

Valeo EGR

Nowadays, diesel with anti-polluting systems benefit from better fuel consumption levels and equivalent or lower CO₂ emissions as compared to gasoline engines. The emitted pollutant gases – carbon monoxide (CO), Oxides of Nitrogen (NO_x) and unburnt hydrocarbons (HC) – are reduced by optimal combustion and post-treatment in a catalytic converter and a self-regenerating particle filter.

Since 1992 most countries have defined rules (Euro, US, JP, Conama, Bharat) defining the acceptable limits of exhaust emissions. NO_x emissions have significant risk factors for multiple health conditions (asthma, lung and stomach damage) and can be lethal at high concentration rates (220 ppm).

Valeo's Exhaust Gas Recirculation (EGR) is an **efficient, cost effective** system for **reducing NO_x**. The high-pressure EGR loop takes part of the exhaust gases at the cylinder head outlet and re-injects them into the engine intake. The main benefit is that NO_x is reduced at the source by limiting the quantities formed during the combustion process rather than by post-treating the gases. The result is a **cleaner combustion process, and the standards respected**.

Valeo is a pioneer and a major actor in the O.E. and Independent Aftermarket for EGR Systems. Major player since more than 20 years, the Valeo Group is now offering to the car manufacturers a range of EGR valves and modules for all the regulation types, from Euro2 to Euro 6.

Today, 80% of the European diesel car park is equipped with EGR systems, meaning around 85 million vehicles. The global aftermarket is **3 million EGR units replaced every year** for a market value around 25 million euros. EGR failures can be mainly identified through 6 symptoms:

Symptoms of EGR Valve and Modules failure



Black/White Smoke

- *Excessive production of NO_x and Soot
- *EGR coolant presence in combustion chamber



Loss of Power

- *High amount of Exhaust Gas at the combustion chamber
- *Advanced or retarded combustion



Increase of fuel Consumption

- *Faulty combustion by wrong mixture of Air, Exhaust Gas and Fuel
- *Advanced or retarded combustion



Loud Noise from Engine

- *Knocking effect due to an advanced detonation
- *Noise effect due to a retarded detonation



Warning Light Diagnostic

- *EGR Valve blocked or clogged
- *Overheating



Loss of Performance

- *Engine performance loss at gear change from max to low engine speed

Valeo EGR Replacement

Frequent EGR System Failures

1-Soot saturation

The system is saturated with soot which, when cooling, forms a varnish on the pipe and the valve, **clogging the EGR system**.

- Clogging at the internal channel
- Soot is formed by carbon particles
- Ash is formed from gasket and engine wear



2-Coolant presence in EGR

- Leakage at the EGR cooler
- EGR PH can corrode internal tubes of the cooler



3-Humidity at the EGR sensor

- Wrong temperature signal
- Misfunction of the EGR Valve



4-Oil leaking into the intake

- Turbocharger rings and bearings are worn
- Engine oil is sucked into the combustion chamber



Valeo's Expert Advice

- Replace also **EGR pipes** when replacing EGR Valve!
- **Cleaning** the EGR Valve is **not effective!**
- Inspect if the **electrical connector is firmly sealed** into the EGR!
- When replacing the EGR valve (pneumatic), **check all the pneumatic circuit is free of carbon particles!**

Valeo EGR Technologies

The EGR Valve controls the quantity of exhaust gases re-injected into the engine. The system reduces NOx by reducing the combustion temperature.

Euro 2 and 3: Pneumatic EGR Valve

First EGR systems were functioned with a pneumatic system where an actuator with a membrane that controls the poppet disc.



Euro 4: Electronic EGR Valve

The arrival of ECU (Engine Control Unit) in more modern vehicles modified the control process of the EGR systems. The valve positions defining the exhaust gas flows are now electronically controlled.



Euro 5: EGR Integrated Modules

Due to the increasing complexity and requirement of engines, original equipment producers have replaced individual components into complete EGR systems. These new integrated modules enable all the components to interact perfectly and more efficiently.



EGR Valve + Cooler + Pipes



EGR Valve + By-pass + Cooler

EGR Cooler

The EGR Cooler reduces the recirculating exhaust gas temperature to avoid having excess temperature in the inlet of the engine.



Throttle

The throttle controls the entry of air necessary for the combustion

Air Management System evolution with emission regulations



Euro 2 / 3



Euro 4



Euro 5