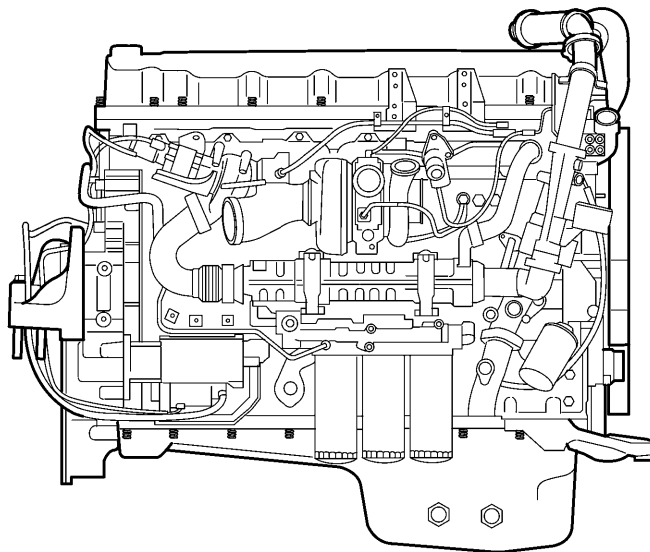


EGR System
Design and Function
D13F

EGR System, Design and Function



W2005779

This information covers design and function of the Exhaust Gas Recirculation (EGR) System on the Volvo D13F engine.

Contents

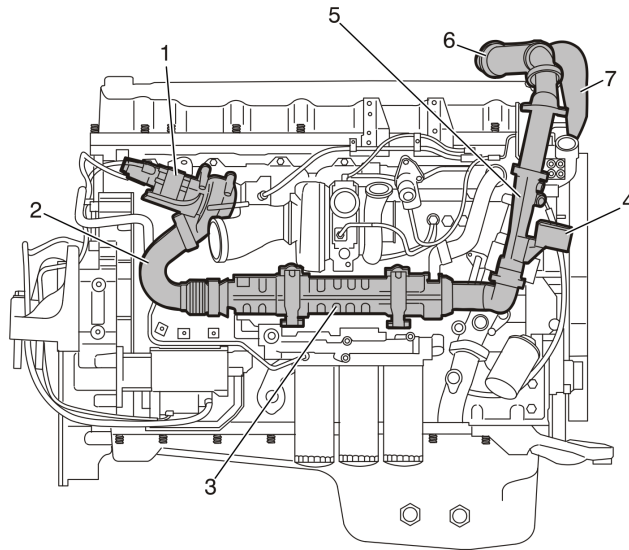
- "Exhaust Gas Recirculation System" page 2

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

Design and Function

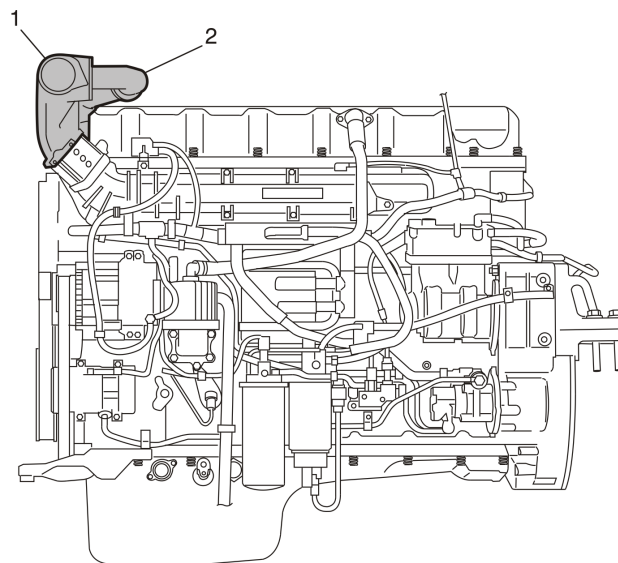
Exhaust Gas Recirculation System

Overview



W2005851

- 1 EGR Valve
- 2 Hot Pipe
- 3 EGR Cooler
- 4 Differential Pressure Sensor
- 5 Venturi Tube
- 6 Crossover Pipe
- 7 EGR Mixer



W2005854

- 1 EGR Mixer
- 2 Crossover Pipe

Nitrous oxide (NOx) emission levels increase with combustion temperature. The primary function of the Exhaust Gas Recirculation (EGR) system is to cool exhaust gas and send it back to the combustion chamber to lower the combustion temperature, thereby reducing NOx.

A portion of the exhaust gas is redirected by an EGR valve (1) from the exhaust manifold into the EGR cooler (2).

Cooled EGR gases flow into the mixing chamber (7), where they mix with intake air that has been cooled through the charge air cooler. From the mixing chamber, the combined EGR gases and intake air flow into the intake manifold.

The amount of recirculated EGR gases is controlled by the EGR valve and depends on differential pressure measured at the EGR venturi tube, engine RPM, engine load and coolant temperature. Maximum EGR flow is used under high engine speed and load conditions.

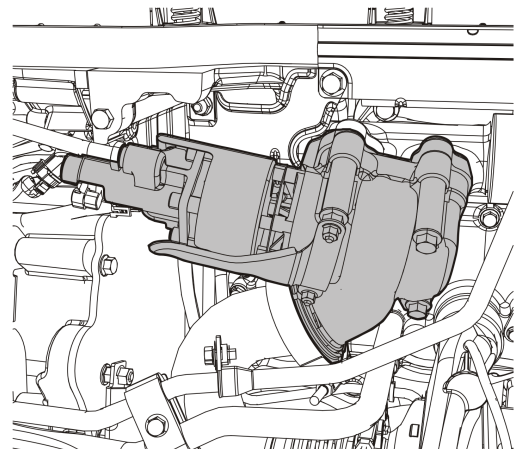
System Components

EGR Valve

The engine uses one EGR valve to control the amount of gases being recirculated. This valve is a poppet-type valve, operated by hydraulic pressure from the engine oil system which meters exhaust gas from the exhaust manifold into the EGR circuit. The hydraulic pressure is controlled by a solenoid within the valve assembly reacting to signals from the engine EECU. An internal spool valve diverts hydraulic fluid, applying pressure to precisely position the EGR poppet valve for control of the exhaust gas circulated through the engine. The poppet valve has two sealing surfaces on a common shaft to draw gases from the exhaust manifold EGR port simultaneously. The EGR valve is cooled by the engine oil lubrication system and has a position sensor to indicate its precise position.

The EGR valve is located on the rear section of the exhaust manifold for reliable response. This location also protects the EGR cooler from exhaust pulses at high pressure, e.g., during engine braking.

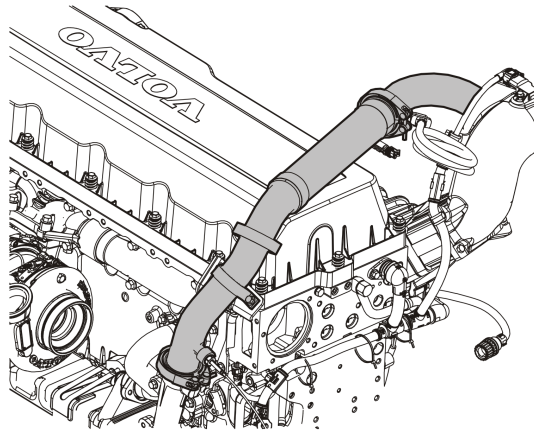
Corrosion occurs in the inlet manifold if exhaust gases are allowed to condense in the manifold. This condensation can produce both internal and external damage. To eliminate this corrosion, the EECU compares engine RPM, torque load, ambient temperature, inlet manifold temperature and EGR demand to calculate the dew point in the inlet manifold. It then adjusts the EGR opening to stay above the dew point. Additionally, surfaces within the inlet manifold and the mixing chamber are treated to resist corrosion.



W2005788

EGR Crossover Tube

The EGR crossover tube along with the venturi outlet and mixer inlet pipes, routes the exhaust gas from the right side of the engine to the EGR mixer on the left side near the inlet manifold. The EGR crossover tube is connected to the outlet end of the EGR cooler by a hose and clamp.



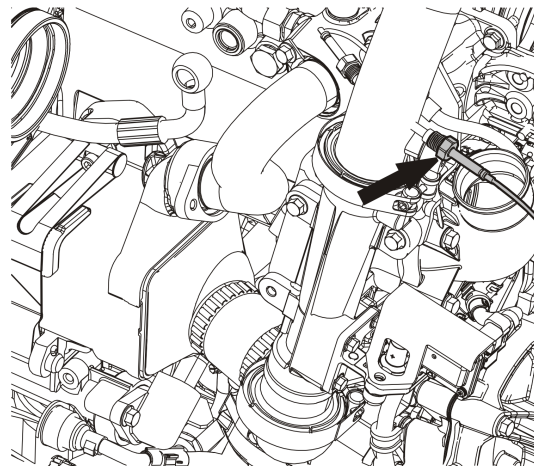
W2005802

EGR Cooler

The EGR cooler is cooled by engine coolant and contains a series of internal pipes with vanes that allow the EGR gases to cool before they reach the mixing chamber. These vanes cause the gases to swirl, creating a higher cooling efficiency while reducing deposits. The swirling action also reduces the formation of undesirable solids in the exhaust gas.

Temperature Sensor

The EGR temperature sensor is mounted in the venturi tube. The temperature sensor provides exhaust gas temperature information to the EECU. The EECU actuates the EGR valve to prevent cooler exhaust gas condensation which can be corrosive in the inlet manifold or mixing chamber.



W2005807

EGR Mixer

The EGR mixer is the meeting point for cooled, recirculating exhaust gas and outside air from the charge air cooler. At this point, the combined gases pass into the inlet manifold and on to the combustion chambers.

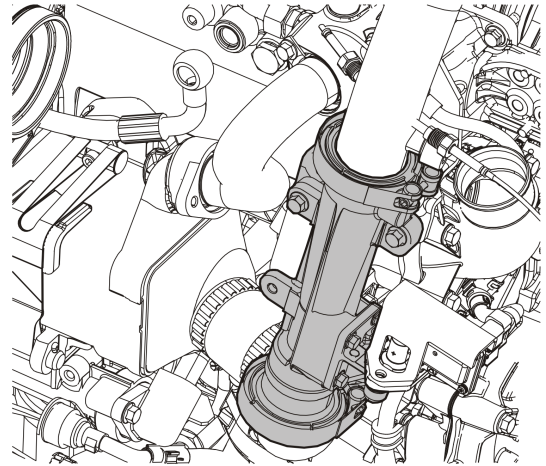
EGR Diagnostics

The EECU commands the EGR valve position and monitors electric current consumed by the EGR valve. An abnormally high reading indicates a jammed EGR valve. The EECU verifies that its command was sent and that the valve position reflects the command. If the valve is jammed, or its position doesn't change when commanded, the EECU sets fault codes.

EGR Venturi Tube

The EGR venturi tube conducts cooled exhaust gas to the EGR mixer where it combines with fresh air coming from the charge air cooler. The flow sensors mount here.

The venturi tube acts along with the differential pressure sensor to determine the amount and temperature of the exhaust gas. The differential pressure sensor provides a signal to the EECU which actuates the EGR valve to increase or reduce flow.



W2005806