

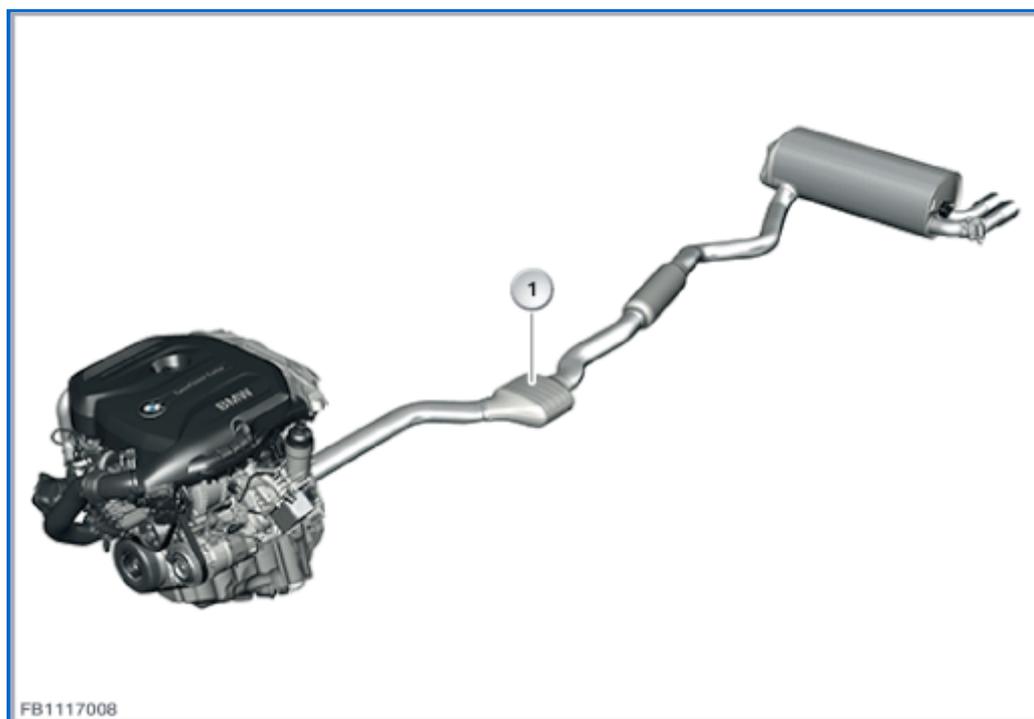
**FUB-FUB-FB-160002-A17 FUB-FUB-FB-160002-A17 - Petrol particulate filter - V.6, VIN: XXXXXXXX**

ISTA system version	4.15.32.17442	Data version	R4.15.32	Programming data	-
VIN	XXXXXXX	Vehicle	2'/F87/Coupe/M2 Competition/S55/MANUAL/ECE/RL/2018/09		
Int.lev.works	-	Int.lev.(cur.)	-	Int.lev.(tar.)	-
Mileage	-				

## Petrol particulate filter

In the EURO 6c exhaust emissions legislation, the limit values of the particle mass (PM) and the particle number (PN) are even more strictly limited. The reason for this is that, in modern petrol engines with direct injection, the most homogeneous fuel-air mixture is created with intake pipe fuel injection.

This means that more particles are created during combustion. In order to comply with the limit values, a petrol particulate filter is installed, among other things.



Example: B48 Engine in the F22/F23

Index	Explanation
1	Petrol particulate filter

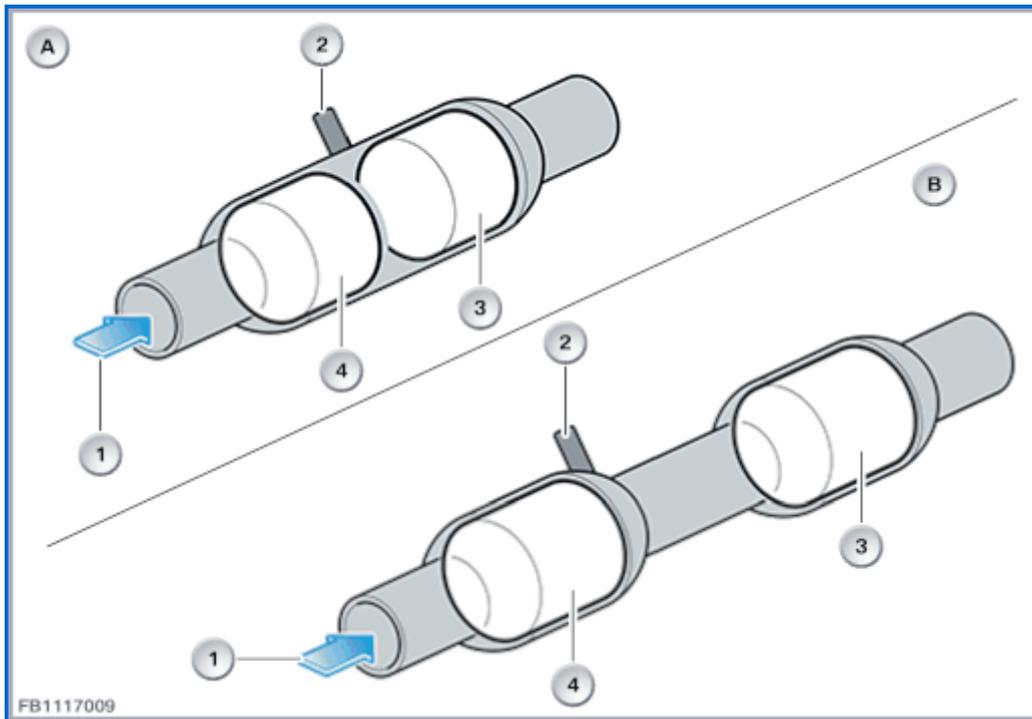
## Functional description

### Mounting orientation of the petrol particulate filter

The petrol particulate filter is installed behind the catalytic converter instead of the centre silencer. In future vehicles, it will also be possible to install the petrol particulate filter near the engine together in one housing with the catalytic converter.

The mounting orientation of the exhaust gas pressure sensor must be checked for unique identification. If the exhaust gas pressure sensor is at the output of the catalytic converter, then the petrol particulate filter is installed far from the engine in the vehicle underbody instead of the centre silencer. If the exhaust gas pressure sensor is located in the centre of the catalytic converter housing, then the petrol particulate filter is installed close

to the engine.



Index	Explanation	Index	Explanation
A	Petrol particulate filter near the engine in the catalytic converter	B	Petrol particulate filter near the engine instead of the centre silencer
1	Exhaust mass flow	2	Exhaust gas pressure sensor connection
3	Petrol particulate filter	4	Catalytic converter

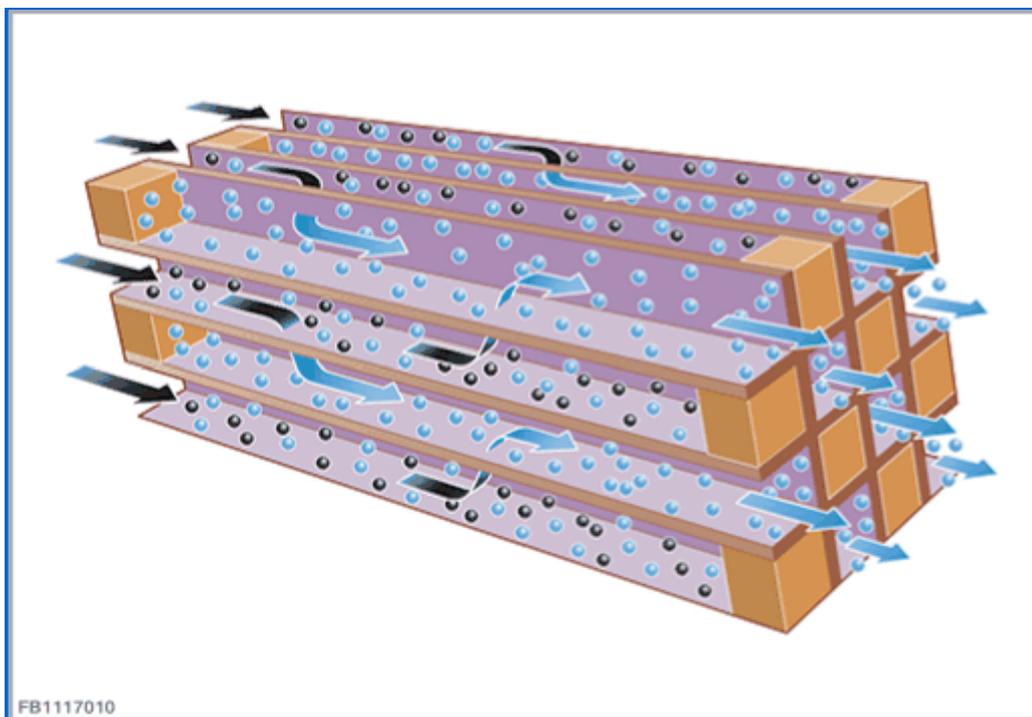
A mounting orientation of the petrol particulate filter near the engine benefits regeneration (erosion of soot) since it is easier to reach the necessary exhaust temperatures.

## Structure and function of the petrol particulate filter

The petrol particulate filter has many channels through which exhaust gas flows. The walls of the petrol particulate filter are porous so that exhaust gas can flow through them. The particles (soot or ash) stay in the channels.

The channels of the petrol particulate filter are closed at the ends. Every intake port is surrounded by 4 exhaust ports. The particles get deposited on the coating of the intake ports. The particles stay there until they combust due to an increase in the exhaust temperature and the required oxygen. The purified exhaust gas streams through the coated, porous walls out of the exhaust ports.

The soot deposits clog the petrol particulate filter over time. For this reason, they have to be burned off. This happens when the exhaust temperature is above the ignition temperature of the soot. This process is called regeneration. The carbon particles are converted into gaseous carbon dioxide (CO<sub>2</sub>) by means of oxidation.



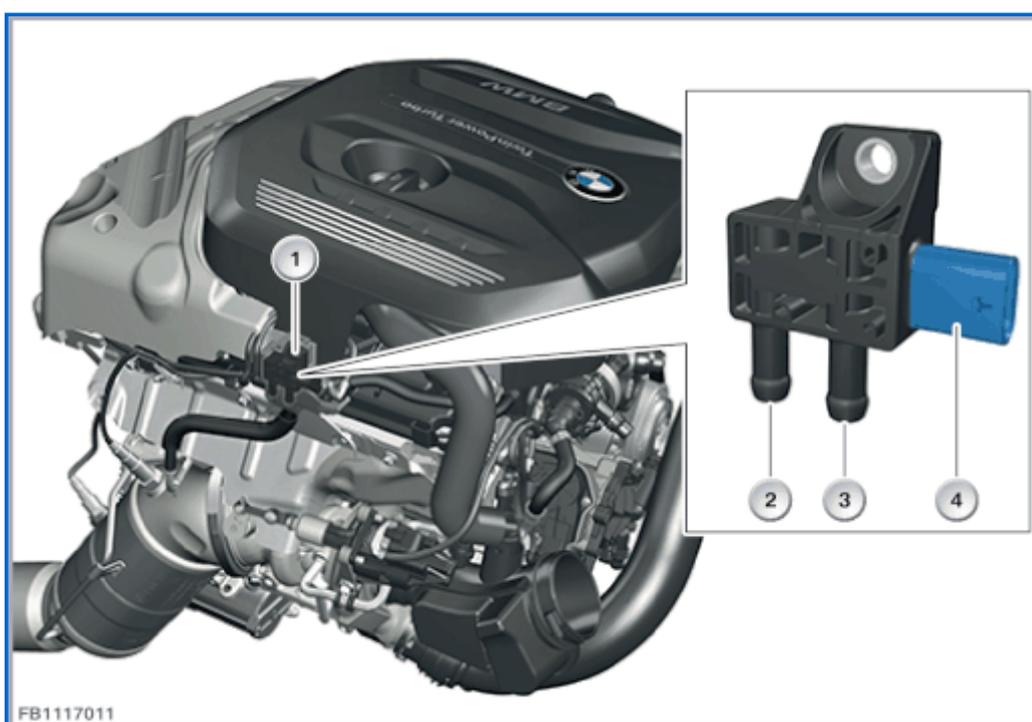
Soot deposits start to burn off at temperatures of 600 °C. Quick and effective regeneration is not achieved until a temperature of 700 °C, however. Since this temperature is only achieved at a correspondingly high load, other measures are taken in addition to natural regeneration (erosion of the soot in case of excess air in the coasting overrun mode) of the petrol particulate filter. The exhaust temperature can be artificially increased by adjusting the ignition timing, for example. The driver typically does not notice this.

## Exhaust gas pressure sensor

The differential pressure before and after the particulate filter is not measured with the petrol engine as it is with a diesel engine. Instead, with petrol engines, the exhaust gas pressure sensor measures the exhaust gas pressure before the petrol particulate filter as well as the ambient pressure.

The Digital Motor Electronics (DME) calculates the exhaust mass flow using the signals of the exhaust gas pressure sensor and other signals such as the air mass.

A value for the exhaust gas pressure after the petrol particulate filter is determined using the calculation of the exhaust mass flow in combination with the measured ambient pressure. The calculated differential pressure before and after the petrol particulate filter gives information on the load status of the petrol particulate filter. The Digital Motor Electronics (DME) activates regeneration when the permitted load status is exceeded.



Index	Explanation	Index	Explanation
1	Exhaust gas pressure sensor	2	Ambient pressure measuring connection
3	Measuring connection before petrol particulate filter	4	three-pin plug connection

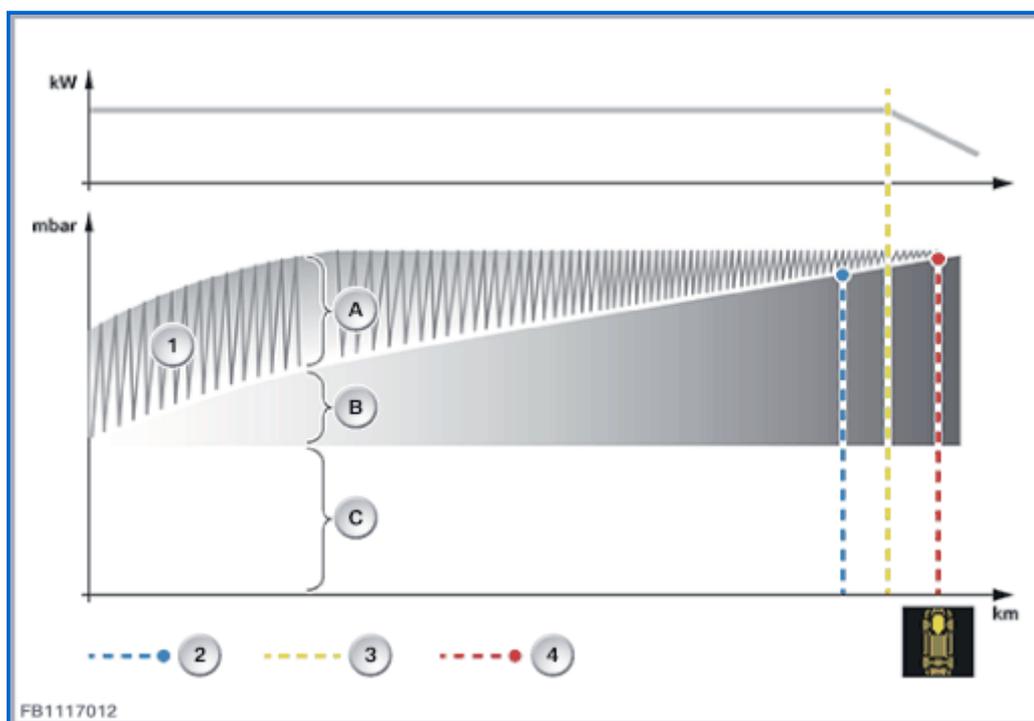
## System functions

### Regeneration

Depending on the driving profile and the service status, the petrol particulate filter is designed for a usage of about 240000 km. After this usage, the petrol particulate filter and housing must be replaced. To do so, the exhaust system must be disconnected and a new petrol particulate filter installed.

Information on the load status can be queried via the diagnosis system. When the maximum usage is reached, a fault memory is entered via which the diagnosis system can be read out. When the maximum usage is reached, **no** service information is displayed in the vehicle.

In order to keep the exhaust gas pressure below the specified limits, the cycles for regeneration increase when the load status rises due to ash in the petrol particulate filter. When the petrol particulate filter reaches its maximum load status with ash, it can no longer be burned off. A step-by-step reduction in engine performance subsequently takes place. If the power reduction exceeds 30%, the Digital Motor Electronics (DME) activates the malfunction indicator lamp. The engine control is in emergency operation.



Index	Explanation	Index	Explanation
A	Soot	B	Ash
C	New condition (unloaded)		
km	Usage in kilometres	kW	Power output in kilowatt
mbar	Exhaust counterpressure in millibar		
1	Load status cycles with regeneration	2	High load of the petrol particulate filter

3	Average usage reached	4	Power reduction and emergency operation program
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## Regeneration options

- Normal regeneration: dependant on regeneration taking place in the driving profile. Erosion of the soot can take place only in case of excess air in coasting overrun mode and at correspondingly high exhaust temperatures.
- Calculated regeneration: cyclically occurring regeneration due to the driving profile.
- Regeneration every 10,000 km: fixed cycle for regeneration.

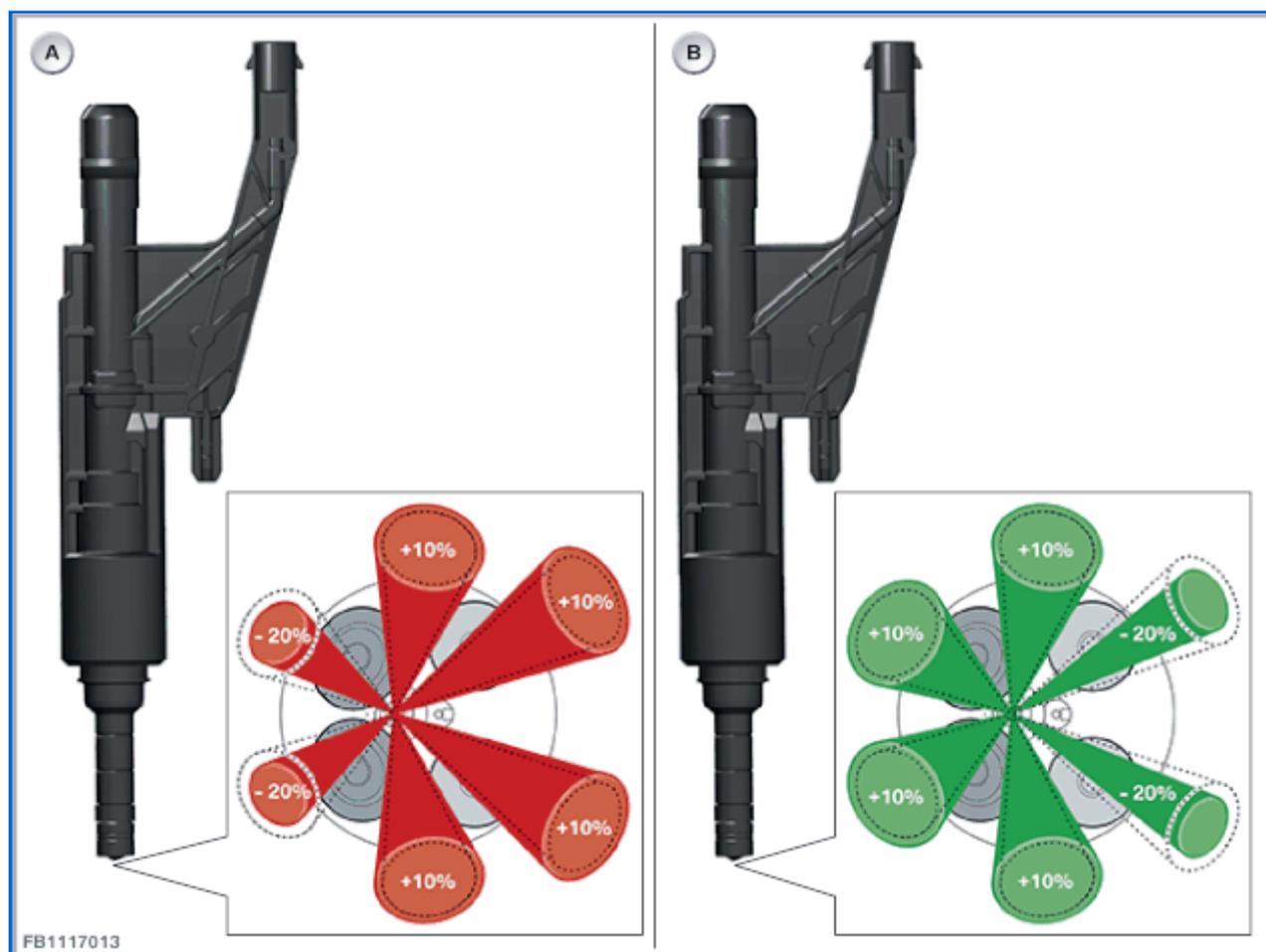


### Note!

A new petrol particulate filter is designed so that regeneration takes place about every 4000 km. If regeneration took place more frequently (below 4000 km), it would be necessary to take into account regeneration for the driving cycle prescribed by law for determining exhaust emission.

## Injection

To improve pollutant emission (particles) for EURO 6c, new fuel injectors are installed. The fuel injectors feature modified geometry for injection. You can see the change in the following graphic:



Index	Explanation	Index	Explanation
A	Fuel injector, generation 5	B	Fuel injector, generation 5,

## Notes for Service department

### General notes

**Note!**

Note the following special features of the petrol particulate filter:

- Hard impacts on the housing could result in damage to the ceramics
- The heat shields must not be loose or damaged.
- Leaks in the exhaust turbocharger near the turbine result in a high load status of the petrol particulate filter.
- An ash-reduced, approved engine oil must be used.  
Preferably:
  - Longlife -04
  - Longlife-12FE
  - Longlife-17FE+

### Diagnosis instructions

The system petrol particulate filter can be diagnosed with the diagnosis system. Test modules for the exhaust gas pressure sensor and the petrol particulate filter are available for this purpose.

The replacement of the petrol particulate filter must be registered via a service function.

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