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Service Information Bulletin

SUBJECT	DATE
Cylinder Head	December 2014

Additions, Revisions, or Updates

Publication Number / Title	Platform	Section Title	Change
DDC-SVC-MAN-0081	DD Platform	Removal of the DD13 Cylinder Head	<p>Added step 26 with graphic.</p> <p>Removed step to remove the EGR crossover pipe.</p> <p>Removed optional equipment note.</p> <p>Added step 18.</p> <p>Removed PN for fuel line service kit.</p> <p>Added note to step 27 regarding EPA07 engines.</p> <p>Added note to step 30 regarding possible damage to fuel injector tips.</p>
		Installation of the DD13 Cylinder Head	<p>Removed step to install the EGR crossover pipe.</p> <p>Change step 32 from "remove" to "install".</p> <p>Added a note for head bolt length.</p> <p>Added notice regarding proper cleaning methods.</p> <p>Added note to steps 2 and 4 regarding possible damage to fuel injector tips.</p> <p>Added step 5.</p> <p>Added tool note to step 11.</p> <p>Added note to step 12 regarding EPA07 engines.</p> <p>Added steps 24 and 26.</p>
DDC-SVC-MAN-0081 DDC-SVC-MAN-0181	DD Platform EuroIV	Removal of the DD15 and DD16 Cylinder Head	<p>Added step 24 with graphic.</p> <p>Removed step 19 for removing the EGR crossover pipe.</p> <p>Removed optional equipment note.</p> <p>Removed note regarding immersion of new cylinder head in fuel oil.</p> <p>Added note to step 24 regarding EPA07 engines.</p>
		Installation of the DD15 and DD16 Cylinder Head	<p>Removed step 19 for installing the EGR crossover pipe.</p> <p>Added a note for head bolt length.</p> <p>Added notice regarding proper cleaning methods.</p> <p>Added note to steps 2 and 4 regarding possible damage to fuel injector tips.</p> <p>Added step 5.</p> <p>Added note to step 28 regarding EPA07 engines</p>



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2 Removal of the DD13 Cylinder Head

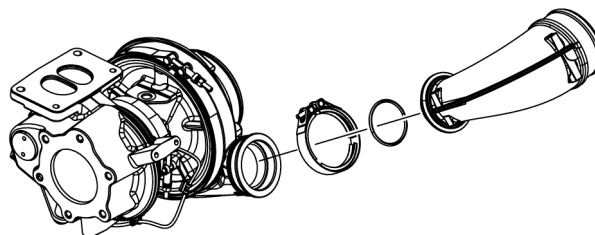


WARNING: PERSONAL INJURY

To avoid injury, never remove any engine component while the engine is running.

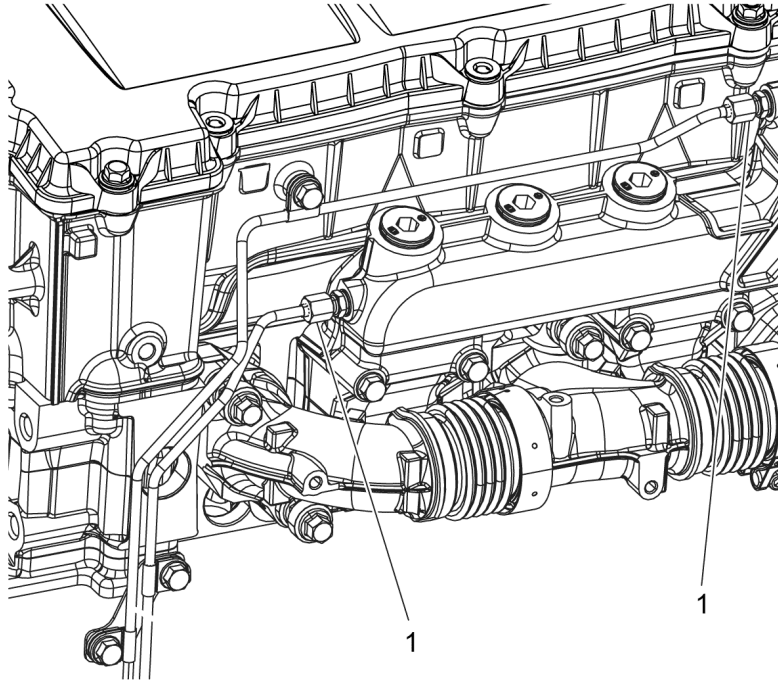
Remove as follows:

1. Shut off the engine, apply the parking brake, chock the wheels, and perform any other applicable safety steps.
2. Disconnect the batteries. Refer to OEM procedures.
3. Open the hood.
4. If needed, remove the bumper. Refer to OEM procedures.
5. For the DD13 with short Bumper-to-Back-of-Cab (BBC), remove the hood. Refer to OEM procedures.
6. If needed, remove the rain tray. Refer to OEM procedures.
7. If needed, remove the windshield wiper linkage. Refer to OEM procedures.
8. Drain the coolant. Refer to section "Cooling System Drain Procedure".
9. Disconnect and remove the Charge Air Cooler (CAC) ducting from the turbo compressor housing to the CAC. Remove the compressor outlet elbow and inlet elbow.



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10. Loosen the Charge Air Cooler (CAC) hose clamp at the intake throttle adaptor inlet and remove the ducting.
11. Disconnect the coolant level sensor.
12. Remove the coolant surge tank. Refer to OEM procedures.
13. For the DD13 with short Bumper-to-Back-of-Cab (BBC), remove the radiator assembly. Refer to OEM procedures.
14. For the DD13 with short Bumper-to-Back-of-Cab (BBC), remove the fan assembly. Refer to OEM procedures.
15. Remove the camshaft housing. Refer to section "Removal of the Camshaft Housing".
16. Remove coolant lines (1) from the Exhaust Gas Recirculation (EGR) cooler water manifold assembly to the fuel doser injector housing.

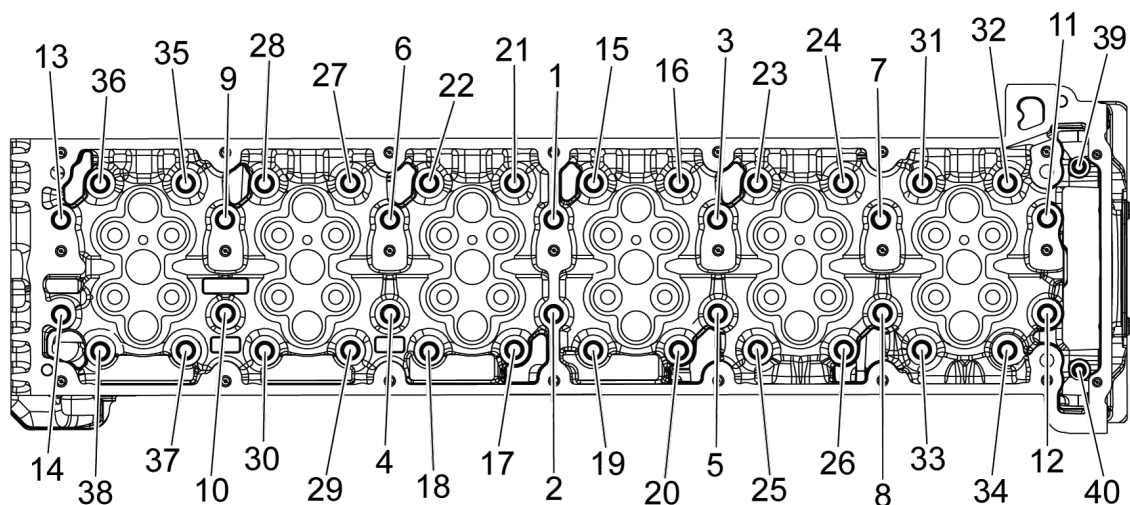


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17. Remove the EGR vent (de-aeration) line from the EGR cooler water manifold assembly.
18. Remove the coolant line from the EGR valve actuator to the EGR cooler water manifold assembly.
19. Remove the turbocharger heat shield.
20. Remove the hot pipe from the EGR cooler and EGR valve and discard the spherical clamps. Refer to section "Removal of the Exhaust Gas Recirculation Hot Pipe".
21. Disconnect the EGR valve actuator to the actuator pull rod from the EGR valve actuator. Refer to section "Removal of the Exhaust Gas Recirculation Valve Actuator Pull Rod".
22. Remove the turbocharger flange bolts.
23. Remove the Coolant Crossover Pipe. Refer to section "Removal of the Coolant Crossover Pipe".
24. Disconnect the Intake Throttle Valve (ITV) electrical harness connector.
25. Remove the two bolts attaching the cold boost pipe to the cold boost pipe support bracket.

NOTICE: The high pressure fuel rail feed lines, vibration dampers, mounting bracket and hardware are one-time-use components and **MUST** be replaced any time they are removed.

26. Remove needle, amplifier, and pressure limiting valve (PLV) return lines.
Refer to section "Removal of the Needle, Amplifier, and Pressure Limiting Valve Return Lines - Three-Filter System"
Refer to section "Removal of the Needle, Amplifier, and Pressure Limiting Valve (PLV) Return Lines – Two-Filter System"
27. Remove the two small cylinder head bolts (39 and 40). For EPA07 DD13, these bolts are located on the outside of the cylinder head casting at the rear of the engine.



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28. Using the flywheel and main pulley socket tool (J-45390), remove the 40 bolts securing the cylinder head to the cylinder block.
29. If the oil dipstick tube is attached to the intake throttle valve bracket, remove the attachment hardware.



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30. Using the cylinder head/engine lifting bar tool (W470589006200), remove the cylinder head from the cylinder block. Place cylinder head on a suitable surface using caution to avoid damage to the fuel injector tips.
31. Remove and discard the cylinder head gasket.

3 Installation of the DD13 Cylinder Head

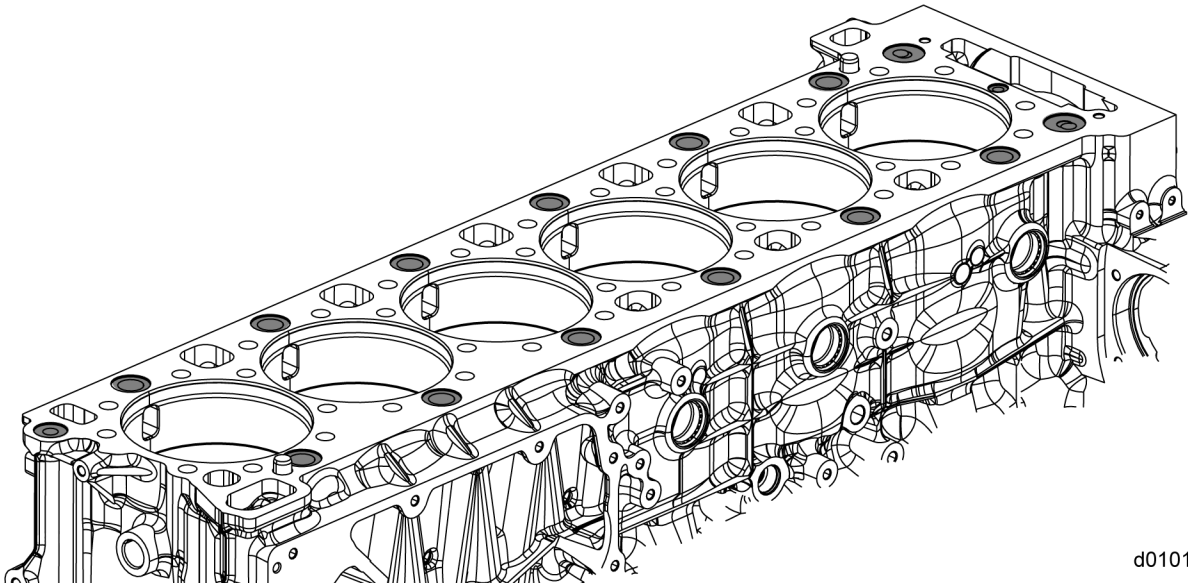
Install as follows:

NOTICE: Do not use any abrasive tools or methods to clean oil and coolant counter bores or gasket surfaces of cylinder head or cylinder block. Foreign material may enter the oil system and cause serious engine damage.

NOTICE: Thoroughly clean oil and coolant counter bores in the cylinder block with a suitable scraper to remove any foreign material before installation of the cylinder head gasket. Counter bores must be clean and dry. Failure to properly clean counter bores may result in cylinder head gasket failure.

NOTE: If the coolant seals on the head gasket have failed, do not proactively replace the cylinder liner seals unless there is evidence of extensive cylinder block erosion.

1. Inspect the cylinder head bolt holes in the cylinder block for the presence of oil, water, dirt, rust or damaged threads. Clean or re-tap as necessary. Ensure piston domes and cylinder block deck surfaces are clean, dry and free of oil, water or any other foreign material.



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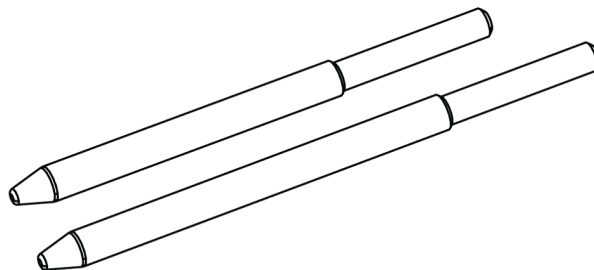


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2. Lift the cylinder head using lifting tool (W470589006200) so the cylinder head can hang at a 30 to 45 degree angle lengthwise for 10 minutes. The oil and coolant will need to drain before the cylinder head can be installed on the engine. Use caution to avoid damage to the fuel injector tips.

3. Verify that the cylinder liner protrusion heights are within specification prior to installing the cylinder head. Refer to section "Installation of the Cylinder Liner" for cylinder liner protrusion specifications.
4. Alternate the cylinder head to hang in the opposite direction at the same 30 to 45 degree angle lengthwise for another ten minutes. Use caution to avoid damage to the fuel injector tips.
5. Clean any oil, water or other foreign material from the cylinder head bolt holes and gasket surface of the cylinder head.
6. Install cylinder head guide studs (W471589016100) into the cylinder block.



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NOTE: Be sure both gasket surfaces on the cylinder block and the cylinder head are clean and dry, especially the oil and coolant counter bores.

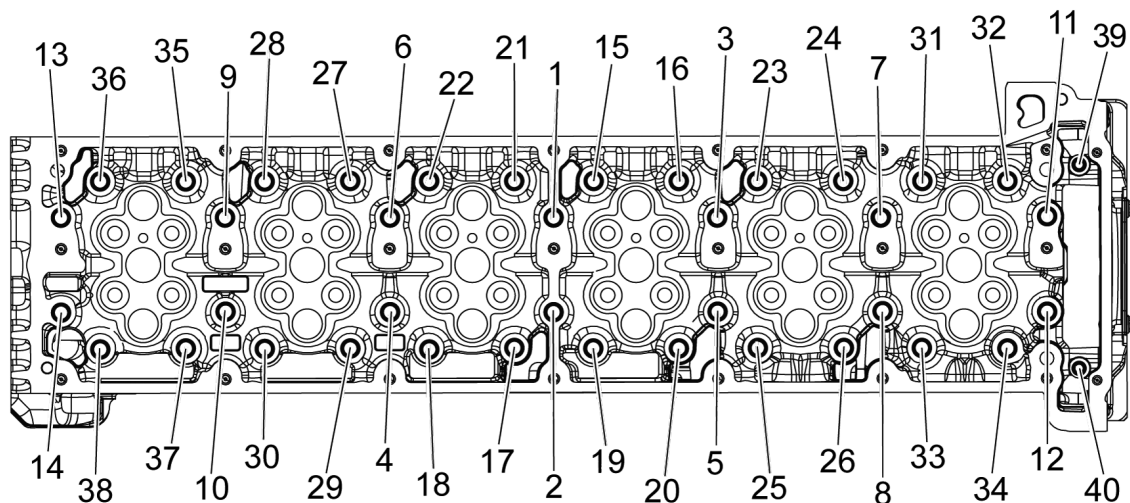
7. Position a new cylinder head gasket onto the cylinder block.
8. Lift the cylinder head into position using cylinder head/engine lifting bar tool (W470589006200). Lower the cylinder head into place over the guide studs and dowel pins until it is fully seated on the cylinder block.
9. Remove the guide studs from the cylinder block.

NOTE: Do not dip the entire cylinder head mounting bolt in oil as the excessive oil could lead to improper torque results.

10. Coat the threads and underside of the bolt heads with clean engine oil before installation.

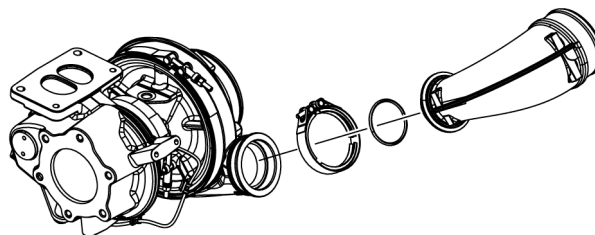
NOTE: If reusing the head bolts, make sure they do not exceed the maximum bolt length of 194 mm (7.638 inches).

11. Using the flywheel and main pulley socket tool (J-45390), install the 38 cylinder head bolts into the cylinder head using the torque sequence shown below. Torque bolts (1 through 38) in three steps as follows:
 - a. 200 N·m (147 lb·ft).
 - b. 90° torque turn.
 - c. 90° torque turn.
12. Using the illustration shown below, install and torque the small bolts (39 and 40) to 60 N·m (44 lb·ft). For EPA07 DD13, these bolts are located on the outside of the cylinder head casting at the rear of the engine.



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13. Install the needle, amplifier, and pressure limiting valve (PLV) return lines.
Refer to section "Installation of the Needle, Amplifier, and Pressure Limiting Valve Return Lines - Three-Filter System"
Refer to section "Installation of the Needle, Amplifier, and Pressure Limiting Valve Return Lines – Two-Filter System"
14. Install the two bolts attaching the cold boost pipe to the cold boost pipe support bracket.
15. Connect the Intake Throttle Valve (ITV) electrical harness connector.
16. Install the Coolant Crossover Pipe. Refer to section "Installation of the Coolant Crossover Pipe".
17. Install the turbocharger flange bolts.
18. Torque the turbocharger-to-exhaust manifold fasteners to 50 N·m (37 lb·ft).
19. Connect EGR valve actuator pull rod to EGR valve actuator. Refer to section "Installation of the DD13 Exhaust Gas Recirculation Valve Actuator Pull Rod".
20. Install the EGR hot pipe onto the EGR cooler and the EGR valve with two new spherical clamps and tighten clamp bolts to 12 N·m (9 lb·ft). Refer to section "Installation of the Exhaust Gas Recirculation Hot Pipe".
21. Install the turbocharger heat shield.
22. Install the coolant line to the EGR valve actuator and EGR cooler water manifold assembly. Tighten coolant line to 35 N·m (26 lb·ft).
23. Install the EGR vent (de-aeration) line to the EGR cooler water manifold assembly.
24. Install the doser injection valve coolant lines to the EGR cooler water manifold assembly.
 - a. For the 5mm long thread fitting, torque to 15 N·m (11 lb·ft).
 - b. For the 15mm long thread fitting, torque to 22 N·m (16 lb·ft).
25. Install the camshaft housing. Refer to section "Installation of the Camshaft Housing".
26. If disconnected, reattach oil dipstick tube to intake throttle valve bracket.
27. If removed, install the fan assembly. Refer to OEM procedures.
28. If removed, install the radiator assembly. Refer to OEM procedures.
29. If removed, install the hood. Refer to OEM procedures.
30. Install the coolant surge tank. Refer to OEM procedures.
31. Connect the coolant level sensor.
32. Install the Charge Air Cooler (CAC) hose clamp at the intake throttle adaptor inlet.
33. Install the compressor outlet elbow and inlet elbow. Connect the Charge Air Cooler (CAC) ducting from the turbo compressor housing to the CAC.



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34. Reconnect the batteries. Refer to OEM procedures.
35. Prime fuel system.
Refer to section "Priming the Fuel System Using ESOC 350 Fuel Priming Pump - Two-Filter System".
Refer to section "Priming the Fuel System Using ESOC 350 Fuel Priming Pump - Three-Filter System".
36. Fill the cooling system. Refer to section "Cooling System Fill Procedure".
37. If removed, install the windshield wiper linkage. Refer to OEM procedures.
38. If removed, install the rain tray. Refer to OEM procedures.
39. If removed, install the bumper. Refer to OEM procedures.

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**WARNING: ENGINE EXHAUST**

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

40. Start the engine and check for fuel, coolant or oil leaks.

4 Removal of the DD15 and DD16 Cylinder Head

Remove as follows:

NOTE: If the cylinder head is to be replaced, the new head must be thoroughly cleaned before installation to remove all rust and rust preventive compound, especially from the fuel and oil galleries.



WARNING: EYE INJURY

To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.

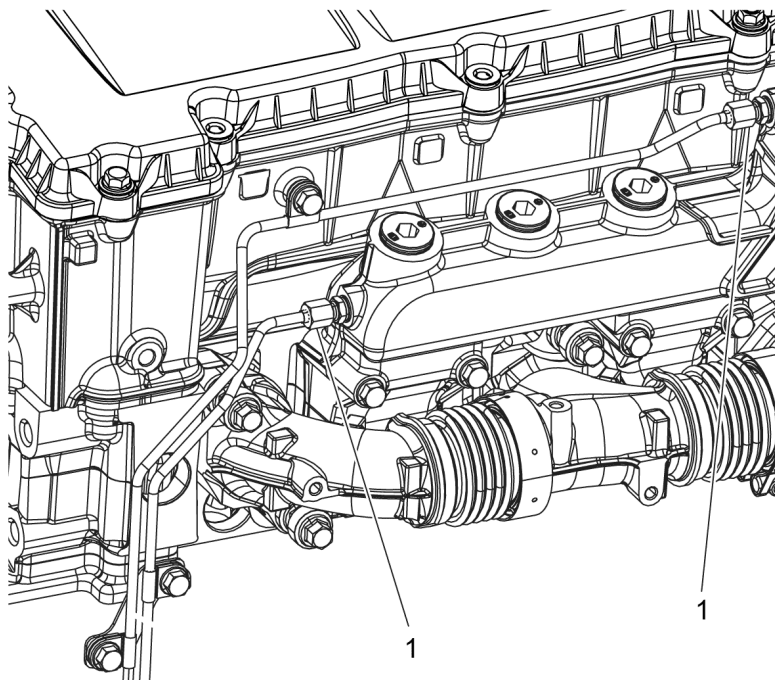
NOTE: When clean, blow the head dry with compressed air.



WARNING: PERSONAL INJURY

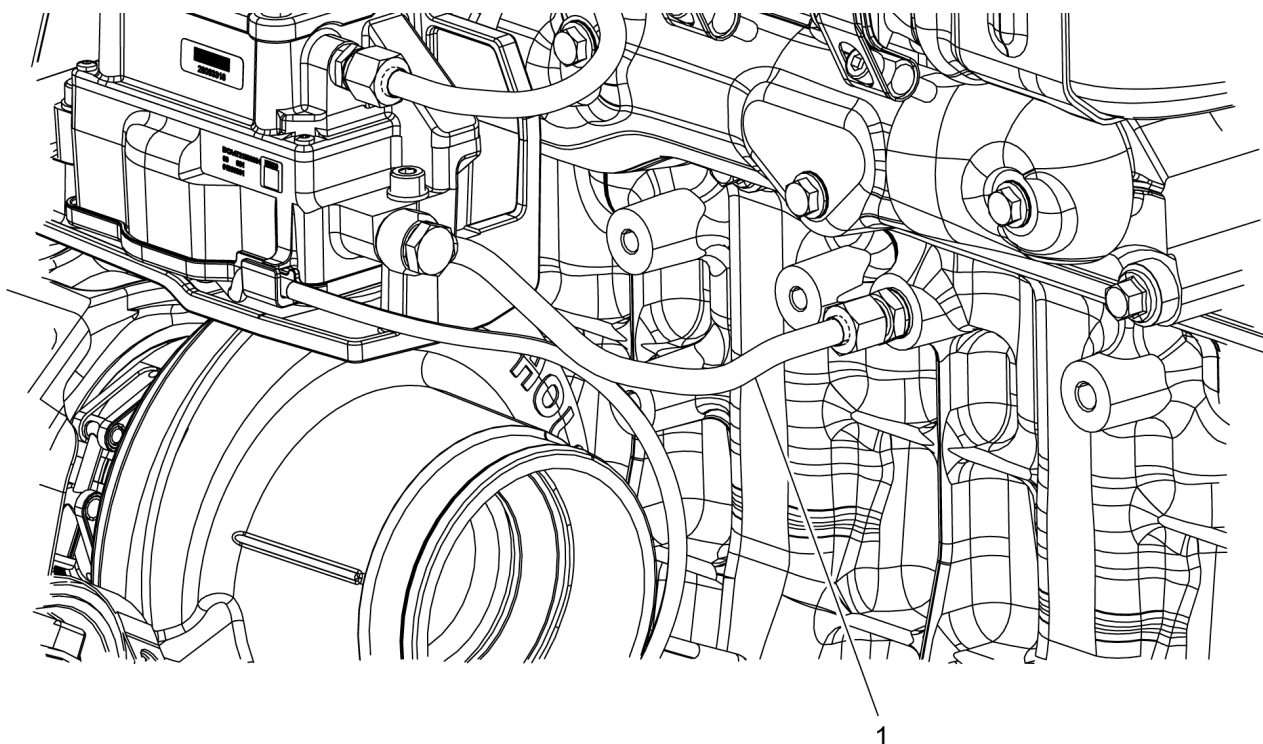
To avoid injury, never remove any engine component while the engine is running.

1. Shut off the engine, apply the parking brake, chock the wheels, and perform any other applicable safety steps.
2. Disconnect the batteries. Refer to OEM procedures.
3. Open the hood.
4. If needed, remove the bumper. Refer to OEM procedures.
5. If needed, remove the rain tray. Refer to OEM procedures.
6. If needed, remove the windshield wiper linkage. Refer to OEM procedures.
7. Drain the engine cooling system. Refer to section "Cooling System Drain Procedure".
8. Disconnect the coolant level sensor.
9. Remove the coolant surge tank. Refer to OEM procedures.
10. Remove the camshaft housing assembly. Refer to section "Removal of the Camshaft Housing Assembly".
11. Remove coolant lines (1) from the water manifold to the fuel doser injector housing.



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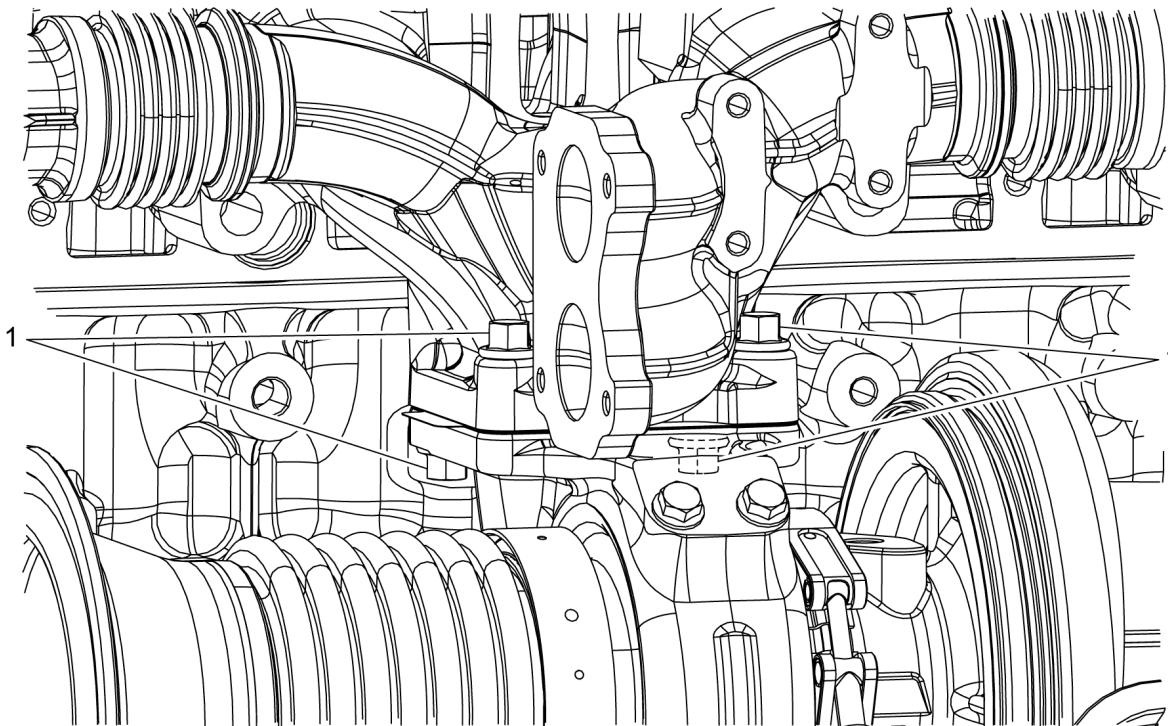
12. Disconnect the DEF heater lines at the chassis water manifold. Refer to OEM procedures.
13. Remove the Exhaust Gas Recirculation (EGR) vent (de-aeration) line.
14. Disconnect the EGR actuator connector and remove the heat shield. Refer to section "Removal of DD15 and DD16 Exhaust Gas Recirculation Valve Actuator".
15. Remove the EGR actuator coolant line (1) from the cylinder block.



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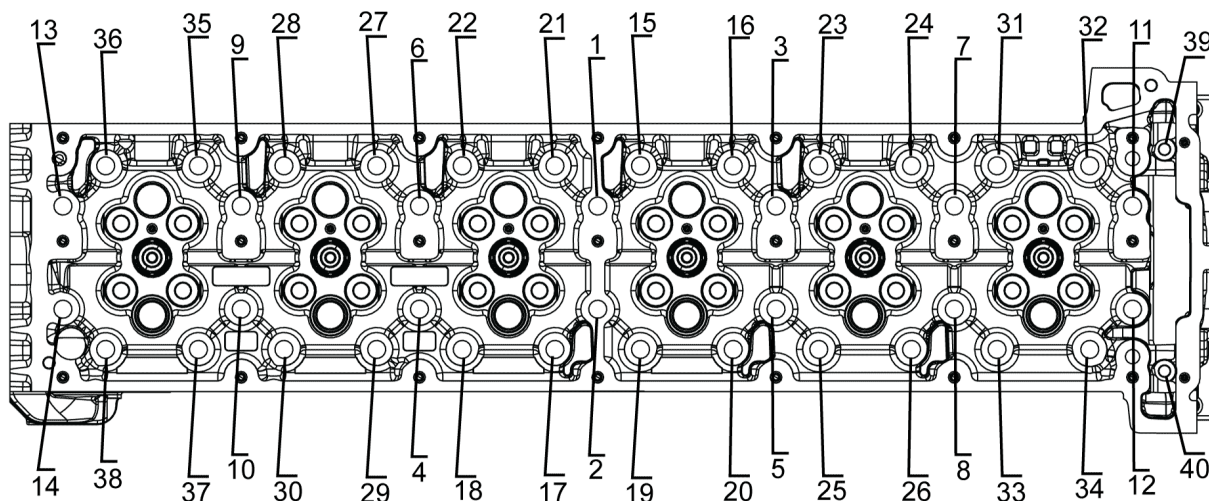
16. Remove nut connecting actuator to linkage and remove linkage from Exhaust Gas Recirculation (EGR) valve.

17. Remove the turbocharger heat shield.
18. Remove the turbocharger flange bolts (1).



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19. Remove the Coolant Crossover Pipe. Refer to section "Removal of the Coolant Crossover Pipe".
20. Disconnect the Intake Throttle Valve (ITV) electrical harness connector.
21. Remove the Charge Air Cooler (CAC) hose clamp at the intake throttle adaptor inlet.
22. Remove the two bolts attaching the cold boost pipe to the cold boost pipe support bracket.
23. Disconnect the needle, amplifier, and pressure limiting valve return lines.
Refer to section "Removal of the Needle, Amplifier, and Pressure Limiting Valve (PLV) Return Lines – Two-Filter System".
Refer to section "Removal of the Needle, Amplifier, and Pressure Limiting Valve Return Lines - Three-Filter System".
24. Remove the two small cylinder head bolts (39 and 40). For EPA07 DD15, these bolts are located on the outside of the cylinder head casting at the rear of the engine.



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25. Using the flywheel and main pulley socket tool (J-45390), remove the 38 bolts securing the cylinder head to the cylinder block.



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26. Using cylinder head/engine lifting bar tool (W470589006200), remove the cylinder head from the cylinder block.
 27. Remove and discard the cylinder head gasket.

5 Installation of the DD15 and DD16 Cylinder Head

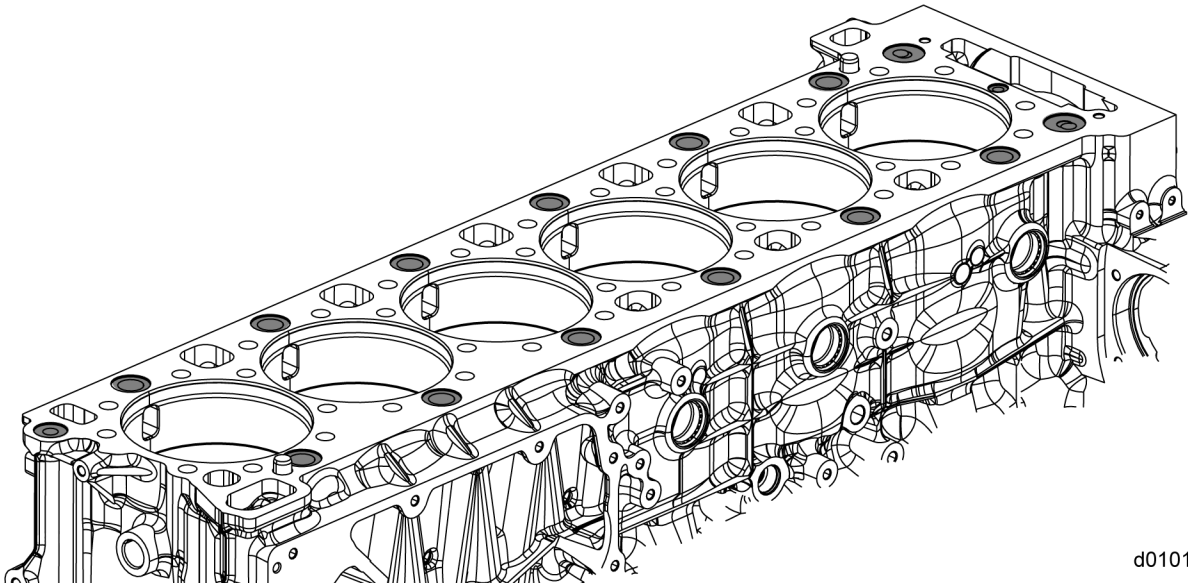
Install as follows:

NOTICE: Do not use any abrasive tools or methods to clean oil and coolant counter bores or gasket surfaces of cylinder head or cylinder block. Foreign material may enter the oil system and cause serious engine damage.

NOTICE: Thoroughly clean oil and coolant counter bores in the cylinder block with a suitable scraper to remove any foreign material before installation of cylinder head gasket. Counter bores must be clean and dry. Failure to properly clean counter bores may result in cylinder head gasket failure.

NOTE: If the coolant seals on the head gasket have failed, do not proactively replace the cylinder liner seals unless there is evidence of extensive cylinder block erosion.

1. Inspect the cylinder head bolt holes in the cylinder block for the presence of oil, water, dirt, rust or damaged threads. Clean or re-tap as necessary. Ensure piston domes and cylinder block deck surfaces are clean, dry and free of oil, water or any other foreign material.



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2. Lift the cylinder head using cylinder head/engine lifting bar tool (W470589006200) so the cylinder head can hang at a 30 to 45 degree angle lengthwise for 10 minutes. The oil and coolant will need to drain before the head can be installed on the engine. Use caution to avoid damage to the fuel injector tips.

NOTE: The area of the cylinder block between the cylinders is not a sealing surface and will not cause a coolant leak.

3. Using liner protrusion tool J-47415A, verify that the cylinder liner protrusion heights are all within 0.0889 mm (0.0035 in.) prior to installing the cylinder head. Minimum liner protrusion is 0.1397 mm (0.0055 in.) and maximum liner protrusion is 0.26924 mm (0.0106 in.).

4. Alternate the cylinder head to hang in the opposite direction at the same 30 to 45 degree angle lengthwise for another ten minutes. Use caution to avoid damage to the fuel injector tips.
5. Clean any oil, water or other foreign material from the cylinder head bolt holes and gasket surface of the cylinder head.

NOTE: Be sure both gasket surfaces on the cylinder block and the cylinder head are clean and dry, especially the oil and coolant counter bores.

6. Position a new cylinder head gasket onto cylinder block.



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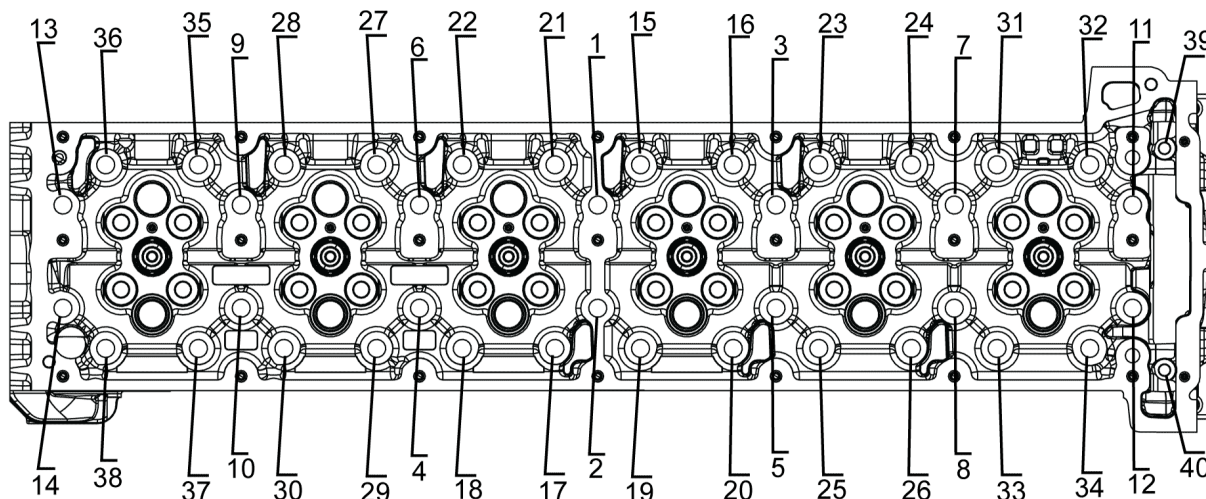
7. Lift the cylinder head into position using cylinder head/engine lifting bar tool (W470589006200). Install the guide studs (J-35784) through the cylinder head into the cylinder block and carefully seat the cylinder head onto the cylinder block.
8. Remove the cylinder head guide studs.

NOTICE: Do not dip the entire cylinder head mounting bolt in oil as the excessive oil could cause improper torque results.

9. Coat the threads and underside of the bolt heads with clean engine oil before installation.

NOTE: If reusing the head bolts make sure they do not exceed the maximum bolt length of 194mm (7.638 inches).

10. Install the 40 cylinder head bolts into the cylinder head.
11. Torque the 38 large bolts in four steps to:
 - a. 50 N·m (37 lb·ft)
 - b. 250 N·m (184 lb·ft)
 - c. 90° torque turn
 - d. 90° torque turn
12. Torque the small bolts (39 and 40) to 60 N·m (44 lb·ft). For EPA07 DD15, these bolts are located on the outside of the cylinder head casting at the rear of the engine.



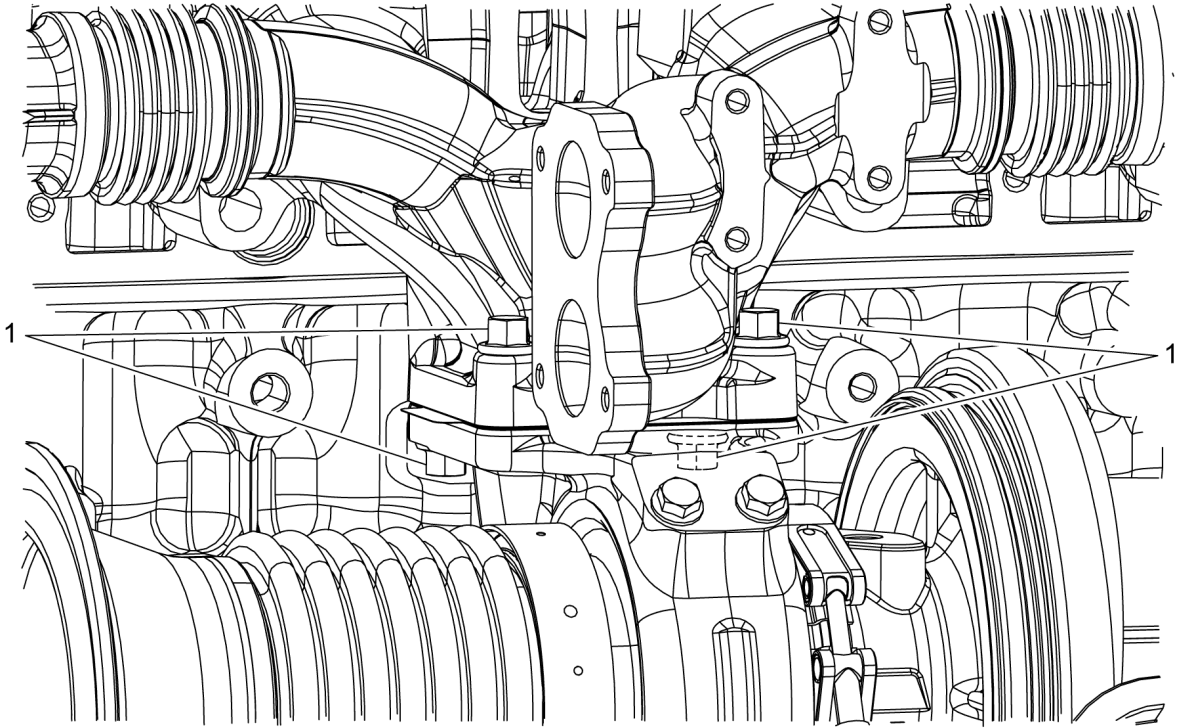
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13. Connect the needle, amplifier, and pressure limiting valve return lines.

Refer to section "Installation of the Needle, Amplifier, and Pressure Limiting Valve Return Lines – Two-Filter System".

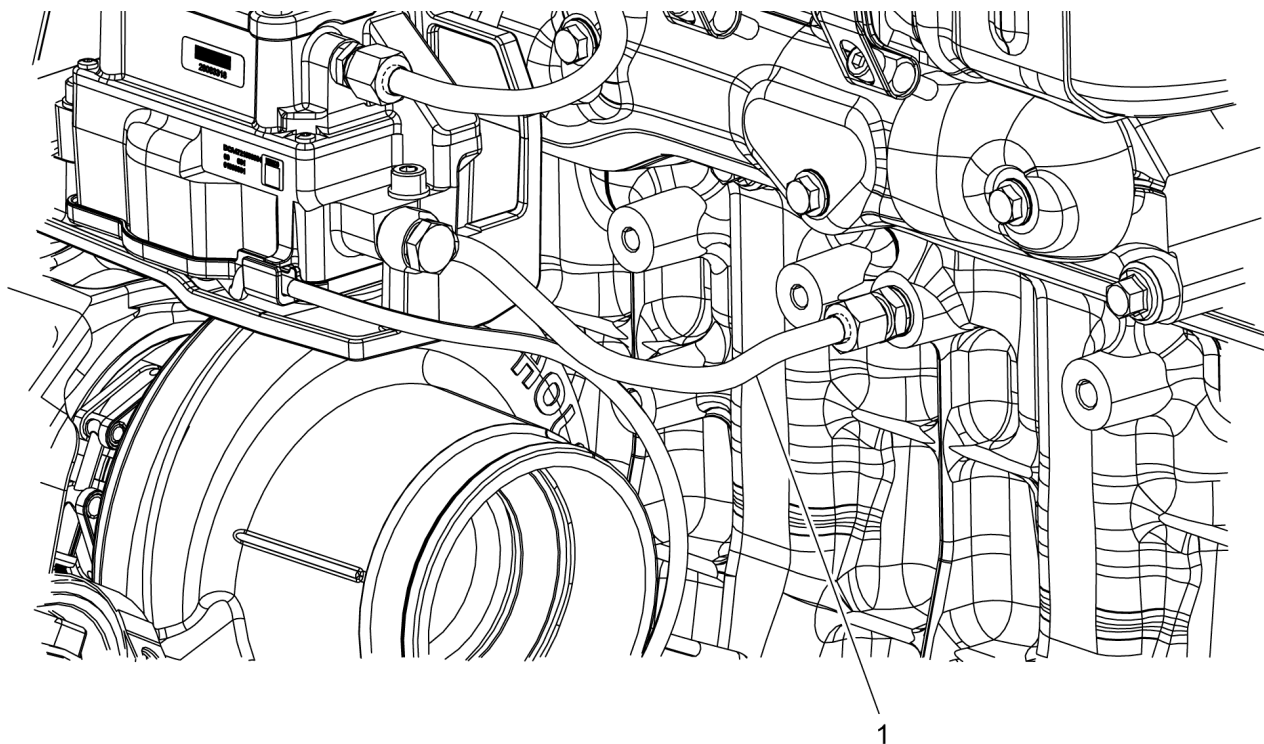
Refer to section "Installation of the Needle, Amplifier, and Pressure Limiting Valve Return Lines - Three-Filter System".

14. Install the two bolts attaching the cold boost pipe to the cold boost pipe support bracket.
15. Install the Charge Air Cooler (CAC) hose clamp at the intake throttle adaptor inlet.
16. Connect the Intake Throttle Valve (ITV) electrical harness connector.
17. Install the Coolant Crossover Pipe. Refer to section "Installation of the Coolant Crossover Pipe".
18. Install the turbocharger flange bolts (1).



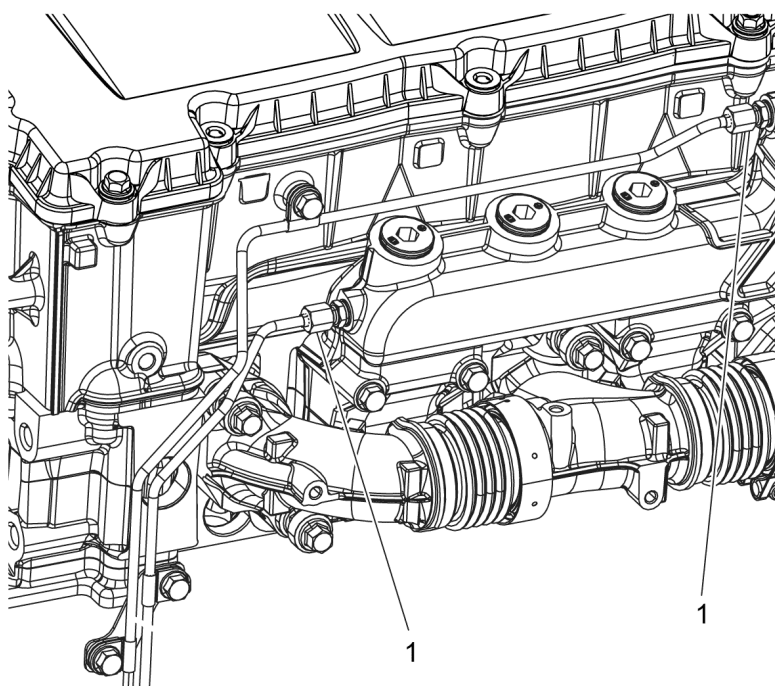
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19. Connect linkage from Exhaust Gas Recirculation (EGR) valve and install nut.
20. Install the EGR actuator coolant line (1) from the cylinder block.



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21. Install the turbocharger heat shield.
22. Connect the EGR actuator connector and install the heat shield. Refer to section "Installation of the DD15 and DD16 Exhaust Gas Recirculation Valve Actuator".
23. Connect the DEF heater lines at the chassis water manifold. Refer to OEM procedures.
24. Install the EGR vent (de-aeration) line.
25. Install the coolant lines (1) from the water manifold to the fuel doser injector housing.



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26. Install the camshaft housing assembly. Refer to section "Installation of the Camshaft Housing Assembly".
27. Install the coolant surge tank. Refer to OEM procedures.
28. Connect the coolant level sensor.
29. Prime fuel system.
Refer to section "Priming the Fuel System Using ESOC 350 Fuel Priming Pump - Two-Filter System"
Refer to section "Priming the Fuel System Using ESOC 350 Fuel Priming Pump - Three-Filter System"
30. Reconnect the batteries. Refer to OEM procedures.
31. Fill the cooling system. Refer to section "Cooling System Fill Procedure".
32. If removed, install the windshield wiper linkage. Refer to OEM procedures.
33. If removed, install the rain tray. Refer to OEM procedures.
34. If removed, install the bumper. Refer to OEM procedures.



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To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

35. Start the engine and check for fuel, coolant or oil leaks.