Workshop Manual

Group 21-26

TAD134X GE/VE
TAD135X GE/VE
TAD136X VE
TAD137X VE

00-9 Miscellaneous

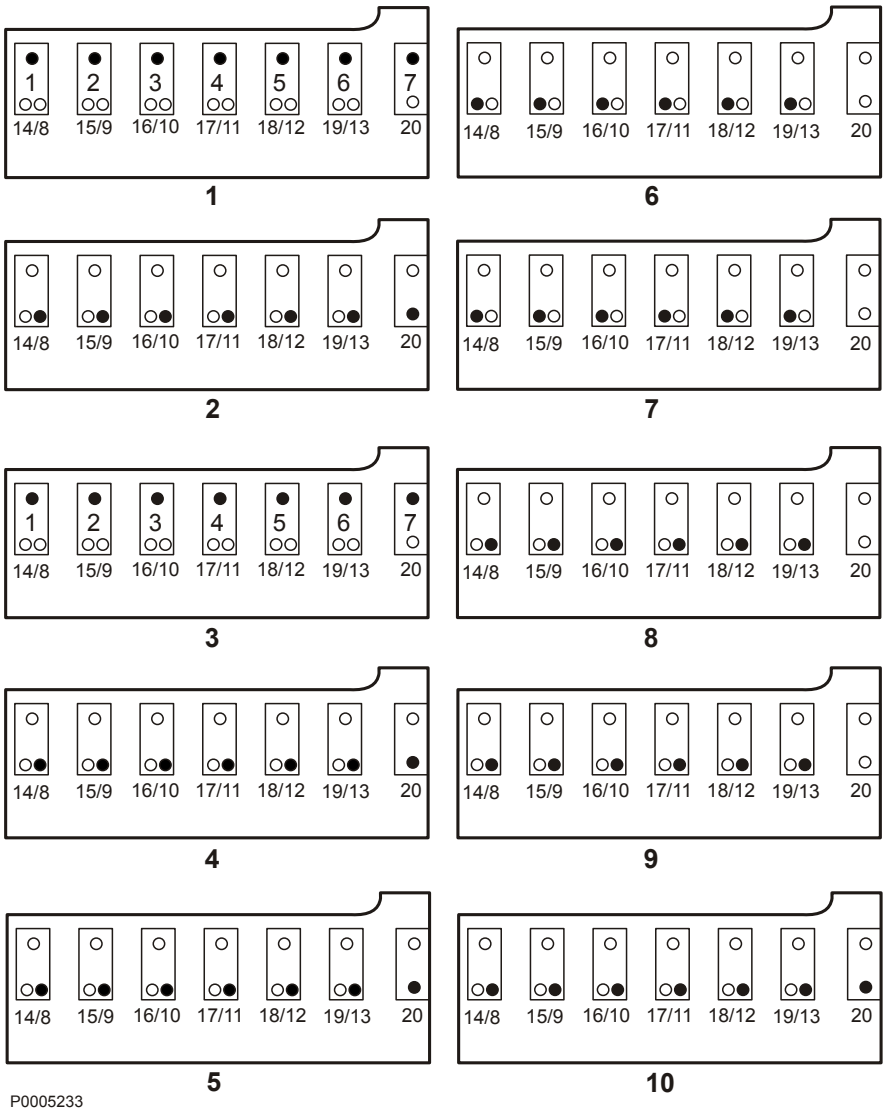
Fan

IMPORTANT!

The engine is equipped with a so-called visco-fan. When the fan is removed the viscous coupling must **always stand upright**.

The coupling contains oil that will run out if it is laid on its side, and because the oil cannot run back in the fan will seize.

Bearing caps, camshaft/rocker arm shaft



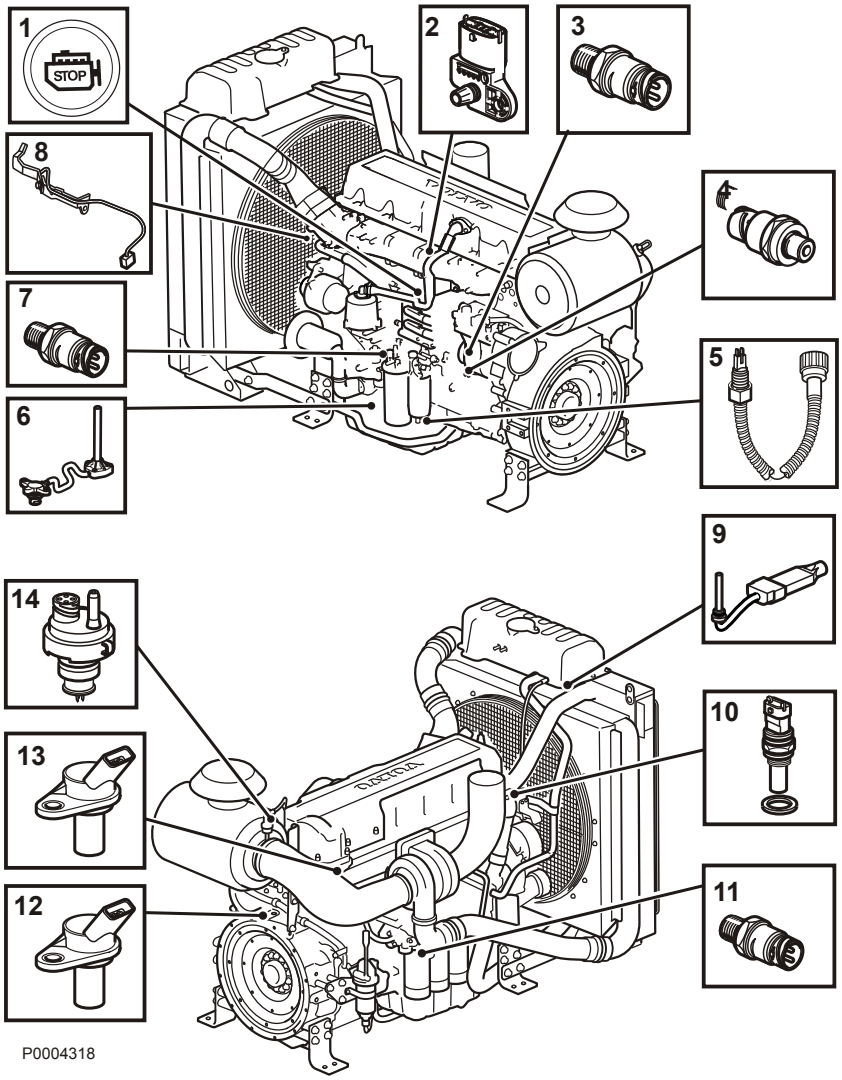
Camshaft: (camshaft and bearing caps in place)

stage **1**: Tighten bolts 1–7	40 ± 3 Nm (29.50 ± 2.21 lbf ft)
stage **2**: (with shorter extra bolts) Tighten bolts 8–13 and 20	60 ± 5 Nm (44.25 ± 3.69 lbf ft)
stage **3**: Angle tighten bolts 1–7	90° ± 5°
stage **4**: Remove the extra bolts 8–13 and 20	

Rocker arm shaft: (rocker arm shaft in place)

stage **5**: Tighten bolts 8–13 and 20 **in stages** in the sequence 11, 10, 12, 9, 13, 8, 20	60 ± 5 Nm (44.25 ± 3.69 lbf ft)
stage **6**: Tighten bolts 14–19	25 ± 3 Nm (18.44 ± 2.21 lbf ft)
stage **7**: Angle tighten bolts 14–19	120° ± 5°
stage **8**: Undo bolts 8–13	
stage **9**: Tighten bolts 8–13	25 ± 3 Nm (18.44 ± 2.21 lbf ft)
stage **10**: Angle tighten bolts 8–13 and 20	120° ± 5°

Location of Sensors



1	Auxiliary stop	
2	Charge pressure sensor / Charge air temperature sensor	M6 standard bolt torque
3	Oil pressure sensor	30 ± 5 Nm
4	Crankcase pressure sensor	30 ± 5 Nm
5	Water separator level sensor	not replaceable, integrated in lines
6	Oil level and oil temperature sensor	standard bolt torque
7	Fuel pressure sensor	30 ± 5 Nm
8	Pressure drop indicator / Air temperature	clamp
9	Coolant level sensor	insertable type
10	Coolant temperature sensor	22 ± 3 Nm
11	Piston cooling oil pressure	30 ± 5 Nm
12	Flywheel position and rotation speed	M6 standard bolt torque
13	Camshaft position sensor	M6 standard bolt torque

Group 26: Cooling System

Refer to *General Tightening Torques, page 10*.

Camshaft

Camshaft drive	gearwheel
No. of bearings	7
Diameter, bearing journals, standard	69.97–70.00 mm (2.755–2.756 in)
Diameter, bearing journals, undersize:	
0.25 mm (0.00984 in)	69.72–69.78 mm (2.745–2.747 in)
0.50 mm (0.0197 in)	69.47–69.53 mm (2.735–2.737")
0.75 mm (0.0295 in)	69.22–69.28 mm (2.725–2.728 in)
Permissible wear, entire camshaft profile	max 0.1 mm (0.00394 in)
Unit injector, stroke	18 mm (0.709 in)
Wear value	
Max end float	0.24 mm (0.00945 in)
Bearing, max permissible radial wear	0.1 mm (0.00394 in)

Camshaft Bearings

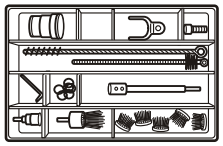
Camshaft bearing thickness, standard	1.92 mm (0.0756 in)
Oversize dimension:	
0.25 mm (0.00984 in)	2.04 mm (0.0803 in)
0.50 mm (0.0197 in)	2.17 mm (0.0854 in)
0.75 mm (0.0295 in)	2.29 mm (0.0902 in)

Refill quantity

Coolant quantity (engine, radiator and hoses):

All engines	44 liter (46.49 quart)
Optional cooler (“Heavy Duty”) for TAD1340-45VE, TAD1350-53VE, TAD1360-65VE and TAD1371-75VE.	58 liter (61.29 quart)

9986173 Puller
Flywheel bearing

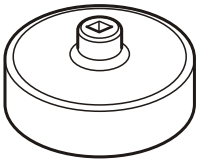


9998599 Cleaning kit

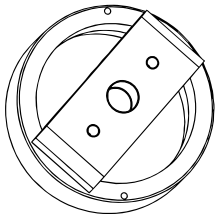
The tool kit includes:

- 9808570 Brush
- 9808616 Extender
- 9998580 Protective sleeve.

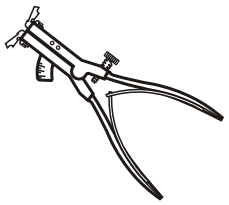
9999179 Extractor oil filter
Removal of filters.



9998487 Sleeve
Removal of filters.

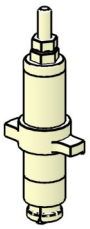


88800021 Drift
Removal of crankshaft seal.

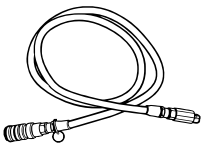


88800083 Piston ring pliers
Installation of piston rings.

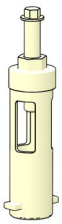
9998250 Sealing ring
Cylinder head fuel ducts (the kit contains 12 pcs.).



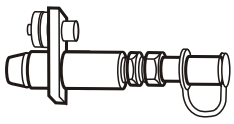
88800387 Puller
Removal of sleeve.



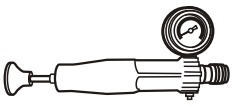
9998493 Hose



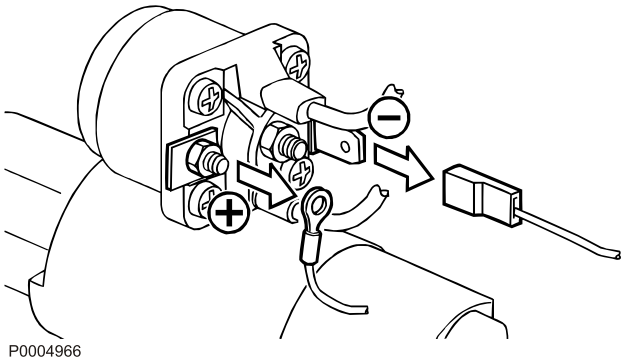
88800513 Drift
Installation of sleeve.



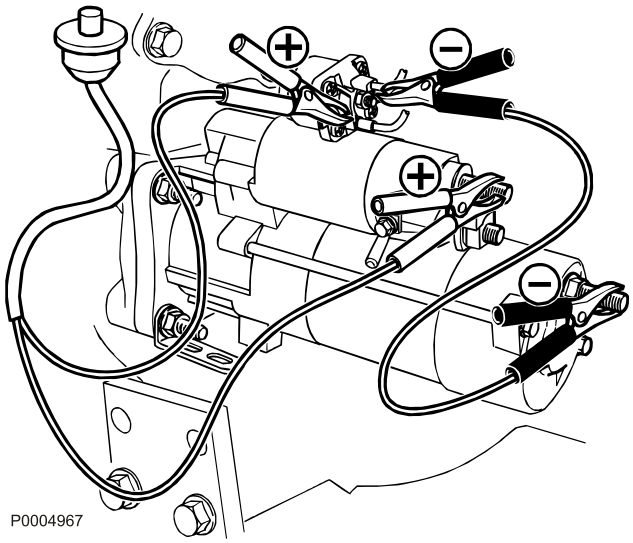
88890102 Nipple



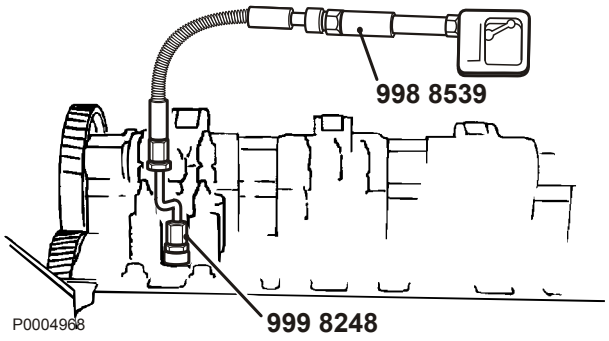
88890104 Pump


P0004966

7 Remove both control wires from the starter motor control connector (the two thin cables).
Connect one of the two free connectors on the control connector to ground.


P0004967

8 Connect the other connector to a switch, which in turn is connected to the positive (plus) connection on the starter motor.



P0004968

9 Connect tool 9988539 Compression meter to 9998248 Adapter on the first cylinder.

10 **NOTICE!** Do not run the engine for more than 15 seconds at a time with intervals of 60 seconds.

Run the engine with the starter motor until the compression meter needle has stopped (max compression reading).
Read the value.
Move the compression meter to the next cylinder.
Repeat the test on all cylinders.

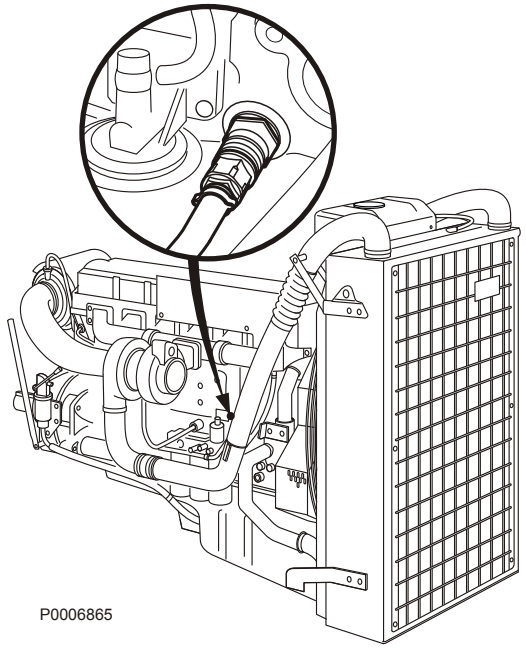
11 Remove the middle piece and the oil pipe for the rocker bridge.

12 Remove the rocker bridge screws equally in stages so that it is not bent.
Remove the bolts and carefully lift off the rocker bridge using 9990185 Lifting tool.

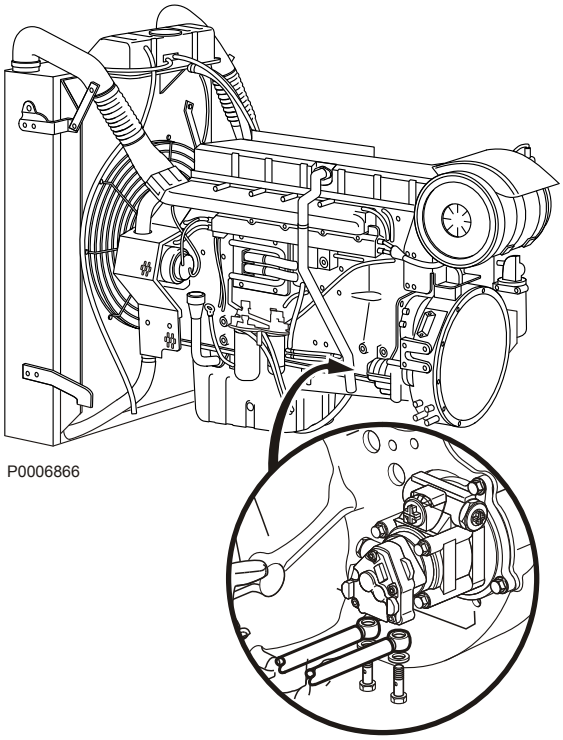
21-0 Engine Complete, General

Exposing the Engine

Exposing


P0006865

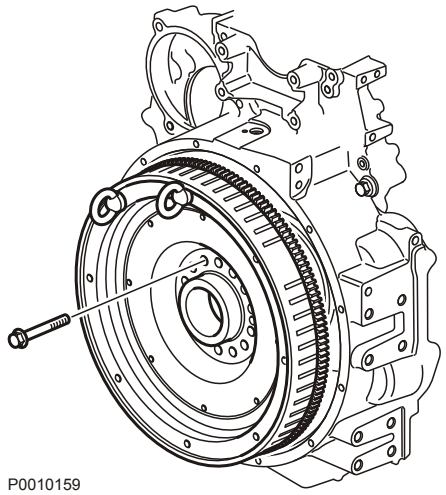
1 Drain the coolant; refer to *Draining the Cooling System, page 296*.
Drain the engine oil.


P0006866

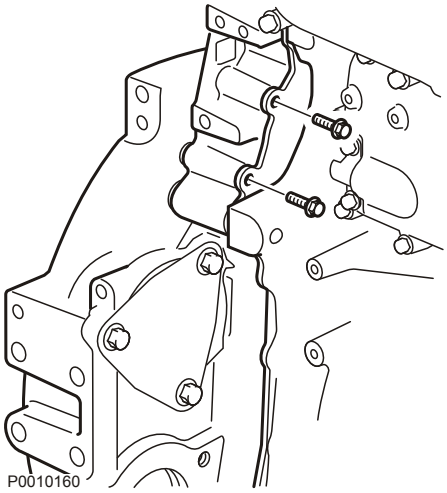
2 Remove fuel connections to the fuel pump and allow the fuel to run out into a suitable container. Also loosen the upper connection on the cooling coil and water drain.

3 Remove the hoses from the radiator and the expansion tank.

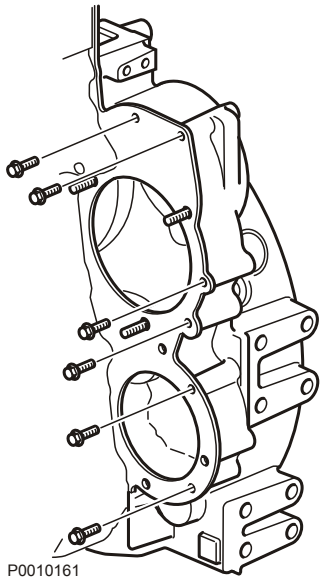
4 Remove the heat shield above the turbo, if fitted.


P0010159

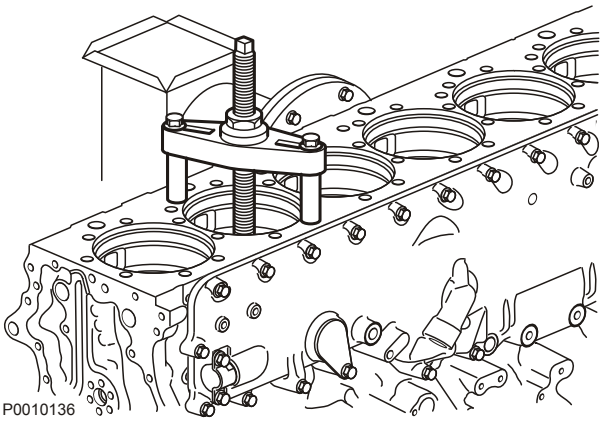
6 Rotate the flywheel to the zero mark. Check that the crankshaft marking is at TDC.
Remove the flywheel bolts. Use 9993590 Rotation tool as a counterhold while undoing the bolts.
Hoist the flywheel using suitable lifting eyes.


P0010160

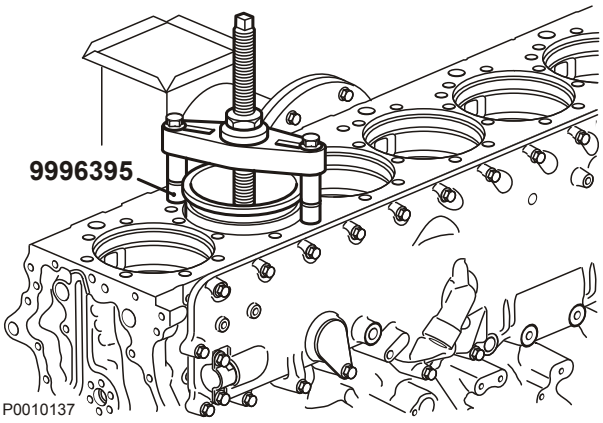
7 Remove the lower timing gear cover bolts on the starter motor side (2 pcs.).


P0010161

8 Remove the bolts on the fuel pump side (6 pcs.).


P0010136

4 Insert the tools in the liner to be removed. Make sure the plate ends up directly under the liner. Screw down on the nut so that the liner is drawn up.



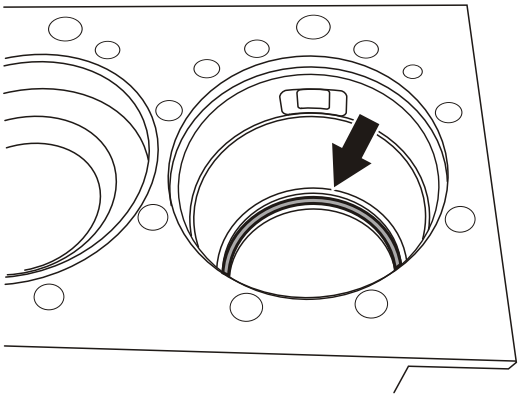
P0010137

5 If the liner does not come free when it has reached the puller, release the nut sufficiently for spacer 9996395 to be installed. Continue to pull the liner up until it is free.

6 Lift out the liner with the tool and then remove the tool from the liner.

7 Remove the remaining liners the same way.

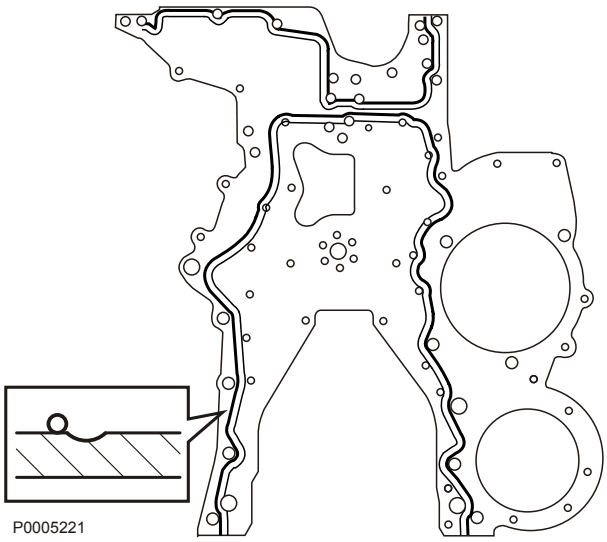
8 Inspect the liners; refer to *Cylinder Liner and Pistons, Inspection, page 140*.


P0010138

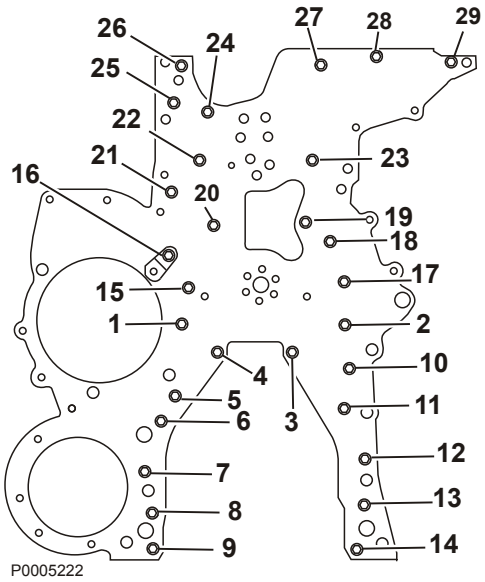
9 Remove the liner O-rings from the engine block. Check the O-ring grooves for corrosion or any other damage.

Timing Gear, Installation

Tools:
9998267 Guide sleeve
9999683 Dial indicator (short probe)
9999696 Magnetic stand

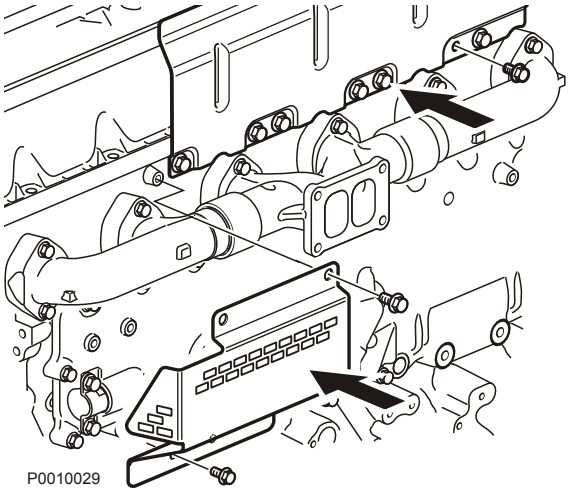


1 Early model:
Apply a 2 mm (0.08”) bead of sealant precisely outside the groove on the timing plate, max 20 min. before installation.(1)

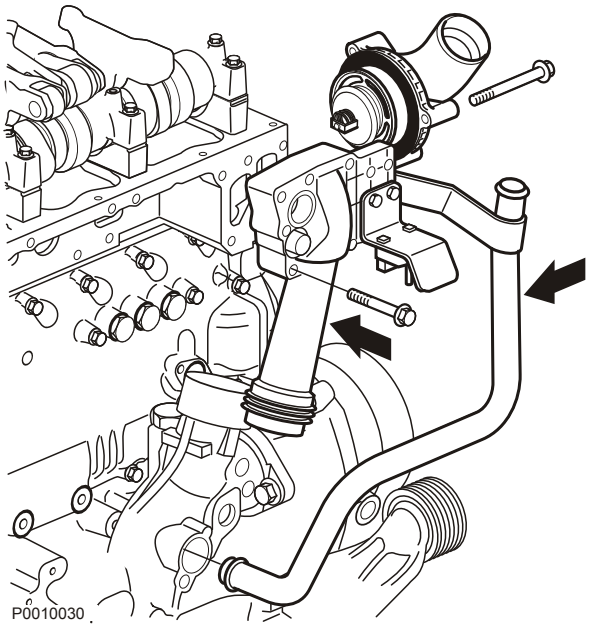


2 Align the plate with the locator sleeves. Install all the bolts and tighten them in sequence according to *Special Tightening Torques, page 12*.

1. TAD1351-1353VE and TAD1371-1375VE have a timing plate with integrated sealing. No sealant needed.



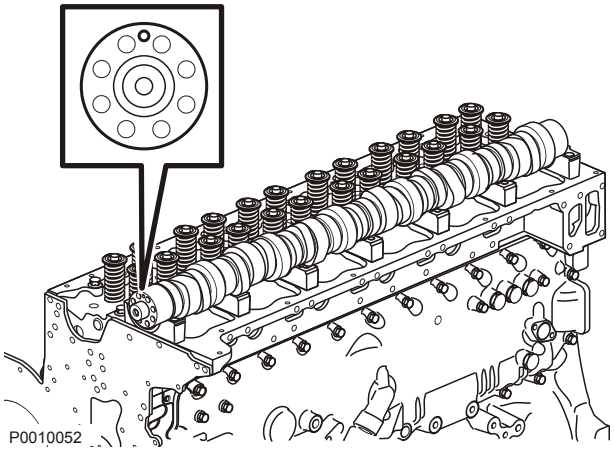
4 remove the heat shield and manifold.



5 Remove the water pipes (2 pcs.). Remove the thermostat cover and thermostat; refer to *Thermostat, Change, page 306*.

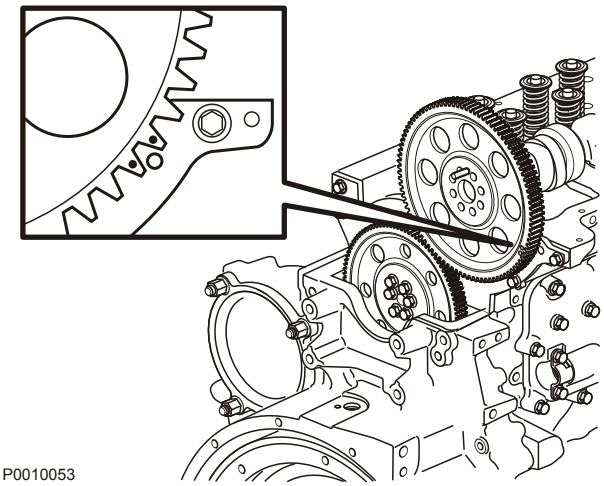
6 Remove the ventilation pipe and valve cover.

7 Remove the wire harness. Begin with the wires under the valve cover.

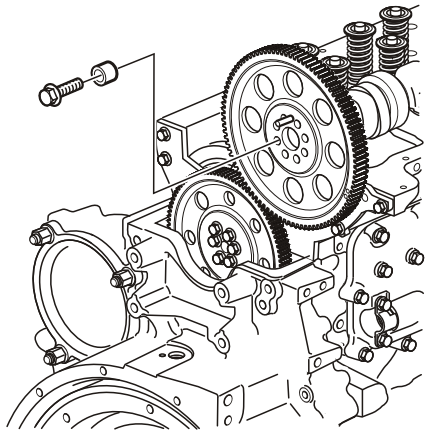

P0010052

8 Rotate the camshaft so that the guide hole faces straight up.

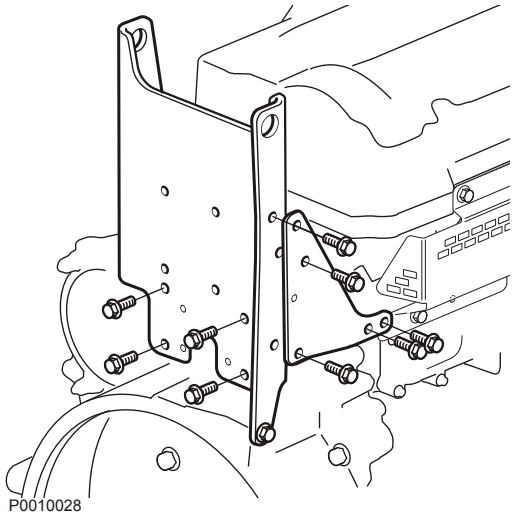
9 Check that the cam bearings are fault free and correctly installed in the caps. Install the caps according to the markings.
Install M10X80 bolts instead of the rocker arm bridge. Tighten the caps according to *Special Tightening Torques, page 12*. Check that the camshaft can be rotated.


P0010053

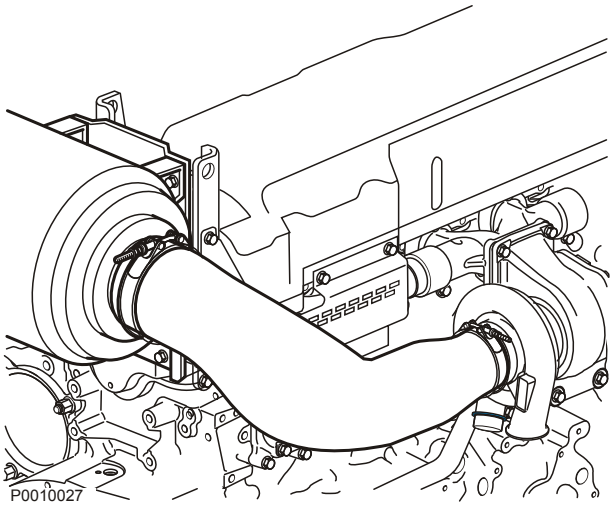
10 Check that the flywheel marking is at zero. Install the camshaft gear so that the locator pin aligns with the hole in the camshaft and the gear marking against the hole in the timing plate.


P0010054

11 Install at least three bolts with suitable spacers in the gear and tighten them.

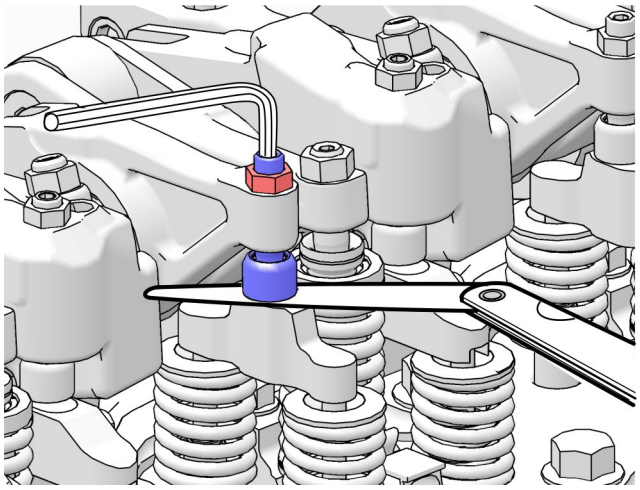


42 Install the rear lifting eye.



43 Install air filters with holders and turbocharger pipes.

44 Install new oil filters and fill with engine oil.

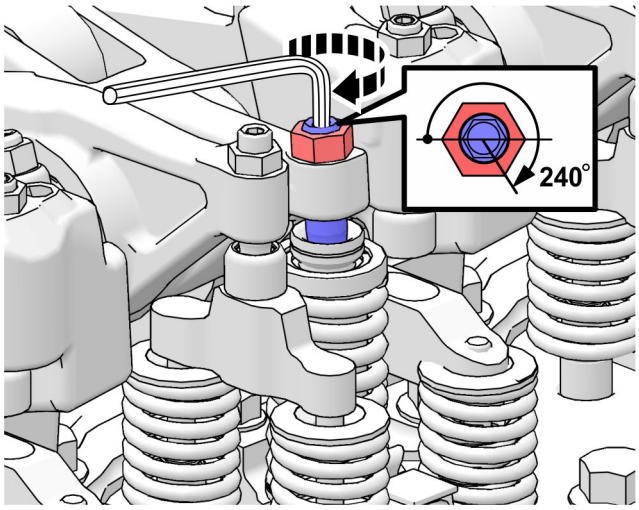


P0019112

4 Adjust inlet valve clearance between the valve yoke and the rocker arm thrust sleeve valve yoke to 0.2 mm (0.0079") with the aid of a feeler gauge. For valve clearances, refer to the section *Valve mechanism* in *Technical Data, page 31*.

Tighten according to the specifications in *Special Tightening Torques, page 12*.

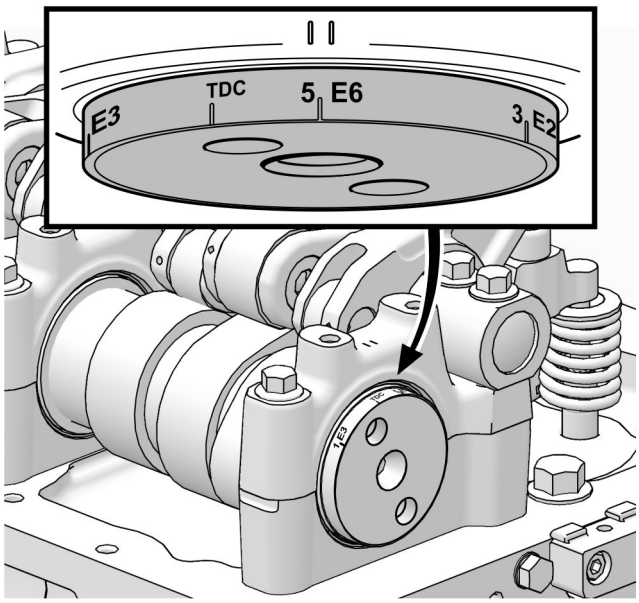
Check the valve clearance. Mark the rocker arm once the valve is adjusted.



P0019098

5 Adjust the unit injector preload by loosening the adjuster screw until a clearance is obtained on the injector.
Adjust the screw until the clearance disappears (by feel until the roller can no longer be rotated). Tighten the adjuster screw a further 240° (4 flats).

Tighten the adjuster screw locking nut as per specifications in *Special Tightening Torques, page 12*.



P0019097

6 **IMPORTANT!**
Adjust the exhaust and VCB rocker arm on the cylinder the camshaft E marking indicates.

E6 = **Exhaust** and **VCB rocker arm,** cylinder **6**

Valve Guides, Inspection

Tools:
9989876 Dial indicator
9999696 Magnetic stand

Cylinder head removed
Refer to removal in *21-1, Cylinder Head, Change*.

1 Remove the valve stem seals from the valve guides.

2

IMPORTANT!

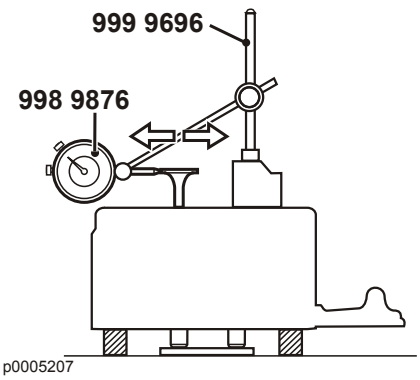
The cylinder head must not be put down so its entire weight rests on the valve guides (see illustration).

Put the cylinder head on the bench with the valve discs facing upwards.

3 Place a new valve in the valve guide with the valve stem end in the same plane as the edge of the guide. Use a suitable counterhold under the valve stem.

4 Place tool 9989876 Dial indicator and tool 9999696 Magnetic stand, so that the dial indicator tip is touching the valve disc edge.
Move the valve sideways, in the direction of the exhaust or inlet duct. Read off the value on the dial gauge.

5 Check all valve guides.
If the measurement values exceed the values noted in the specifications, the valve guide must be changed; refer to *Technical Data, page 31*.

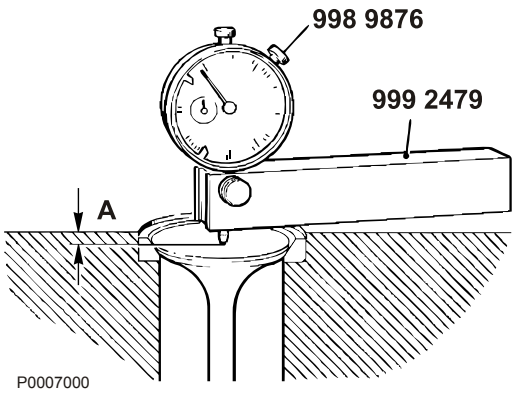


p0005207

Valve Seat, Change

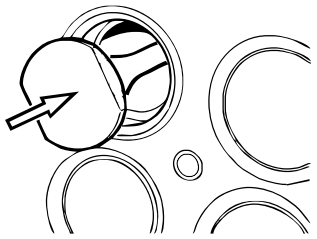
Cylinder head and valves removed.

Tools:
9989876 Dial indicator
9992479 Holder for dial indicator



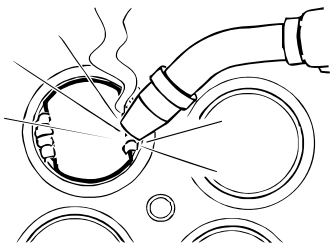
P0007000

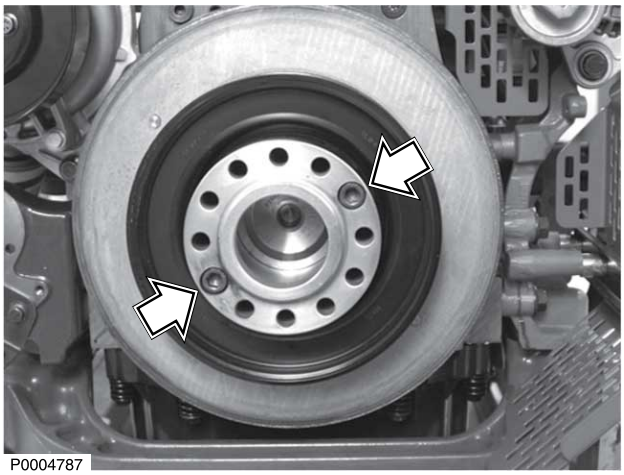
1 The valve seats must be changed if a satisfactory seal cannot be obtained or when the distance (**A**) exceeds the value stated in the specification; refer to *Technical Data, page 31*.


P0007001

2 Grind the head off an old valve and weld it onto the valve seat. Use a MAG welder, or a conventional arc welder (with a stainless welding electrode).

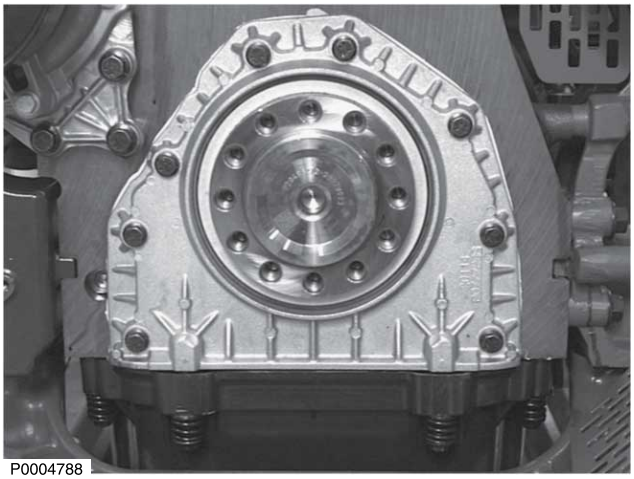
IMPORTANT!
Carefully cover the other surfaces on the cylinder head to prevent any weld spatter from fastening.


P0007002


P0004787

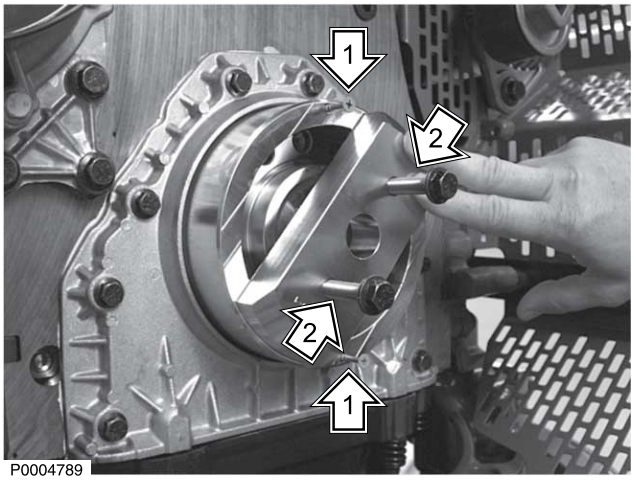
10 **NOTICE!** The inner belt pulley / vibration damper is heavy. Handle with care.

Remove the two bolts to the hub and belt pulley.


P0004788

11 Remove the hub and outer and inner belt pulley / vibration damper.

Alternative 1, seal removal



P0004789

12 Fit tool 88800021 Drift.

13 Drill two holes Ø3.5 mm in the seal with the aid of the guide hole in the tool. Bush grease on the drill to prevent dirt from getting into the engine.

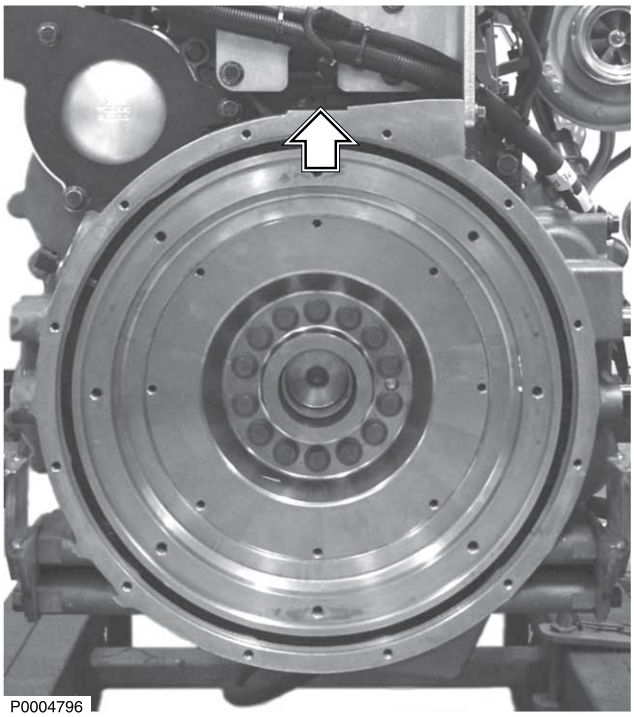
14 Screw in two suitable sheet metal screws (**1**), length approx. 50 mm, through the holes in the tool, so that they fasten firmly in the seal.

15 Fit two long-threaded M10x60 bolts (**2**) and screw them in until the seal releases.

Crankshaft Seal, Change (rear)

Tools:
9990166 Mounting tool
9990192 Puller
9996400 Slide hammer

Removal


P0004796

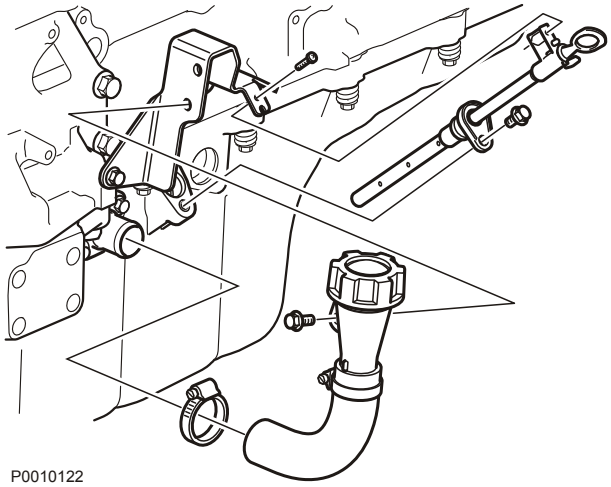
1 Remove the flywheel sensor.

22-1 Oil pump and Line

Lubrication Oil Pump, Change

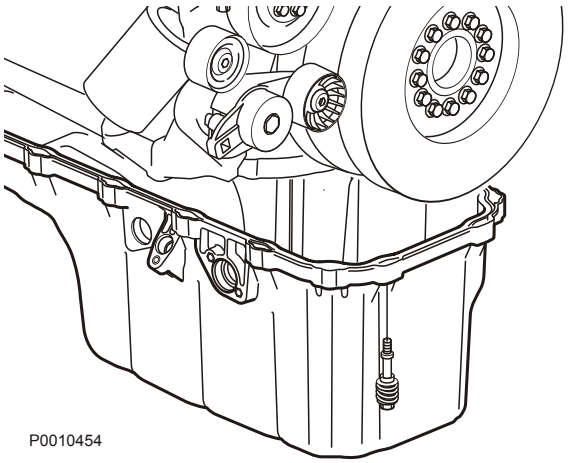
Engine oil drained.

Removal



P0010122

1 Remove the oil filler with attachment and the oil dipstick.
Remove the oil level sensor connector.



P0010454

2 Remove the oil sump bolts and remove the sump.

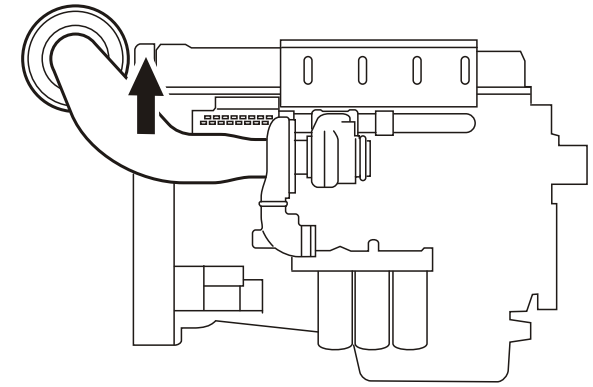
3 Remove the oil filters.

22-3 Oil cooler

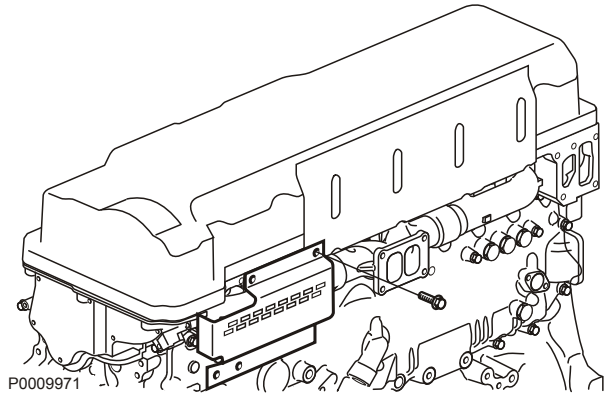
Oil Cooler, Replace

Coolant drained.

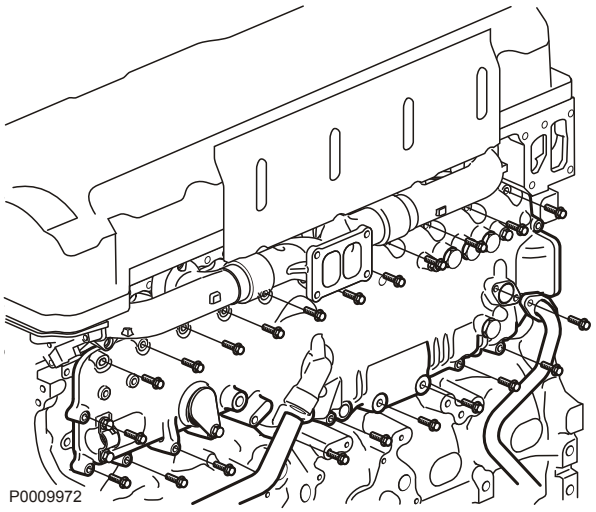
Removal


P0009970

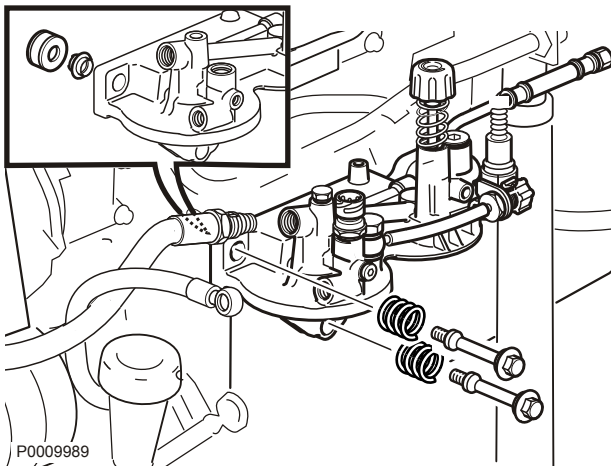
1 Remove the pipe between the air cleaner and the turbocharger.


P0009971

2 Remove the heat shield.

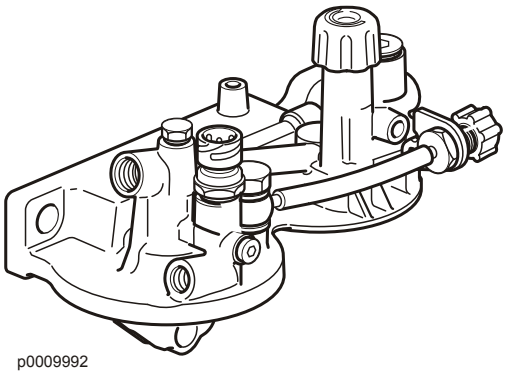

P0009972

3 Remove the oil pipe to the oil cooler. Remove the coolant drain pipe.
Remove the thermostat housing bolts. One of the rear bolts is saved until last.
One bolt behind the water pump must remain in place in the cover when the former is removed.
Carefully prise the cover away from the engine block. Lift the cover and oil cooler away to the rear.

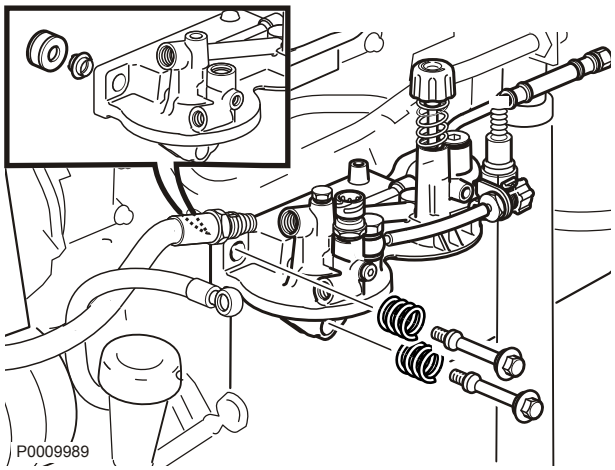


6 Remove the two remaining bracket bolts. Retain the rubber bushings located behind the bracket. Lift away the bracket.

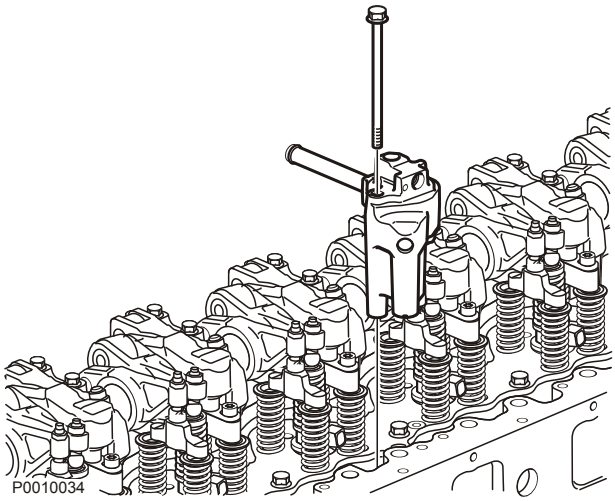
Installation



7 Move over any parts that are to be reused to the new bracket.

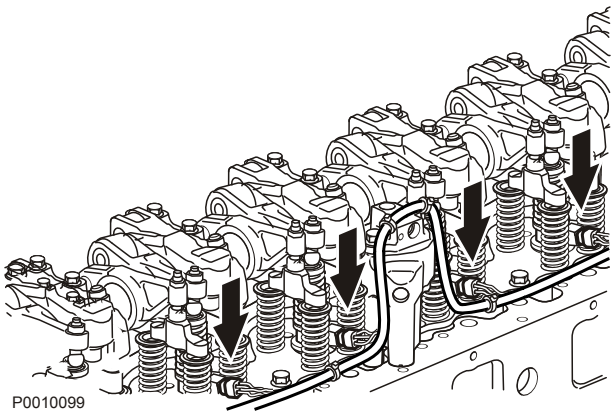


8 Install two retaining bolts and the rubber bushings to the bracket (the lower one and the front one).

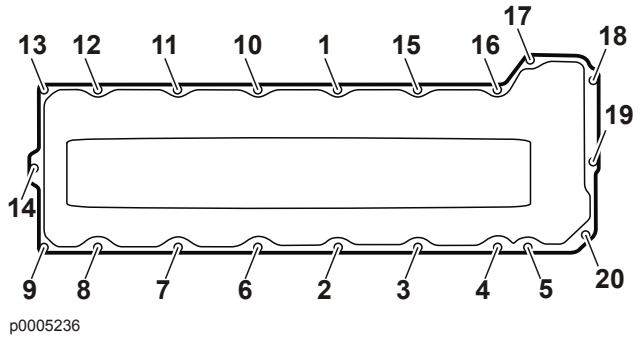


18 Install the valve and rocker arm lubrication oil pipe with new seals.

19 Adjust the valves and unit injectors; refer to *Valves and Unit Injectors, Adjustment, page 142*.



20 Install the connectors to the unit injectors and oil valve. Clamp the wire harness under the valve cover with original cable ties (heat and oil resistant).



21 Install the valve cover. Replace gasket as necessary. Tighten according to *Special Tightening Torques, page 12*.

22 Vent the fuel system; refer to *Fuel system, bleeding, page 214*.

Sleeve for unit injector, replace

Unit injector removed

Tools:
9998251 Protection plug
9998250 Sealing ring
9998580 Protective sleeve
9998599 Cleaning kit
9996049 Draining hose
88800513 Drift
9986173 Puller
88800196 Drift

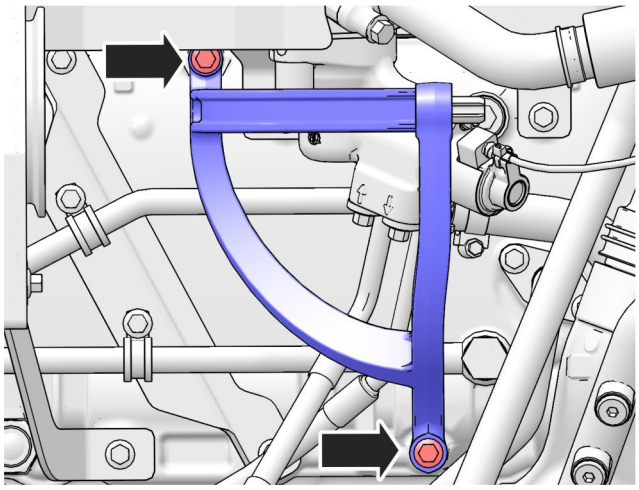
25-0 Inlet and Exhaust System, General

Charge Air Pipe, Leakage Check

1 Inspect the charge air pipes for visible cracks and external damage.

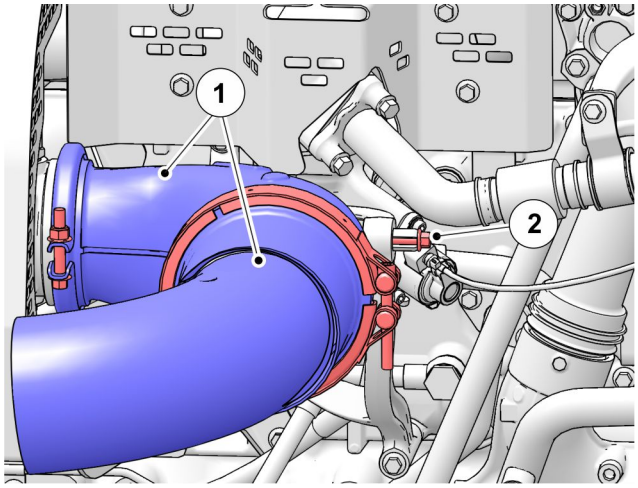
2 Check that there is no oil in the charge air pipes. If the pipes are damaged or the union seal rings leak, the charge pressure will be too low and engine performance will be affected. If the pipes are contaminated with oil on the inside, this indicates oil leakage in the turbocharger turbine shaft seal. In this case, the turbocharger should be changed as a unit.

NOTICE! If there is any oil in the charge air pipes and charge air hoses, the charge air cooler and all pipes and hoses in the charge air system must be cleaned very carefully before the engine is started.



P0019068

12 Install the support bracket.



P0019069

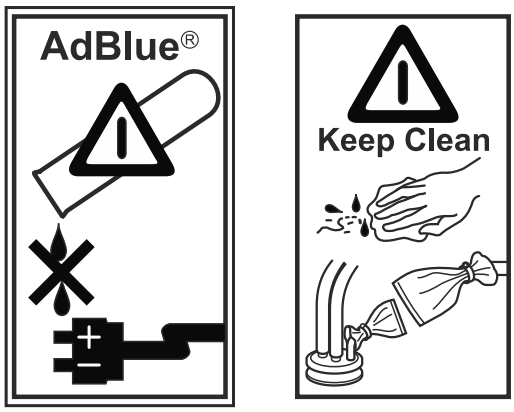
13 Install the exhaust elbow and pipe elbow (1).
Tighten the attachment bolts (2).
Install the clamps and fasten them.

14 Turn on the main switch.

15 Check that no leakage occurs.

16 If there is exhaust leakage from the control valve, repeat valve torque tightening steps 3-5 and carry out follow-up checks.

25-8 Emission After-Treatment



P0011697

Repair instructions

TAD1360VE, TAD1361VE, TAD1362VE, TAD1363VE, TAD1364VE, TAD1365VE, TAD1371VE, TAD1372VE, TAD1373VE, TAD1374VE, TAD1375VE

NOTICE! Because the illustrations in the maintenance literature are used for different engine variants, certain details may vary compared to the actual model concerned. The essential information in the illustrations is always correct, however.

IMPORTANT!

AdBlue/DEF and urea solutions cause corrosion damage. Do not remove AdBlue/DEF hoses, urea hoses or electrical wiring during normal service or when moving a component. Tools that have come into contact with AdBlue/DEF or urea solution must be cleaned.

⚠ CAUTION!

Gloves must be changed. Take off contaminated clothes.

⚠ WARNING!

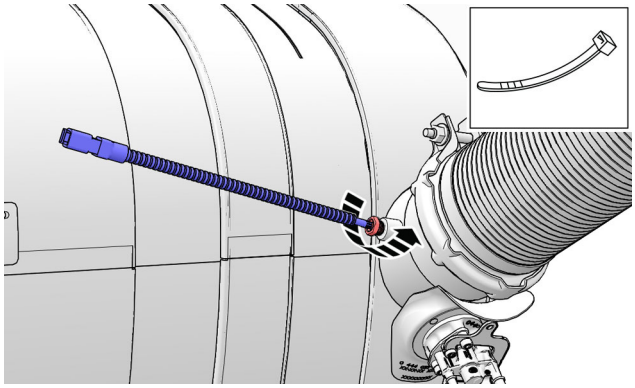
In the case of any contact with eyes or skin the affected area must be thoroughly rinsed with lukewarm water. If you inhale any fumes, make sure you breathe fresh air.

NOTICE! Always plug AdBlue/DEF and urea hoses in order to avoid dirt in the AdBlue/DEF system, and any crystallization of AdBlue/DEF.

NOTICE! Clean the AdBlue/DEF system before any type of work is done to avoid dirt.

IMPORTANT!

Fluids other than AdBlue/DEF (such as diesel) and that are not approved by Volvo, will cause a breakdown of the exhaust aftertreatment system.



P0019383

Exhaust Temperature Sensor, Change

TAD1360VE, TAD1361VE, TAD1362VE, TAD1363VE, TAD1364VE, TAD1365VE, TAD1371VE, TAD1372VE, TAD1373VE, TAD1374VE, TAD1375VE

1 Disconnect the battery negative terminal.

2 Remove the cable ties.

3 Disconnect the connector.

4 Disconnect and remove the temperature sensor.

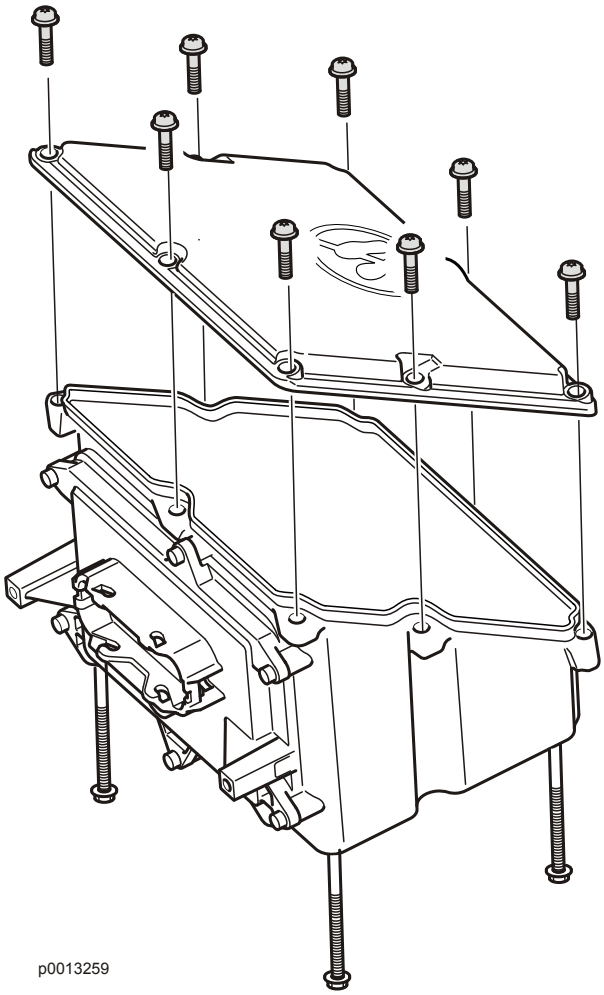
5 Screw in a new temperature sensor.

6 Connect the connector. Attach new cable ties.

7 Reconnect the battery negative terminal.

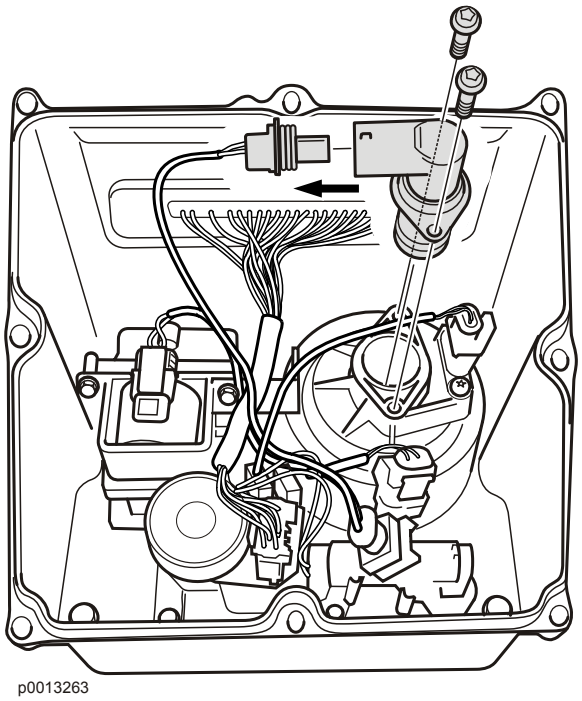
8 Start the engine. Check operation and inspect for leaks.

9 Delete any fault codes.



p0013259

2 Clean around the pump cover.
Remove the pump cover.



p0013263

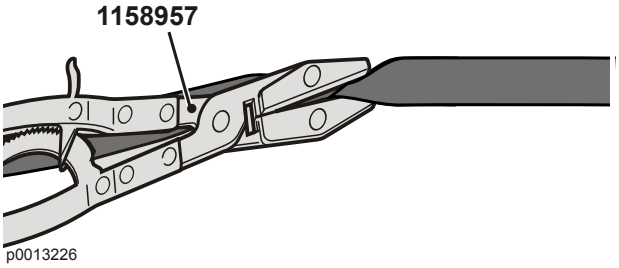
3 Remove the connector and the sensor.

Combined Tank Unit, AdBlue/DEF Tank, Change

TAD1371VE, TAD1372VE, TAD1373VE, TAD1374VE, TAD1375VE

Tools:
1158957 Pliers

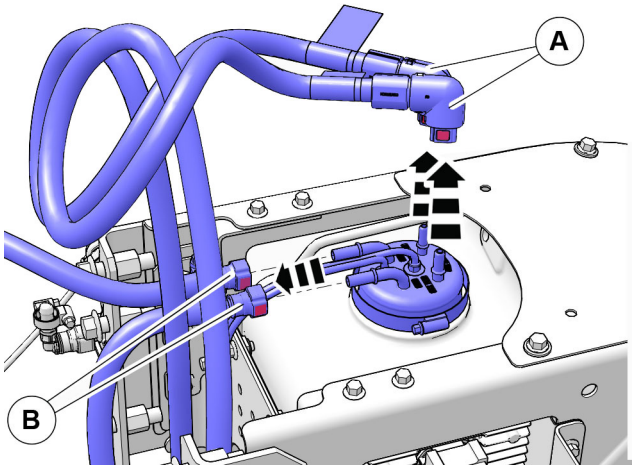
2 Min



p0013226

P0013226

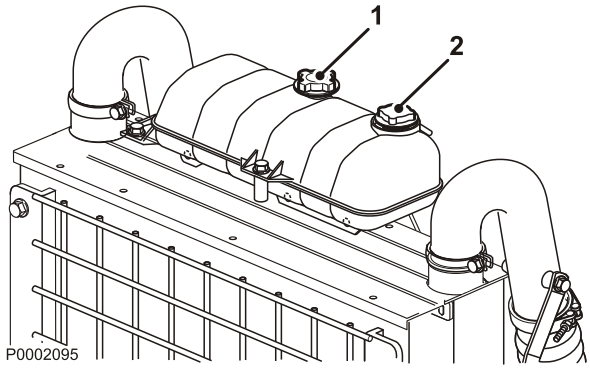
1 **NOTICE!** Wait at least 2 minutes after engine stop to give the automatic drainage function time to complete operations. Make sure the system is depressurized before beginning to remove components.



P0019367

2 Pinch off the coolant hoses (**B**).

3 Remove the hoses. Seal the connectors (**A**) in a plastic bag.



2 Open the filler cap (**1**). Do not open the pressure cap (**2**).

3 Fill up with coolant, so that the level is between the MIN and MAX marks.

4 Start the engine when the cooling system has been completely filled and vented. Open any venting taps a short while after starting, to allow trapped air to escape.
If a heating unit is connected to the engine cooling system, the heat control valve should be opened and the installation vented during filling.

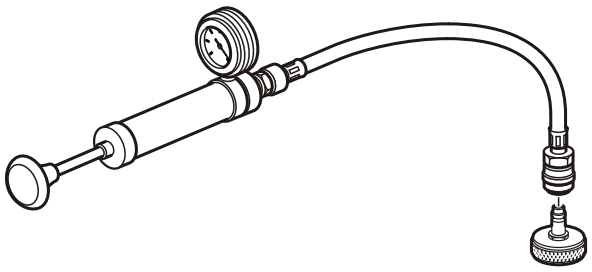
5 Stop the engine after about an hour and check the coolant level. Top up as necessary.

Cooling System, Pressure Testing

Alternative 1

⚠ WARNING!
Do not open the coolant filler cap when the engine is hot. Steam or hot fluid could spray out, causing severe burns.

Tools:
3849613 Pressure testing kit



1 Check that all hoses and clamps are undamaged and intact.

2 Check the coolant level in the expansion tank.

3 Replace the filler cap on the expansion tank with a suitable cover from 3849613 Pressure testing kit.

4 Connect the pump and pump up a pressure of 70 kPa (0.7 bar).

5 Pressure must not drop for a **two minute** test period, for the cooling system to be regarded as being free from leakage.

6 Release the excess pressure and remove the pressure testing unit.

7 Check the coolant level in the expansion tank. Install the regular filler cap.

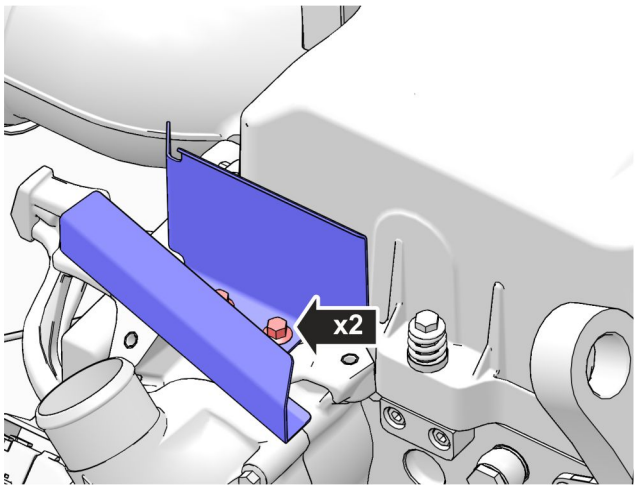
8 Start the engine and check that no leakage occurs.

Alternative 2

⚠ WARNING!
Do not open the coolant filler cap when the engine is hot. Steam or hot fluid could spray out, causing severe burns.

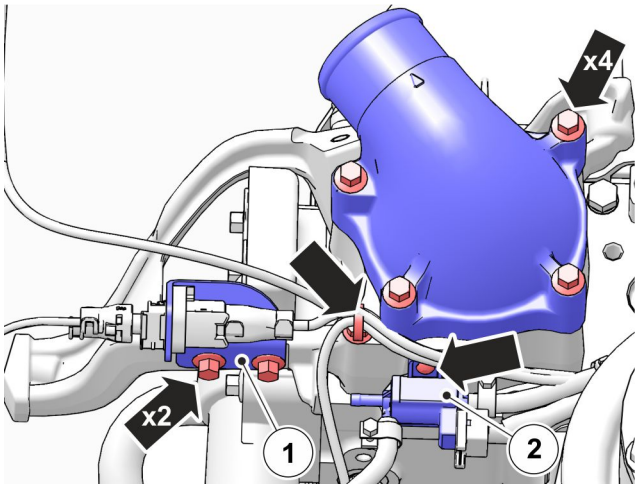
Tools:
9996441 Cover, with connecting nipple
9996662 Pressure testing kit

1 Check that all hoses and clamps are undamaged and intact.



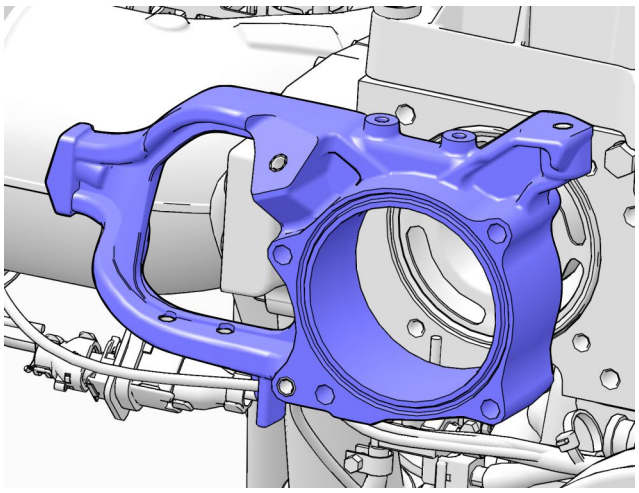
P0019089

6 Remove the EGR pipe heat shield.



P0019090

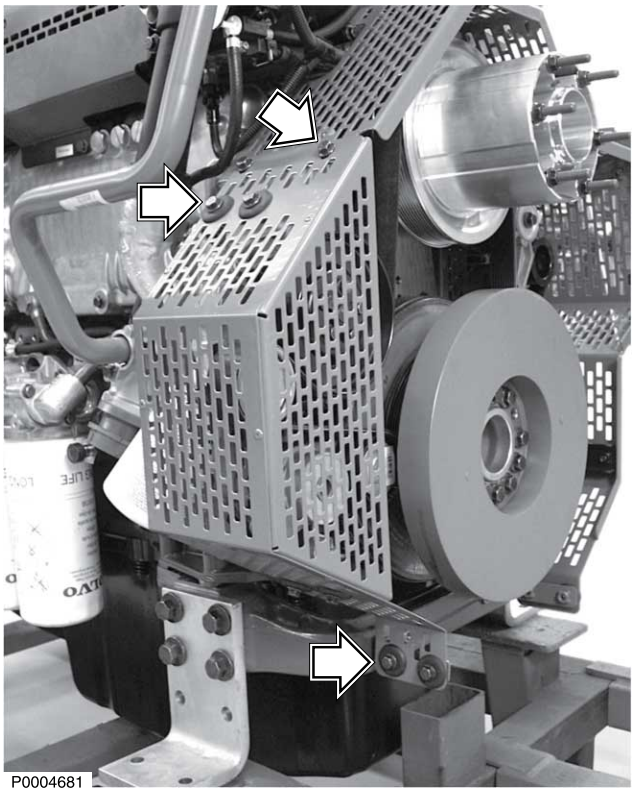
7 Remove the cable tie.
Undo the harness terminal (1) bracket.
Undo the wastegate valve (2).
Remove the thermostat housing cover.



P0019091

8 Remove the EGR pipe bracket.

26-3 Fan, Fan Shroud


P0004681

Belt Guard

Right belt guard

1 **Removal:** Undo and remove the bolts. Remove the guard.

2 **Installation:** Install the guard and the bolts. Tighten the bolts.

IMPORTANT!

Never lay the fan down. Oil will run out that cannot run back, which will result in the fan seizing.