



# NRF: the **aftermarket supplier** with the **largest EGR cooler range** >

Since 1927 NRF is a leading manufacturer and supplier of cooling products for the automotive market, industrial, railway and marine sector. NRF is known for the production of high quality radiators, but also produces and supplies a large range of other engine cooling and air conditioning products. The product range of more than 8.000 products has recently expanded with EGR coolers for passenger cars, light commercial vehicles, trucks and buses.

## **Stricter emission standards** >

The European emission standard is continually being stricter for vehicles in the European Union. It is focussed on the CO<sub>2</sub> (carbon dioxide) and NO<sub>x</sub> (nitrogen oxide) emission of petrol and diesel vehicles.

Diesel cars produce more NO<sub>x</sub> than petrol cars, because the combustion temperature in a diesel engine is much higher. By recirculating the exhaust gas back into the engine the NO<sub>x</sub> emission decreases. But how?

## **Exhaust gas recirculation (EGR)** >

The principle of EGR is that a controllable proportion of the exhaust gas is recirculated back into the combustion chamber(s). Because the exhaust gas is mixed with the incoming air, the oxygen level (and therefore the lambda value) of the combustion mixture will decrease.

This reduces the combustion temperature and thereby NO<sub>x</sub> emissions (with 30%), because NO<sub>x</sub> is mainly produced at high combustion temperatures.

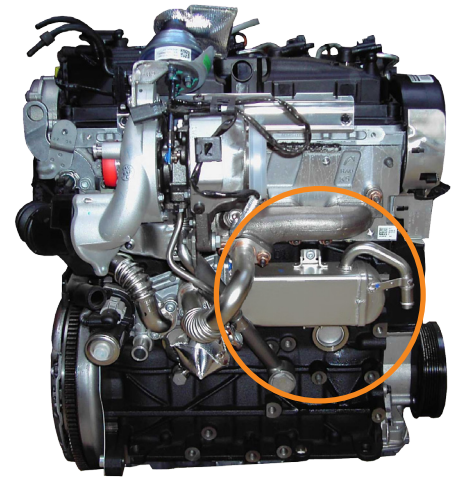
## **EGR cooling** >

With the new EURO 6 regulations NO<sub>x</sub> reduction is becoming more important. For an even more effective reduction of NO<sub>x</sub>, the recirculated exhaust gas can be passed through an EGR cooler. As a result, the combustion temperature will be extra reduced and a larger amount of exhaust gas can be recirculated.

The temperature of the exhaust gas is in partial load about 300 degrees (at a constant speed on the highway). At full load, the temperature can reach more than 700 degrees. However, the colder the air supplied to the inlet, the better the engine performs. Cold air contains more oxygen. Warm air is expanded more and therefore contains less oxygen.

The EGR cooler operates as a heat exchanger. Through the EGR cooler, coolant is flowing in fixed channels. The coolant absorbs the heat from the exhaust gas. The EGR cooler reduces the exhaust gas temperature to +/- 100 degrees.

## **NRF #48213 EGR cooler in VAG engine** >

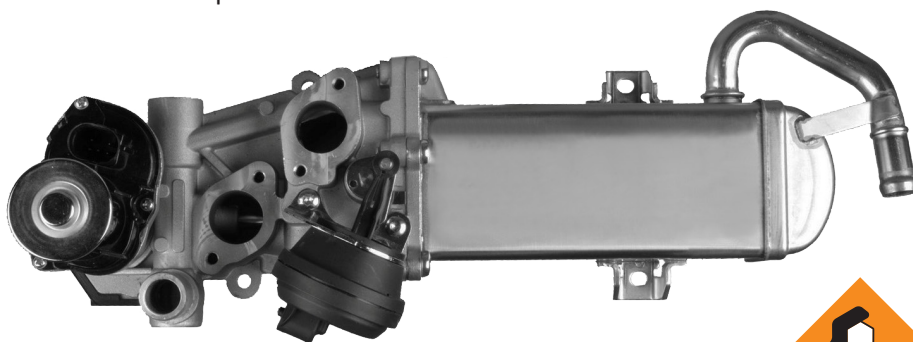


## **Important: Reset your ECU** >

Modern systems utilizing electronic engine control units (ECU), multiple control inputs, and servo-driven EGR valves typically improve performance and efficiency with no negative impact on drive-ability and function. In most modern engines, a faulty or disabled EGR system will cause the computer to display a check engine light and the vehicle to fail an emissions test. The check light can be remedied by ECU remapping.

**NRF provides EGR modules (incl. valve), EGR coolers and EGR heat exchangers (without housing).**

**For more information ask your (local) supplier or visit the NRF website.**



The **art** of cooling >