

Document Title: <b>Internal Exhaust Gas Recirculation description</b>	Function Group: <b>214</b>	Information Type: <b>Service Information</b>	Date: <b>2014/10/29</b>
Profile: <b>EXC, EC290C L [GB]</b>			

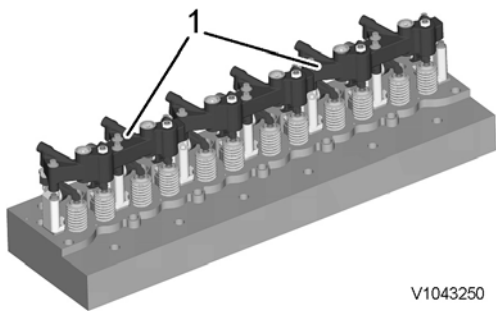
## Internal Exhaust Gas Recirculation (IEGR), description

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.

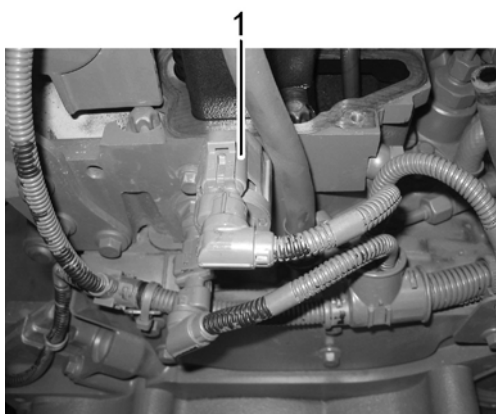


**Figure 1**

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.

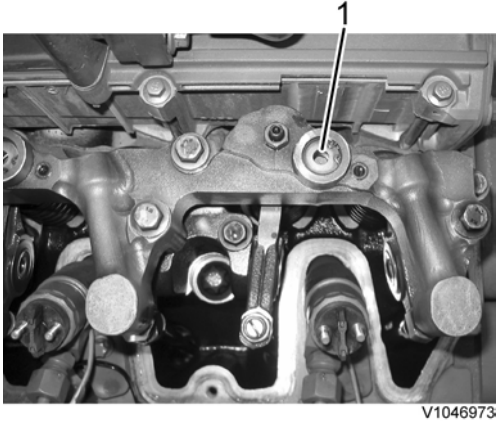


**Figure 2**

1. Solenoid valve

**Control valve**

The control valve is located in the IEGR-unit between the high-pressure circuit and low-pressure circuit. When the low-pressure circuit is supplied from the lubrication oil system, the control valve is lifted and closes the high-pressure circuit. The ball in the control valve enables filling of the high-pressure circuit when IEGR is activated. The lubrication oil is drained through the control valve.

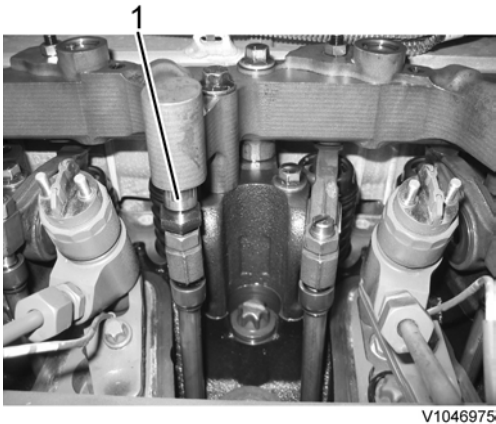


**Figure 3**

1. Control valve

**Main piston**

The main piston is acted on by the adjusting screw on the inlet valve's rocker arm, and affects the oil pressure in the IEGR-unit's high-pressure channel. At the end of the IEGR-phase, a pressure of 100 bar is generated in the high-pressure circuit.

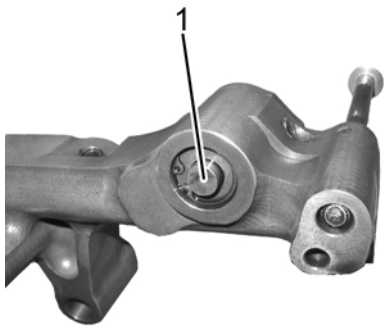


**Figure 4**

1. Main piston

**Servo piston**

The servo piston is activated by the hydraulic pressure from the main piston via a channel in the IEGR-unit when the IEGR-function is active/on (solenoid valve in open position). Then the servo piston opens the exhaust valves via the rocker arm an extra time during the induction stroke.



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**Figure 5**

1. Servo piston

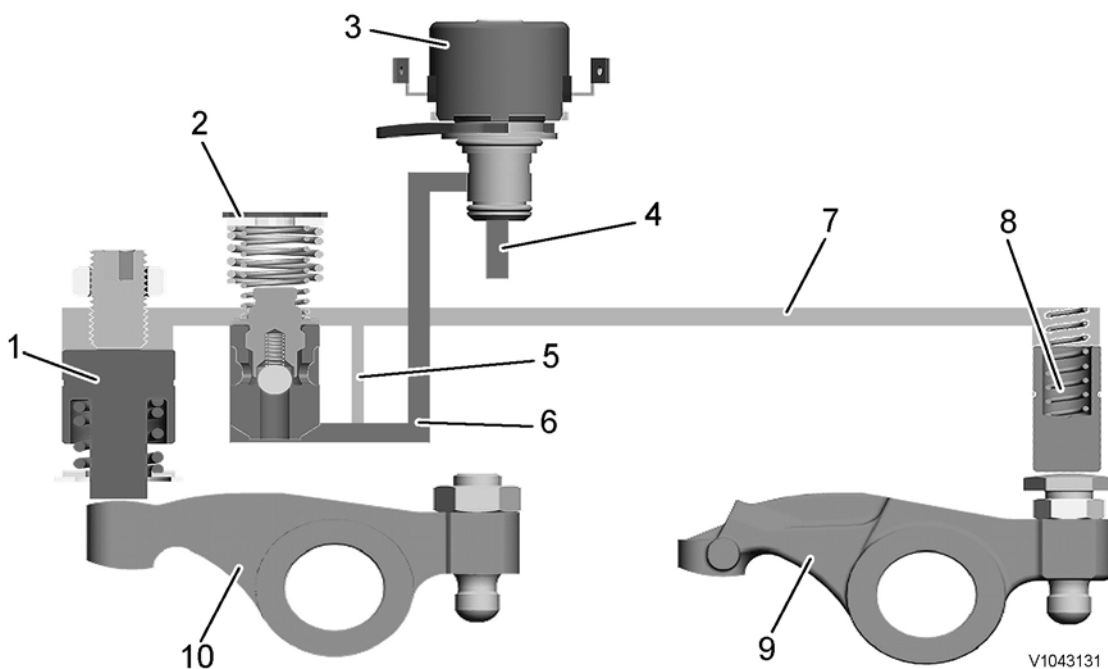
**Function**

IEGR is activated by the system being supplied with full lubrication oil system pressure via the solenoid valve. The solenoid valve is activated by the E-ECU.

The control valve closes the high-pressure circuit and the ball inside the valve enables filling of the system.

With the same movement as the inlet valve's rocker arm opens the valve, the main piston is forced upward. The pressure in the IEGR-unit's high-pressure channel (up to 100 bar) overcomes the spring force in the servo piston. The servo piston forces down the rocker arm, which results in the exhaust valve being open for a short time at the end of the induction stroke.

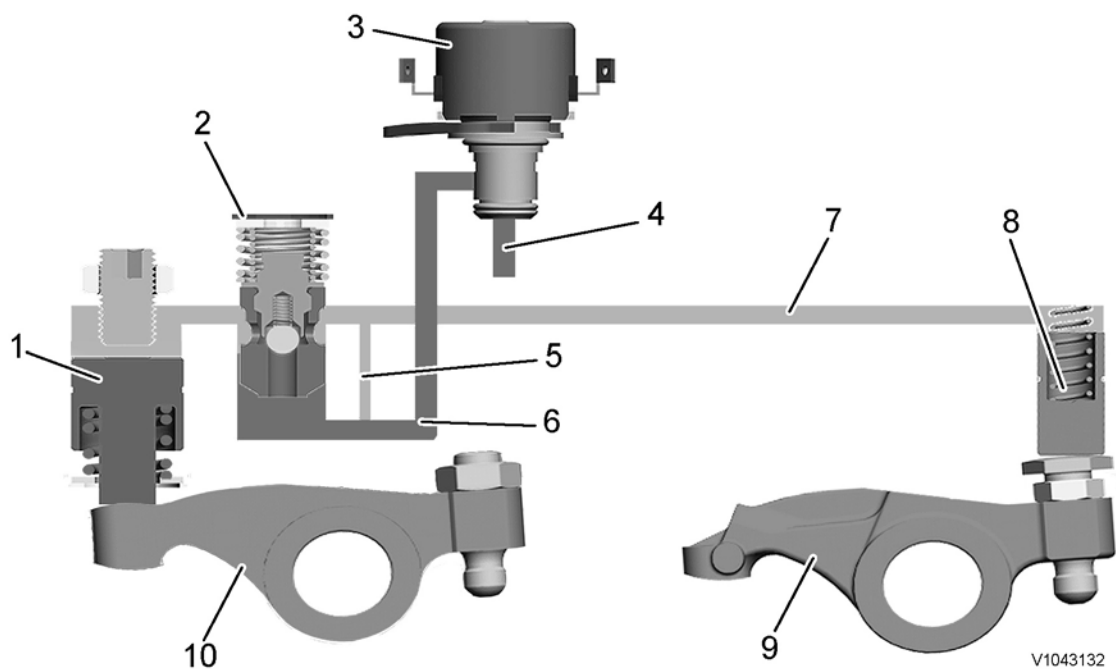
Exhausts from the exhaust manifold are sucked into the cylinder by vacuum from the other cylinders. The breather hole between the low-pressure channel and the high-pressure channel in the IEGR-unit enables longer exhaust recirculation at high engine speed.



**Figure 6**  
**IEGR-system (inactive)**

1. Servo piston
2. Control valve
3. Solenoid valve
4. 2–5 Bar lubrication oil pressure
5. Breather hole
6. Oil channel, low-pressure

7. Oil channel, high-pressure
8. Main piston
9. Induction rocker arm
10. Exhaust rocker arm



**Figure 7**  
**IEGR-system activated**

1. Servo piston
2. Control valve
3. Solenoid valve
4. 2–5 Bar lubrication oil pressure
5. Breather hole
6. Oil channel, low-pressure
7. Oil channel, high-pressure
8. Main piston
9. Induction rocker arm
10. Exhaust rocker arm

#### Checking and adjusting

Checking and adjusting of the IEGR-opening piston's clearance against the exhaust rocker arm should be done in connection with checking and adjusting valves according to [214 Valves, adjusting](#).

#### Software

The function monitors the EGR valve for return of combustion gases and informs the operator if the function is not ensured or if there is a system malfunction.

The function is also used as input signal for Engine protection.

Document Title: <b>Valves, adjusting</b>	Function Group: <b>214</b>	Information Type: <b>Service Information</b>	Date: <b>2014/10/29</b>
Profile: <b>EXC, EC290C L [GB]</b>			

## Valves, adjusting

Op nbr 214-012

[9998681 Rotation tool](#)

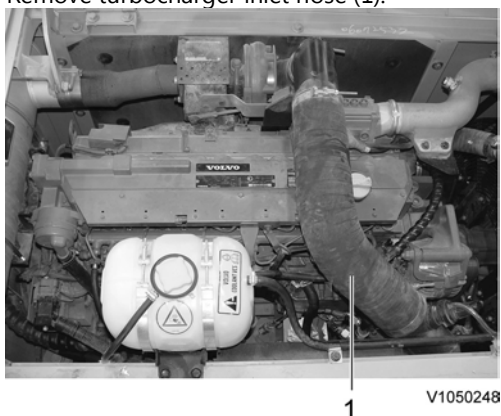
[885812 Timing tool](#)



### **WARNING**

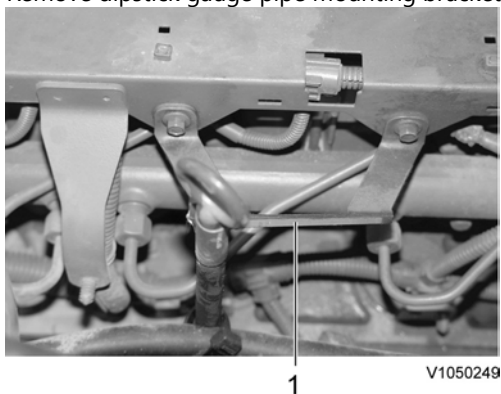
**Risk of burns - stop the diesel engine and allow it to cool down before starting any work.**

1. Place the machine in service position B. See [091 Service positions](#)
2. Open the engine hood.
3. Remove turbocharger inlet hose (1).



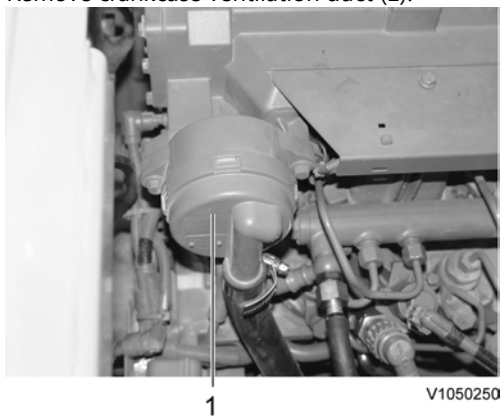
**Figure 1**

4. Remove dipstick gauge pipe mounting bracket (1).



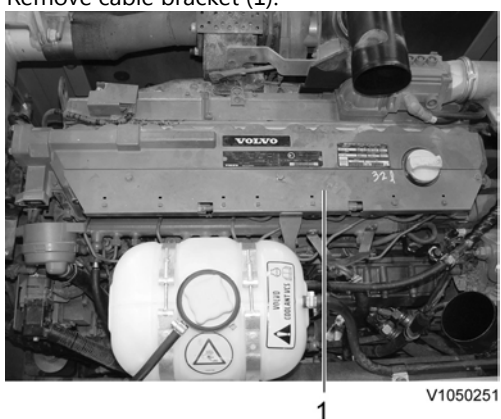
**Figure 2**

5. Remove crankcase ventilation duct (1).



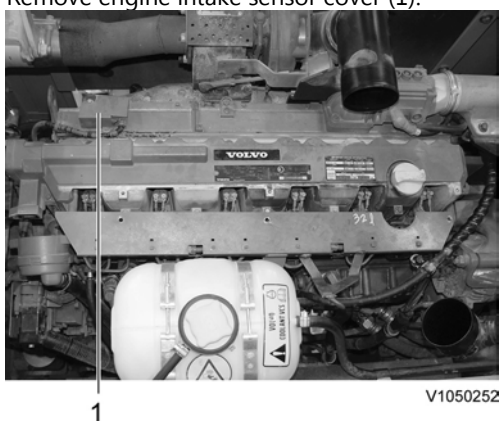
**Figure 3**

6. Remove cable bracket (1).



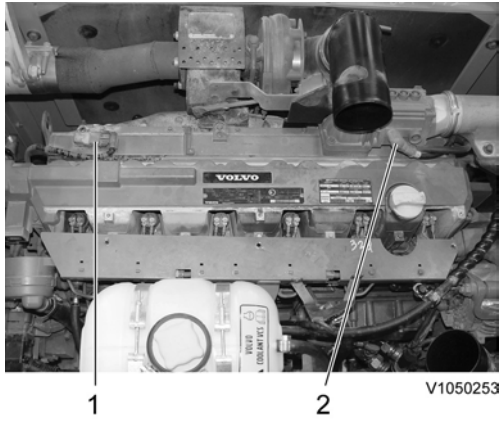
**Figure 4**

7. Remove engine intake sensor cover (1).



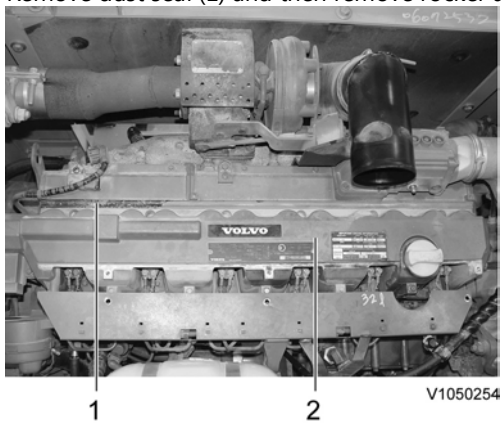
**Figure 5**

8. Disconnect engine intake sensor (1) and preheating coil terminal (2).



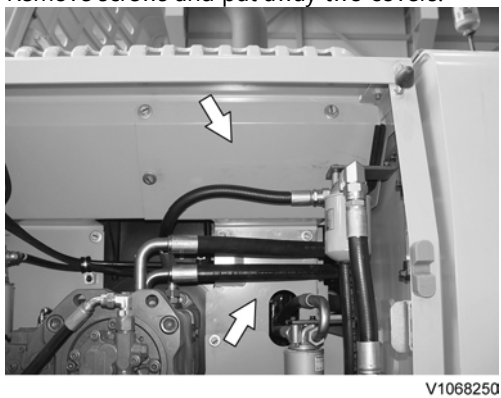
**Figure 6**

9. Remove dust seal (1) and then remove rocker arm cover (2).



**Figure 7**

10. Open the side door on the right side of the machine.
11. Remove screws and put away two covers.

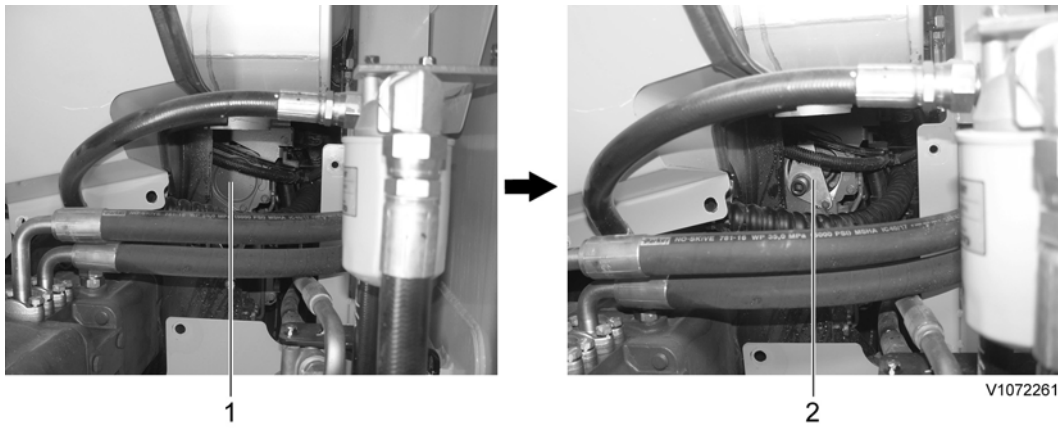


**Figure 8**

12. Remove the camshaft gear cover (1) and install turning gear (2).

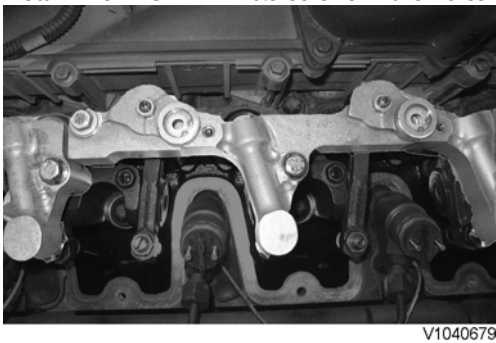
**NOTE!**

The teeth of the turning gear must mesh fully with the teeth of the camshaft gear.



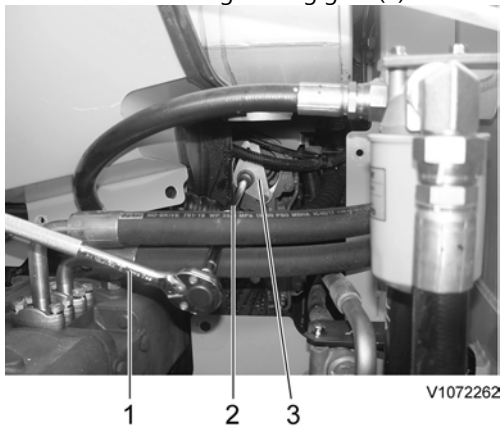
**Figure 9**

13. Remove the IEGR unit. (If installed)  
Install M 8 x 75 mm – 10.9 screws in the holes for the IEGR unit on the rocker arm holders.



**Figure 10**

14. **Setting engine to valve overlap**  
Turn crankshaft using turning gear (3) until the valve overlap of cylinder 1 is reached.

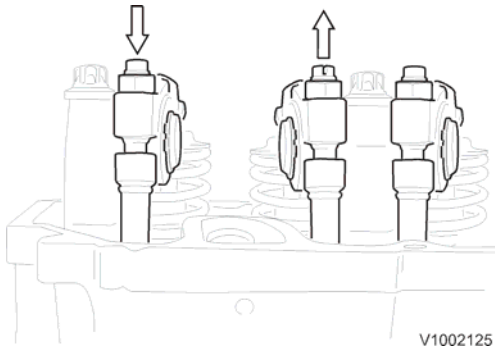


**Figure 11**

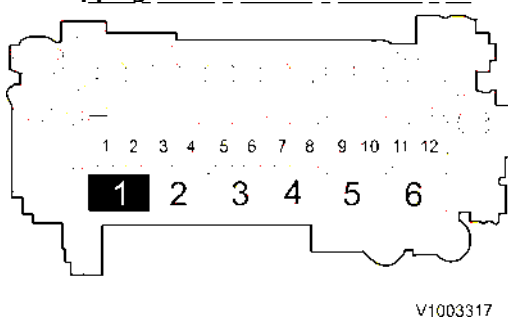
1. Wrench
2. Extension bar
3. Turning gear

Overlapping means that the exhaust valve is about to open and the inlet valve is about to close. It should not be possible to rotate any push rods by hand for the cylinder in question in this position.





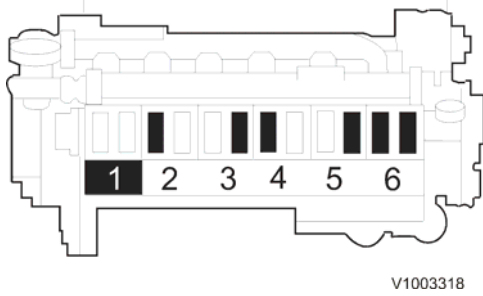
**Figure 12**  
**Overlapping**



**Figure 13**

1, 3, 5, 7, 9 and 11 are exhaust valves  
2, 4, 6, 8, 10 are 12 inlet valves

15. Adjust the valve clearance for each cylinder according to the black markings in the figure. Procedure for adjusting:



**Figure 14**

**Thank you very much for reading.**

**This is part of the demo page.**

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