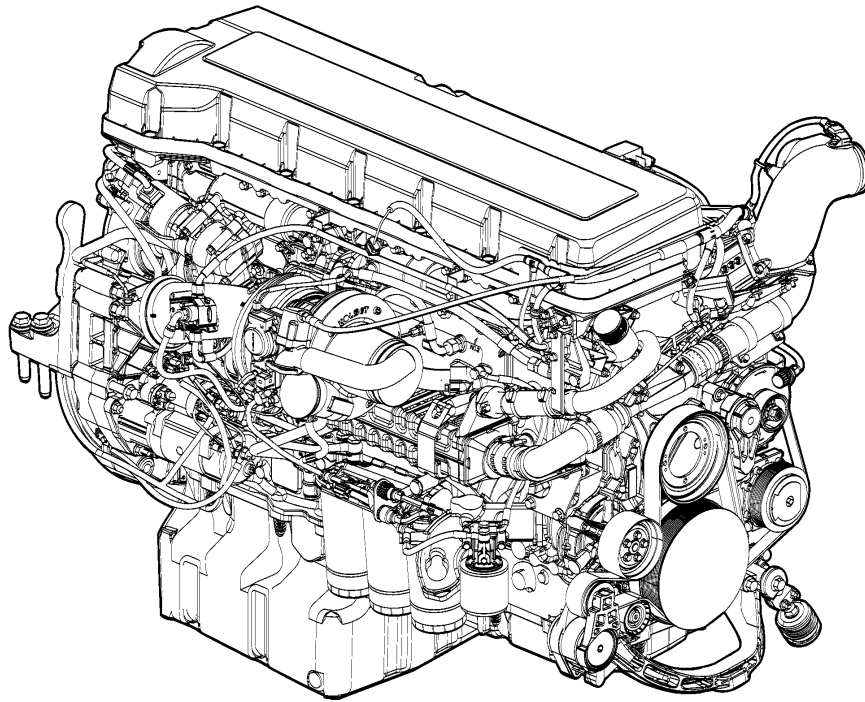


This Service Bulletin replaces SB 223-114, "Oil Cooler, Service," (6.2007), publication no. PV776-20180432.

Date	Group	No.	Page
10.2007	223	122	1(35)

Oil Cooler Replacement D16F

Oil Cooler, Replacement



W2005772

This information covers procedures for servicing the oil cooler on the Volvo D16F engine.

Contents

- "Special Tools" page 2
- "Oil Cooler, Replacement" page 3

Note: Information is subject to change without notice. Illustrations are used for reference only and can differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

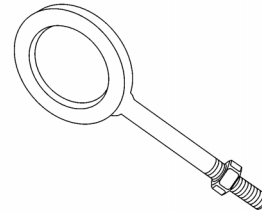
Special Tools

For special tools ordering instructions, refer to Tools Information, group 08.



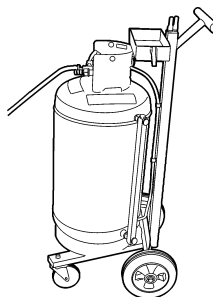
W0001795

9996049
Coolant Drain Hose



W0002266

85108575
Turbocharger Lifting Tool



W2004191

DBT2V700
Coolant Extractor

2231-03-02-01 Oil Cooler, Replacement

You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

Special tools: DBT2V700, 9996049, 85108575

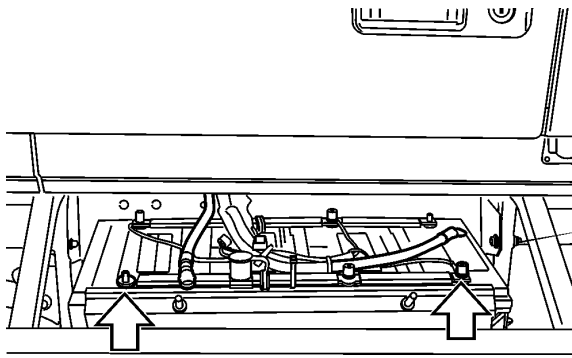
Removal

1

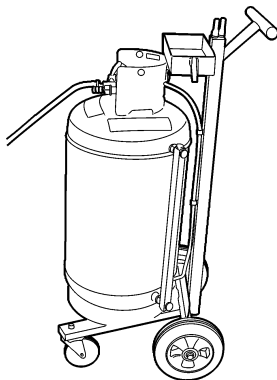
Apply the parking brake and place the shift lever in neutral.

2

Remove all cables from ground (negative) battery terminals to prevent personal injury from electrical shock.



W2003815



W2004191

3

Connect the coolant extractor to the drain fitting at the bottom of the radiator and drain the coolant.

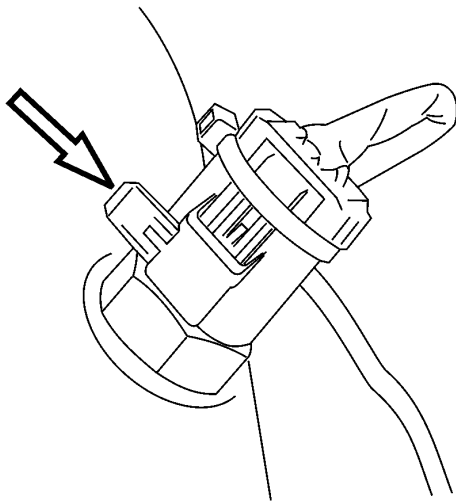
Note: An alternate method is to connect the drain hose to the drain fitting and drain the coolant into a suitable container.

DBT2V700, 9996049

4

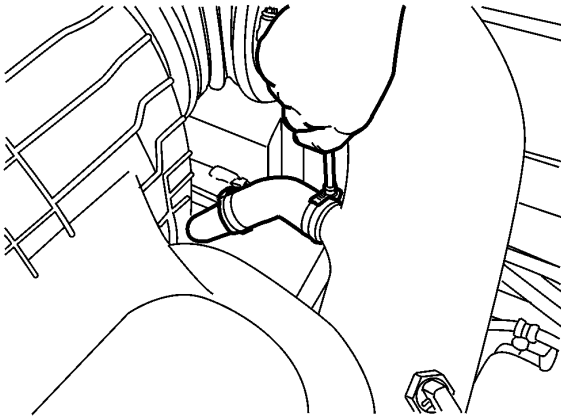
Remove inner splash guard as an assembly.

Note: Some models may be equipped with fender extenders, attached to the inner splash guard. Remove these as an assembly.



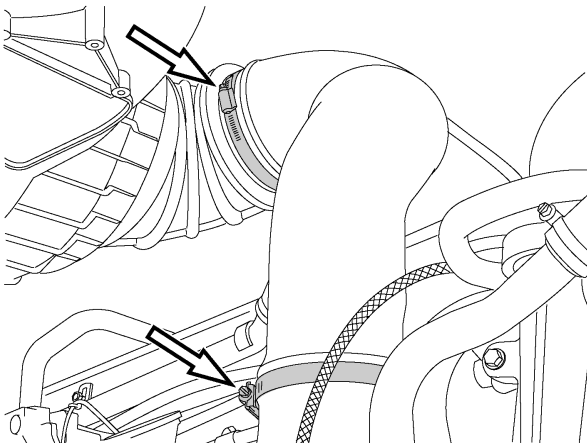
W2004720

- 5**
Disconnect the air temperature sensor connector from the sensor. Cut the tie strap and disengage the lock tab. Remove the clamp securing the harness to the main fresh air pipe.



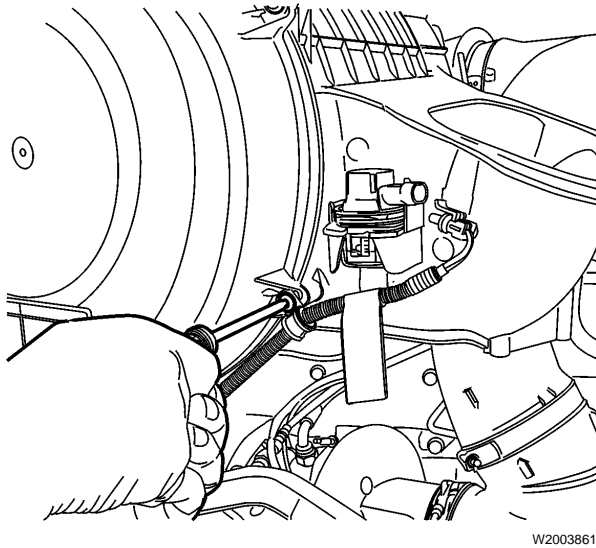
W2004719

- 6**
Loosen the air compressor fresh air pipe coupling hose clamp at the main fresh air pipe. Separate the hose from the pipe.



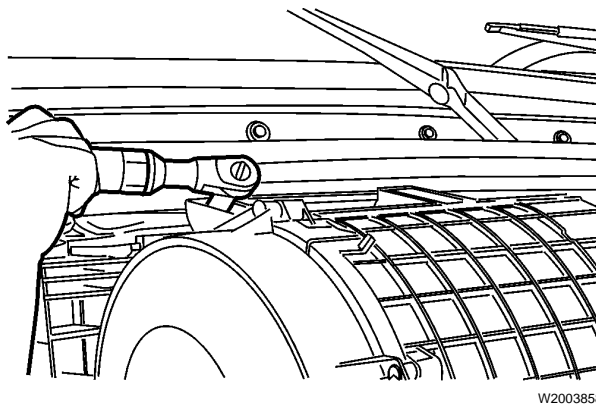
W2006005

- 7**
Loosen the clamps securing the main fresh air pipe to the air cleaner and to the turbocharger inlet elbow. Remove the main fresh air pipe.



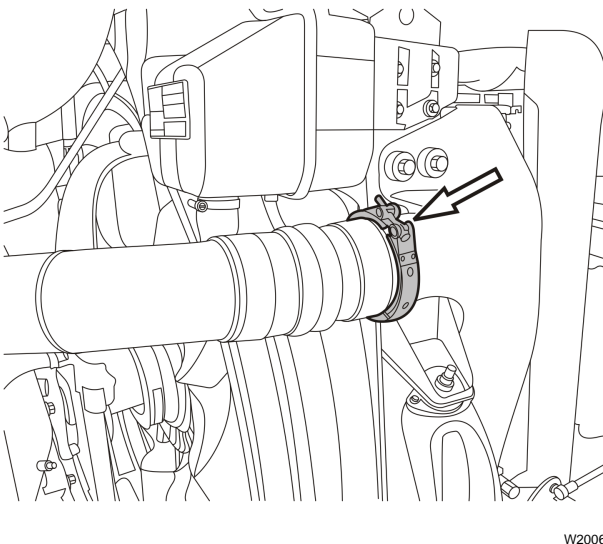
8

Disconnect the air restriction gauge harness connector and remove the clamps securing the wiring harness to the air filter housing.



9

Remove the fasteners securing the air filter housing to the cab and remove the housing.



10

Remove the charge air inlet pipe from between the turbocharger and the charge air cooler.

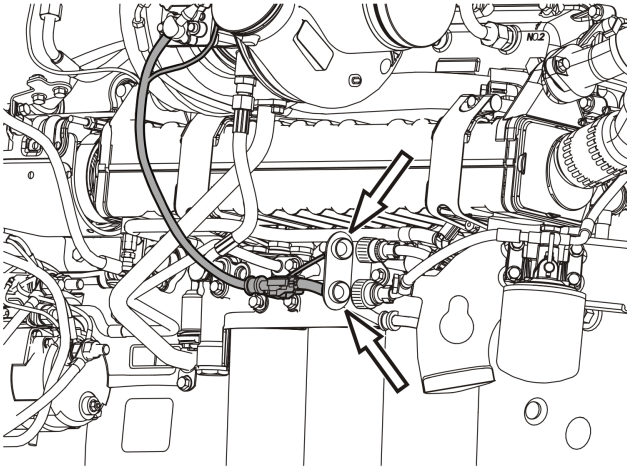
Note: Disconnect the Discharge Recirculation Valve (DRV) air line. Loosen the clamp and disconnect the recirculation hose from the inlet elbow.

11

Remove the turbocharger inlet elbow.

12

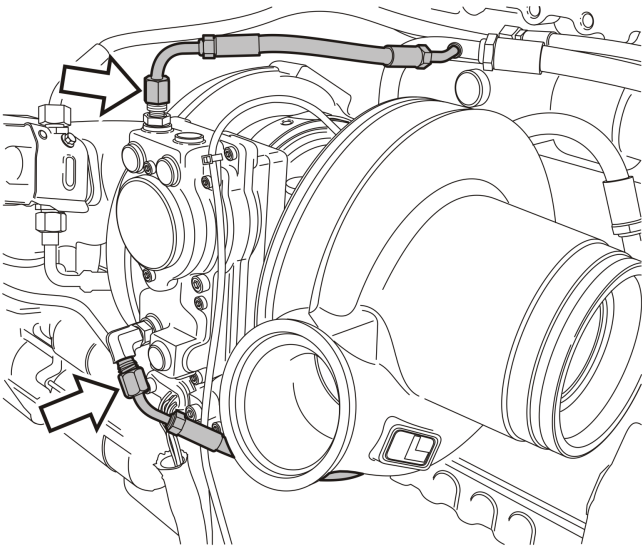
Cut the tie straps securing the turbocharger actuator and speed sensor wiring harnesses. Disconnect and remove the connectors mounted in bracket at the oil filter housing.



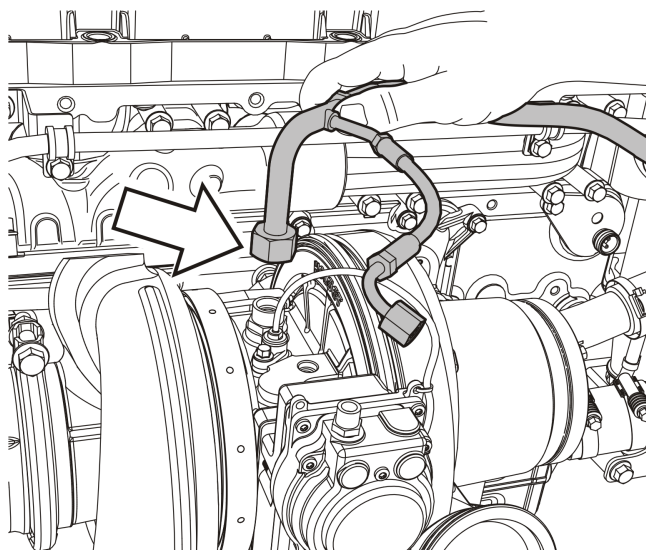
W2005620

13

Disconnect the coolant supply and return lines from the turbocharger actuator.



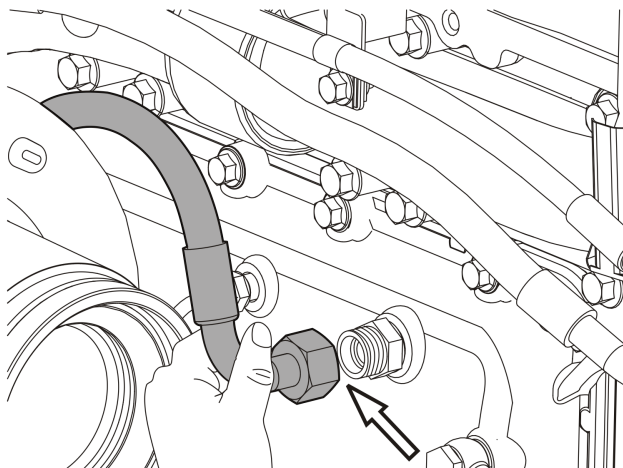
W2005621



W2005622

14

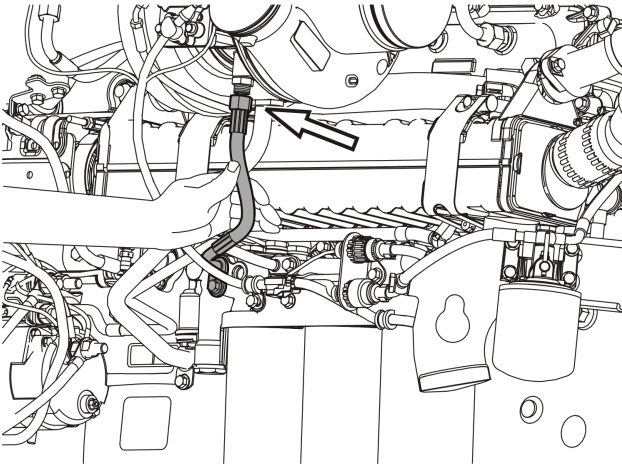
Disconnect the coolant line from the top of the turbocharger.



W2005623

15

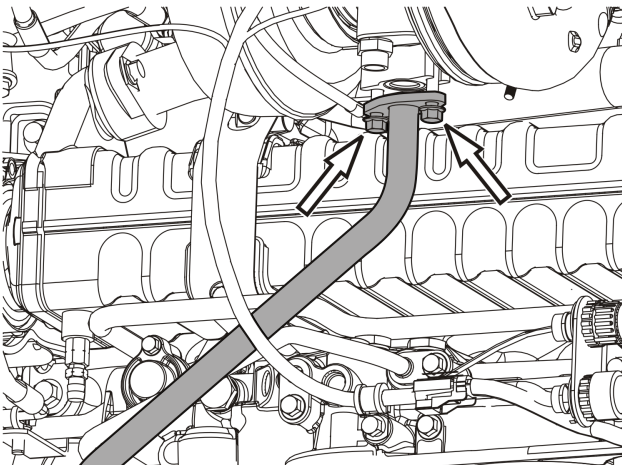
Disconnect the turbocharger coolant line from the oil cooler cover.



W2005624

16

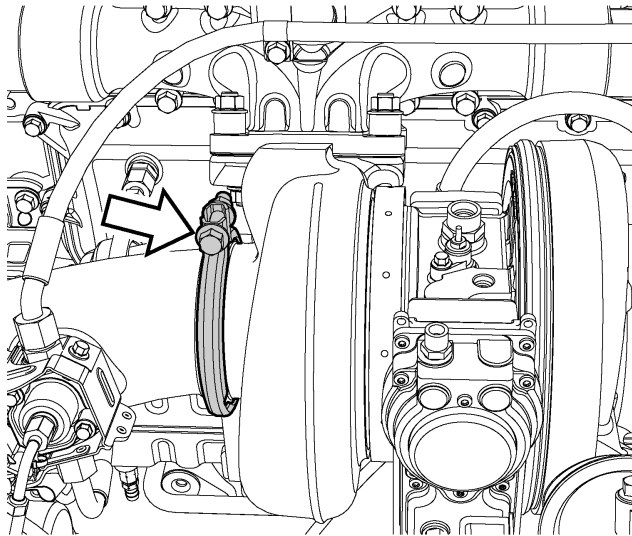
Disconnect the oil supply line from the bottom of the turbocharger.



W2005628

17

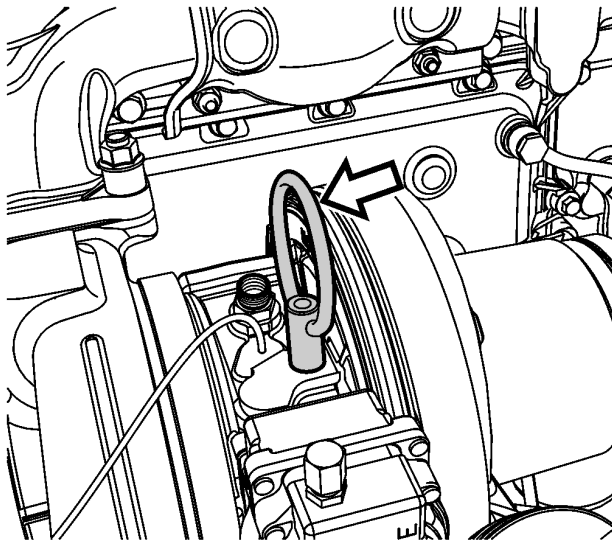
Remove the fasteners securing the oil drain pipe to the bottom of the turbocharger and spacer block. Remove the spacer block. Separate the gasket and O-ring from the spacer block and discard.



W2006108

18

Loosen the diffuser-to-turbocharger clamp and slide the diffuser away from the turbocharger.

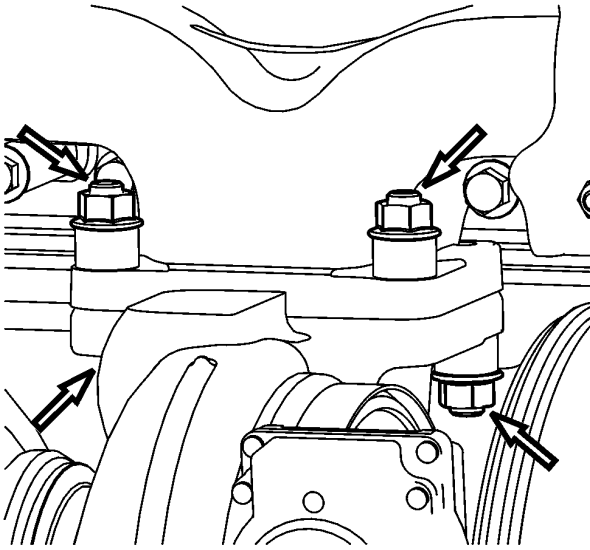


W2005042

19

Remove the plug at the top of the turbocharger and install the turbocharger lifting tool.

85108575



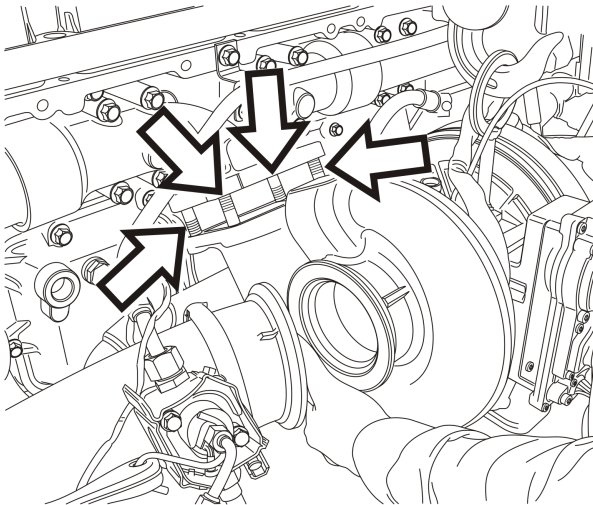
W2005011

20

Support the weight of the turbocharger using a mobile floor crane such as OTC 16-1815 or equivalent. Remove the turbocharger mounting nuts and spacers.

21

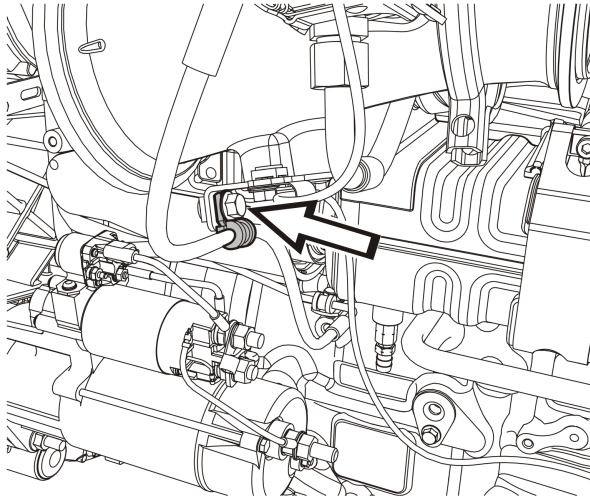
With the aid of an assistant, lower the turbocharger away from the exhaust manifold studs and remove it from the engine.



W2005629

22

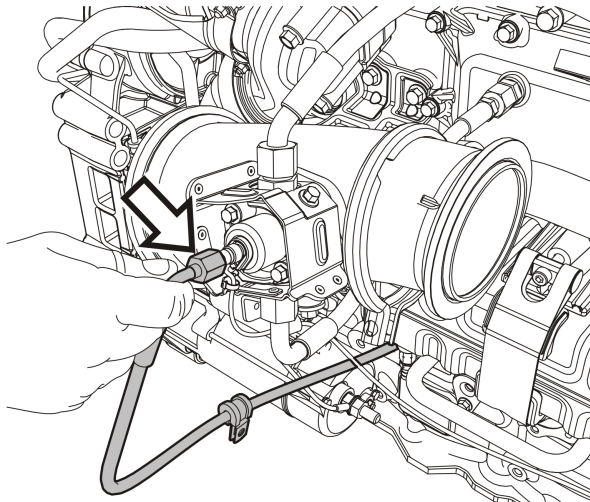
Place the turbocharger on a suitable support. Plug the turbocharger oil lines and outlet openings to prevent contamination. Install covers on the intake and exhaust openings of the turbocharger to prevent foreign material from entering.



W2005657

23

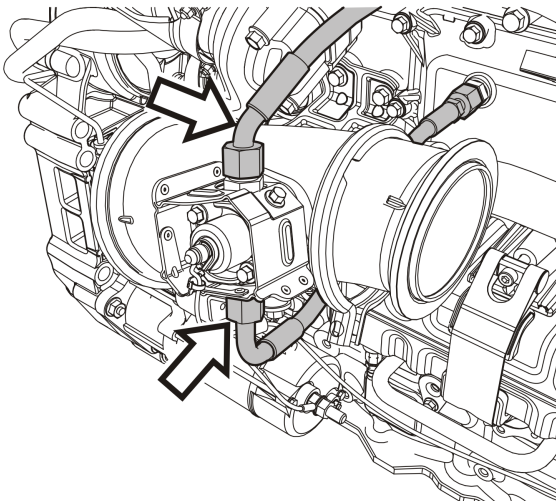
Remove the aftertreatment fuel line clamp at the bottom of the diffuser.



W2005656

24

Remove the fuel line from the aftertreatment fuel injector.



W2005655

25

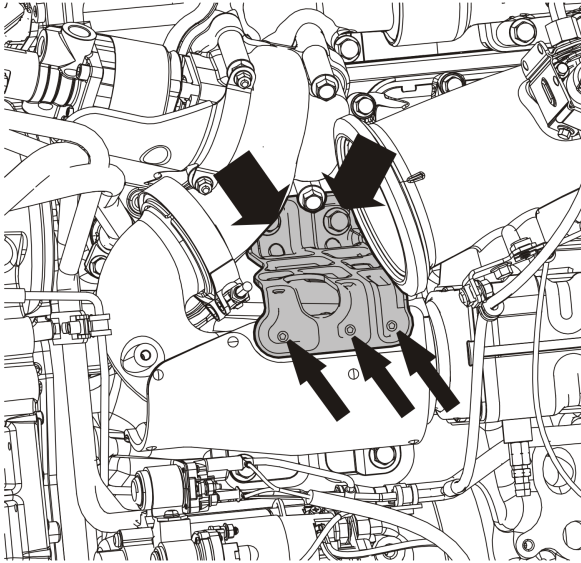
Remove the supply and return coolant lines from the aftertreatment fuel injector.

26

Remove the diffuser-to-exhaust pipe clamp and move the diffuser away from the EGR cooler for easier access to cooler connections.

27

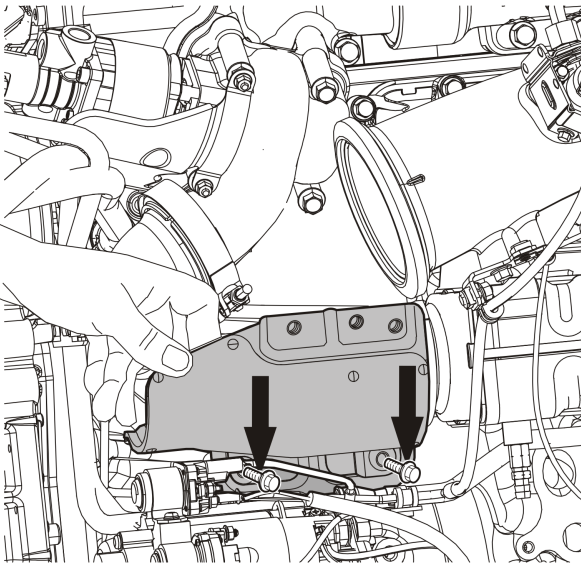
Remove the fasteners securing the upper portion of the EGR hot pipe shield and remove the shield.



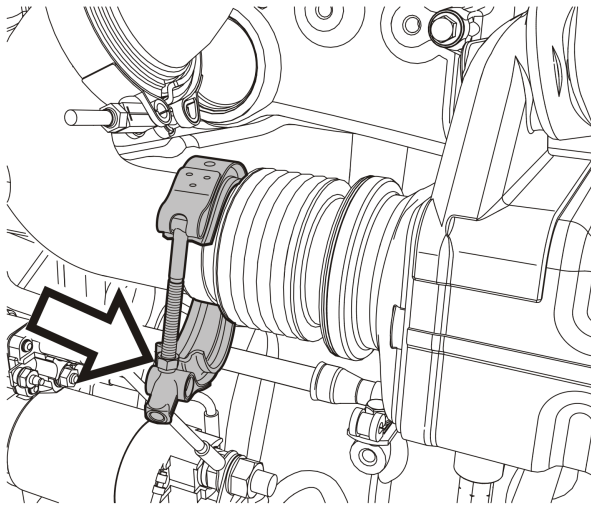
W2005686

28

Remove the fasteners securing the lower portion of the EGR hot pipe shield and remove the shield.

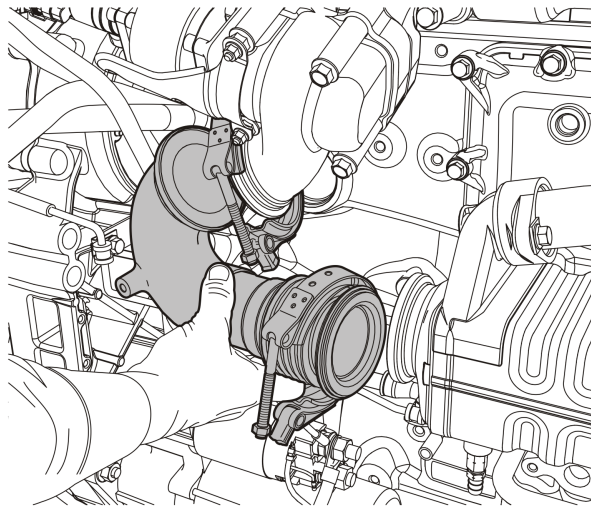


W2005687



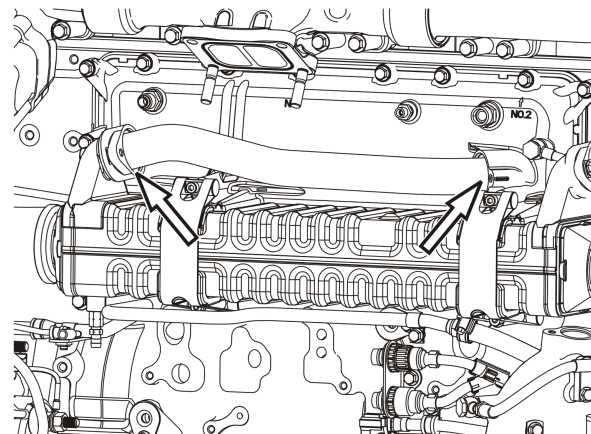
29

Loosen the EGR hot pipe V-clamps. Free the EGR hot pipe clamps from the flanges at the EGR valve and at the EGR cooler.



30

Remove the EGR hot pipe from between the EGR valve and the EGR cooler. Remove and discard the gaskets.

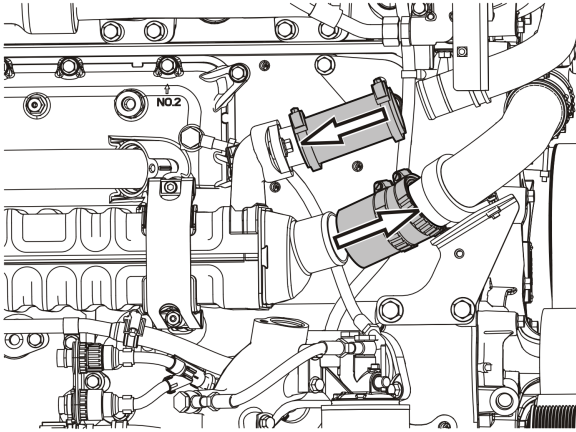


31

Remove the fasteners and clamps securing the coolant pipe to the oil cooler cover and the EGR cooler.

32

Remove the clamps securing the coolant hose to the EGR cooler and thermostat housing and slide the hose rearward. Remove the clamps securing the EGR cooler hose to the EGR pipe and slide the hose forward.



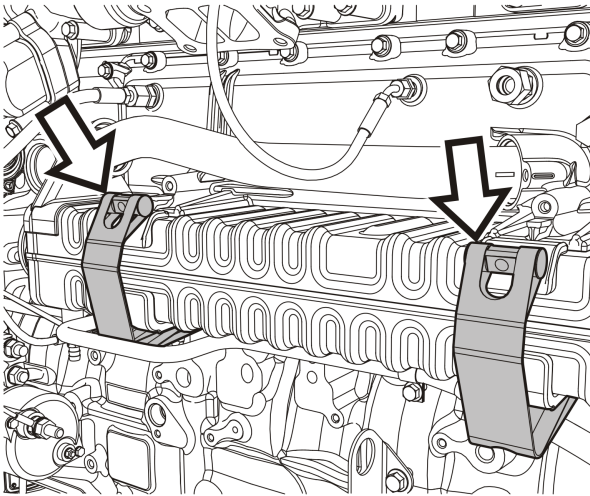
W2005647

33

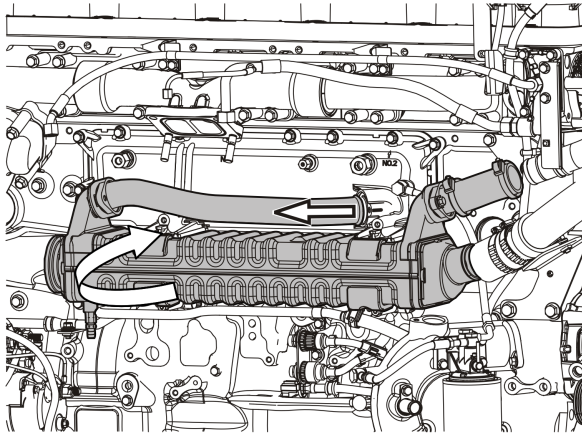
Remove the static fill pipe from the EGR cooler.

34

Disconnect the EGR cooler straps by removing the top bolts and pulling straps back to allow clearance.



W2005645



W2005658

35

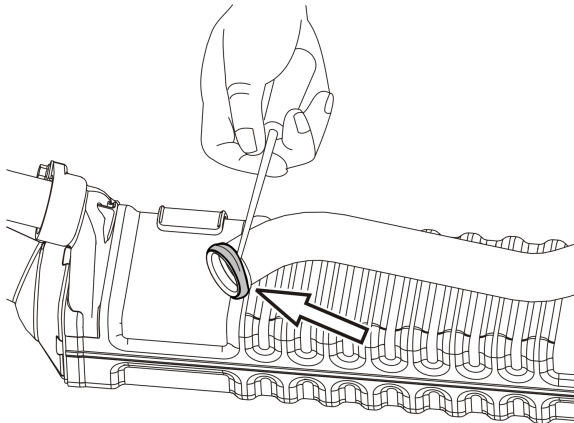
Pull the EGR cooler outward and back to free the coolant pipe from the oil cooler cover. Remove the EGR cooler.

36

Remove EGR pipe coupling hose and replace with new hose.

37

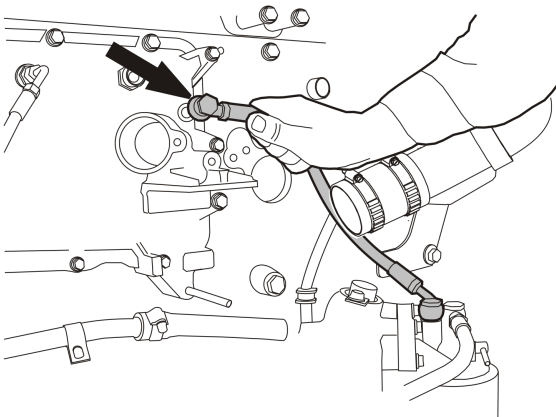
Remove the O-ring at each end of the EGR cooler coolant pipe and discard.



W2005659

38

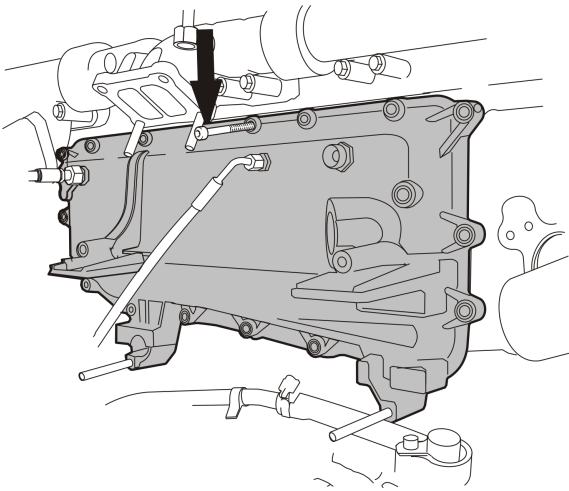
Remove the bottom strap nuts and spacers, then remove straps.



W2005661

39

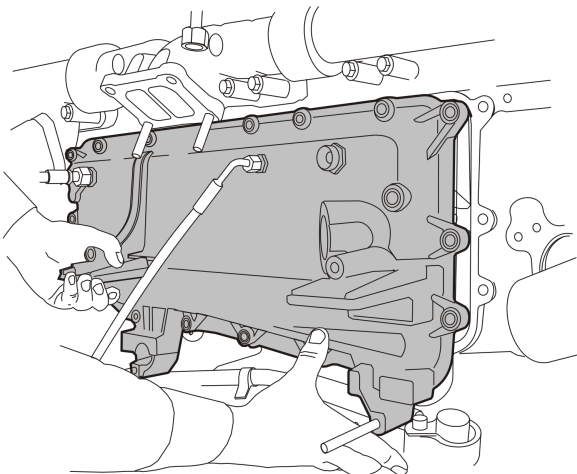
Disconnect the coolant conditioner hose from the oil cooler cover.



W2005662

40

Remove all oil cooler cover bolts except the one at the top center of the cover.

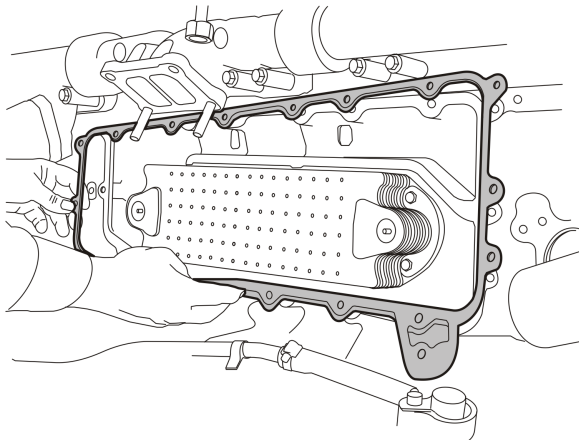


W2005668

41

Support the cover and remove the top center bolt. Remove the oil cooler cover.

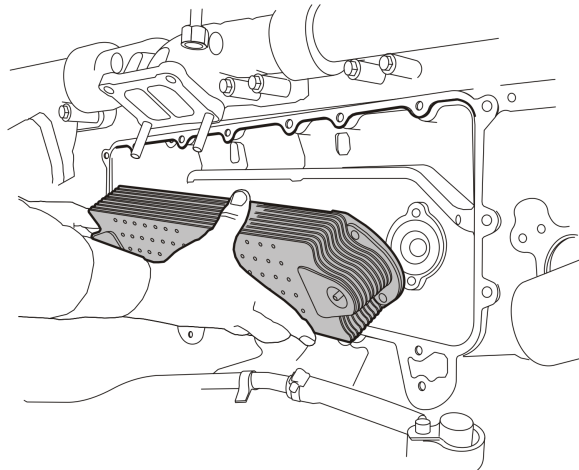
Note: Tap the cover with a soft mallet to loosen the cover if necessary.



W2005664

42

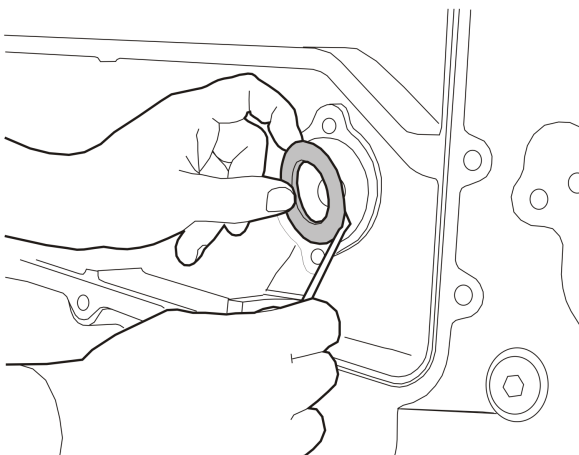
Remove the oil cooler cover gasket from the cylinder block.



W2005667

43

Remove the bolts securing the oil cooler to the cylinder block and remove the cooler.



W2005663

44

Remove the oil cooler sealing rings.

45

Clean the sealing surfaces of the oil cooler, cooler cover and cylinder block.

Installation

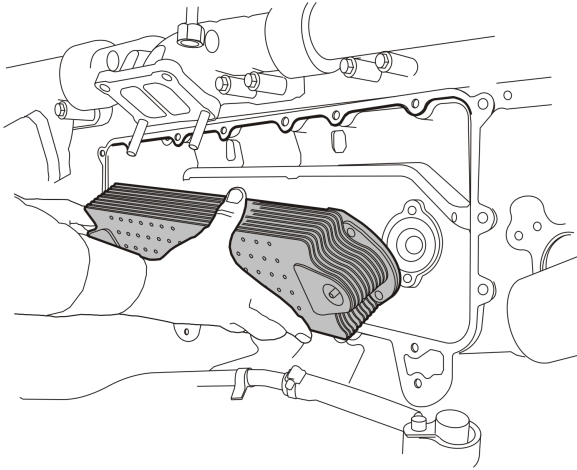
1

Install new oil cooler sealing rings in the cylinder block.

2

Install the oil cooler and tighten the bolts to 27 ± 4 Nm (20 ± 3 ft-lb).

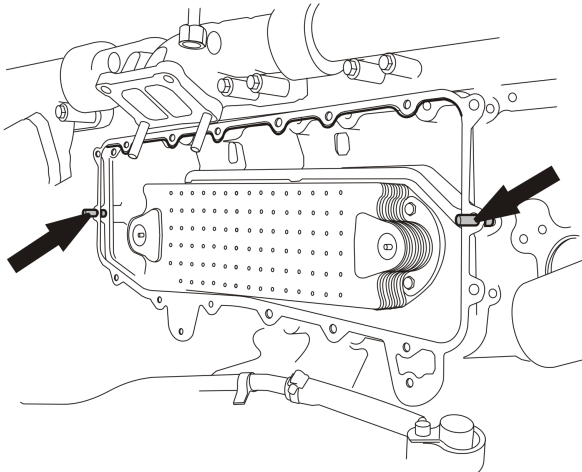
27 ± 4 Nm
(20 ± 3 ft-lb)



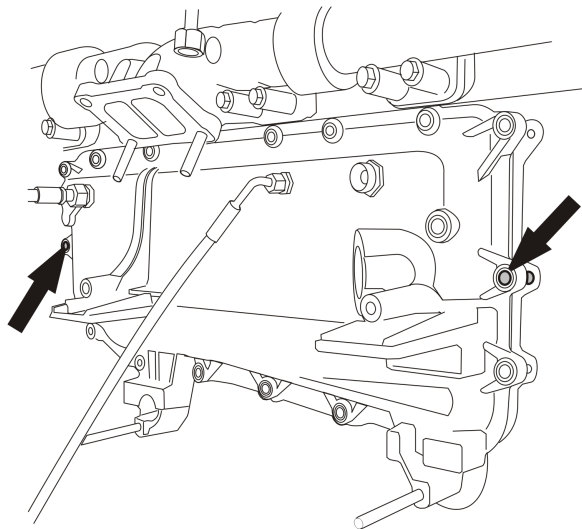
W2005667

3

Install two alignment pins one on each side of the oil cooler cover opening. Install a new oil cooler cover gasket on the alignment pins.



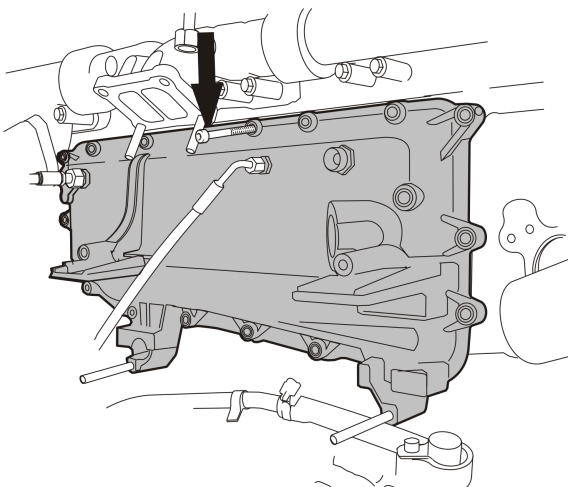
W2005666



W2005665

4

Install the oil cooler cover over the alignment pins and against the gasket.

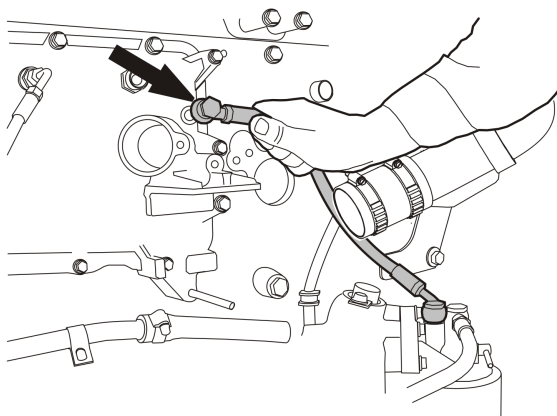


W2005662

5

Install the top center bolt and all remaining bolts. Tighten the bolts in steps to 24 ± 3 Nm (18 ± 2 ft-lb), evenly around the cover.

24 ± 3 Nm
(18 ± 2 ft-lb)



W2005661

6

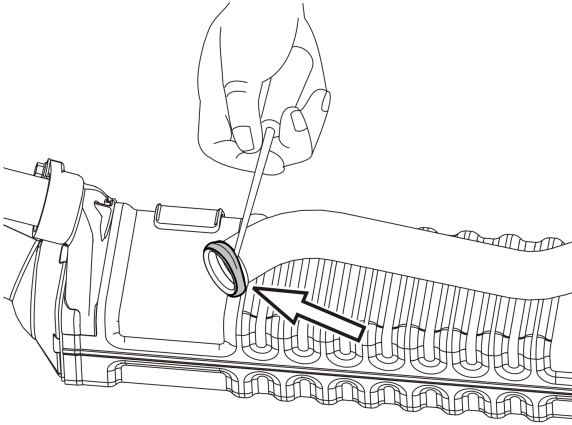
Install the coolant conditioner hose with new seals to the oil cooler cover. Tighten the fitting to secure.

7

Position straps on bottom mounts, install the spacers and nuts.

8

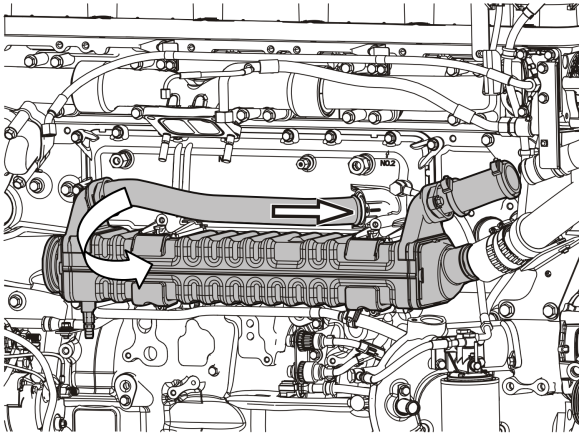
Install a new O-ring at each end of the EGR cooler coolant pipe and lubricate with coolant. Install the coolant pipe into the EGR cooler.



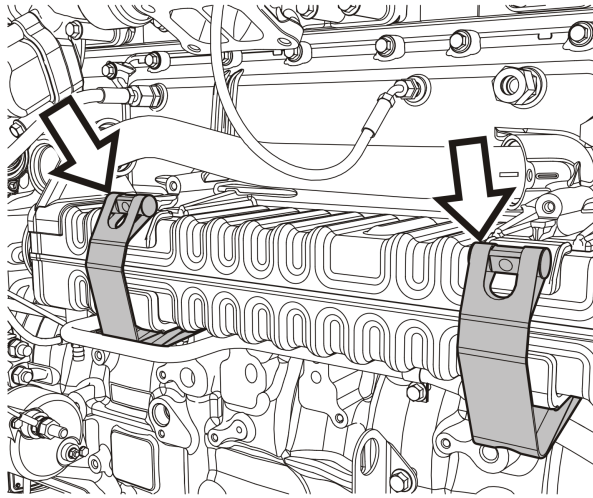
W2005659

9

Position the EGR cooler onto the cooler brackets. Slide the cooler forward to engage the coolant pipe with the oil cooler cover.



W2005660



W2005645

10

Position the straps over the EGR cooler, install the strap bolts and hand tighten.

11

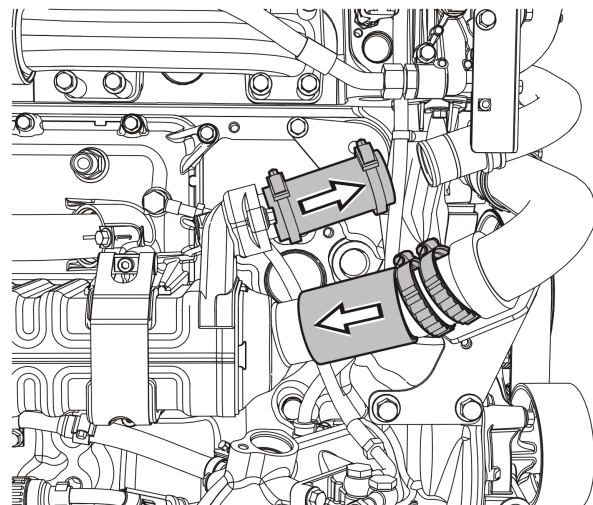
Tighten the nuts at the bottom of the cooler straps to 24 ± 3 Nm (18 ± 2 ft-lb).

24 ± 3 Nm
(18 ± 2 ft-lb)

12

Tighten the EGR strap bolts to 12 ± 2 Nm (106 ± 18 in-lb).

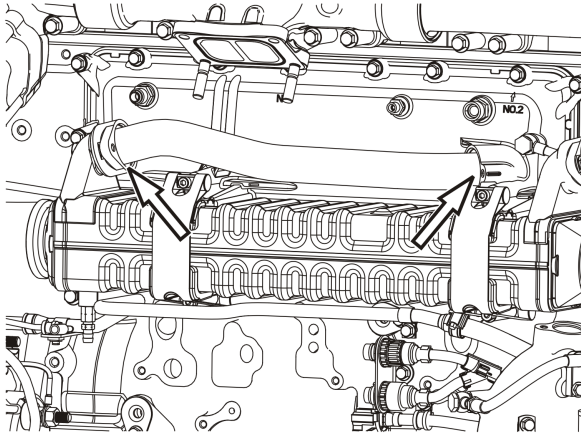
12 ± 2 Nm
(116 ± 18 in-lb)



W2005648

13

Connect the EGR cooler coolant hose, position the clamps and tighten to secure. Connect the EGR cooler hose to the EGR pipe, position the clamps and tighten to secure.



W2005646

14

Install the coolant pipe clamps and fasteners and tighten to secure.

15

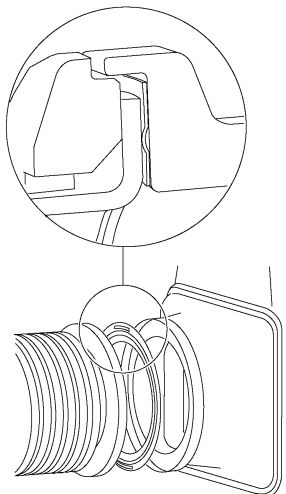
Install the static fill pipe to the EGR cooler. Tighten to 10 ± 2 Nm (89 ± 18 in-lb).

10 ± 2 Nm
(89 ± 18 in-lb)

16

Install new gaskets onto the EGR valve end of the hot pipe and into the inlet flange of the EGR cooler. Ensure the gaskets lay flat against the flange surfaces with the bead of the gasket facing toward the hot pipe.

Note: Gaskets are one-time use only. Do not reuse gaskets.

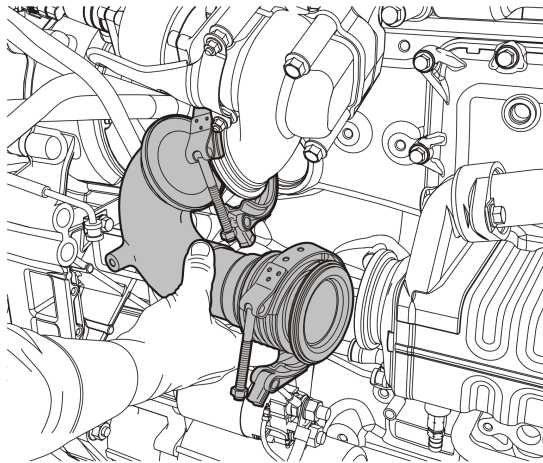


W2006187

17

Inspect the V-band clamps and T-bolt threads for wear or damage. If they are OK, lubricate the V-inserts of the clamps.

Note: The V-band clamps can be reused if no wear or damage is visible.



W2005641

18

Hook the upper V-band clamp over the EGR valve flange. Place the lower V-band clamp over the bellows on the hot pipe.

19

Lubricate the flange on the EGR cooler inlet and the flange on the EGR hot pipe with fresh engine oil. Lubrication aids in V-band clamp installation.

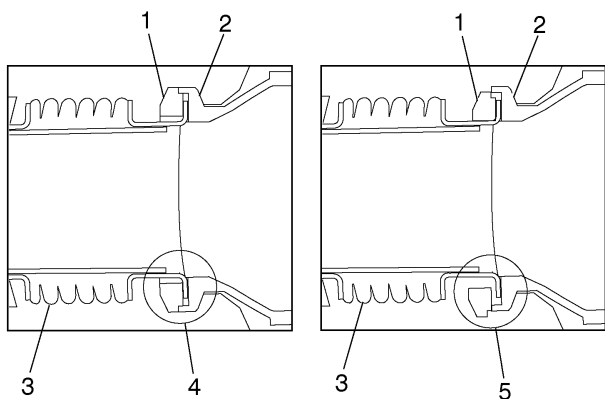
20

Position the EGR hot pipe between the EGR valve and the EGR cooler. Make sure the flange engages properly. While holding the hot pipe in position, slide the upper V-clamp over the flange and tighten until snug. Slide the floating flange into the groove of the EGR cooler flange. Slide the lower V-band clamp over the flange of the EGR cooler and tighten the clamp until enough pressure prevents the floating flange from falling out of the EGR cooler flange.

21

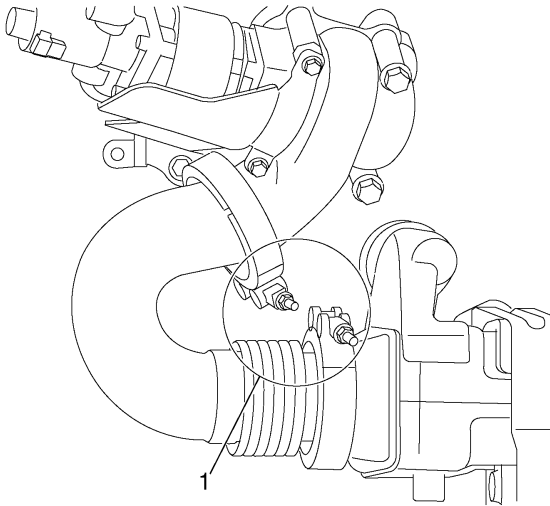
Visually inspect the floating flange through the gap in the V-band clamp to make sure it is properly seated in the EGR cooler flange. The floating flange must be concentric with the EGR cooler flange.

Note: If the floating flange is not properly seated in the EGR cooler flange, the gasket will not be compressed and the seal will leak.



W2006163

- 1 EGR Pipe Floating Flange
- 2 EGR Cooler Flange
- 3 EGR Pipe
- 4 Flange Assembled Correctly
- 5 Flange Assembled Incorrectly



1 EGR Pipe Clamp Position

W2006164

22

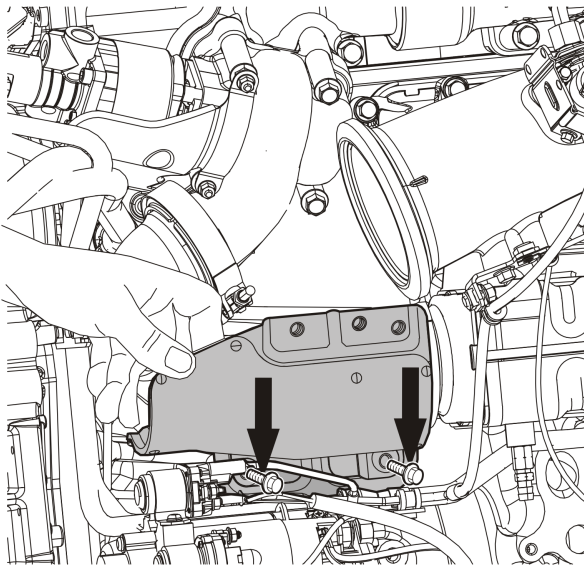
Position the V-band clamps as shown so that the T-bolts clear both heat shields. Apply anti-seize compound to the threads of the T-bolts. Tighten to 20 ± 4 Nm (15 ± 3 ft-lb).

Note: After reaching the specified torque, inspect the V-band clamps to make sure that no portion of the clamp has “bottomed out.”

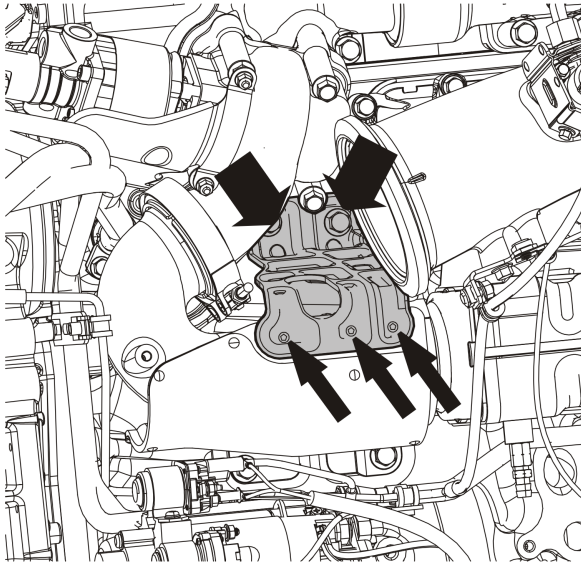
20 ± 4 Nm
(15 ± 3 ft-lb)

23

Position the lower EGR hot pipe heat shield over the pipe and secure with bolts. Do not tighten at this time.



W2005687



W2005686

24

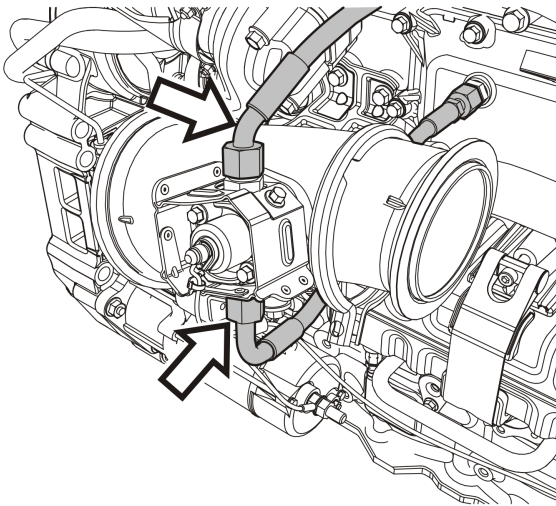
Position the upper EGR hot pipe heat shield and install the fasteners to secure the shield. Tighten all fasteners to specification.

25

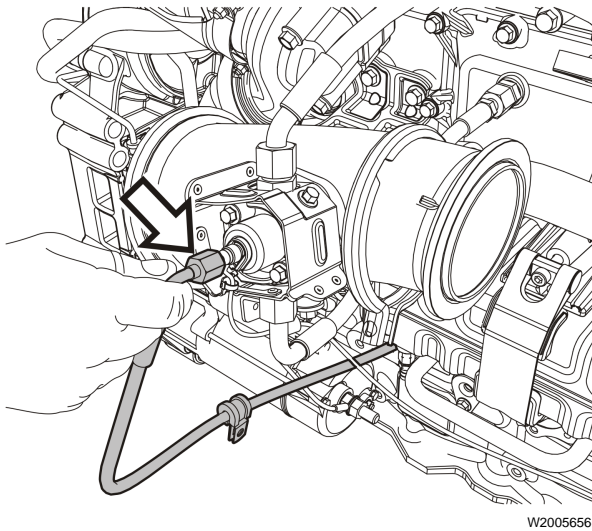
Position the diffuser to the exhaust pipe and loosely install the V-band clamp.

26

Install the coolant supply and return lines to the aftertreatment fuel injector.

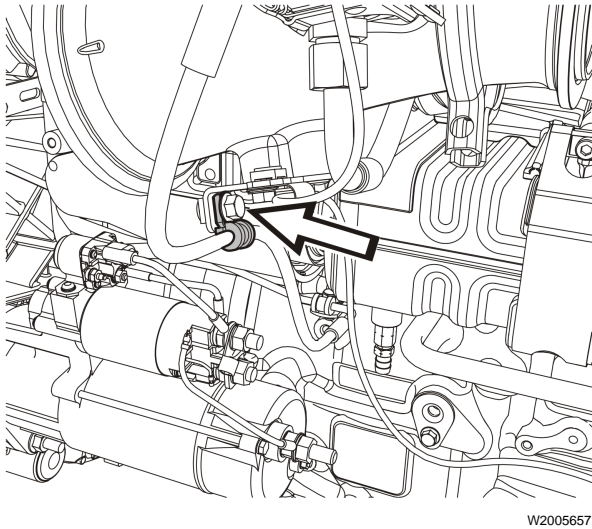


W2005655



27

Install the fuel line onto the aftertreatment fuel injector.



28

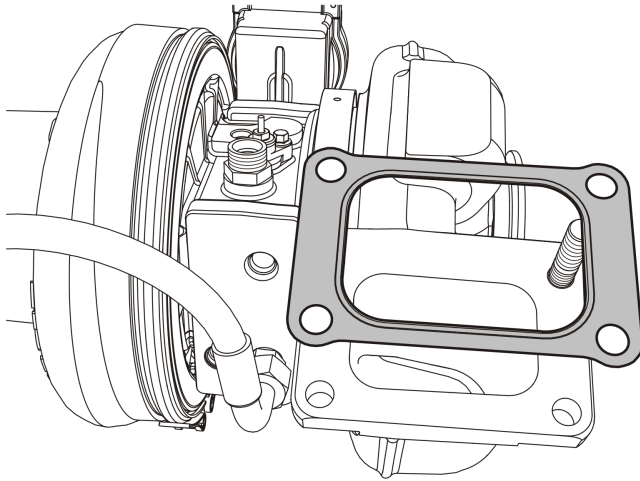
Install the aftertreatment fuel injector line clamp and fastener to the bottom of the diffuser.

29

Clean the contact surface of the exhaust manifold and the turbocharger.

30

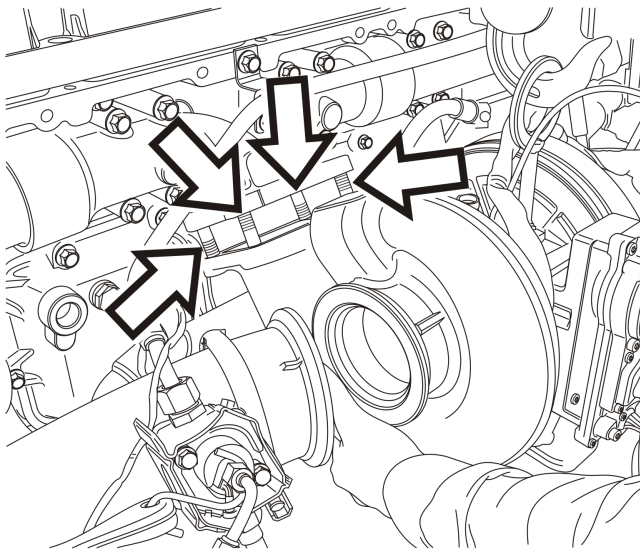
Remove the plugs from the turbocharger oil lines.
Remove the covers from the turbocharger intake and exhaust openings.



W2005636

31

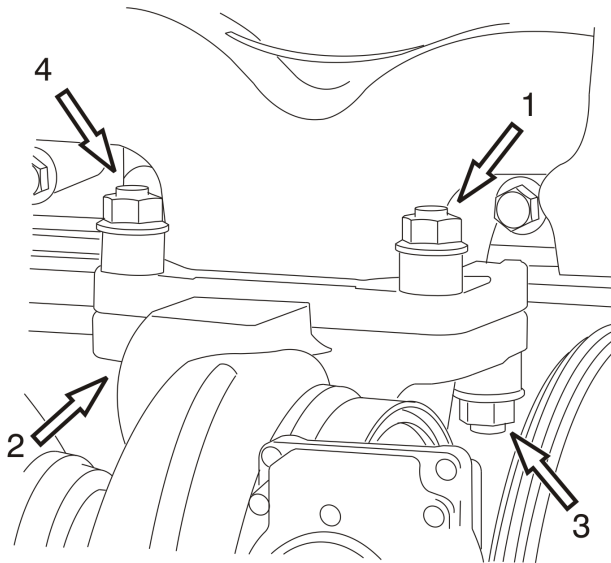
Install a new gasket onto the studs of the turbocharger.



W2005629

32

Attach the turbocharger to a mobile floor crane such as OTC 16-1815 or equivalent. With the aid of an assistant, position the turbocharger against the exhaust manifold, aligning the studs with the holes.



W2005206

33

Install the turbocharger flange nuts and spacers and tighten to 135 Nm (100 ft-lb). The nuts should be tightened in the sequence shown.

Note: Apply anti-seize compound to the threads and under the heads or contact surfaces of the fasteners. Anti-seize helps to prevent fastener oxidation corrosion and reduces friction to help achieve the intended clamp load on the component when tightening the fasteners to specification.

135 Nm
(100 ft-lb)

34

Remove the hoist and turbocharger lifting tool. Install the plug in the threaded hole at the top of the turbocharger.

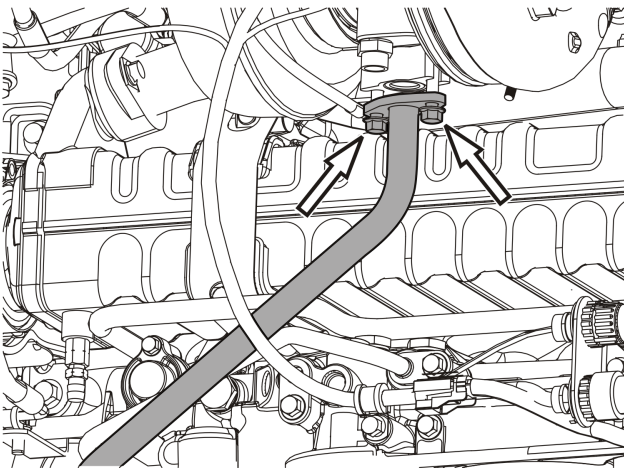
35

Clean the contact surface of the turbocharger, spacer block and drain back pipe.

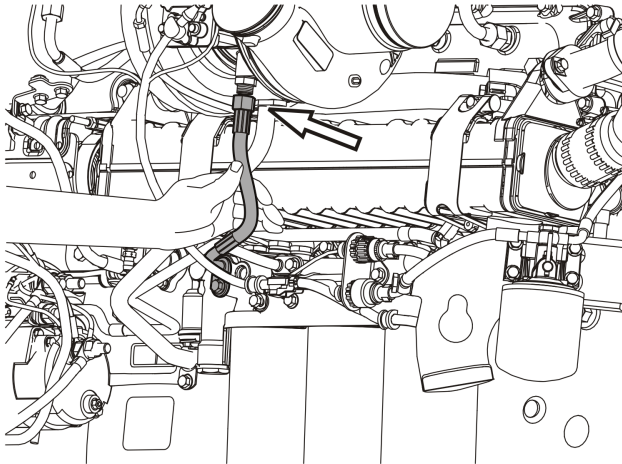
36

Position a new O-ring and gasket on the spacer block and install the turbocharger oil drain pipe and spacer block to the bottom of the turbocharger. Tighten the fasteners to 24 ± 4 Nm (18 ± 3 ft-lb).

24 ± 4 Nm
(18 ± 3 ft-lb)



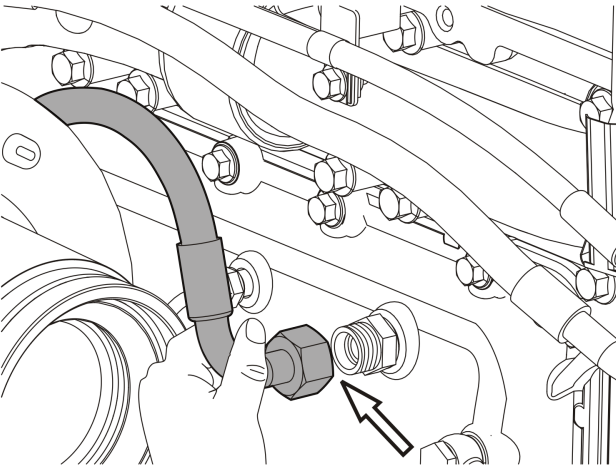
W2005628



W2005624

37

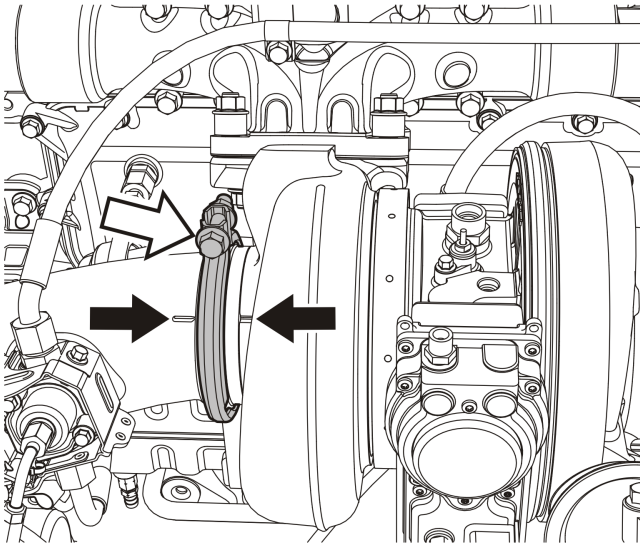
Install the turbocharger oil supply line to the bottom fitting of the turbocharger and tighten the fitting.



W2005623

38

Install the turbocharger coolant line to the fitting on the oil cooler cover and tighten to secure.

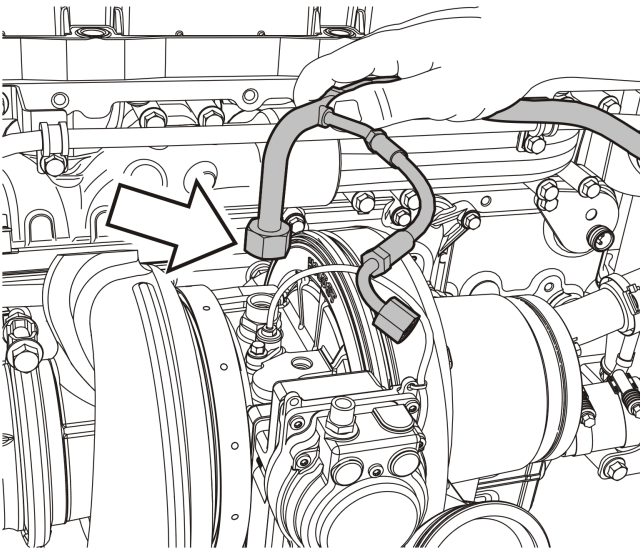


W2005626

39

Position the diffuser against the turbocharger and install a new V-band clamp. Align the cast marks on the diffuser with the mark on the turbocharger and tighten the clamp to secure. Tighten the diffuser-to-exhaust pipe clamp.

Note: The diffuser V-band clamp is a one time use clamp.

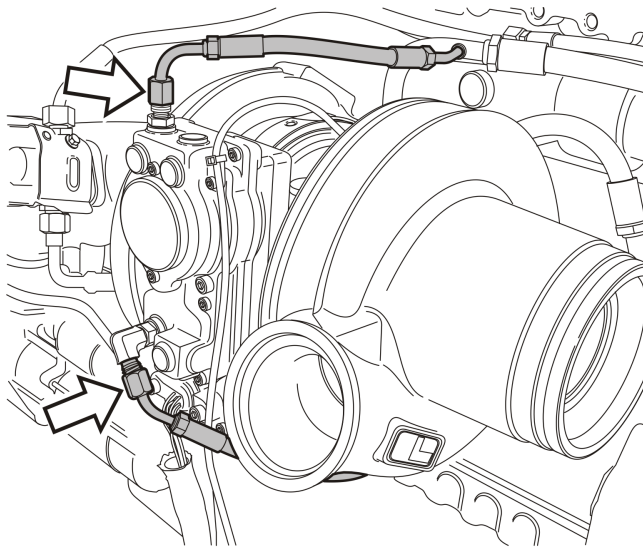


W2005622

40

Install the coolant line to the top of the turbocharger and tighten the fitting to secure.

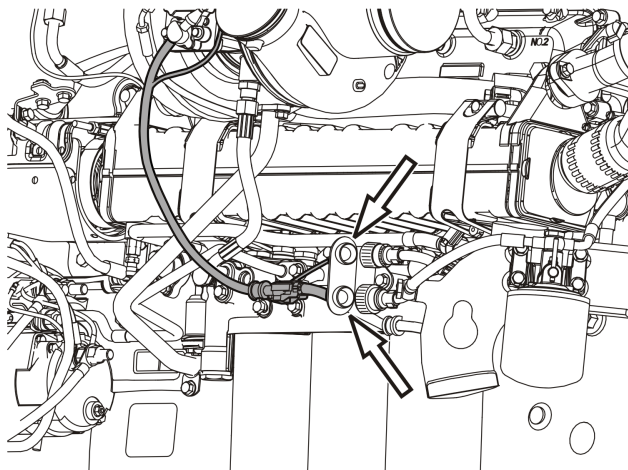
Note: This coolant line also connects to the turbocharger actuator.



W2005621

41

Install the turbocharger actuator coolant lines to the fittings and tighten to secure.



W2005620

42

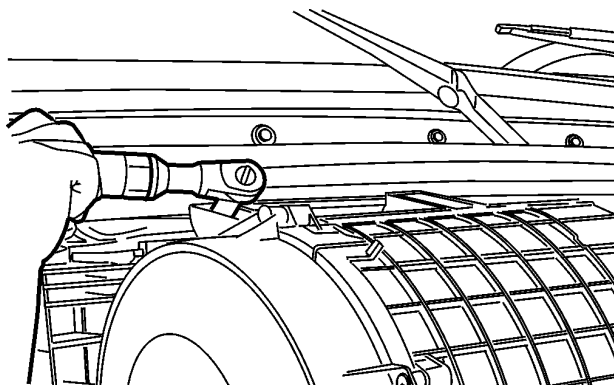
Connect the turbocharger actuator and turbocharger wheel speed sensor wiring harnesses. Make sure the connectors are oriented with the flat side toward the flat in the bracket. Install the cable clamp on the oil filter housing. Secure the wiring harness to itself and to the turbocharger oil drain pipe using tie straps.

43

Install the inlet elbow to the turbocharger. Do not tighten.

44

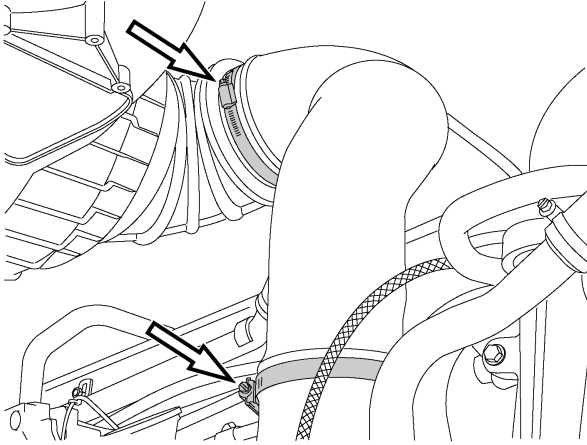
Position the air filter housing against the cab, install the bolts and tighten to secure.



W2003858

45

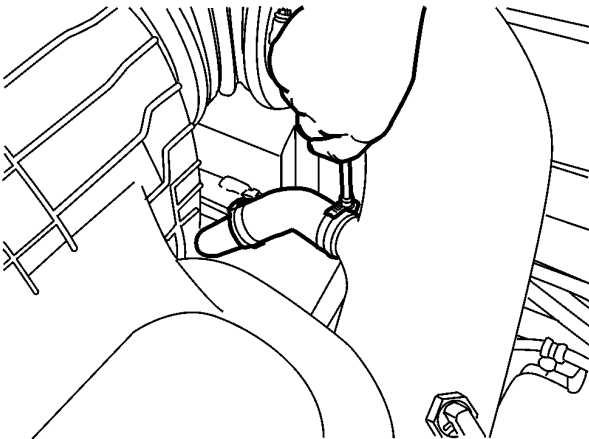
Install the main fresh air pipe to the air filter housing and the turbocharger inlet elbow. Tighten the clamps to secure.



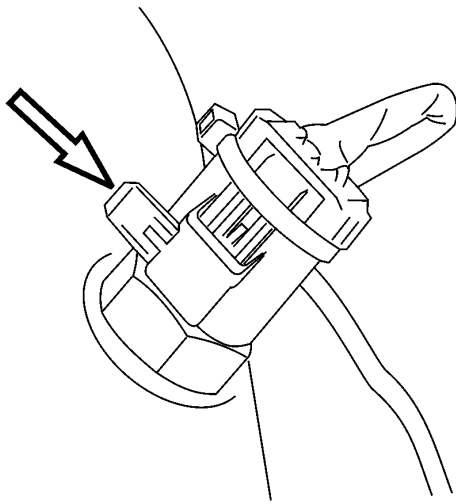
W2006005

46

Install the air compressor fresh air coupling hose to the main fresh air pipe, position the clamp and tighten to secure.



W2004719

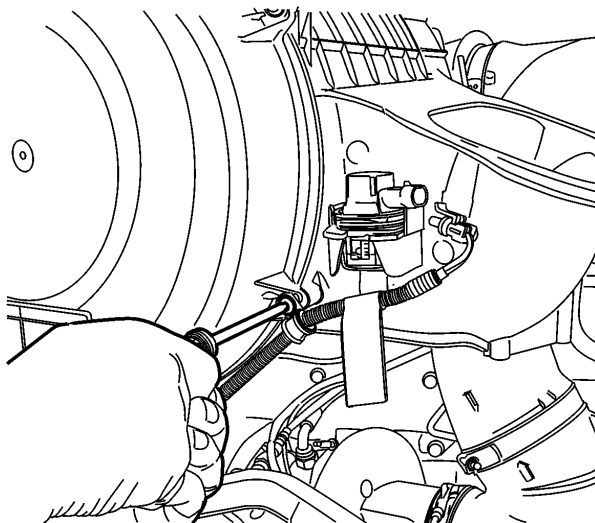


W2004720

47

Install the air temperature sensor connector to the sensor. Insert the connector lock tab, push in place and secure with a tie strap. Install the clamp and fastener to secure the harness to the main fresh air pipe. Tighten the clamp bolt to 8 ± 1.2 Nm (6 ± 1 ft-lb).

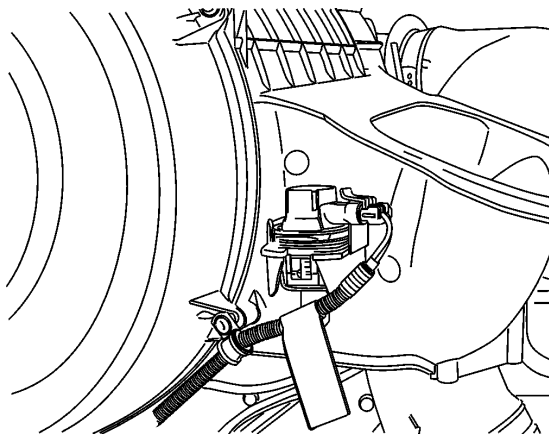
8 ± 1.2 Nm
(6 ± 1 ft-lb)



W2003861

48

Install the air filter restriction gauge wiring harness to the air filter housing and tighten the clamps to secure.



W2004249

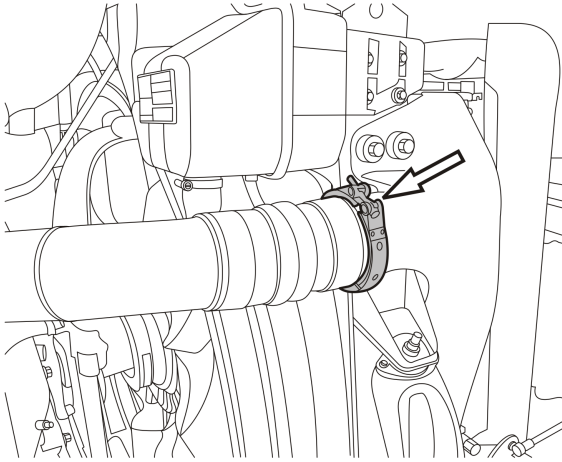
49

Connect the air filter restriction gauge electrical harness connector.

50

Inspect the O-rings at each end of the charge air inlet pipe for damage, replace if needed. Install the charge air inlet pipe assembly between the turbocharger and charge air cooler.

Note: Connect the DRV air line. Connect the recirculation hose to the inlet elbow, position the clamp and tighten to secure.



W2006040

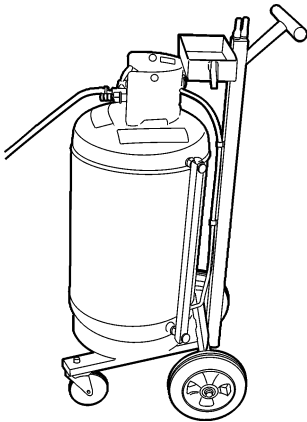
51

Check the engine oil level and replenish as needed with the recommended oil.

52

Fill the cooling system with the recommended coolant using the coolant extractor.

DBT2V700



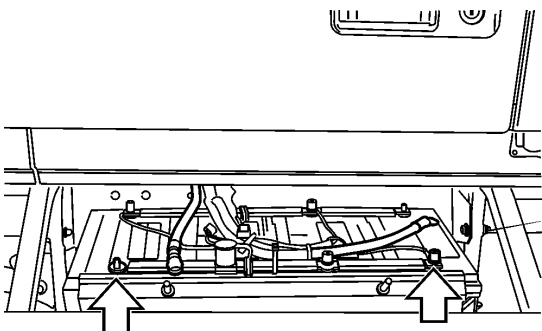
W2004191

53

Install the inner splash guard assembly.

54

Install all previously removed cables to the ground (negative) battery terminals.



W2003815

55

Start the engine, check for leaks and proper operation.
After shutdown, replenish fluids as necessary.