SUSTAINABLE DEVELOPMENT

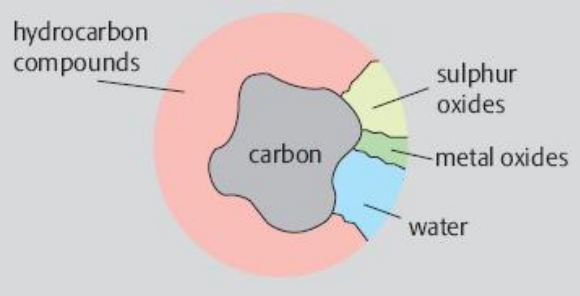
Škoda cars with diesel particle filter - DPF

The diesel engines of Škoda cars with the high pressure fuel injection "pump-injector" system fulfil the stringent emission norm EU4. The addition of the diesel particle filter to the exhaust systems of these engines further reduces emission of fine particles from series systems to maximum 5mg/km. The EU4 limit is 25mg/km. The diesel particle filter (termed DPF) is an additional component similar to the catalytic converter, which captures solid particles (soot) created in the process of combustion in diesel engines.

What are solid particles (soot) and how are they created?

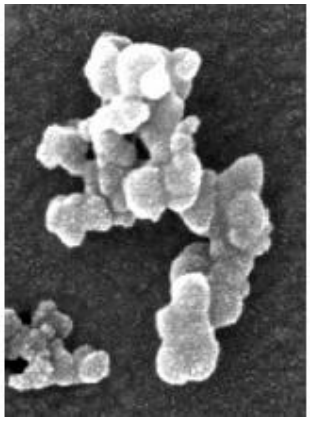
The combustion in every diesel engine generates soot particles. This cannot be eliminated. The quality of combustion depends on many engine parameters, such as air intake, injection, and flame distribution, as well the quality of fuel. In order to minimize the volume of soot particles and minimize fuel consumption, we optimize our engines to the extent possible (injection, combustion chamber design, etc.). The better the mixture of fuel and oxygen is, the more effective the use of the fuel and the lower the volume of soot particles will be.

The soot particles consists of a great number of various substances. Every carbon speck of approx. 0.05 micrometer in size contains particles of various hydrocarbons, water, and sulphides deriving primarily from the fuel and residue oil. Moreover, there are small quantities of metal oxides generated by abrasion inside the engine.



Schematic graph of soot particles

Despite successful cutbacks in the volume of soot particles by means of designer measures, the most effective method of getting rid of soot particles is based on exhausting them by means of filter systems, specially designed for diesel engines, so-called diesel particle filters (DPF).



Typical soot particle generated during combustion in a diesel engine

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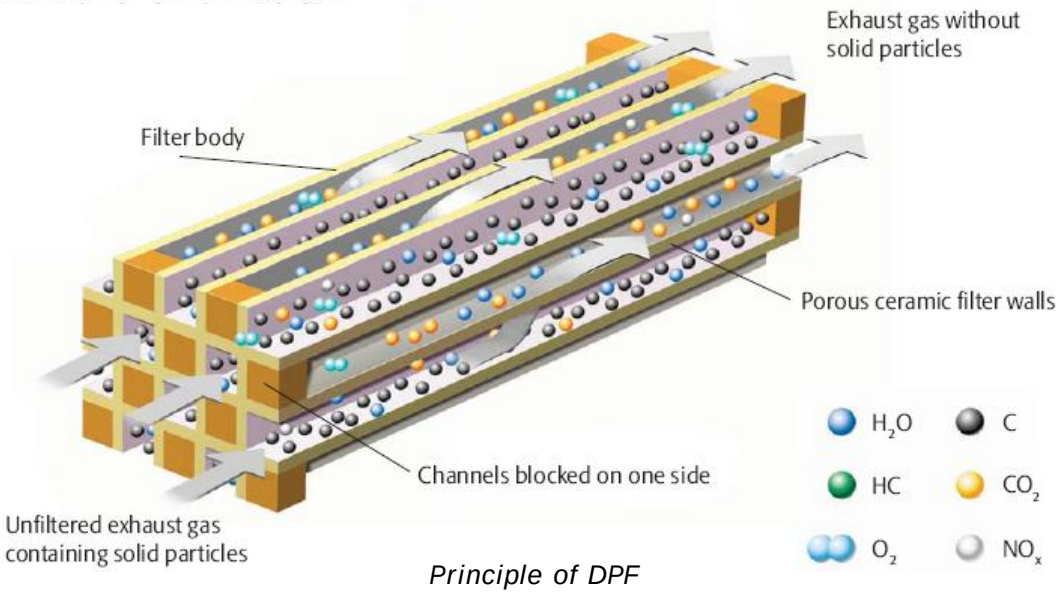
The Principles of DPF

The DPF consists of a ceramic body of honeycomb shape that is made of silicon carbide, which is in a metal sheath. The exhaust gases pass through the filter body via canals closed at one end with porous ceramic walls in which the soot is captured. In order to prevent clogging of the filter and reduction of its functionality, the captured particles are burnt and converted to carbon dioxide (CO_2) – filter regeneration.



Principle of DPF

However, the combustion temperature of the soot, which is 600 - 650°C, is only attained in the Diesel engines under maximum load. The problem of attainment of soot combustion temperature is solved by two systems with catalytic combustion, which make it possible to regenerate the filter already at lower temperatures:

- System with additive

The additive is automatically fed from the additional reservoir to the fuel tank each time the car is refuelled. The quantity of additive in the reservoir suffices for approximately 120 000 km; it is monitored and in case of the level becoming too low, the driver is warned by signalisation and advised to visit the service centre. The system with additive is offered as standard equipment for the Superb cars with the 2.0 TDI PD/103 kW engine.

- System without additive

This system works without additive and is maintenance-free.
We differentiate two operating modes:

- passive regeneration (e.g. when driving at motorway speed)

  At exhaust gas temperatures in the range 350 - 500°C, the so-called catalytic combustion takes place automatically to convert the captured soot to CO_2.

- active regeneration (city)

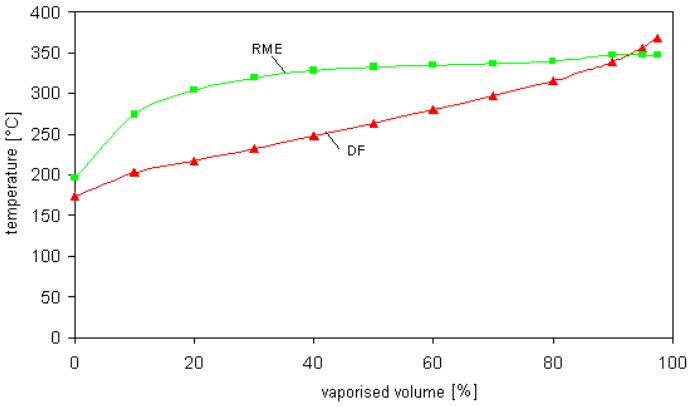
  After approximately every 1000 km, through a short-term modification of combustion process the temperature of exhaust gases is raised to 600 °C which results in the combustion

of the captured particles. The filter with maintenance-free system without additive is offered as an option according to the desire of the customer for the Octavia and Roomster.

Octavia/Roomster Diesel particle filter

Superb Diesel particle filter

The use of biodiesel, also known as rapeseed methylester (RME), must be reliquished for technical reasons. Namely, biodiesel has a higher reaction temperature than diesel fuel (DF). This is demonstrated in destillation curves of fuels shown below. Regeneration could therefore be incomplete accordingly. The consequence of more frequent regeneration phases, thus higher fuel consumption, could under certain circumstances lead to filter jamming or inferior performance.



Different behaviour of destillation curves of diesel fuel (DF) and biodiesel (RME)

Skoda models offered with DPF:

Vehicle	Engine	Emission Standard	System Additive	Date of availability
Octavia	1,9l 77 kW 2V TDI-PD	EU4	without	05/06
Octavia	2,0l 103 kW 2V TDI-PD	EU4	without	available
Octavia	2,0l 125 kW 2V TDI-PD	EU4	without	06/06
Roomster	1,4l 59 kW 3Zyl. 2V TDI-PD EU4	EU4	without	06/06
Superb	2,0l 103 kW 2V TDI-PD	EU4	with	available

Our customers are offered diesel engine vehicles with diesel particle filters minimising the emissions of fine particles to the atmosphere. We thus permanently contribute to the sustainable development of society.

Mladá Boleslav
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