

# **COMMERCIAL VEHICLE FILTERS**

No compromises in truck business



### **Commercial vehicle filters** Overview

The right filter for every vehicle: When it comes to commercial vehicles, there is no room for compromises. That is why Bosch provides the complete range for all current types of commercial vehicles and engines.

#### Safety through outstanding product quality

High-quality materials, neat and accurate processing and well-defined quality checks – according to the same standards as for OE parts.

#### System competence

Bosch develops and produces diesel and Denoxtronic injection systems and therefore knows how to protect them.

#### Complete range from a single source

Easier handling and ordering thanks to a comprehensive program, which is permanently updated.

#### High availability of goods

Bosch ensures quick availability of its parts by means of an international sales and logistics network.

#### Strategic partner for the future

Suitable diagnostic solutions, training courses and seminars for wholesalers and workshops.



### **Commercial vehicle filters** Product range



injection system. They reliably separate particles and water from fuel and contribute to optimum engine performance. engine. They reliably separate soot and metal abrasion from engine oil.

engine. They reliably separate particles from intake air and contribute to optimum engine performance.

vehicle occupants against pollen, fine dust as well as harmful and foul-smelling gases.





Air dryer cartridge	Denoxtronic filter	Special filters
Bosch air dryer cartridges protect the pneumatic system of commercial vehicles against damages. They dehumidify compressed air and reliably separate par- ticles and oil mist thus reducing the risk of expensive downtimes.	Bosch Denoxtronic filters protect the Denoxtronic injection system. They reliably remove particles from AdBlue® thus contributing to correct dosing.	Special filters for special tasks – from coolant filters and oil mist separators to hydraulik/transmission filters.

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### **Commercial vehicle filters** Quality requirements

Product quality is not negotiable; there can't be any compromises in this regard. Besides high-quality materials and excellent processing, this includes optimized alignment of the filter specifications. These specifications influence one another. They must thus be exactly geared to each other in order to ensure outstanding filter performance.

All functional and quality tests are performed according to the same standards applied to original equipment parts.



#### Magic triangle of filtration



#### Service life (dust retention capacity):

the amount of particles a filter is able to retain before reaching the change interval – should be as high as possible

#### **Efficiency (particle separation rate):**

the ratio of the number of particles retained by the filter to the number entering the filter, expressed as a percentage – should be as high as possible

#### Pressure drop (differential pressure):

the difference in fuel/oil/air pressure between filter inlet and outlet – should be as low as possible

# **Commercial vehicle filters** Quality requirements

Commercial vehicles are almost always on the road. This means all filter types are constantly strained and – in case of international transport – it also implies significant variations in fuel quality in different countries. As a result, commercial vehicle filters need to meet technical requirements being two to three times higher than those placed on passenger car filters.



Technical requirements\* of passenger car and commercial vehicle oil filters in comparison

\*according to OE requirements, approximated values



Quality requirements | Commercial vehicle filters

? Did you know?

Every year, some

13.4 million

commercial vehicles with more than 6 tons of GVW circulate on European roads – covering an annual overall distance of some 145,000 km in long-haul traffic.

### **Diesel filters** Product details

Bosch diesel filters protect the injection system. They reliably separate particles and water from fuel and contribute to optimum engine performance.



#### Advantages at a glance

- Excellent filter efficiency and reliable water separation due to multilayered, microporous filter media
- High dust holding capacity and low flow resistance due to large filter surface
- Moisture resistance and tensile strength due to specially impregnated filter media
- Protected against inner and outer leakage due to high-quality processing and usage of resistant materials

Change diesel filters regularly as specified by the vehicle manufacturer!

# (i) Consequences of silted-up filters:

- Loss of engine power or even engine standstill
- Impairment of the fuel supply
- Impairments to the output of the fuel pump or even a short-circuit
- Internal corrosion of engine components

# **Diesel filters** Technology



#### **Design and operation**

- 1 Seal
- 2 Threaded connection
- 3 Double beading
- 4 Multilayer filter media
- 5 Water accumulation chamber
- 6 Water drain screw
- A Inflow of contaminated diesel
- B Dirt and water filtration of diesel
- C Cleaned diesel is conducted to the engine



### **Diesel filters** Technology

### Because of varying diesel quality

In global terms, the quality of diesel varies considerably. Depending on the region and the climatic conditions, the concentration of water and dust may be extremely high. Bosch thus provides various diesel filters exactly geared to the individual diesel qualities of the respective country.



Source: SGS World Wide Fuel Surveys summer 2006 to winter 2010/2011

≤ 19 Established diesel markets

 $\left. \begin{array}{c} 20\\ 21 \end{array} \right\}$  Increased impurity due to particles



### (i) Water – the archenemy of injection systems

Any diesel fuel contains finely dissipated water. This water content depends on the fuel quality. Condensation inside the tank can increase the it even further. Insufficient water separation – e.g. by non-compliance with replacement intervals or use of cheap filters – can result in expensive corrosion damages on the engine, the high-pressure pump or even on the injectors.

Corrosion at the injector

Technology I Diesel filters

### **Oil filters** Product details

Bosch oil filters protect the engine. They reliably separate soot and metal abrasion from engine oil.



#### Advantages at a glance

- Long service life of filter and engine oil due to multilayered, specially impregnated filter media
- High dust holding capacity due to large filter surface
- Excellent filter efficiency due to specially designed and well balanced filter components
- Reliable engine lubrication in almost all temperature and oil pressure conditions
- No oil loss by corrosion-resistant housing materials and seals made of special rubber

Change oil filters regularly as specified by the vehicle manufacturer!

# (i) Consequences of silted-up filters:

- Premature engine wear or even engine damage
- Reduced engine performance
- Increased oil consumption

### **Oil filters** Technology



#### Design and operation

- A Inflow of contaminated oil
- B Filtration of oil
- C Clean oil is conducted to the engine

#### Bypass valve

- Ensures continuous oil supply for the engine at low ambient temperatures and protection when the filter is clogged at the end of service life through brief bypassing of the filter
- Less damage caused by impurities than by interrupted oil supply and cooling

#### Non-return valve

- Prevents idling of the oil filter after switching off the engine
- Immediate lubrication at restarts thanks to quick buildup of pressure

# (i) Combined main-flow/bypass filter in CV

- ► 100 % of the oil is filtered by the main flow filter
- In addition, 10 % of the oil are subject to a fine filtration at the bypass filter – slowing down oil aging

### **Air filters** Product details

Bosch air filters protect the engine. They reliably separate particles from intake air and contribute to optimum engine performance.



#### Advantages at a glance

- Long service life, excellent filter efficiency, moisture resistance and tensile strength due to multilayered, specially impregnated filter media
- High dust holding capacity and low flow resistance due to large filter surface
- Robust fold geometry due to filter media with special embossing
- Appropriate fit due to precise dimensions and high-quality sealing materials

Change air filters regularly as specified by the vehicle manufacturer!

# (i) Consequences of silted-up filters:

- Increased fuel consumption
- Reduced engine power
- Increased pollutant emissions

### **Cabin filters** Product range & details

Bosch cabin filters protect the vehicle occupants against pollen, fine dust as well as harmful and foul-smelling gases.



Recommended replacement interval: Cabin filters should be changed every 200 000 to 300 000 km. Please observe the manufacturer specifications!

Function	Activated carbon filter	Standard filter			
	<b>Bosch activated carbon cabin filters –</b> for noticeably purer and more pleasant air inside the car.	<b>Bosch standard cabin filters</b> – for clean air inside the car.			
Separates foul-smelling and harmful gases (ozone, smog, exhaust gases)	•				
Separates pollen and fine dusts (up to 100% of $10\mu\text{m})$	•	•			
Protects the air conditioning	•	•			
Reduces dazzling effects	•	•			
Coverage					
Advantages at a glance	Neutralizes reliably harmful and foul- smelling gases in an activated-carbon layer	<ul> <li>Filters effectively fine dust, soot and pollen in an ultrafine microfiber layer</li> </ul>			
	► Filters effectively fine dusts, soot and pollen in an ultrafine microfiber layer	Protects the air conditioner and improves the vision by reducing deposits			

Protects the air conditioner and improves the vision by reducing deposits

### **Cabin filters** Technology



### (i) Consequences of silted-up filters:

- Poor vision due to misted windows, and thus reduced safety
- Increased concentration of pollutants inside the vehicle
- ► Allergic reactions, e.g. sneezing
- Restricted operation of the air conditioning system due to deposits on the evaporator



Activated carbon is made of coconut shells carbonized and crushed in a hermetically sealed environment. Water vapor with a temperature of



is used to create its sponge-like structure.

### **Denoxtronic filters** Product details

Bosch Denoxtronic filters protect the Denoxtronic injection system. They reliably remove particles from AdBlue<sup>®</sup> thus contributing to correct dosing.





#### Advantages at a glance

- High particle separation rate due to microporous filter medium with special impregnation
- High dust retention capacity due to large filter surface
- Chemical resistance to aggressive AdBlue<sup>®</sup> due to usage of high-quality materials
- Frost resistance due to compressible compensation elements

Recommended replacement interval: Depending on the circumstances of their application, Denoxtronic filters should be replaced every 120 000 to 320 000 km. Please observe the manufacturer specifications!

### ? Did you know?

AdBlue<sup>®</sup> is a watery urea solution composed of up to 32.5 % urea and up to 67.5 % demineralized water. Due to its high water content, AdBlue<sup>®</sup> freezes and expands at just

# -11° C.

In this case, compressible compensation elements prevent damage to both the filter and the supply module.

Product details | Denoxtronic filters

### **Denoxtronic filters** Technology



### **Denoxtronic filters** Product range

#### Spare-part sets for repairs and servicing

Тур	/кіт				•	ø	0	Ť		₽ <b>j)</b>	/	
DNC Serv	DX 1 vice	1 457 436 042		•	•		•	•	٠			DAF, MAN, IVECO, Scania, Volvo
DNC Rep	DX 1 air	F 00B H40 025					•	•		•		DAF, MAN, IVECO, Scania, Volvo
DNC Serv	DX 2.1 vice	1 457 436 006	•	•			•	•				Case, IVECO, KHD, Renault, Volvo
DNC Rep	DX 2.1 air	1 457 030 020								•		Case, IVECO, KHD, Renault, Volvo
DNC Serv	DX 2.2 vice	1 457 436 088*		•	•	•					•	Cummins, IVECO, Mack, Nissan, Renault, Volvo
DNC Serv	)X 6.5 vice	1 457 436 039		٠	•	•					•	Perkins, IVECO, CNH, JCB, Daimler India, CAMC (China)
*avail	lable as	of September 201	18									
	Filter with compensation element				Compensation element with sealing function					Pre-filter		
	Filter element O			<b>&gt;</b> s	Set of seals				Filter cover			
Compensation element				Drain plug			/	Extraction tool				



#### **Replacement of Denoxtronic 2.1 filters**

The filter is screwed onto the housing cover of the Denoxtronic supply module and is extracted from the housing along with the cover. In case the filter detaches from the cover or gets stuck at the housing, it can be extracted using the extraction tool.



#### **Replacement of Denoxtronic 2.2 filters**

Using the extraction tool, the filter is extracted from the Denoxtronic supply module. The matching extraction tool is included within the service kit.

### **Air dryer cartridges** Product details

Bosch air dryer cartridges protect the pneumatic system of commercial vehicles against damages. They dehumidify compressed air and reliably separate particles and oil mist thus reducing the risk of expensive downtimes.



#### Advantages at a glance

- Large reserves for water absorption due to usage of high-quality air dryer granulate
- High resistance to pulsation and burst pressure due to robust high-quality processing
- Even longer service life of air dryer granulate by integrated oil separator

Air dryer cartridges shall be replaces anually. Please observe the manufacturer specifications!

#### (i) Consequences of poor dehumidification of compressed air

- Risk of malfunctioning valves due to frozen water – in case of cold weather
- Corrosion in air reservoirs as well as on valves and cylinders
- Erosion of oil lubricant film in brake-system components

### **Air dryer cartridges** Technology

#### A Contaminated, humid air passes 1 Housing the prefilter - separation of coarse particles 2 Compression spring B Separation of oil mist C Drying of compressed air within the air dryer container 3 Oil separator D Dry, clean compressed air is returned to the pneumatic system 4 Air dryer container 5 Air dryer granulate 6 Fleece Prefilter 8 Seal ring 9 O-ring 1 Surface 4 Fine channel 2 Pore 5 Water molecule 10 Thread plate 3 Air

#### Design and operation

Smart design for an extended service life Air-drier granulate Oil separator

#### Bosch air dryer cartridge

#### Oil mist is separated before

reaching the air dryer granulate

→ water-absorption capability remains fully intact, extended service life



### **Oil mist is separated after** reaching the air dryer granulate

→ deteriorated water-absorption capability, reduced service life

### **Coolant filters** Product details

Bosch coolant filters protect the fine channels of the cooling system of commercial vehicles against deposits. They reliably separate particles and other residues from coolant, thus reducing the risk of expensive downtimes.



#### Advantages at a glance

- High dust retention capacity due to large filter surface and specially impregnated filter media
- Long service life due to corrosion-resistant housing and coolant-resistant seals
- Prevents bacterial growth and acidification by easily soluble chemical additives

Coolant filters should be replaced regularly and together with the oil filter. Please observe the manufacturer specifications!

# (i) Consequences of insufficient coolant filtration

- Pitting (corrosion within the cooling system)
- Premature wear of the coolant pump
- ► Deposits of calcium and magnesium
- Acidification and bacterial growth
- Particle residues within the cooling system

### **Coolant filters** Technology



#### **Design and operation**

- A Inflow of contaminated coolant
- B Coolant is filtered and chemical additives are added
- C Cleaned coolant is conducted to radiator

\* not standard



Insufficient coolant filtration can result in pitting. The result: damage to the cylinder due to corrosion.

### (i) KTS Truck: ECU diagnosis for CV electronics

- KTS Truck module for trucks, vans, trailers and buses
- KTS Truck can be connected to the Bosch DCU range and all common laptops/PCs via the USB port
- Integrated Bluetooth connection with a large range of up to 100 m
- Bluetooth USB adapter included
- Sturdy housing



### **Oil mist separators** Product details

Bosch oil mist separators protect the engine intake duct of commercial vehicles – e.g. the turbocharger – against damages. They reliably separate oil mist and particles from returned blow-by gases thus reducing the risk of expensive downtimes.



#### Advantages at a glance

- Highly efficient oil separation and permanent particle collection due to multilayer microfiber filter media
- Reduced engine oil consumption due to recirculation of separated oil to the oil circuit
- Energy-efficient as the oil mist separator does not require any electric energy

In short-distance and distribution traffic, oil mist separators should be changed every 40 000 km; in long-distance traffic, they should be replaced every 80 000 km. Please observe the manufacturer specifications!

### (i) How are blow-by gases formed?

During engine operation, gases flow out of the combustion chamber, through the constructionborne gaps between piston and cylinder wall and into the crankcase. Even with optimum sealing, these blowby gases make up approximately 0.5 % to 2 % of the entire gas volume inside the cylinders. Blow-by gases contain fuel residues, soot particles and oil mist.

### Hydraulik/transmission filter Product details

Bosch hydraulic/transmission filters protect the hydraulic system of commercial and offhighway vehicles against damages. They reliably separate particles and other residues from hydraulic oil thus reducing the risk of expensive downtimes.



#### Advantages at a glance

- Long filter service life and high dust retention capacity due to specially designed and well balanced filter components
- High particle separation rate due to filter media made of synthetic or glass fibers
- No oil loss by corrosion-resistant housing materials and seals made of special rubber

*Hydraulic/transmission filters should be replaced every 500 to 1 000 hours of operation, at latest once a year. Please observe the manufacturer specifications!* 

### (i) Properties of hydraulic fluids

Hydraulic fluid is used to transmit pressures in hydraulic systems. These pressures can be up to 400 bar, thus demanding hydraulic fluids to meet tough requirements:

- Low temperature sensitivity for viscosity (fluidity)
- Low compressibility
- Low tendency to form foams
- High shear stability, i.e. no rupture of the lubricant film – even if subject to high mechanical strains

"Racing implies a constant search for optimization potentials. A reliable partner is thus a huge support. Bosch workshop equipment and parts feature a particularly high quality. That's material for professionals."

### Jochen Hahn



# **Team Hahn Racing** Successful with Bosch

Since 2000, Jochen Hahn's participation at the FIA European Truck Racing Championship (ETRC) has been highly successful - bringing him four titles as European champion and two as vice champion since 2011. This success is facilitated by his Team Hahn Racing, a real family business run by him, his wife, his children and his parents. For several years, Bosch has been supporting Team Hahn Racing providing both technology and know-how. The European truck motor racing series ETRC is a real crowd-puller attracting more than 800 000 spectators at roughly eight events each year.

#### Bosch technology inside the race truck





Battery

Bosch S5 battery with PowerFrame® technology: more power right from the start

**Diesel injection system** Diesel injection system with EDC7U control unit and unit injectors

Alternator Heavy Duty alternator for reliable power supply







**Ribbed V-belts** 

Bosch ribbed V-belts provide top performance in racing applications

The fuel-filter replacement box and the oil filter protect both the injection system and the engine

Filters

Fuses

Crankshaft, camshaft and intake-manifold pressure sensors provide accurately measured data







#### Relays

Bosch relays - invisible from the outside

Bosch fuses protect cables, harnesses and Bosch Aerotwin wiper blades - highly but extremely important for the race truck devices against overloads or short circuits

Wiper

Sensors

esteemed in racing for their high wiping performance

### **Team Hahn Racing** Successful with Bosch

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#### Bosch technology inside the race truck

- Bosch S5 battery with PowerFrame® technology: more power right from the start
- Diesel injection system with EDC7U control unit and unit injectors
- ► Heavy Duty alternator for reliable power supply
- Bosch ribbed V-belts provide top performance under racing conditions
- Fuel-filter replacement box and oil filter protect both injection system and engine
- Crankshaft, camshaft and intake-manifold pressure sensors provide accurately measured data
- Bosch relays invisible from the outside but extremely important for the race truck
- Bosch fuses protect cables, harnesses and devices against overloads or short circuits
- Bosch Aerotwin wiper blades highly esteemed in racing for their high wiping performance

Successful with Bosch | Team Hahn Racing

# Driven by efficiency

Bosch technologies are used worldwide in almost all vehicles. People, and assuring their mobility, is what we are focused on.

Therefore, we have dedicated the last 125 years of pioneering spirit and expertise in research and manufacturing to achieving this.

We continue to work on our unique combination of solutions for spare parts, diagnostic devices, workshop equipment and services:

- ► Solutions for efficient vehicle repairs
- ▶ Innovative workshop equipment and software
- ▶ The world's most comprehensive range of new and replacement parts
- ► Large network of wholesale customers, for quick and reliable parts supply
- ► Competent hotline support
- ▶ Comprehensive educational and training offers
- ▶ Targeted sales and marketing support

Find out more at: bosch-automotive-aftermarket.com

What drives you drives us.

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