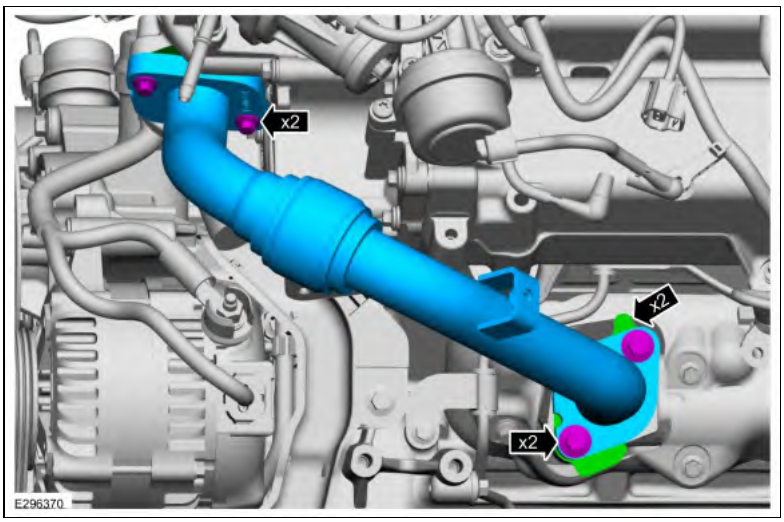


15. Install the turbocharger heat shield, then install and tighten the turbocharger heat shield bolts.
    Torque: 89 lb.in (10 Nm)



16. Install the exhaust downpipe.

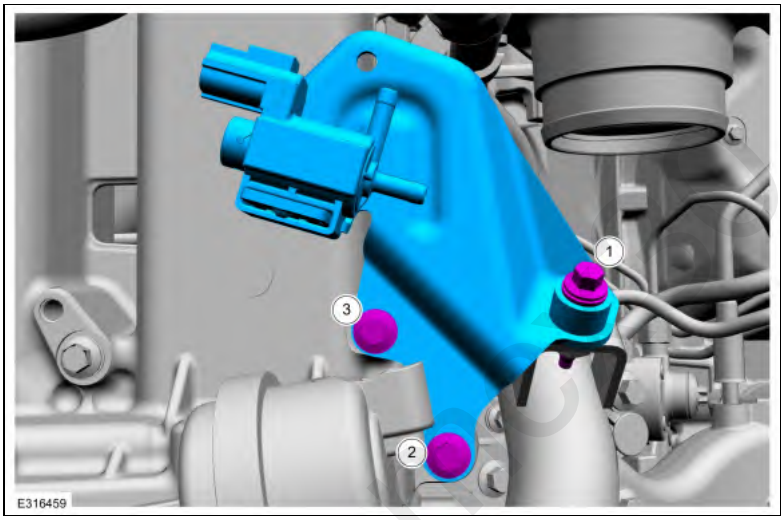
17.
    1. Using new gaskets, install the exhaust gas recirculation cooler inlet pipe, install the bolts finger tight.
    2. Tighten the bolts at the exhaust manifold.
       Torque: 177 lb.in (20 Nm)
    3. Tighten the bolts at the exhaust gas recirculation cooler.
       Torque: 89 lb.in (10 Nm)



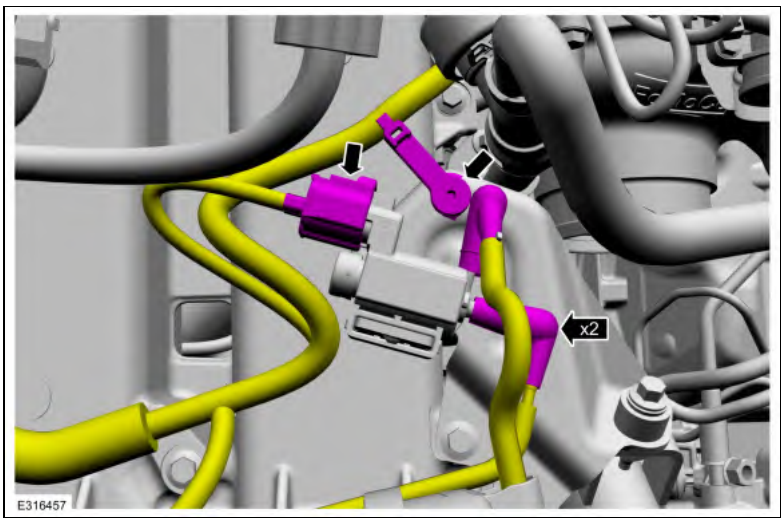
18.

- Install the exhaust gas recirculation cooler inlet pipe bracket, then install the bolts finger tight.

1. *Torque*:
   Stage 1: Tighten the bolt to: : 89 lb.in (10 Nm)
   Stage 2: Tighten an additional: : 45 Â°
2. *Torque*:
   Stage 1: Tighten the bolt to: : 89 lb.in (10 Nm)
   Stage 2: Tighten an additional: : 45 Â°
3. *Torque*:
   Stage 1: Tighten the bolt to: : 89 lb.in (10 Nm)
   Stage 2: Tighten an additional: : 45 Â°

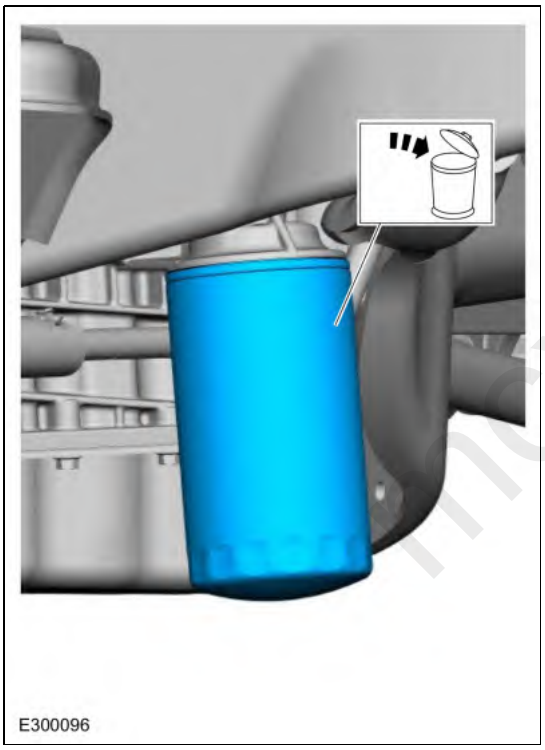


19. Connect the electrical connector and the vacuum tubes to the exhaust gas recirculation bypass valve solenoid. Attach the wire harness retainer.

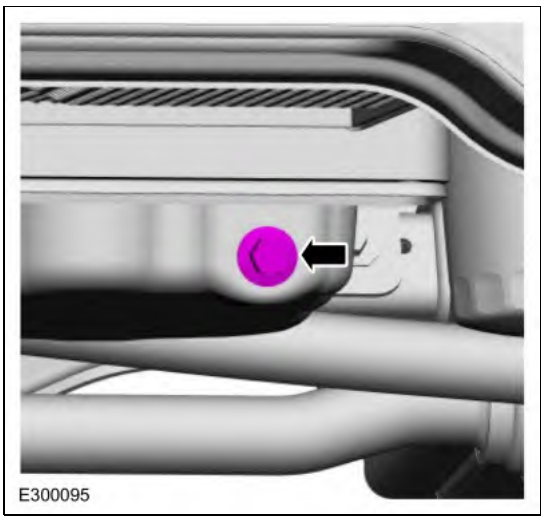


20. Install the lower intake manifold.
    Refer to: Lower Intake Manifold (303-01B Engine - 6.7L Power Stroke Diesel, Removal and Installation).

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

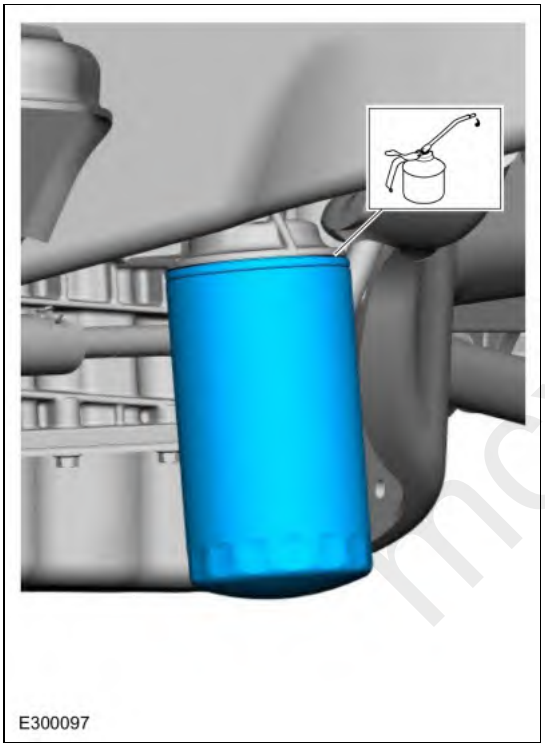


22. Drain the engine oil.
    Use the General Equipment: Oil Drain Equipment
    Torque: 19 lb.ft (26 Nm)



23. **NOTE:** *Lubricate the engine oil filter seal with clean engine oil.*

    Install a new engine oil filter.
    Refer to: Specifications (303-01B Engine - 6.7L Power Stroke Diesel, Specifications).
    Torque:
    Stage 1: 44 lb.in (5 Nm)
    Stage 2: 230 Â°



24. Fill the engine with the correct engine oil for the climate.
    Refer to: Specifications (303-01B Engine - 6.7L Power Stroke Diesel, Specifications).

25. **NOTICE: Evaluate the cooling system condition before filling the engine cooling system. Failure to follow these instructions can result in damage to the engine.**

    Evaluate the engine cooling system.
    Refer to: Engine Cooling System Condition Evaluation (303-03B Engine Cooling - 6.7L Power Stroke Diesel, General Procedures).

26. Perform the cooling system pressure test.
    Refer to: Engine Cooling (303-03B Engine Cooling - 6.7L Power Stroke Diesel, Diagnosis and Testing).

27. **NOTE:** *This step is required only when a new turbocharger is being installed.*

    After the new turbocharger is installed, using a diagnostic scan tool, follow the on screen instructions and perform the following:
    - Reset/clear the specified function for the turbo system.
    - Turbocharger variable vane actuator offset learn.
    - Using the scan tool clear the continuous PCM DTC's and then reset the emissions monitors information in the PCM. Refer to Section 2 of the PC/ED manual.