VOLVO

Construction Equipment

Service Information

Document Title:	Function Group:	Information Type:	Date:
Basic check, Engine	**210**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Basic check, Engine

NOTE!

Certain tests and checks are performed with unlocked safety locking lever. Make sure that the machine cannot operate unexpectedly when the safety locking lever is unlocked.

Purpose of the basic check

The purpose of the basic check is to provide fast and accurate information about the general condition of the engine.

The basic check should be performed and evaluated according to instructions in the PC-tool VCADS Pro.

Tests included in the basic check

The basic check which is divided into the following tests should be performed after **reading out error codes and checking parameters**.

Tests:

1. **Cylinder compression, test**
   The purpose of the test is to show if any cylinder has a deviating compression pressure. The test replaces the old pressure check method but does not give any absolute values.
2. **Cylinder balancing, test**
   The purpose of the test is to show if there is any deviation in the fuel injection to a cylinder.
3. **Feed pressure, test**
   The purpose of the test is to check that the feed pressure is as per specification.
4. **Sensor, test**
   The purpose of the test is to check the function of all sensors.

Document Title:	Function Group:	Information Type:	Date:
Troubleshooting	**210**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Troubleshooting

General about troubleshooting

When a malfunction is suspected or has been confirmed, it is important to identify the cause as soon as possible.

The starting point for all troubleshooting is that there is some type of trouble symptom or malfunction.

Malfunctions can be indicated by:

- generation of error codes
- detection of a malfunction symptom.

Troubleshooting work

The first step in troubleshooting is to gather information from the operator concerning the malfunction symptoms, see Electrical and information system, Collection of basic data. Then, attempt to pin-point the cause by checking in a certain order, for more information, see Electrical and information system, troubleshooting strategy.
The different checking steps are:

- Check error codes
- Check parameters
- Perform basic check

Troubleshooting information

The following is included in Electrical and information system and is used when troubleshooting:

1. **Troubleshooting strategy**
   Describes troubleshooting work, step by step.
2. **Troubleshooting, assistive devices**
   Brief summary of the assistive devices that are available for troubleshooting.
3. **Functional checks and tests, VCADS Pro**
   Brief description of VCADS Pro. For a detailed description, see VCADS Pro User's Manual.
4. **Error code information**
   Contains information regarding error code design, lists of all error codes and error code information about each error code.
5. **Components, troubleshooting and specifications**
   Contains methods and measuring values for troubleshooting of components. Also includes wiring diagrams and certain specifications.
6. **Parameters**
   Incorrectly set parameters may cause malfunction symptoms. The parameter list includes all limit and command values for parameters.
7. **Control units, functional description**
   Describes the functions of the control units, inputs and outputs as well as communication between the various control units.
8. **Control units, active and passive measuring**
   Contains measuring values for active and passive measuring of the ECUs.
9. **Software functions**
   Describes the pre-requisite conditions for the control and monitoring functions that are performed by the software in the ECUs.

Document Title:	Function Group:	Information Type:	Date:
Cylinder head, description	**211**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Cylinder head, description

The cylinder head is made of grey cast iron and is common for all cylinders. The induction air enters vertically (A) and the exhausts leave horizontally (B). Inlets and exhaust outlets are located on the same side of the cylinder block. Inlet and exhaust valve size is increased to optimize the gas exchange and combustion process. Valve guides are replaceable. Coolant flow in the cylinder head is modified to accommodate an outlet controlled cooling system.
On order for the engine to fulfill governing emission standards, there are 3 cylinder head gaskets of different thicknesses between the cylinder head and the piston.

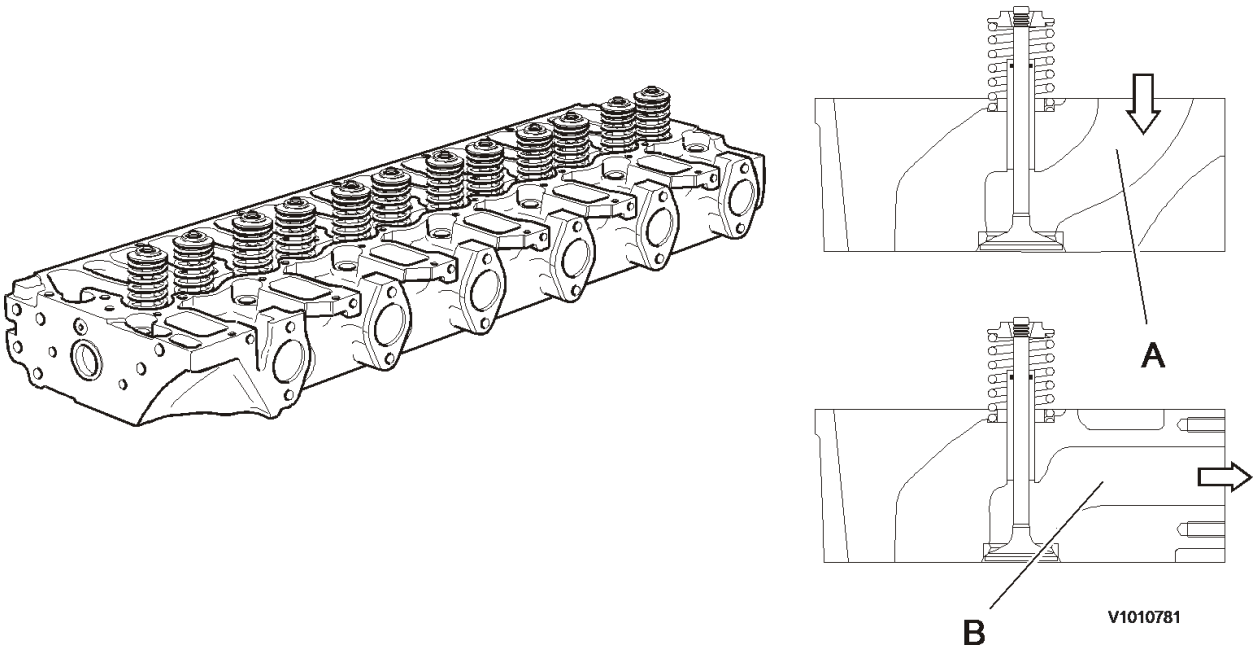

Figure 1

Document Title: **Cylinder head gasket, description**	Function Group: **211**	Information Type: **Service Information**	Date: **2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Cylinder head gasket, description

The cylinder head gasket is a multi layered gasket with 1, 2 or 3 identification holes to indicate three different thicknesses available. Selection of the proper thickness of gasket is determined by the measurement of piston projection above the cylinder block sealing surface. Recalibration for the correct gasket thickness would be required if new pistons or a new cylinder block were installed.

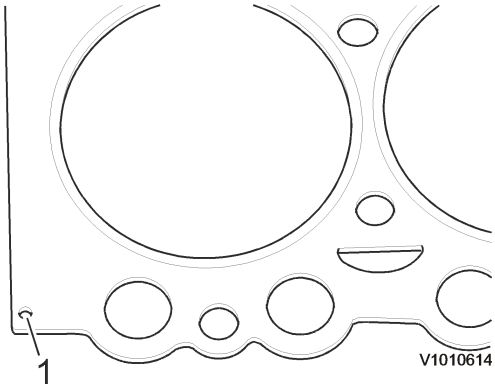

Figure 1

1. Cylinder head gasket, marking

Document Title:	Function Group:	Information Type:	Date:
Cylinder liner, description	**213**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Cylinder liner, description

The engine has a cylinder block with wet (replaceable) cylinder liners. The bottom part of the liner is sealed against the cylinder block with two O-rings positioned in grooves machined into the lower end of the liner.
The upper part of the cylinder liner is sealed by the cylinder head gasket and the pressure created by the cylinder head clamping force against liner protrusion.

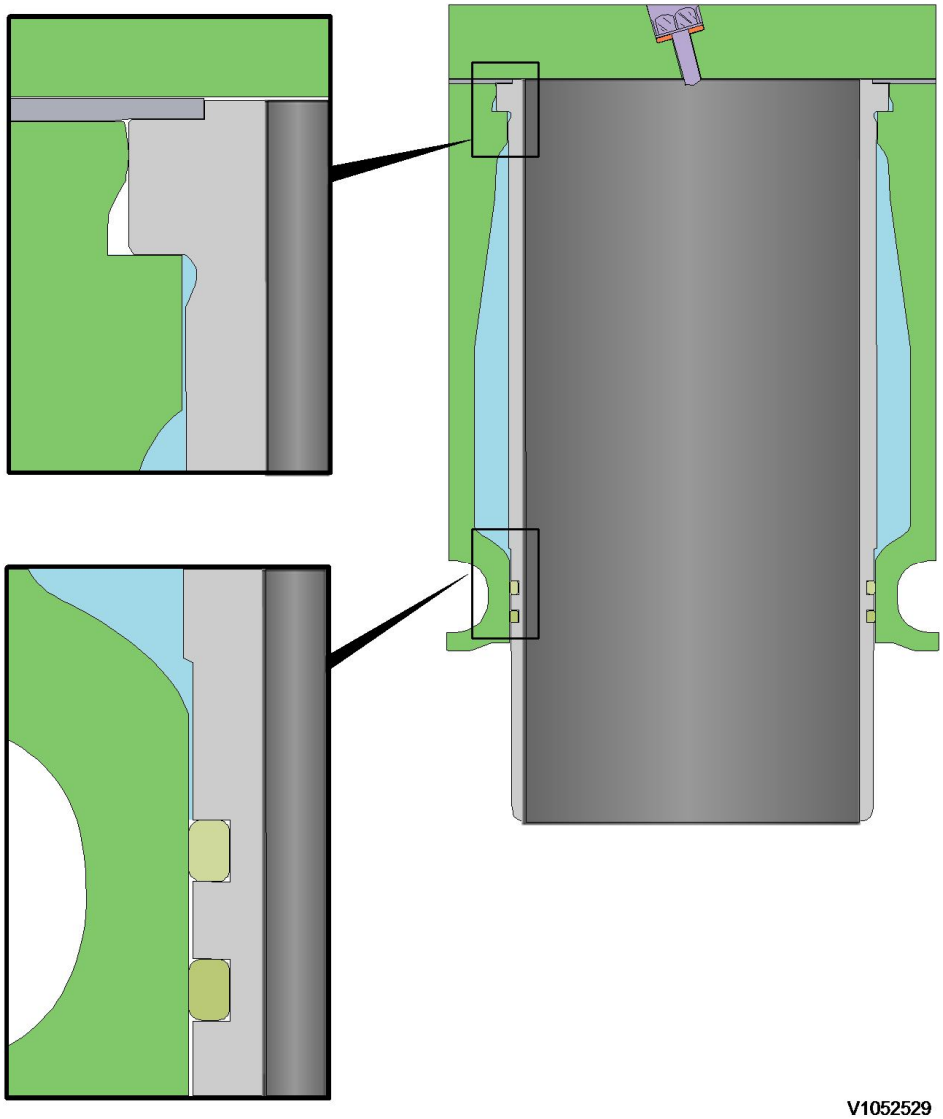

Figure 1
Cylinder liner

Document Title:	Function Group:	Information Type:	Date:
Pistons, description	**213**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Pistons, description

The pistons of the engine are made of special alloy aluminium.
The top of the piston has a combustion cavity and a flywheel symbol to indicate the correct piston orientation.

Piston cooling is by oil spray to the inside of the piston from nozzles located in the main bearing pedestals.

The pistons are provided with three piston rings, two compression rings and one oil control ring.
The first or top compression ring has a cast iron carrier. The cross-section area for the second compression ring is tapered. The third ring is an oil ring with a bevelled edge.

When installing the piston rings, the marking TOP by the opening in the rings must be face up.

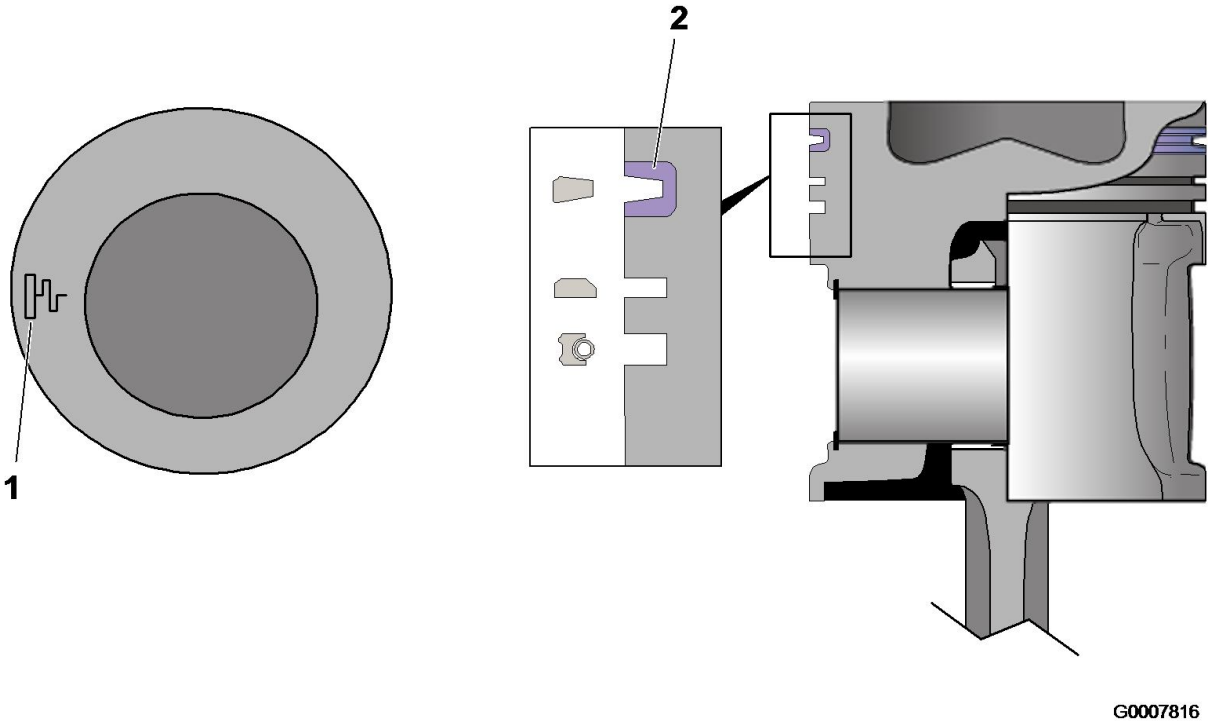

Figure 1

1. Flywheel symbol
2. Iron carrier

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Document Title:	Function Group:	Information Type:	Date:
Piston rings, description	**213**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Piston rings, description

Each piston is equipped with two compression rings and one oil ring. The uppermost compression ring is of the "Keystone" type (dual trapezoid-formed cross section). Compressions rings should be placed with the text facing upwards.
The oil ring is equipped with two scraping edges, which are pressed against the cylinder wall using the spring tension in the ring and an expander spring placed on the inside of the ring. The oil ring can be placed on either side but should be placed with expander spring and oil ring openings 180° from one another.

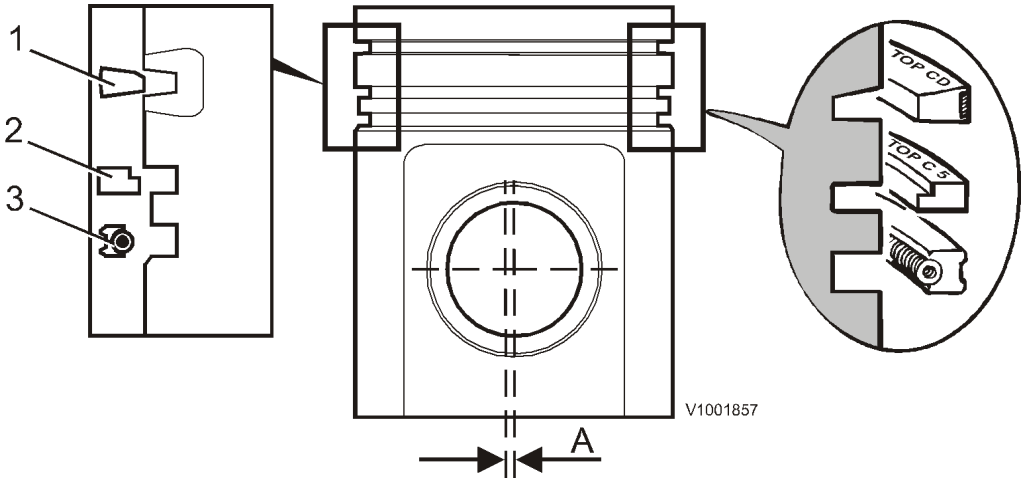

Figure 1

Document Title:	Function Group:	Information Type:	Date:
Piston cooling	**213**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Piston cooling

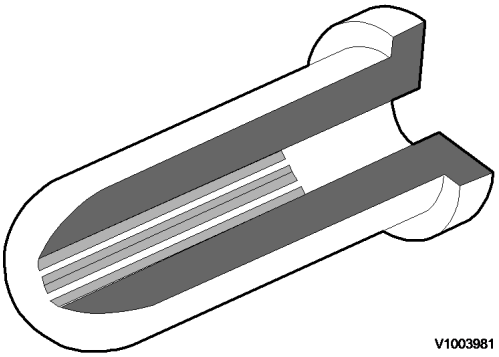

Figure 1
Piston cooling

The piston is cooled by spraying lube oil against the inside of the piston top.

The 2-hole piston cooling nozzles made of plastic are fitted in the main bearing pedestals.

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Document Title:	Function Group:	Information Type:	Date:
Valves, description	**214**	**Service Information**	**2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Valves, description

The engines are equipped with one inlet and one exhaust valve per cylinder.
At the upper end of the valve guide, there is an O-ring seal (A) against the valve spindle to prevent major oil consumption and to reduce the amount of hydrocarbons in the exhausts.
The valves are rotated by the eccentric action of the rocker arms.
The new compressed tapered shape enables the valves to turn easily despite loading.
Rocker arm lubrication is part of the engine force-feed lubrication system. The oil is supplied via the tappets and push rods.
If the valve guides are replaced, they are obtained in another version (B) to facilitate installation.
Figure 1 shows a valve guide installed in production and figure 2 shows a replacement guide.

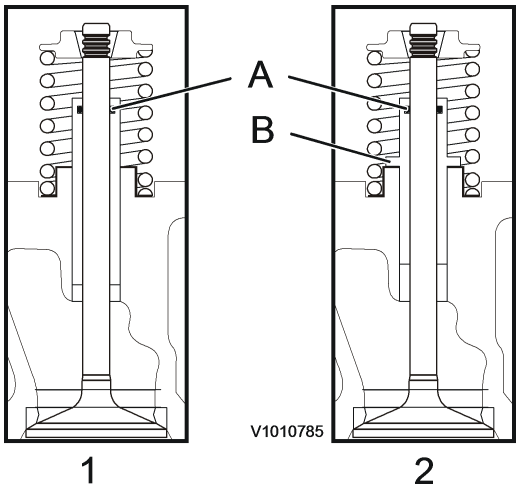


Figure 1

Document Title: **Internal Exhaust Gas Recirculation (IEGR), description**	Function Group: **214**	Information Type: **Service Information**	Date: **2014/8/12**
Profile: **EXC, EC240B LC [GB]**			

Internal Exhaust Gas Recirculation (IEGR), description

A system for IEGR (**I**nternal **E**xhaust **G**as **R**ecirculation) is used as part of V-ACT (Volvo Advanced Combustion Technology). On D6E and D7E this takes place by an IEGR-opening piston, controlled by the lubrication oil's system pressure, acting on the exhaust rocker arm which enables a second opening of the exhaust valves. When activated, the secondary piston will give a limited valve opening of the exhaust valves during the induction phase, which leads exhausts back into the cylinder.

Included components

IEGR-unit

The hydraulic mechanism is housed in two interconnected IEGR-units, located on the rocker arm holders. Lubrication oil is routed from the cylinder head via the solenoid valve to the high-pressure channel in the IEGR-unit through a channel in one of the rocker arm holders.

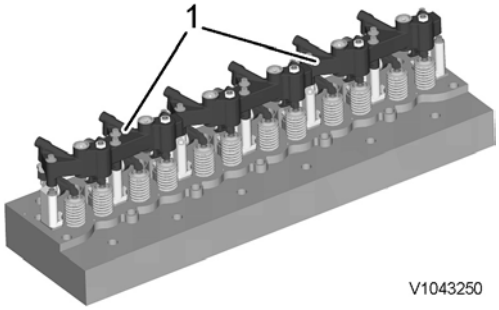
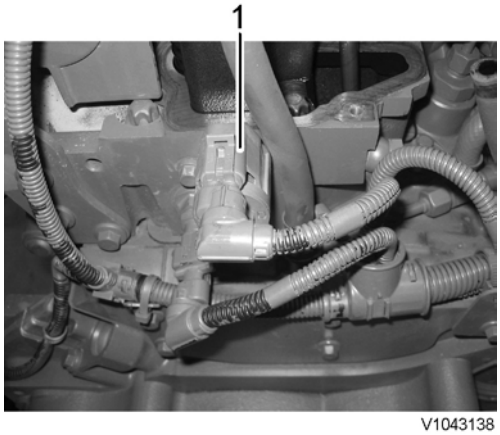


Figure 1

1. IEGR-unit

Solenoid valve

The solenoid valve is located in the cylinder head on the flywheel side and is activated by the EECU via the control system EMS 2. When IEGR is not activated, the solenoid valve is closed and no oil flow is allowed into the IEGR-unit. At activation of IEGR, the solenoid valve opens the channel from the engine's lubrication system to the IEGR-unit.



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