

Diesel particulate filter

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Function

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Filter systems

Different systems are possible here, depending on the application and conditions of use. "Closed" particulate filter systems are used as original equipment in cars or when retrofitting heavy goods vehicles. "Open" particulate filter systems are generally used when retrofitting cars, vans or mobile homes.

Diesel particulate filters are self-cleaning, i.e. they continuously burn off the soot deposits. They are normally maintenance-free and last the entire life of a vehicle. Retrofitting systems do not require the assistance of engine management computers, sensors and electronics or additives to control soot levels effectively and continuously burn off soot.

Structure of Diesel particulate filter

Particulate filters are made of different materials depending on the manufacturer:

- codierite,
- silicon carbide,
- aluminium titanate or
- sintered metal.

The hot exhaust gases containing soot particles from the engine are fed to the relevant filter materials in the filter housing. The gaseous components of the exhaust flow through the microscopic pores of the filter pockets. They trap the soot including ultra-fine particles on the surface and deposit them into the individual filter pockets.

Filterregeneration

Regeneration (cleaning) of the filter starts when the exhaust gas temperature reaches roughly 200 °C. Nitrogen dioxide (NO₂) formed by the oxidation catalytic converter comes into contact with the soot deposited in the filter pockets. The soot particles are oxidised and broken down, with the NO₂ being

reduced to nitrogen monoxide (NO). This chemical process is constantly repeated and allows the particulate filter to continuously clean itself. This means it does not require any further aid with regeneration, for example assistance from an engine management system.

Combi system

Combination systems are equipped with an integral or upstream oxidation catalytic converter or an efficient catalytic layer. This ensures optimum regeneration when the necessary exhaust gas temperature is reached.

Safety

The design of high-efficiency particulate filters depends on many factors. In addition to the regeneration strategy, the aim is to ensure the continuous burn-off of soot. Here consideration must be given to the operating conditions, different driving cycles and the individual engine exhaust concept of the vehicle manufacturer. Other factors relevant to ensuring long-term compliance with the statutory regulations for filtration efficiency are the filter area available and the resulting filter volume. Filters are often also used in enclosed areas. For these special automotive applications, the share of carcinogenic particles must be reduced by at least 90 percent.

Environmental protection

Solids such as soot particles (PM – particulate matter or also known as carbon black) are produced mainly by diesel engines. They are the result of incomplete combustion. Emissions of soot particles are proven to have a carcinogenic effect. The smaller the soot particles, the more easily they can enter the lung and hence the blood stream, i.e. other human organs as well.

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Global warming

It has meanwhile also been scientifically proven that soot emissions contribute to global warming (keyword "climate change"). Being dark/black in colour, soot absorbs sunlight, emits it again as heat and so pushes up the temperature of our atmosphere. Soot can be described as the second most important driver of climate change, particularly in the Arctic. Soot particles therefore significantly contribute to the acceleration of the rate at which ice and glaciers are currently melting. This also applies to continental high mountain regions and glacier massifs. Retrofitting filters in cars, vans and mobile homes allows the negative impact of soot particles on health and the environment to be significantly reduced.

Depreciation

In many towns and cities you must display a green environmental permit disc if you wish to enjoy unrestricted mobility. Diesel vehicles are however awarded this green disc only if they comply with the specific Euro exhaust emissions standard. If your car is less recent and does not meet those standards, you don't have to manage without such access. Instead of buying a new car, you can simply have a particulate filter fitted to your diesel. That is far cheaper than purchasing another vehicle and can be installed by any garage that offers emissions testing. Vehicles throughout Germany have been equipped with particulate filters and comply with the regulations in over 40 environmental zones. If you fit your Euro III diesel with one, you can get the green disc – and drive wherever you want in the entire country. Retrofitting your car with a filter will therefore significantly boost its resale value.

Bilder



Particulate filter

Particulate filter

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HELLA

Quelle:

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