

## TIPS AND TRICKS

### EGR

#### Application

All models

#### Part numbers

Valeo's EGR p/n



## Exhaust Gas Recirculation

### Description

#### Good combustion results

- To obtain good combustion mixture of Air to Fuel (A/F) in diesel engines, the fuel must be atomized.
- In order to achieve this process, the fuel injector designed to have 5 or 6 holes with diameter smaller than 0.12mm diameter under high pressure which can reach up to 2000 bar in common rail diesel, resulting the fuel is well atomized with the air.
- This will provide very low amount of harmful gases.
- Recently engines were adopted by Exhaust Gas Recirculation (EGR) & Diesel Particulate Filter (DPF), this systems are to decrease the harmful emissions to meet Euro 5 or Euro 6 regulations.

#### Effect of Carbon deposit in EGR

- Recently in some engines found carbon deposits on the EGR (**Fig. 1**) this is due to unbalanced combustion mixtures happens in the cylinder chamber, as the EGR circulate specific amount of exhaust gas to the cylinder chamber calculated by the Engine Control Unit (ECU).
- This carbon deposit will make the EGR clog up and will not close again to normal position (**Fig. 3**), and finally will replace it and it may black smoke and engine hesitation appears.

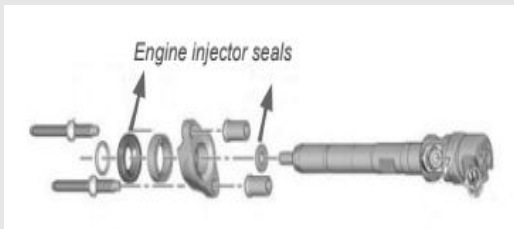
#### Reasons of Carbons deposits in EGR

- **Driving Short distance:** Diesel engines depends on high temperature to create good Air to Fuel (A/F) mixture, so short distance will not allow the engine reach the normal operating temperature (**more than 85 celsius**), so as a result unburned fuel may will be in the emissions. (**short distance is less than 10km**)
- **Injector seal:** Leakage may occurs between the injector seal and the cylinder chamber (**Fig.2**) the air will escape from the chamber and as a result the ratio of air quantity compared to fuel quantity is **less than normal** and black smoke and carbon are created



**Fig. 1**

Carbon deposits in EGR



**Fig. 2**



**Fig. 3**

EGR stuck open

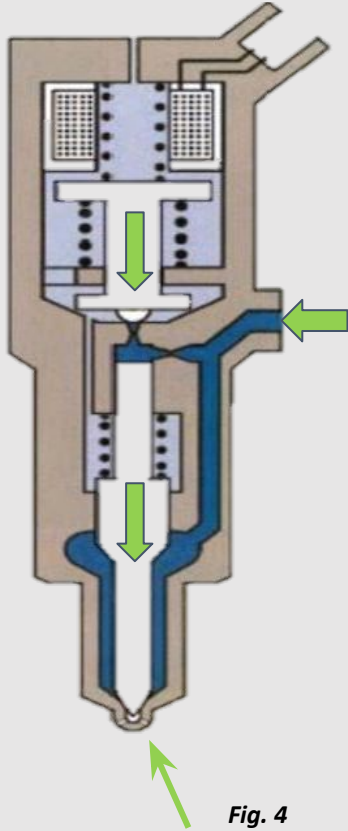


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**Fig. 4**

*Fuel leakage from injector nozzles*

## Reasons of Carbons deposits in EGR

- **Injector fuel leakage:** Uncalculated amount of Fuel is leaked in the combustion chamber this is due to the injector is leaking fuel from its nozzles, the results of this fault that the Fuel quantity is **more** than the air quantity which create more carbon and black smoke. ( **Fig.4** )
- **Oil leakage:** Oil leaks into the cylinder chamber due to mechanical sealing failure in either piston rings, cylinder head gasket or **Positive Crankcase Ventilation (PCV)**
- **Cooling system:** Long period of warming up due to engine coolant problem which increase the **warming up** period of engine e.g. (Thermostat stuck open, engine coolant problem)
- **Fuel Quality:** Fuel quality affect the quality of the combustion, as poor quality of fuel has more impurities, this leads for more carbon and black smoke from combustion process
- **Engine Sensors failure:** Some sensors in the **Engine management system** can be faulty and gives wrong data to Engine control unit about the combustion emissions and the quantity of intake air and Fuel.

## Fitting new EGR

Before installing the new EGR part, checking steps must be done:-

- Visual check the old EGR for any excessive carbon deposits in order to correct any failure mentioned
- Visual check the pipes or the hoses for any cracks or damages

## After replacing

- Connect the diagnostic tool after engine start
- Delete any Trouble code if found
- Monitor the Readings of the EGR
- Monitor the **Injector feedback parameter**:- this parameter shows if there is a leakage from fuel, if the reading reach maximum negative value this means fuel quantity is high and the **Engine Control Unit (ECU)** wants to decrease the amount of Fuel and visa-versa if the reading in positive value
- monitor the cooling temperature value and the warming up period.
- monitor the reading of the sensors for example: cooling temperature, Mass Air flow sensor MAF, Air/fuel or (upstream oxygen) sensor, if there is any false reading in them it will affect the mixture of the Air to fuel.

