

VEHICLE ELECTRONICS

What is EGR?

EGR = Exhaust Gas Recirculation

GK

What is its Purpose?

To reduce NOx (oxides of nitrogen) emissions. NOx compounds are undesirable by-products of the combustion process. They are namely nitric oxide and nitrogen oxide:

- NOx formulates when the combustion peak temperature is high.
- Target is to reduce this temperature.

How does the system work?

The higher the oxygen (O2) content is of the charge entering the combustion chamber, the higher the burn temperature. Recirculating some of the exhaust gasses into the inlet side of the engine has the effect of reducing the amount of O_2 , which lowers combustion temperatures and reduces NOx emissions.

What does the valve do?

It controls the amount of exhaust gas which flows through it.

What vehicles are fitted with an EGR valve?

The units were developed in the USA in the 1970's and used in Europe since 1993 – to meet the (then new) European standard known as Euro 1. They are installed on petrol and diesel engines.

How do they work?

Early units were purely pneumatic (vacuum operated). Since then, electronically operated units were introduced, some both vacuum and electronic. Modern units have grown in complexity and are an integral part of the engine management system, and the Engine Control Unit (ECU) monitors all areas, e.g., speed, load, boost pressure, mass air flow rate and temperatures to control the valve to allow the correct amount of exhaust gas through for all operating conditions.

Are there any other types of EGR valves?

Many EGR valves utilise a system to reduce the temperature of the exhaust gas. This is because it is undesirable to pass hotter than required exhaust gas into the system, to maintain combustion efficiency and prevent component damage. Some do this with either a separate or integral (water cooled) heat exchanger to reduce the exhaust gas temperature.

Why is a valve required?

There can be a compromise between the reduction of NOx emissions and engine efficiency. Too much exhaust gas in the intake charge when the engine is cold would make combustion very unstable and the engine would not run smoothly. At high engine loads too much exhaust gas in the intake charge would cause a reduction in power output. Diesel engines can suffer with excessive black smoke. So hence the valve needs to be controlled accurately to maintain good drivability throughout all operating conditions.

Can a valve become faulty?

Because exhaust gasses are flowing through the valve, carbon tends to build up over surfaces. This contamination can tend to clog a valve, so the operation becomes sluggish, or it fails to operate. Depending on engine condition, the exhaust gas can also contain unburnt oil which can gum the valve up. Root cause of the oil vapour can be worn cylinders, piston rings, valve guides or oil entering via an issue with a turbo charger.

Other factors which can cause issues include clogged air filter, air leaks, defective injectors, worn spark plugs or poor glow plug system operation/DPF operation.

A contaminated valve will not be the fault of the valve itself, so the cause of contamination should be investigated.





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Can the valves be cleaned?

Whilst some valves can appear to lend themselves to cleaning, the process may cause damage or may not be entirely successful, and valves should be replaced with new units to ensure the correct operation of the engine is restored.

Is there anything to bear in mind upon EGR replacement?

A problem with the operation of the EGR valve is usually accompanied by an engine management (MIL) light on the dash and an accompanying fault code, read by code reader. Note that a fault code is only a guide and that the problem can often frustratingly lie elsewhere. This is the same for any fault code relating to the EGR system; so, the cause could be with, for instance an exhaust temperature sensor, MAF sensor or pressure sensor.

The root cause of the failure should be considered and ascertained otherwise the issue could easily remain or reoccur.

Prior to fitting, compare the unit physically with the old one (including electrical connections, flange and pipe sizes) and, if possible, check with the Original Equipment part number (as some valves differ internally).

Note that if the EGR exhaust gas inlet is clogged, the pipes leading to the EGR valve may be also. Upon high contamination, check entire EGR system, including throttle body etc.

Ensure fault codes are erased.

What if a faulty EGR valve is replaced but a fault still remains?

Some EGR systems have a transducer operated by the ECU. The transducer is either attached to the EGR valve or is a separate component. If separate, a failure of this part can flag up an EGR fault code but may not be cured by replacing the EGR valve.

Some vehicles are required to undergo a 'learning cycle'; even when replacing a faulty EGR valve, some may not appear to initially function effectively – engine performance may not immediately improve, and smoke may be emitted from the exhaust. The vehicle must be driven for the vehicle's engine management system to recognise that the unit has been replaced (as it has learned to try to compensate for the faulty valves inefficiency and needs to adapt to the improved working parameters of the new EGR valve).

Some vehicles will not recognise the new unit without intervention of the engine management system by specialist equipment. It is important in those situations, that replacement is carried out by competent persons with vehicle manufacturers requirements to hand and the correct equipment to affect a suitable repair.

NTK Product Quality

As with all NGK/NTK products, NTK EGR valves are manufactured with the best materials and undergo strict testing and durability regimes to meet or exceed OE standards. Items include relevant gaskets and seals where necessary to ensure trouble free installation.