

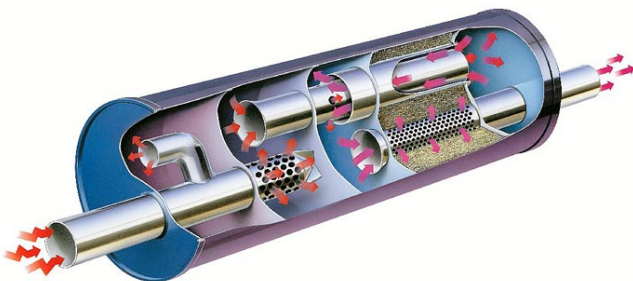
Exhaust system

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Function

The exhaust system collects the exhaust gases from the cylinders, removes harmful substances, reduces the level of noise and discharges the purified exhaust gases at a suitable point of the vehicle away from its occupants. The exhaust system can consist of one or two channels depending on the engine. The flow resistance must be selected so that the exhaust backpressure affects engine performance as little as possible. To ensure that the exhaust system functions perfectly, it must be viewed as a whole and developed accordingly. This means that its components must be coordinated by the design engineers in line with the specific vehicle and engine.

Silencer



Every internal combustion engine produces "exhaust noise" due to the pulsating emission of gases from the cylinders. This noise has to be silenced by reducing the sound energy of the exhaust gas flow. There are two basic options here: Absorption and reflection of the sound in the silencer. These two principles are generally combined in a single silencer. Exhaust chambers and exhaust flaps are other sound-absorbing and sound-modifying elements that can be used to eliminate especially undesirable frequencies from the outlet noise. Catalytic converters also have a sound-absorbing effect.

The exhaust system is itself a system subject to vibration, it produces noise itself through natural frequencies and vibration which are transmitted to the car body. Careful coordination of the entire system is therefore necessary here. This includes design and positioning of the individual elements of the exhaust system and their flexible mountings.

Other functions

In addition to all the complex functions which the exhaust system has to perform, it is also subject to extreme stresses. The fuel-air mixture in the cylinders is abruptly heated to temperatures up to 2,400 °C. This causes it to expand greatly before escaping into the exhaust system at supersonic speed. This noise level resembles the crack of an explosion and must be reduced by approx. 50 dB(A) as it travels from the engine exhaust valve to the end of the exhaust system.

Apart from temperature and pressure stresses, the exhaust system must also cope with vibrations from the engine and bodywork as well as vibrations and jolting from the carriageway. The exhaust system additionally has to resist corrosion attacking from the inside caused by hot gases and acid, and from the outside in the form of moisture, splashed water and salt water. There is also the risk that the catalyst may be poisoned through sulphur or lead present in the fuel.

Structure of an exhaust system

Today's exhaust systems have very little in common with the simple exhausts used in the past. In more modern cars, they basically consist of a front section with

- the exhaust manifold,
- the purification system and
- the connecting pipes, together with a rear section with the silencer system and pipes.

Mass dampers and decoupling elements



In Vee engines, each of the two cylinder banks has its own exhaust channel. The exhaust channels either remain separate up to the tailpipes or are brought together beforehand – for example, in a common end silencer.

If the exhaust system consisted only of rigid pipes, the rear silencer would vibrate violently – with the risk of subsequent breakage. For this reason, modern exhaust systems are built with mass dampers and decoupling elements. They prevent major deflections of the exhaust system and also prevent smaller vibrations being passed from the engine to the exhaust system and entering the interior as acoustic pulses. Mass dampers and decoupling elements thus improve ride comfort while increasing the service life of the exhaust system.

Bilder



Exhaust system



End silencer shells

Hersteller



ERNST



Valeo_EN



Wahler

Quelle: <http://www.my-cardictionary.com/exhaust-system/exhaust-system.html>