



**Truck
Experts.**

**EGR
SYSTEMS**



About Highway Automotive

HIGHWAY AUTOMOTIVE offers a wide range of EGR system repair kits for the most popular MAN and SCANIA vehicles, including buses of these makes. You will find in the offer components and subassemblies that can be repaired without damaging the engine and compromising the combustion process.

A product that is particularly worth of attention is the repair kit for EGR coolers, which comes with a spare core and all necessary seals and fasteners. Instead of an EGR cooler repair kit, it is also possible to opt for a remanufactured cooler. Another product that simplifies the repair of EGR systems is the remanufactured cooler kit with a new or remanufactured EGR valve. During professional remanufacturing, the EGR cooler is equipped with a new core and the proper functioning of the valve assembly is restored through the repair of its individual components, including the valve body, or replacement of defective parts, such as moving parts.

The use of HIGHWAY AUTOMOTIVE products for EGR systems significantly reduces repair costs, speeds up the process and, what is nowadays of key importance, reduces CO2 emissions due to the use of already existing components.



**HIGHWAY
AUTOMOTIVE**

EXHAUST EMISSION STANDARDS

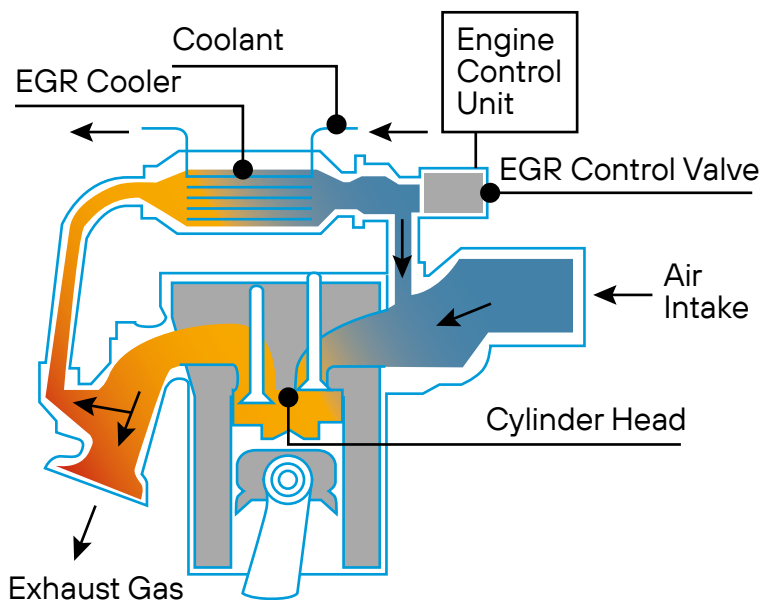
The environmental standards imposed on the automotive industry require engine manufacturers to reduce harmful exhaust emissions. Major toxic components in exhaust gases include CO₂, NO_x and soot particles, which are produced in the combustion process of hydrocarbon fuels in internal combustion engines. Various solutions are used in order to adapt the combustion process to current emission standards. Some of these are aimed at improving the preparation process of the fuel mixture supplied to the engine, while others address the problem of exhaust gases produced in the combustion chamber. Both solutions allow to adapt the engines to environmental standards and limit the emissions of CO₂, regarded as the primary greenhouse gas.



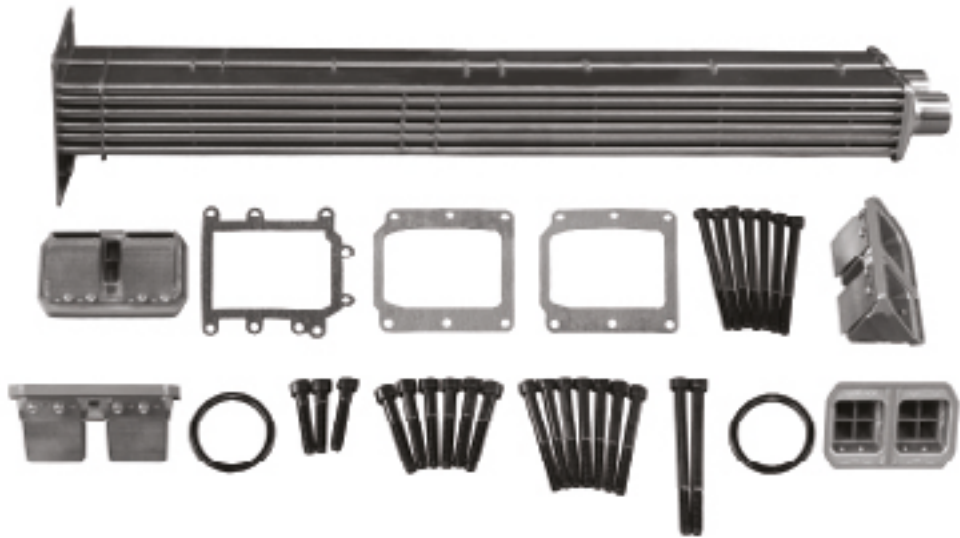
EXHAUST GAS RECIRCULATION (EGR)

One of the commonly used methods of limiting the emission of toxic components in exhaust gases is exhaust gas recirculation. This process consists in introducing a certain amount of exhaust gases from the exhaust manifold into the intake manifold in order to lower the temperature in the combustion chamber, which in turn reduces the formation of NO_x (nitrogen oxides). Reintroducing exhaust gases into the combustion chamber also helps to break long hydrocarbon chains, thus inhibiting the formation of soot particles. This applies in particular to Diesel engines, burning diesel fuel consisting mainly of long hydrocarbon chains. The recirculation of exhaust gases in the combustion chamber, especially in large Diesel engines, prevents rough engine operation, reducing engine noise and improving the comfort of driving. In petrol engines EGR also helps to reduce the formation of soot particles, but due to the fuel composition this effect is somehow limited. In both types of engines, EGR significantly reduces CO₂ emissions.

In terms of engine operation, EGR contaminates the fuel supplied to the combustion chamber and reduces the efficiency of combustion. In order to maintain optimal engine performance and at the same time meet the requirements of environmental standards, the amount of exhaust gas recirculated to the intake manifold must be carefully controlled. This is the task of the ECU, which calculates the amount of exhaust gas that can be redirected to the combustion chamber at any given time. The element acting as an actuator and controlling the amount of exhaust gas flowing from the exhaust manifold to the intake manifold is the EGR valve.



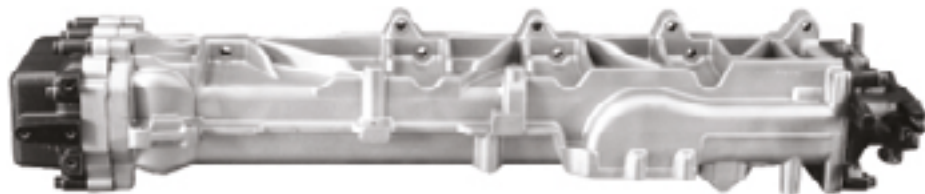
REPAIR KIT EGR-COOLER



NEW EGR-COOLER



REMANUFACTURED EGR-COOLER



EGR VALVES

EGR valve consists of two parts: the mechanical valve and the control part. The former is usually a globe valve which closes the outflow from the exhaust manifold and directs the exhaust gases into a special connection with the intake manifold. Very often, especially in the case of utility vehicle engines, the exhaust gases directed to the intake manifold are cooled by the EGR cooler. Depending on the size, parameters and intended use of the engine, either exhaust gas-air or exhaust gas-coolant solutions are used. The exhaust gases enter the intake manifold through a valve under their own pressure.

The other part of the valve consists of a control unit for the mechanical part. The controller is actuated by the ECU. The EGR valve uses two control systems: a vacuum actuator and a stepper motor system. The former is connected to the engine intake system - it uses the vacuum from the intake manifold to move the valve. An electric valve controlled by the ECU is installed at the inlet to the actuator. If the valve is open, the vacuum pulls up the actuator diaphragm, which opens the valve to let the exhaust gas through. The valve's opening time determines the amount of exhaust gas used in the recirculation process. The other solution is a system which uses a stepper motor. The motor is connected to the valve via a gear and enables smooth opening and closing of the valve. Signals from the ECU control the stepper motor, which determines the position of the EGR valve.

EGR valves are susceptible to damages as a result of carbon deposits on their moving parts or sealing, which are formed due to poor quality fuel or due to wear and tear of the engine and the resulting large amounts of oil entering the intake system. Moving parts may also wear out as a result of high temperatures due to such factors as incorrect composition of the mixture supplied to the combustion chambers, damage to or loss of efficiency of the EGR coolers.

The mechanical part must be resistant to high temperatures of exhaust gases; the valve components must be made of appropriate materials so as to prevent wear and tear, as well as deformations caused by high temperature.

EGR valve components used in small engines (mainly petrol engines) cannot be repaired. In case of malfunction, the entire valve must be replaced. In turn, the engines of utility vehicles, such as tractors and machines in the construction industry, are equipped with EGR systems that come with repair kits. This allows the users to save on spare parts and to keep a certain stock of components to reduce the time of repair, if necessary.

Highway Automotive NUMBER	PRODUCT	FIELD	BRAND	MODEL	OE NUMBER
28045003	EGR-COOLER	BUS/TRUCK	SCANIA	P,G,R,T - SERIES (04-)/K - SERIES (06-)	1724124/1724127/1803282
28045004	EGR-COOLER	BUS/TRUCK	SCANIA	P,G,R,T - SERIES (04-)/K - SERIES (06-)	1795704/1866224/1835414/1866762/2049468/2072977
29031101	REPAIR KIT EGR-COOLER	TRUCK	MAN	ENGINE D28	51081007027*C/51081007029*C/51081007089*C/51081007026*C/51081007028*C/51081007012*C/51081007008*C/51081007009*C/51081007045*C/51081007054*C/51081007057*C/51081007055*C/51081007087*C
29031102	REPAIR KIT EGR-COOLER	TRUCK	MAN	ENGINE D20	51081007196*C/51081007104*C/51081007048*C/51081007060*C/51081007111*C/51081007172*C/51081007068*C/51081007074*C/51081007086*C/51081007097*C/51081007063*C
29031103	REPAIR KIT EGR-COOLER	TRUCK	MAN	TGL/TGM ENGINE 6 CYL.	51081007136*C/51081007211*C/51081510131*C
29031104	REPAIR KIT EGR-COOLER	TRUCK	MAN	TGL ENGINE 4 CYL.	51081007135*C/51081007213*C
29031105	REPAIR KIT EGR-COOLER	TRUCK	MAN	TGL/TGM ENGINE 6 CYL.	51081007070*C
29031106	REPAIR KIT EGR-COOLER	TRUCK	MAN	TGX/TGS	51081007157*C/51081007239*C/51081007156*C/51081007133*C/51081007259*C/51081007236*C/51081007192*C/51081007222*C/51081007238*C/51081007235*C/51081007258*C/51081007273*C/51081007134*C/51081007153*C/51081007158*C/51081007248*C/51081007240*C/51081007253*C
29031107	REPAIR KIT EGR-COOLER	TRUCK	MAN	TGX/TGS	51081007157*C/51081007239*C/51081007156*C/51081007133*C/51081007259*C/51081007236*C/51081007192*C/51081007222*C/51081007238*C/51081007235*C/51081007258*C/51081007273*C/51081007134*C/51081007153*C/51081007158*C/51081007248*C/51081007240*C/51081007253*C
29031108	REPAIR KIT EGR-COOLER	TRUCK	MAN	TGL ENGINE 4 CYL.	51081007077*C/51081007137*C
29031109	REPAIR KIT EGR-COOLER	TRUCK	MAN	ENGINE D26	51081007141*C/51081007140*C/51081007152*C/51081007107*C/51081007151*C/51081007108*C/51081007130*C/51081007105*C/51081007106*C/51081007197*C/51081007150*C
29031201	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 2 PCS	TRUCK	MAN	ENGINE D28	51081007027*C/51081007029*C/51081007089*C/51081007026*C/51081007028*C/51081007012*C/51081007008*C/51081007009*C/51081007045*C/51081007054*C/51081007057*C/51081007055*C/51081007087*C
29031202	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 2 PCS	TRUCK	MAN	ENGINE D20	51081007196*C/51081007104*C/51081007048*C/51081007060*C/51081007111*C/51081007172*C/51081007068*C/51081007074*C/51081007086*C/51081007097*C/51081007063*C
29031203	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 2 PCS	TRUCK	MAN	TGL/TGM ENGINE 6 CYL.	51081007136*C/51081007211*C/51081510131*C
29031205	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 2 PCS	TRUCK	MAN	TGL/TGM ENGINE 6 CYL.	51081007070*C
29031206	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 4 PCS	TRUCK	MAN	TGX/TGS	51081007157*C/51081007239*C/51081007156*C/51081007133*C/51081007259*C/51081007236*C/51081007192*C/51081007222*C/51081007238*C/51081007235*C/51081007258*C/51081007273*C/51081007134*C/51081007153*C/51081007158*C/51081007248*C/51081007240*C/51081007253*C
29031207	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 4 PCS	TRUCK	MAN	TGX/TGS	51081007157*C/51081007239*C/51081007156*C/51081007133*C/51081007259*C/51081007236*C/51081007192*C/51081007222*C/51081007238*C/51081007235*C/51081007258*C/51081007273*C/51081007134*C/51081007153*C/51081007158*C/51081007248*C/51081007240*C/51081007253*C
29031208	REPAIR KIT EGR-COOLER + NEW VALVE OE	TRUCK	MAN	TGL ENGINE 4 CYL.	51081007077*C/51081007137*C
29031209	REPAIR KIT EGR-COOLER + NEW CHECK VALVE 2 PCS	TRUCK	MAN	ENGINE D26	51081007141*C/51081007140*C/51081007152*C/51081007107*C/51081007151*C/51081007108*C/51081007130*C/51081007105*C/51081007106*C/51081007197*C/51081007150*C
28031301	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	ENGINE D20	51081007196/51081007104/51081007048/51081007060/51081007111/51081007172/51081007068/51081007074/51081007086/51081007097/51081007063
28031302	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	ENGINE D26	51081007141/51081007140/51081007152/51081007107/51081007151/51081007108/51081007130/51081007105/51081007106/51081007197/51081007150
28031303	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	ENGINE D28/4	51081007027/51081007029/51081007089/51081007026/51081007028/51081007012/51081007008/51081007009
28031304	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	ENGINE D28/6	51081007045/51081007054/51081007057/51081007055/51081007087
28031307	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	TG-L (05-)/TG-M(05-)	51081007136/51081007211/51081510131
28031110	REMANUFACTURED KIT EGR-COOLER	BUS/TRUCK	MAN	TG-S (07-)/TG-X (07-)	51081007157/51081007239/51081007156/51081007133/51081007259
28031312	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	TG-S (07-)/TG-X (07-)	51081007238/51081007235
28031313	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	TG-S (07-)/TG-X (07-)	51081007258
28031314	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	TG-S (07-)/TG-X (07-)	51081007273
28031319	REMANUFACTURED KIT EGR-COOLER	TRUCK	MAN	TGS I (14-)/TGX I (14-)(TGX-9 EURO6)	51081007290/51081007304/51081007274
28045103	REMANUFACTURED KIT EGR-COOLER	TRUCK	SCANIA	P,G,R,T - SERIES (04-)	1724124/1724127/1803282
28045104	REMANUFACTURED KIT EGR-COOLER	TRUCK	SCANIA	P,G,R,T - SERIES (04-)	1795704/1866224/1835414/1866762/2049468/2072977
28031105	REMANUFACTURED KIT EGR-COOLER (WITHOUT VALVE)	TRUCK	MAN	TGL I (05-) ENGINE D0834	51081007135/51081007213
28031206	REMANUFACTURED EGR-COOLER (DOUBLE PIPE. WITH OE VALVE)	TRUCK	MAN	TGL I (05-) ENGINE D0834	51081007077/51081007137
28031106	REMANUFACTURED EGR-COOLER (DOUBLE PIPE. WITHOUT VALVE)	TRUCK	MAN	TGL I (05-) ENGINE D0834	51081007077/51081007137
28031611	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITH CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007192/51081007222
28031412	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITHOUT CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007238/51081007235
28031612	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITH CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007238/51081007235
28031413	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITHOUT CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007258
28031613	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITH CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007258
28031414	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITHOUT CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007273
28031614	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITH CONTROLLER OE)	TRUCK	MAN	TGS I (05-)/TGX I (06-)	51081007273
28031419	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITHOUT CONTROLLER OE)	TRUCK	MAN	TGS I (14-)/TGX I (14-)	51081007290/51081007304/51081007274
28031615	REM. EGR-COOLER (NEW VALVES OE, NEW THROTTLE WITH CONTROLLER OE)	TRUCK	MAN	TGS I (14-)/TGX I (14-)	51081007290/51081007304/51081007274