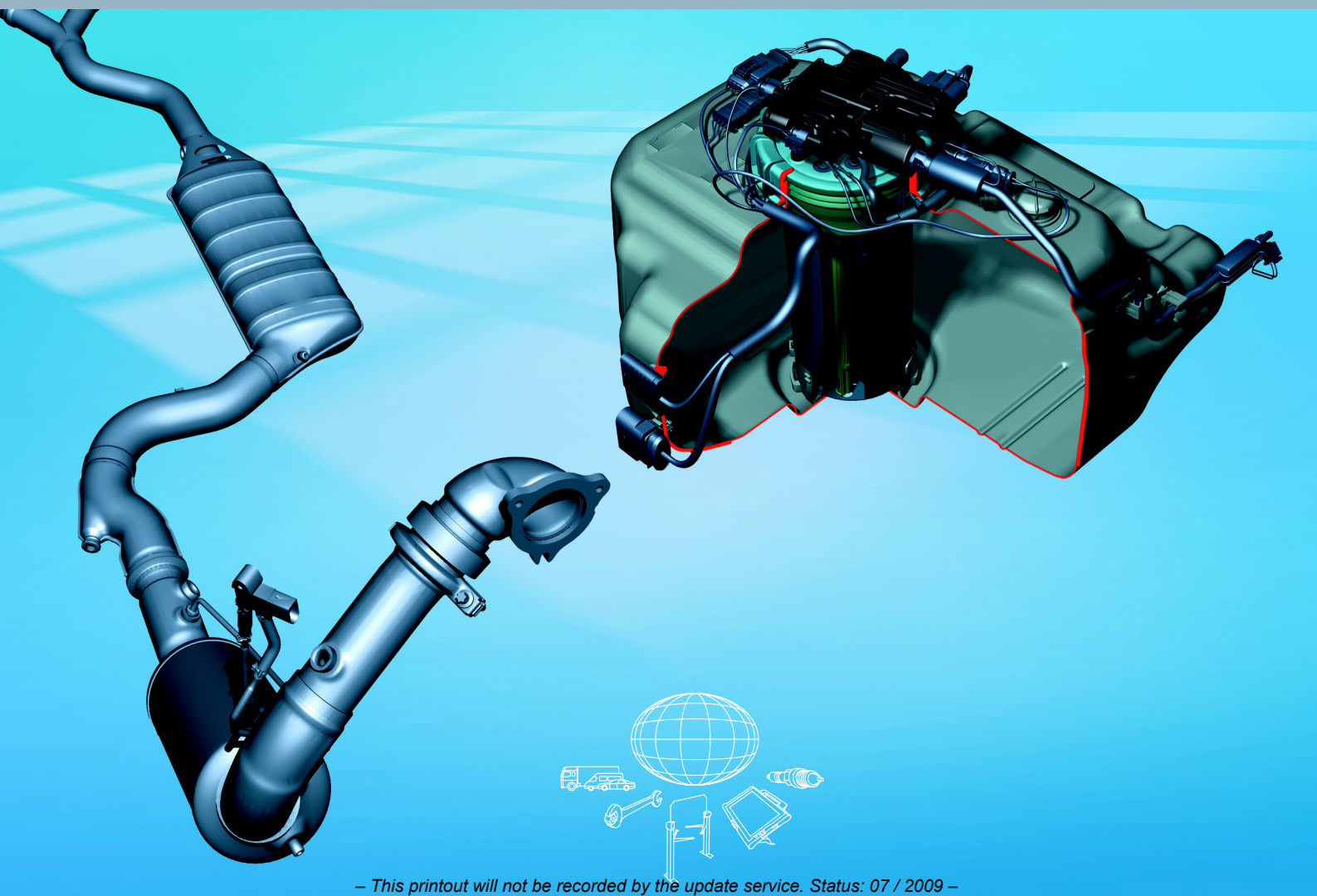
Exhaust Aftertreatment BlueTEC with AdBlue®

System Description of Engine 642.8

Mercedes-Benz



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Technical Information Bulletin for Service

Daimler AG · Technical Information and Workshop Equipment (GSP/OI) · D-70546 Stuttgart

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Image no. of title image: P00.10-4823-00
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07/2009

Contents

Contents

Dear Reader,

This brochure presents the BlueTEC with AdBlue® emission control system for Mercedes-Benz passenger cars. The applicability of this system description is not restricted to specific vehicle models.

The emphasis is on presenting the following content irrespective of the vehicle model:

- Design and operation of BlueTEC emission control system with NO_x storage catalytic converter (NSK)
- Design and operation of BlueTEC emission control system with AdBlue® (SCR (Selective Catalytic Reduction))
- Interaction of system components in overall system
- Useful information about AdBlue®

The system description is not intended as a basis for repair work or for the diagnosis of technical problems. For such needs, the following systems are available as usual:

- Workshop Information System (WIS)
- Diagnosis Assistance System (DAS) for model series 164 and 251
- Xentry Diagnostics for model series 212

We will publicize modifications and new features in the relevant WIS documents only. The information presented in this system description may therefore differ from the information published in the WIS.

All the technical data listed in this brochure were valid at the July 2009 copy deadline date and may therefore differ from the current production configuration.

Daimler AG

Technical Information and Workshop Equipment (GSP/OI)

Introduction

Environmental authorities around the world are aiming for massive reductions in the level of emissions produced by diesel vehicles.

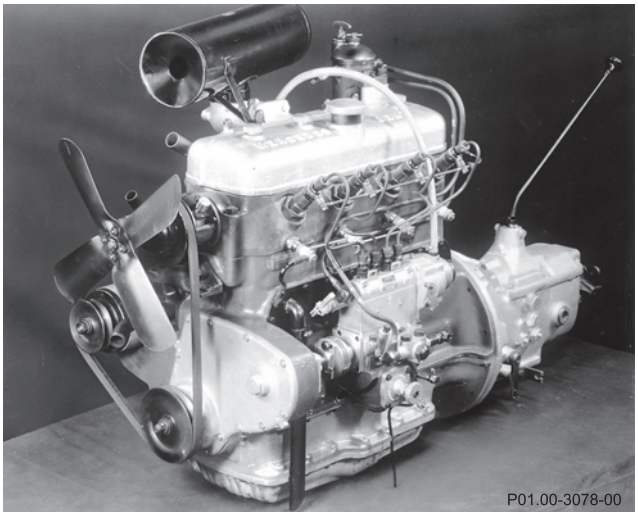
The introduction of the EURO 6 exhaust emissions standard is intended to reduce pollutant emissions e.g. nitrogen oxides by 54% compared to EURO 5.

An oxidation catalytic converter combined with a diesel particulate filter (DPF) was enough to satisfy the EURO 4 exhaust emissions standard. More components were however required to meet the EURO 5 emissions standard. The technical complexity required to comply with the EURO 6 exhaust emission values is much greater.

In January 2008, Mercedes-Benz introduced the E 300 CDI BlueTEC – the first vehicle in the EU with BlueTEC technology.

As of September 2009, Mercedes-Benz will be offering four more models featuring BlueTEC technology in the EU in the form of the E-Class, M-Class, GL-Class and R-Class. These vehicles meet the EURO 6 exhaust emissions standard and are based on the new V6 engine generation 642.8.

With its BlueTEC technology, Mercedes-Benz has been able to heavily reduce exhaust gas emissions while at the same time maintaining the performance of the diesel engines in terms of torque and power output.



First passenger car diesel engine 138, manuf. 1936

Low-tech design of the first diesel engines: 2.6 l displacement with 33 kW of power as used in the Mercedes-Benz 260 D, the world's first diesel passenger car.

Engine 642.8

The diesel engine 642.8 is characterized by its high level of complexity. With 3.0 l displacement and 155 kW of power, it will be installed in the E 350, ML 350, and R 350 BlueTEC vehicles as of September 2009. In the GL 350 BlueTEC vehicles, engine 642.8 has a power output of 160 kW.

BlueTEC technology

BlueTEC is a modular emission control system which is available in two versions:

- On the previous E 300 BlueTEC sedan, the oxidation catalytic converter and the particulate filter are combined with a particularly long-life NSK and an additional SCR catalytic converter.
- The second version will be used on the new models E 350, ML 350, GL 350 and R 350 BlueTEC as of September 2009. The NSK is omitted on this version. However, AdBlue® is sprayed into the exhaust flow on these vehicles. This releases ammonia which reduces the nitrogen oxides to unharmful molecular nitrogen (N_2) and water (H_2O) in the downstream SCR catalytic converter.

To allow them to be differentiated, the two versions are designated as follows:

- BlueTEC (NSK) in model E 300 CDI
- BlueTEC (SCR) in the models E 350, ML 350, GL350 and R350

Additional operating fluid – AdBlue®

AdBlue® is required as an additional operating fluid for the BlueTEC exhaust aftertreatment system (SCR). It is carried in a separate tank.

AdBlue® is a non-toxic, highly pure, colorless, synthetically manufactured urea solution.

Benefits for the consumer and the environment

During combustion of the fuel/air mixture in a diesel engine which is designed for maximum efficiency and low particulate emissions, varying concentrations of nitrogen oxides (NO_x) are produced depending on the combustion temperature and pressure. If an engine is designed to produce lower nitrogen oxide emissions, it emits soot and the fuel consumption is higher. Engines with an optimized efficiency level and higher combustion temperatures inevitably produce a greater proportion of nitrogen oxide in their exhaust.

BlueTEC reduces the undesirable nitrogen oxide component in the exhaust gas by adding AdBlue®. The AdBlue® produces ammonia (NH_3), which is converted into molecular nitrogen (N_2) and water (H_2O) in the SCR catalytic converter along with the nitrogen oxides (NO_x) Combustion can then be designed for maximum efficiency, low soot emissions and therefore low fuel consumption. BlueTEC is a wear-free system that is largely maintenance-free and thus operates cost-effectively.

Note

Vehicles with NSK must be operated on sulfur-free diesel fuel (sulfur content ≤ 10 ppm (parts per million)). If the sulfur content is > 10 ppm, the NSK will be contaminated by sulfur dioxide (SO_2) and damaged.

Vehicles with SCR catalytic converter must be operated on low-sulfur diesel fuel (sulfur content ≤ 50 ppm). If the sulfur content is > 50 ppm, the DPF will be contaminated by sulfur dioxide (SO_2) and damaged.

Introduction

Current exhaust emissions regulations for Europe

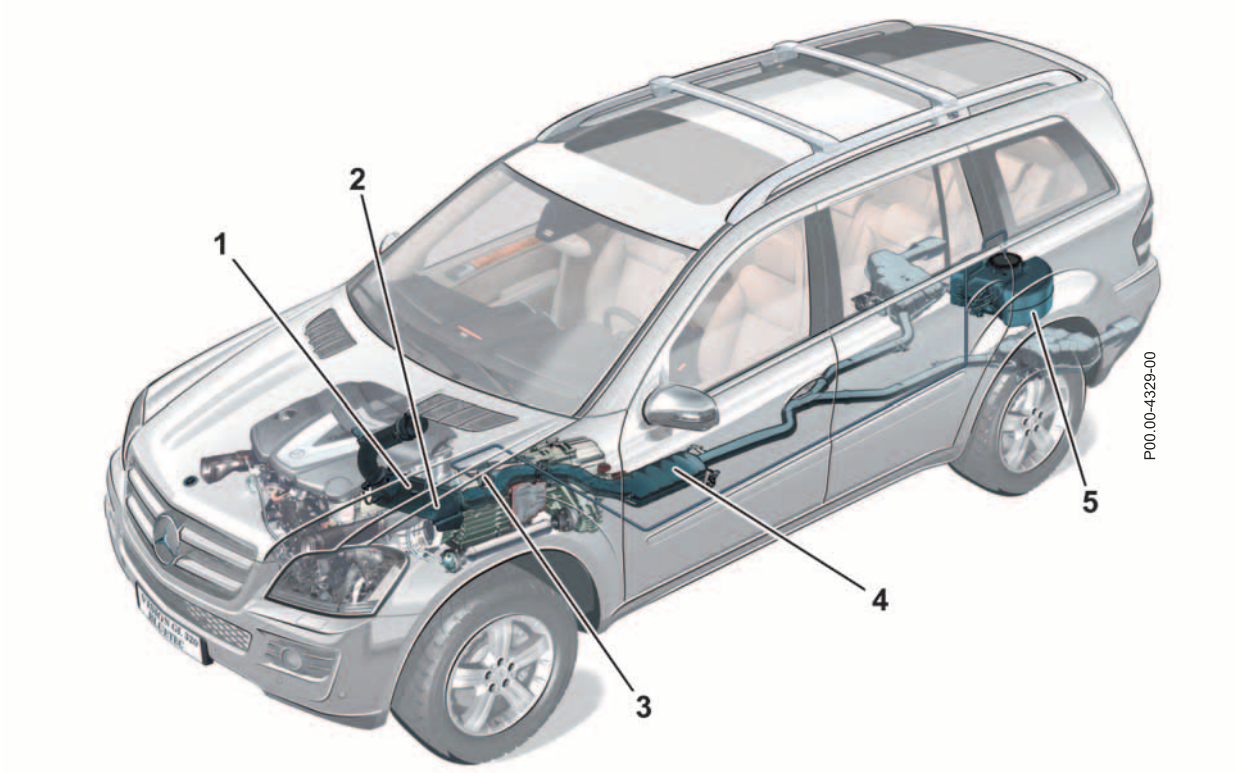
Stage 4 of the EU exhaust emission regulation (EURO 4) came into force for all new passenger cars registered on the European market on 01.01.2006. Type approval to EURO 4 for passenger cars has been valid since 01.01.2005. Type approval to the EURO 5 exhaust emission regulation will be valid as of 01.09.2009.

The EURO 5 standard will then come into force for all new registered vehicles as of 01.01.2011.

The following tables list the new limit values for the emissions regulations.

Diesel engine exhaust emissions standard	EURO 4 from 01.01.2006	EURO 5 from 01.01.2011	EURO 6 from 01.09.2015
Carbon monoxide (CO)	0.5 g/km	0.5/0.45* g/km	0.45 g/km
Hydrocarbons and nitrogen oxides (HC + NO_x)	0.3 g/km	0.23 g/km	0.17 g/km
Nitrogen oxides (NO_x)	0.25 g/km	0.18 g/km	0.08 g/km
Particulate matter (PM)	0.025 g/km	0.005 g/km	0.005 g/km

* As of 01/2013



BlueTEC with AdBlue® in vehicle, shown on model 164.8

1 Oxidation catalytic converter
2 Diesel particulate filter
3 AdBlue® metering valve
4 SCR catalytic converter
5 AdBlue® tank

In-engine measures

The changes introduced on these vehicles mainly involve adaptation of the engine to optimize the combustion process and in-engine exhaust gas recirculation.

This set of measures for downstream exhaust gas cleaning makes it possible for diesel passenger cars to meet the strict EURO 6 exhaust emissions standard for the first time.

Cross-section of engine 642

Comparison of BlueTEC exhaust system variants

Mode of operation of BlueTEC (NSK)

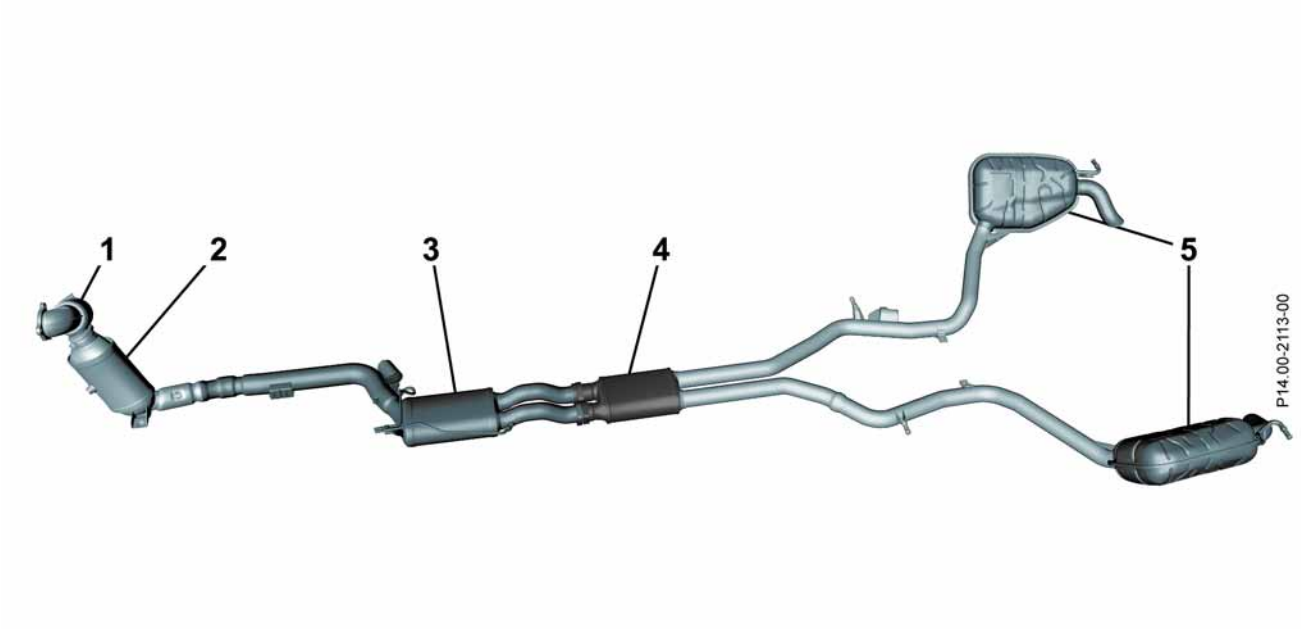
On vehicles with BlueTEC (NSK), the exhaust gas is cleaned by a near-engine mounted oxidation catalytic converter, an NSK, a DPF and an SCR catalytic converter.

The carbon monoxide (CO) and hydrocarbon (HC) emissions produced during combustion are oxidized to carbon monoxide (CO_2) and water (H_2O) in the oxidation catalytic converter.

During lean-burn operation, the NSK stores the nitrogen oxides produced during combustion. These are converted to molecular nitrogen (N_2) and water (H_2O) during the regeneration phase. During rich-burn operation, a chemical reaction produces ammonia, which is stored in the SCR catalytic converter and consumed during lean-burn operation.

The DPF downstream of the NSK holds back the carbon (C) soot particles in the exhaust gas, which are then burnt to produce carbon dioxide (CO_2) during DPF regeneration.

During lean-burn operation, the nitrogen oxides which cannot be stored in the NSK are converted into molecular nitrogen and water by the SCR catalytic converter using the stored ammonia. When the sulfur is removed from the NSK, the odor is minimized by the SCR catalytic converter.



BlueTEC exhaust system (NSK)

1 Oxidation catalytic converter
2 Advanced NO_x storage catalytic converter
3 Diesel particulate filter
4 SCR catalytic converter
5 Rear muffler

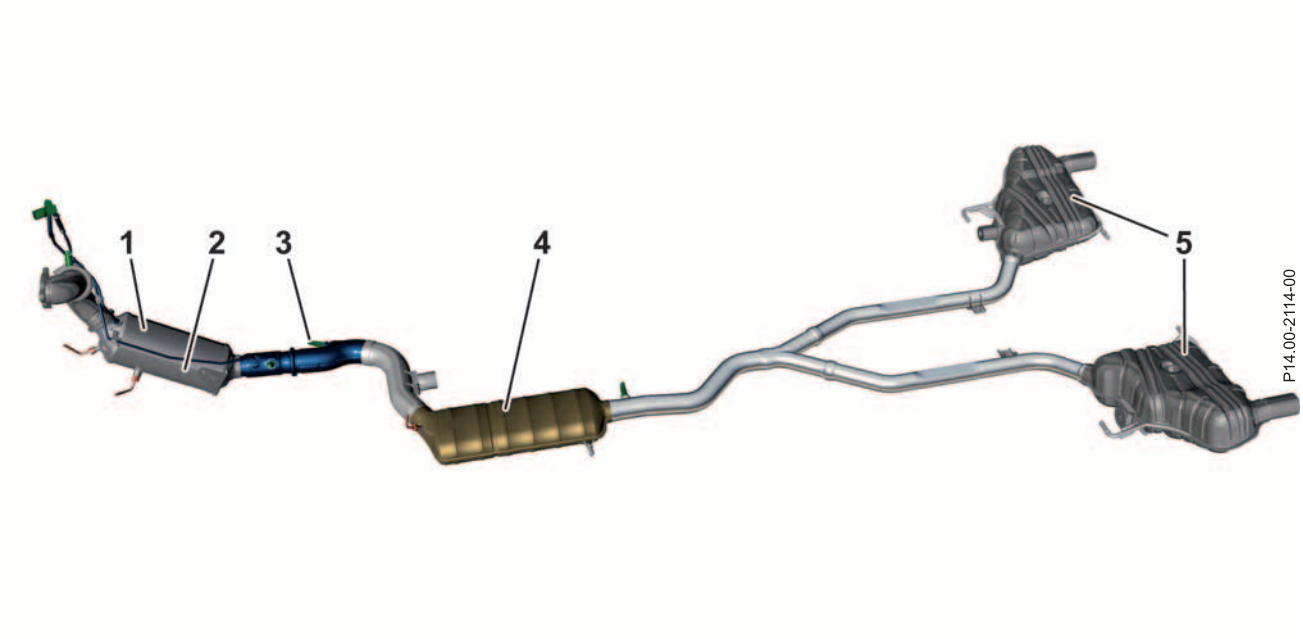
Mode of operation of BlueTEC (SCR) with AdBlue®

On vehicles with BlueTEC (SCR), the exhaust gas is cleaned by an oxidation catalytic converter, a DPF and an SCR catalytic converter. The oxidation catalytic converter and the DPF perform the same functions as on vehicles with the BlueTEC (NSK).

On vehicles with BlueTEC (SCR), the nitrogen oxides produced during combustion are reduced in the SCR catalytic converter by the reducing agent AdBlue®. To achieve this, the AdBlue® is injected downstream of the DPF by the AdBlue® metering valve (Y129).

The AdBlue® mixes with the exhaust flow on the path between the AdBlue® metering valve and the SCR catalytic converter. The AdBlue® causes ammonia (NH_3) to be released. Uniform distribution of the AdBlue® in the exhaust is facilitated by a mixing element located upstream of the SCR catalytic converter.

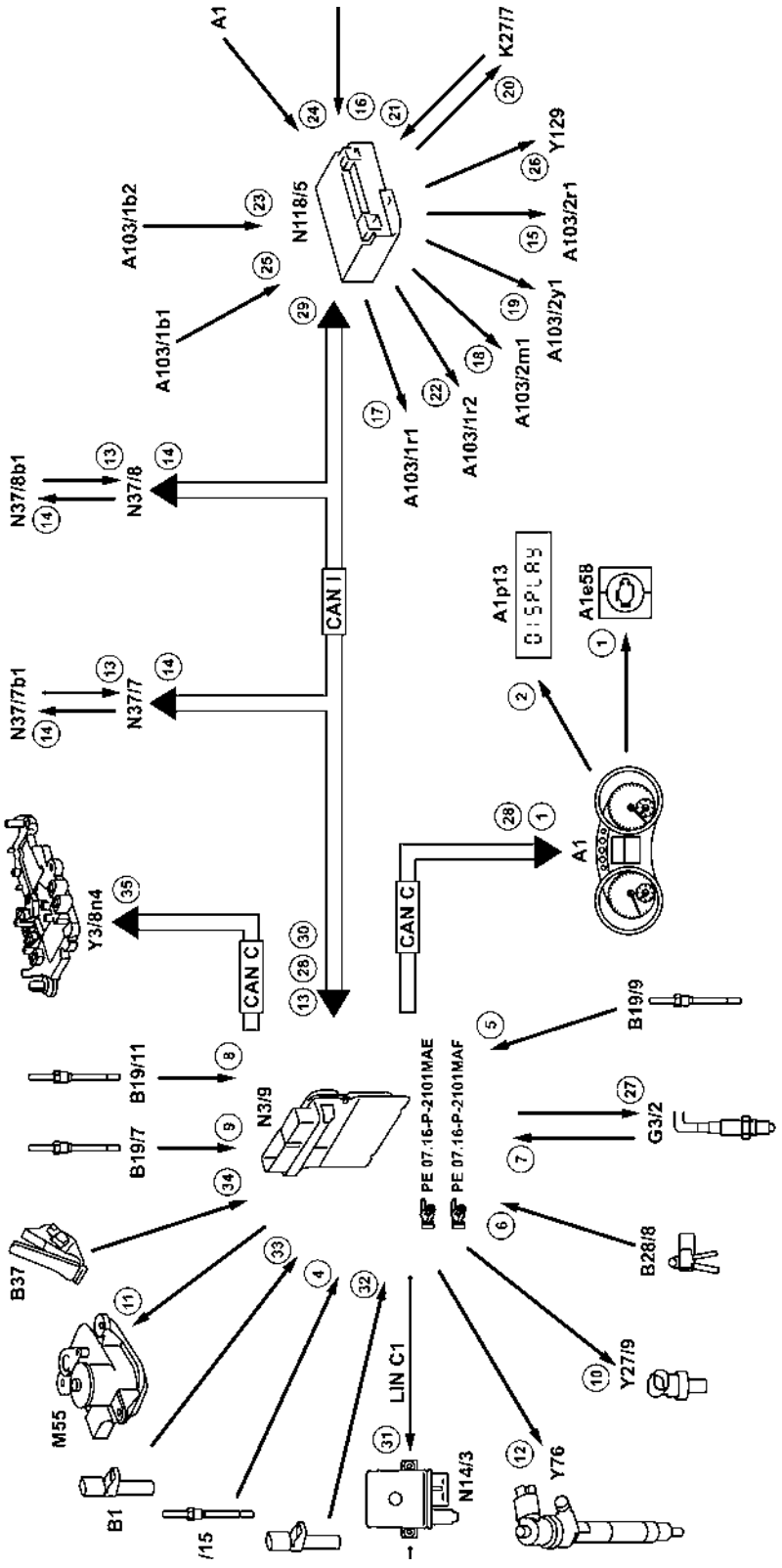
In the SCR catalytic converter, the nitrogen oxides are converted into non-toxic molecular nitrogen and water vapor with the help of ammonia and oxygen. The ammonia which is not immediately required for nitrogen reduction is stored in the SCR catalytic converter and used during periods when no AdBlue® is being injected. This means that AdBlue® is only injected in short intervals and ensures that the operating fluid is used more economically.



BlueTEC exhaust system (SCR)

1 Oxidation catalytic converter
2 Diesel particulate filter
3 AdBlue® metering valve
4 SCR catalytic converter
5 Rear muffler

System overview



System components of Common-Rail Diesel Injection (CDI) exhaust treatment

A1	*Instrument cluster*
A1e58	*Engine diagnosis indicator lamp*
A1p13	*Multifunction display*
A103/1b1	*AdBlue® tank temperature sensor*
A103/1b2	*Fill level sensor (full)*
A103/1b4	*Fill level sensor (empty)*
A103/1r1	*AdBlue® tank heating element*
A103/1r2	*AdBlue® pressure line heating element*
A103/2b1	*AdBlue® pressure sensor*
A103/2m1	*AdBlue® delivery pump*
A103/2r1	*AdBlue® delivery module heating element*
A103/2y1	*AdBlue® reversing valve*
B1	*Oil temperature sensor*
B16/15	*Temperature sensor upstream of SCR catalytic converter*
B19/7	*Temperature sensor upstream of CAT*
B19/9	*Temperature sensor upstream of diesel particulate filter*
B19/11	*Temperature sensor upstream of turbocharger*
B28/8	*Pressure differential sensor (DPF)*
B37	*Accelerator pedal sensor*
B70	*Crankshaft Hall sensor*
G3/2	*O_2 sensor upstream of CAT*
K27/7	*AdBlue® supply relay*
M55	*Intake port shutoff motor*
N3/9	*CDI control unit*
N14/3	*Glow time output stage*
N37/7	*NO_x control unit downstream of diesel particulate filter*
N37/7b1	*NO_x sensor downstream of diesel particulate filter*
N37/8	*NO_x control unit downstream of SCR catalytic converter*
N37/8b1	*NO_x sensor downstream of SCR catalytic converter*
N118/5	*AdBlue® control unit*
R9	*Glow plugs*
Y27/9	*Left exhaust gas recirculation positioner*
Y3/8n4	*Fully integrated transmission control unit (VGS)*
Y76	*Fuel injectors*
Y129	*AdBlue® metering valve*
CAN C	*Engine compartment CAN*
CAN I	*Drivetrain sensor CAN*
LIN C1	*Drive LIN*

Sensor and control signals of Common-Rail Diesel Injection (CDI) exhaust treatment

1	*Engine diagnosis indicator lamp, actuation*
2	*Multifunction display, actuation*
4	*Temperature sensor upstream of SCR catalytic converter, signal*
5	*Temperature sensor upstream of diesel particulate filter, signal*
6	*Differential pressure sensor (DPF), signal*
7	*O_2 sensor, signal*
8	*Temperature sensor upstream of turbocharger, signal*
9	*Temperature sensor upstream of CAT, signal*
10	*Exhaust gas recirculation positioner, actuation*
11	*Intake port shutoff motor, actuation*
12	*Fuel injectors, actuation*
13	*NO_x sensor, signal*
14	*NO_x sensor heater, actuation*
15	*AdBlue® delivery module heating element, actuation*
16	*AdBlue® pressure sensor, signal*
17	*AdBlue® tank heating element, actuation*
18	*AdBlue® delivery pump, actuation*
19	*AdBlue® reversing valve, actuation*
20	*AdBlue® supply relay, actuation*
21	*Circuit 30 AdBlue® supply relay, signal*
22	*AdBlue® pressure line heating element, actuation*
23	*Fill level sensor (full), signal*
24	*Fill level sensor (empty), signal*
25	*AdBlue® tank temperature sensor, signal*
26	*AdBlue® metering valve, actuation*
27	*O_2 sensor heater, actuation*
28	*AdBlue® fill level, message*
29	*AdBlue® injection, request*
30	*AdBlue® injection, message*
31	*Glow plugs, actuation*
32	*Crankshaft Hall sensor, signal*
33	*Oil temperature sensor, signal*
34	*Accelerator pedal sensor, signal*
35	*Shift characteristics adjustment, request*

Emissions classes – Components used

Exhaust aftertreatment components	EURO 4	EURO 5	EURO 6
CDI control unit	CR 4	CR 5	CR 6+
AdBlue® control unit with BlueTEC (SCR) components			X
Oxidation catalytic converter	X	X	X
NO_x storage catalytic converter	–	X	–
Diesel particulate filter	X	X	X
SCR catalytic converter	–	X	X
AdBlue®	–	– (ammonia produced by conversion in NSK)	X
Oxygen sensor	X	X	X
NO_x control unit with NO_x sensor	–	–	2
Turbocharger with exhaust temperature sensor	–	X	X
AGR valve (direct coolant circulation)	–	X	X

Overview of individual components

The BlueTEC emission control system (SCR) with AdBlue® requires the following additional components compared to vehicles that comply with EURO 5:

- AdBlue® control unit
- AdBlue® tank
- AdBlue® delivery module (A103/2) with pressure sensor AdBlue®
- AdBlue® tank temperature sensor
- AdBlue® tank heating element
- AdBlue® pressure line heating element
- Fill level sensor (full) in AdBlue® tank
- Fill level sensor (empty) in AdBlue® tank
- AdBlue® metering valve
- AdBlue® mixing element
- SCR catalytic converter
- Temperature sensor upstream of SCR catalytic converter
- AdBlue® supply relay
- NO_x control unit downstream of diesel particulate filter
- NO_x sensor downstream of diesel particulate filter
- NO_x control unit downstream of SCR catalytic converter
- NO_x sensor downstream of SCR catalytic converter
- Pressure line

Note

Vehicles with BlueTEC (SCR) are equipped with a 220 amp alternator.

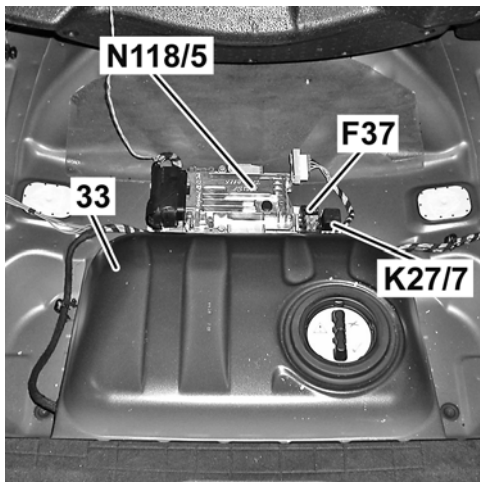
AdBlue® control unit

AdBlue® control unit

The AdBlue® control unit for exhaust gas cleaning is located in the trunk below the intermediate trunk bottom directly next to the AdBlue® tank.

The AdBlue® control unit determines the quantity of reducing agent which needs to be injected from the CDI control unit via the drive train sensor CAN. The AdBlue® control unit performs the following functions depending on the signals received from the CDI control unit:

- Correct metering and injection of AdBlue®
- Actuation of the AdBlue® delivery module (feed and return)
- Antifreeze function (three heater elements)



Shown on model 164

33	*AdBlue® tank*
F37	*AdBlue® fuse block*
K27/7	*AdBlue® supply relay*
N 118/5	*AdBlue® control unit*

Injection

The AdBlue® reducing agent is pumped from the tank through the feed line and injected into the exhaust train upstream of the SCR catalytic converter by the AdBlue® metering valve.

During pressure buildup and during the run-on period, the AdBlue® metering valve is actuated to release air from the system. This prevents an air pocket from forming in the AdBlue® pressure line during filling or a vacuum forming during return flow. The metering valve is actuated by the AdBlue® control unit via a PWM signal (pulse width modulation). It is cooled by the flow of AdBlue® to prevent overheating.

Feed

The AdBlue® delivery pump generates a pressure of 5 bar to transport the AdBlue®. At the start of operation, the feed line of the AdBlue® delivery pump is actuated and diagnosis is performed based on its power consumption.

The delivery pressure can be adjusted through the control unit software and may be different depending on the variant. The AdBlue® delivery pump is also actuated to cool the AdBlue® metering valve and to ventilate the pressure line during filling.

If the system pressure of 5 bar is not reached, this is entered in the fault memory of the CDI control unit and shown on the multifunction display of the instrument cluster.

Antifreeze function

The AdBlue® control unit prevents the AdBlue® reducing agent from freezing using the following heating elements:

- AdBlue® tank heating element
- AdBlue® delivery module heating element
- AdBlue® pressure line heating element

Return flow

After every engine stop, the AdBlue® is removed from the feed system by the AdBlue® delivery pump to prevent it from freezing. The AdBlue® reversing valve is thus actuated by the AdBlue® control unit to reverse the delivery direction.

The AdBlue® metering valve is actuated by the AdBlue® control unit to prevent pressure loss.

AdBlue® delivery module

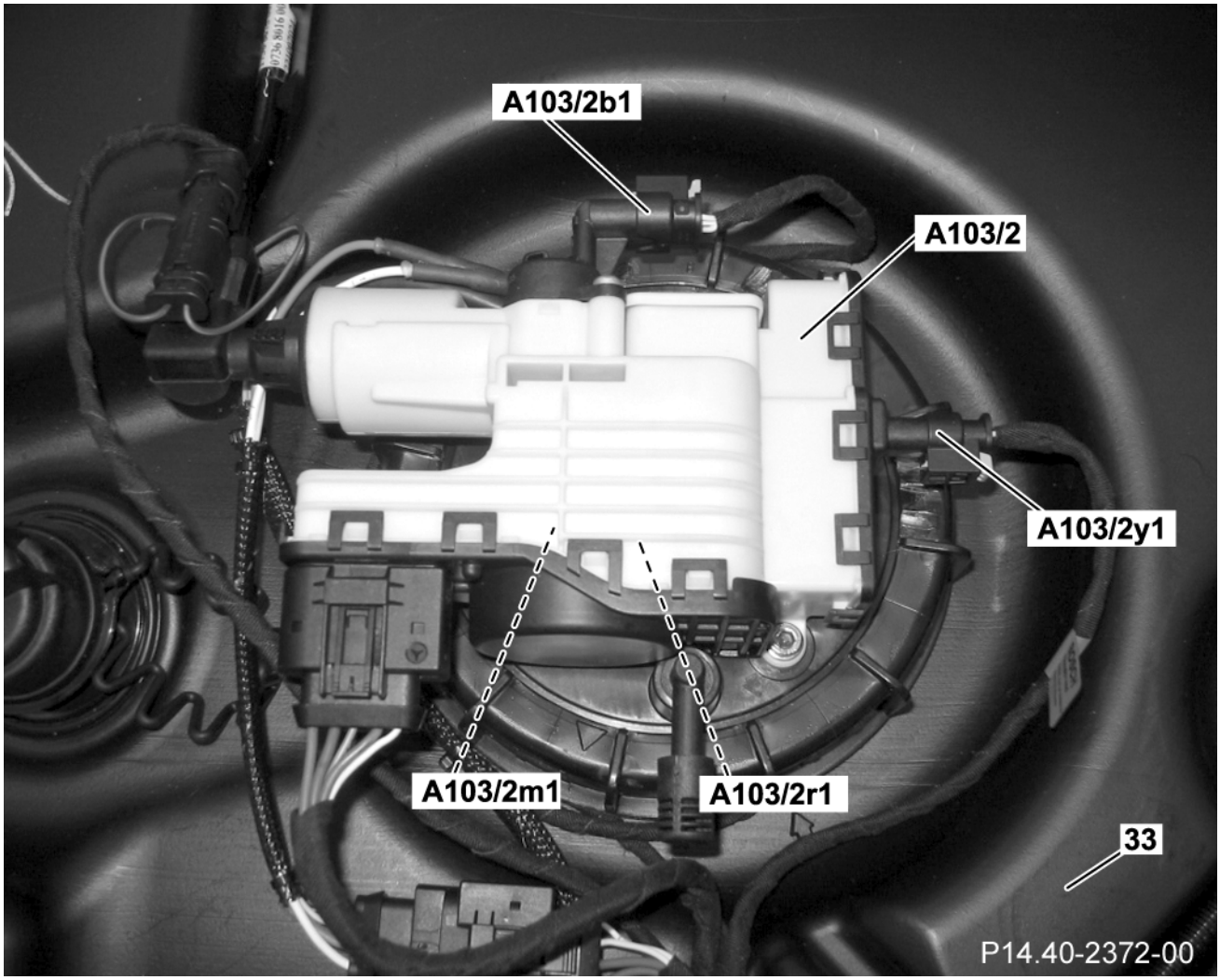
The AdBlue® delivery module is located on the cover of the AdBlue® removal tank, which is integrated in the AdBlue® tank.

Direct output signals:

- Measurement of power consumption for diagnosis of delivery pump by AdBlue® control unit
- Voltage signal from AdBlue® pressure sensor

Direct input signals:

- Positive supply from AdBlue® control unit
- Circuit 31 AdBlue® delivery pump supply
- PWM signal for actuation of AdBlue® delivery pump
- Circuit 30 AdBlue® reversing valve supply
- Circuit 31 control signal for actuation of AdBlue® reversing valve
- Power supply for heating element in AdBlue® delivery module
- Power supply for AdBlue® pressure sensor



Shown on model 164

A103/2	*AdBlue® delivery module*
A103/2b1	*AdBlue® pressure sensor*
A103/2m1	*AdBlue® delivery pump*
A103/2r1	*AdBlue® delivery module heating element*
A103/2y1	*AdBlue® reversing valve*
33	*AdBlue® tank*

Pressure generation

The AdBlue® control unit actuates the AdBlue® delivery pump with a PWM signal based on a performance map. The majority of the reducing agent which is drawn in is used to supply the system via the AdBlue® metering valve. Part of the AdBlue® reducing agent which enters the pump is returned back to the 2-tank system (AdBlue® tank with AdBlue® removal tank) via a bypass in the AdBlue® delivery module. This ensures that the AdBlue® removal tank is always full and that no air is drawn in, which would prevent the pump from generating the required system pressure of 5 bar.

Pressure measurement

The AdBlue® control unit records the system pressure generated by the AdBlue® delivery pump via the AdBlue® pressure sensor.

Antifreeze function

The heating element in the AdBlue® tank ensures that fluid AdBlue® reducing agent can be drawn in from the 2-tank system even at low temperatures. In addition, the AdBlue® delivery module heating element heats the delivery module itself and the AdBlue® reducing agent at low temperatures based on a performance map. The AdBlue® pressure line heating element is wound around the pressure line and prevents it from freezing up.

The remaining AdBlue® reducing agent is extracted from the pressure line by reversing the delivery direction. This prevents the pressure lines from freezing up if the vehicle is left stationary at temperatures below – 11°C for an extended period of time.

Flow reversal

With "Circuit 15 OFF", the run-on period of the AdBlue® control unit starts after a waiting time of up to three minutes.

During the control unit run-on period, the delivery pump extracts the remaining AdBlue® reducing agent from the pressure line via the reversing valve actuated by the control unit. At the same time, the metering valve is opened to prevent a vacuum from forming. The waiting time of three minutes has to be complied with to protect the AdBlue® lines from hot exhaust gases and damage.

The duration of the run-on period and the point at which the reducing agent is pumped out depend on the exhaust temperature. Excessively hot exhaust gases can thermally decompose the AdBlue® inside the pressure line.

Note

The AdBlue® is pumped back out of the pressure line to prevent the AdBlue® from being damaged by continuous overheating. The duration of this procedure is determined by the CDI control unit depending on the exhaust temperature measured and the length of the pressure line.

Maintenance operations may only be performed once return flow of the AdBlue® reducing agent is complete.

AdBlue® tank

The AdBlue® tank is made of plastic and is located below the intermediate trunk bottom.

The AdBlue® tank consists of the following system components:

- AdBlue® removal tank
- AdBlue® tank temperature sensor
- AdBlue® tank heating element
- AdBlue® tank fill level sensors

The buffer tank acts as a swirl pot for the AdBlue® reducing agent and consists of the following:

- Cap for extraction and filling
- Filter for pressure compensation

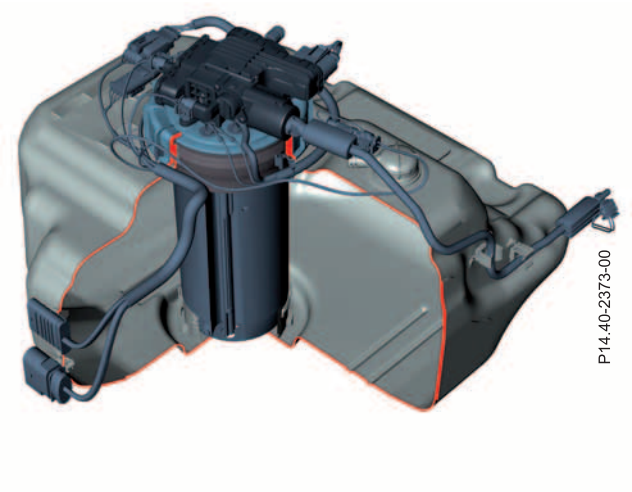
The AdBlue® tank is designed so that it cannot be damaged by frozen AdBlue®. The AdBlue® tank thus also plays a role in protecting the system against freezing and overheating.

Temperature sensor

The AdBlue® tank temperature sensor records the temperature of the reducing agent in the AdBlue® tank. It is a negative temperature coefficient (NTC) sensor. When the temperature increases, the resistance of the NTC drops. This change in resistance is forwarded to the control unit, which uses it to calculate the temperature.

Fill level sensor

Together with the AdBlue® tank temperature sensor, the "full" and "empty" fill level sensors are located one below the other in the AdBlue® tank. The sensors are located parallel to the AdBlue® removal tank. The AdBlue® control unit actuates the fill level sensors in succession with a PWM signal. The AdBlue® control unit detects whether the electrodes of the fill level sensors are coated with reducing agent based on the various sensor signals and thus determines the fill level.



AdBlue® tank with AdBlue® delivery module

Note

When the AdBlue® tank is filled with AdBlue® for the first time, the tank must be completely filled to ensure that the AdBlue® removal tank is filled. Otherwise, air will be drawn in when the AdBlue® is subsequently pumped and the pump will not be able to generate the required system pressure of 5 bar.

When the AdBlue® is fed through the system, part of the AdBlue® reducing agent is returned back to the removal tank via a bypass in the delivery module.

Heating element for AdBlue® pressure line

The heating element is a heated film which is wrapped around the AdBlue® pressure line. It extends from the AdBlue® delivery module up to the AdBlue® metering valve. The heating element is actuated by the AdBlue® control unit.

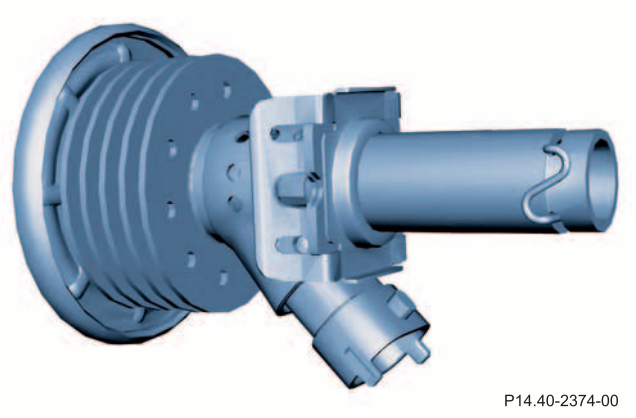
Note

The heating element of the AdBlue® pressure line is equipped with several connectors and can be tested via a resistance measurement.

AdBlue® metering valve

The AdBlue® metering valve is connected directly to the exhaust pipe so that it can inject AdBlue® into the exhaust flow.

In addition to injecting the reducing agent, the AdBlue® metering valve is also used to admit air to and release air from the AdBlue® pressure line.



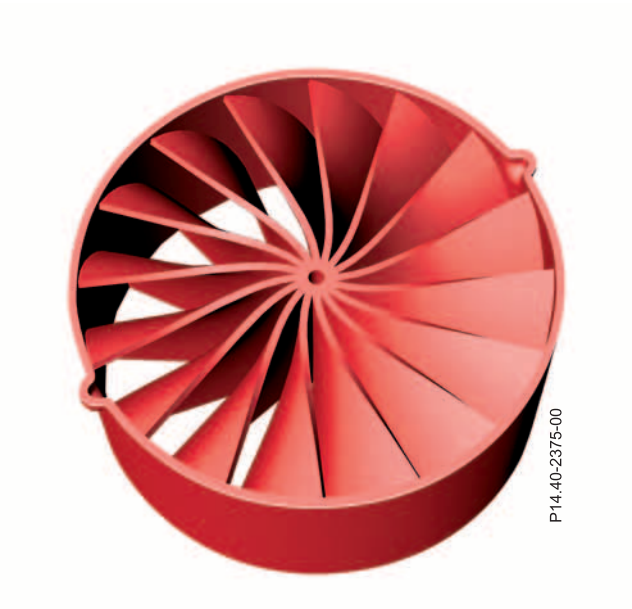
AdBlue® metering valve

Mixing element

There is a mixing element in the exhaust pipe upstream of the SCR catalytic converter approximately 10 cm behind the AdBlue® metering valve. This is an integral component of the exhaust system which improves the separation of the AdBlue® reducing agent through reaction with water (hydrolysis) and ensures a more uniform distribution of the AdBlue® upstream of the SCR catalytic converter. This is an important precondition for the high level of NO_x throughput.

Note

When installing the AdBlue® metering valve, note that the metal layer seal and clamp may only be used once. Observe the tightening torque.



Mixing element

Oxidation catalytic converter

Oxidation catalytic converters are used on vehicles with diesel engines to convert the carbon monoxide (CO) and hydrocarbon (HC) emissions that are produced by the combustion of diesel fuel.

The oxidation catalytic converter oxidizes carbon monoxide (CO) and unburned hydrocarbons (HC) into carbon dioxide (CO_2) and water (H_2O).

Initial reduction of the nitrogen oxides (NO_x) in the combustion chamber is achieved via exhaust gas recirculation.

The exhaust flow entering the oxidation catalytic converter consists of the following undesirable components:

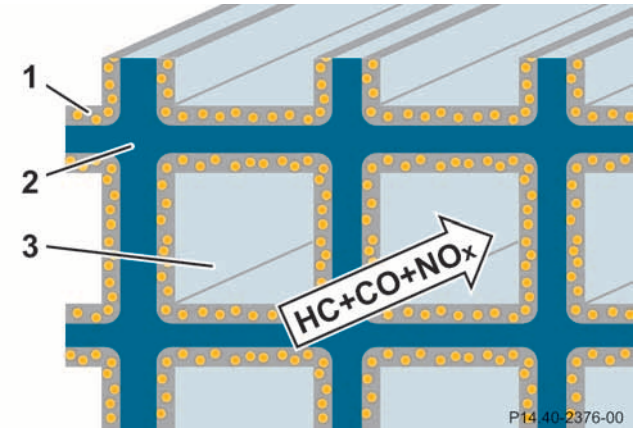
- CO
- HC
- NO_x ($NO + NO_2$)

The exhaust flow leaving the oxidation catalytic converter consists of the following components:

- CO_2
- H_2O
- NO_x ($NO + NO_2$)

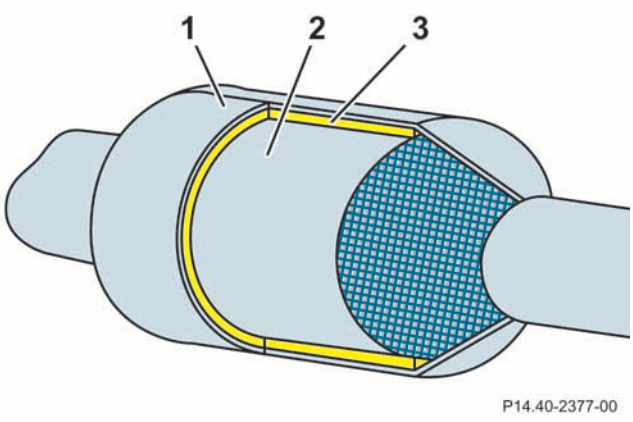
The ceramic monolith is a ceramic object with several thousand small passages running through it.

The monolith, which is extremely sensitive to physical stress, is mounted inside a stainless steel housing.



Design (simplified)

1 Intermediate layer (washcoat)
2 Ceramic monolith
3 Incoming exhaust flow



Design of oxidation catalytic converter

1 Stainless steel housing
2 Ceramic monolith
3 Insulating/supporting jacket (vibration-damping connection between monolith and catalytic converter shell)

Diesel particulate filter

On vehicles with BlueTEC (NSK), the diesel particulate filter (DPF) is located under the vehicle floor and on vehicles with BlueTEC (SCR) it is located near the firewall in the engine compartment. On the BlueTEC (SCR) variant, the DPF is installed in a housing together with the oxidation catalytic converter whereas it has a separate housing on vehicles with BlueTEC (NSK) (also see "Comparison of BlueTEC exhaust system variants").

The DPF has the following tasks:

- It filters and stores the soot particles that are produced by the combustion process in the engine.
- It ensures that soot particles are combusted during DPF regeneration.

The DPF comprises a ceramic honeycomb filter element made of silicon carbide and coated with a rare metal (platinum). The passages of the diesel particulate filter are open alternately at the front or rear and separated from one another by the porous filter walls of the honeycomb filter element.

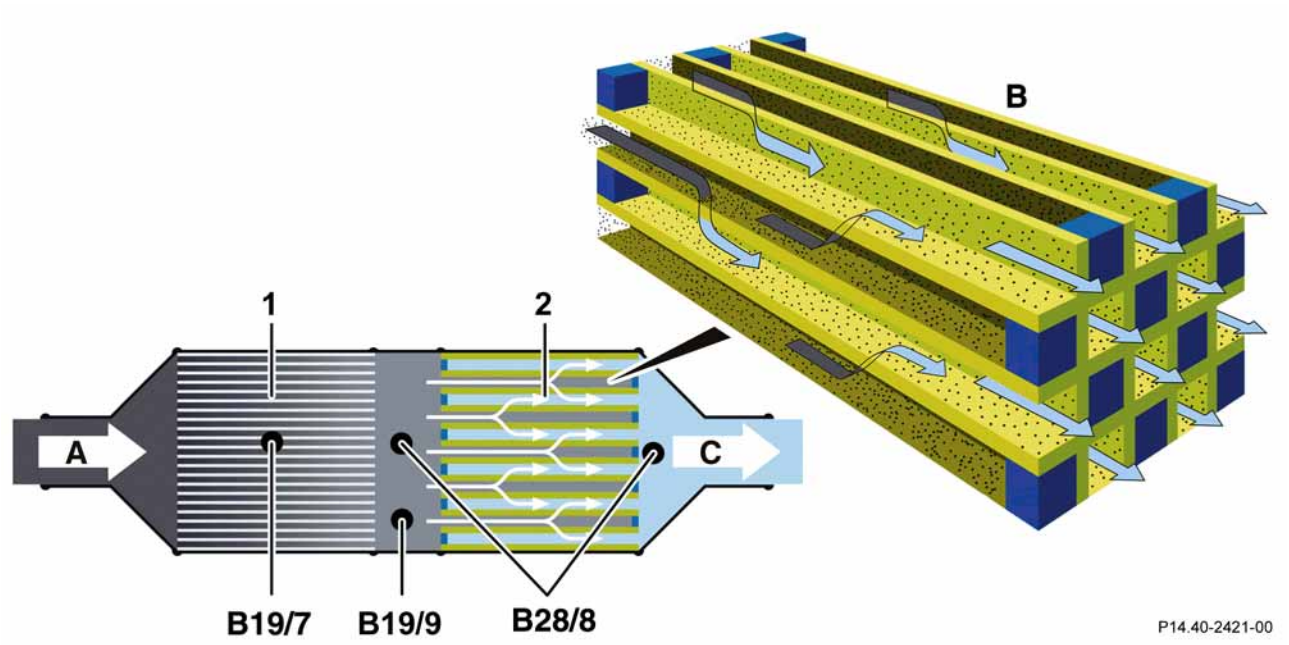
The unfiltered exhaust gas flows through the porous ceramic honeycomb filter of the DPF. The soot particles are held back in the honeycomb filter body. For regeneration purposes, the load condition is determined by measuring the exhaust gas pressure upstream and downstream of the DPF. The CDI control unit measures the load condition of the DPF via the pressure differential sensor. The following steps take place during regeneration:

- Soot particles are burnt off
- Sulfur is removed fro the NSK

In order to burn off the soot particles, temperatures of over 600 °C are required. These temperatures are not reached during normal operation of the diesel engine. The CDI control unit can raise the exhaust temperature with the following measures:

- Intake air throttling
- Second post injection
- DPF heating (performed periodically)

Diesel particulate filter



Schematic illustration of a diesel particulate filter

A Exhaust gases from engine
B Filtering of soot particles
C Exhaust gases downstream of DPF
1 Oxidation catalytic converter
2 Diesel particulate filter
B19/7 Temperature sensor upstream of CAT
B19/9 Temperature sensor upstream of diesel particulate filter
B28/8 Pressure differential sensor (DPF)

Note

Approximately 99% of soot particles are reduced. If regeneration is interrupted as a result of short-distance trips, the process is spread out over several driving cycles. This means that the heating-up phases until the specified regeneration temperature is reached occur more frequently. Regeneration occurs unnoticed by the driver.

NO_x storage catalytic converter

On vehicles with BlueTEC (NSK), a NSK in combination with a passively operated SCR catalytic converter is used to reduce the nitrogen oxides (NO_x) without adding AdBlue®. The coating of the NSK largely corresponds to that of the NSK in gasoline engines.

During lean-burn operation of the diesel engine ($\lambda > 1$), nitrogen oxides (NO_x) are produced in the exhaust. These are stored in the NSK by the formation of a nitrate compound with the storage component barium carbonate ($BaCO_3$), in the same way as in a NSK for a gasoline engine.

During regeneration, the diesel engine is briefly (t = 2 - 5 s) operated in rich-burn mode ($\lambda < 1$) which causes an increase in the proportion of hydrocarbons (HC), carbon monoxide (CO) and hydrogen (H_2) in the exhaust gas.

During regeneration, the barium nitrate is changed back into its original state of barium carbonate ($BaCO_3$) and nitrogen oxide (NO) is released, which is then converted into molecular nitrogen (N_2) and carbon dioxide (CO_2) by carbon monoxide (CO).

$$Ba(NO_3)_2 + 3CO \Rightarrow BaCO_3 + 2NO + 2CO_2$$

$$2NO + 2CO \Rightarrow N_2 + 2CO_2$$

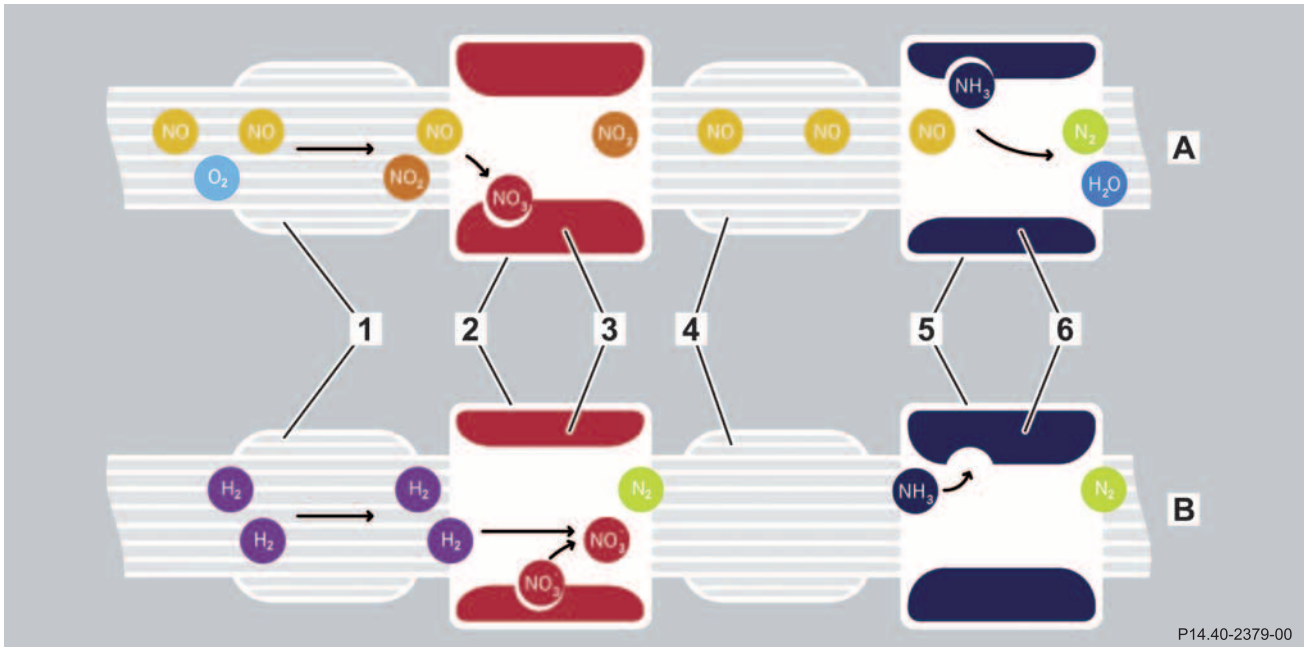
In addition, nitrogen oxide (NO) reacts with hydrogen (H_2) to produce ammonia (NH_3), which can be stored in the downstream SCR catalytic converter for the subsequent lean-burn phase.

$$2NO + 5H_2 \Rightarrow 2NH_3 + 2H_2O$$

Here, the ammonia (NH_3) reduces the nitrogen oxides which are not bonded in the NSK, thus further reducing NO_x emissions.

The sulfur in the diesel fuel is also stored in the NSK after combustion in the form of sulfur oxides (SO_x), which causes the storage capability to deteriorate. These are removed from the NSK at temperatures over 600 °C during DPF regeneration in extended rich-burn phases ($\lambda < 1$ and t = 5 - 15 s).

NO_x storage catalytic converter



NO_x storage catalytic converter with SCR catalytic converter

1 Oxidation catalytic converter
2 NO_x storage catalytic converter
3 Nitrate
4 Particulate filter
5 SCR catalytic converter
6 Ammonia
A Lean-burn phase
B Rich-burn phase

In addition to the oxidation catalytic converter and diesel particulate filter, diesel vehicles with BlueTEC technology either use an active SCR system with AdBlue® injection or a NSK in combination with a passively operated SCR catalytic convertor without the addition of AdBlue® in order to reduce the nitrogen oxide emissions. BlueTEC is a modular emission control system which is available in two variants:

BlueTEC (NSK) without AdBlue®

This variant consists of a combination of oxidation catalytic converter and particulate filter with a NO_x storage catalytic converter and additional SCR catalytic converter.

The reduction of the nitrogen oxides is largely performed in the NSK. Nitrogen oxides are also reduced in the SCR catalytic converter with the help of ammonia (NH_3). Ammonia is produced directly during the regeneration phase of the NSK.

BlueTEC (SCR) with AdBlue®

BlueTEC (SCR) with AdBlue® operates using the additional reducing agent AdBlue®, which is injected into the exhaust flow. The reducing agent AdBlue® is converted into ammonia (NH_3) through thermolysis (heat-activated chemical reaction) and hydrolysis (water-activated chemical reaction).

Thermolysis: $(NH_2)_2CO \Rightarrow NH_3 + HNCO$

Hydrolysis: $HNCO + H_2O \Rightarrow NH_3 + CO_2$

NO_x sensors upstream and downstream of the SCR catalytic converter measure the concentration of NO_x in the exhaust gas and, on the variant with AdBlue® injection, regulate the addition of AdBlue® reducing agent.

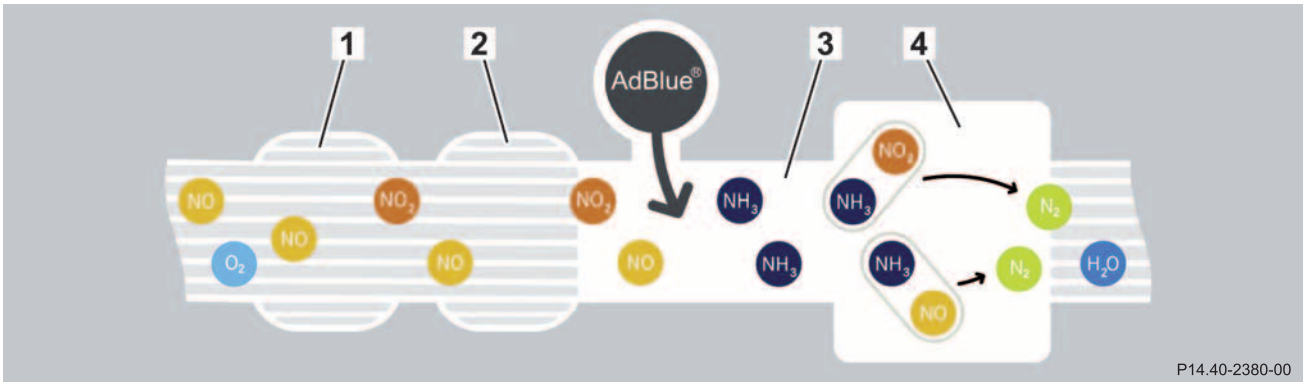
Note

In both variants, the reduction of nitrogen oxides with ammonia largely takes place via two main reactions:

$4NO + 4NH_3 + O_2 \Rightarrow 4N_2 + 6H_2O$

$2NO + 2NO_2 + 4NH_3 \Rightarrow 4N_2 + 6H_2O$

The nitrogen oxides (NO_x) in the exhaust gas are reduced to molecular nitrogen (N_2) and water vapor by ammonia (NH_3) and oxygen (O_2). Approximately 80% of the NO_x in the exhaust gas is thus converted.



SCR catalytic converter with AdBlue® injection

1 Oxidation catalytic converter
2 Particulate filter
3 AdBlue® metering valve
4 SCR catalytic converter

NO_x control unit with NO_x sensors

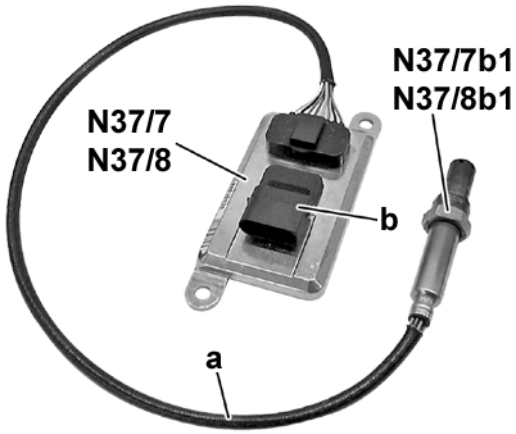
The NO_x sensors are fixed to the NO_x control units. The NO_x control units are located in the underfloor area.

On diesel vehicles with BlueTEC (SCR) with AdBlue®, the NO_x concentration in the exhaust gas is measured by a NO_x sensor upstream of and downstream of the SCR catalytic converter respectively.

The measuring range is specified as 0 to 500 ppm but values up to max. 1,650 ppm can be output.

The NO_x sensor is equipped with a sensor heater so that it becomes operational as quickly as possible.

The information from the NO_x sensor is transmitted to the NO_x control unit, where it is processed. The NO_x control unit communicates with the CDI control unit via the drive train sensor CAN.



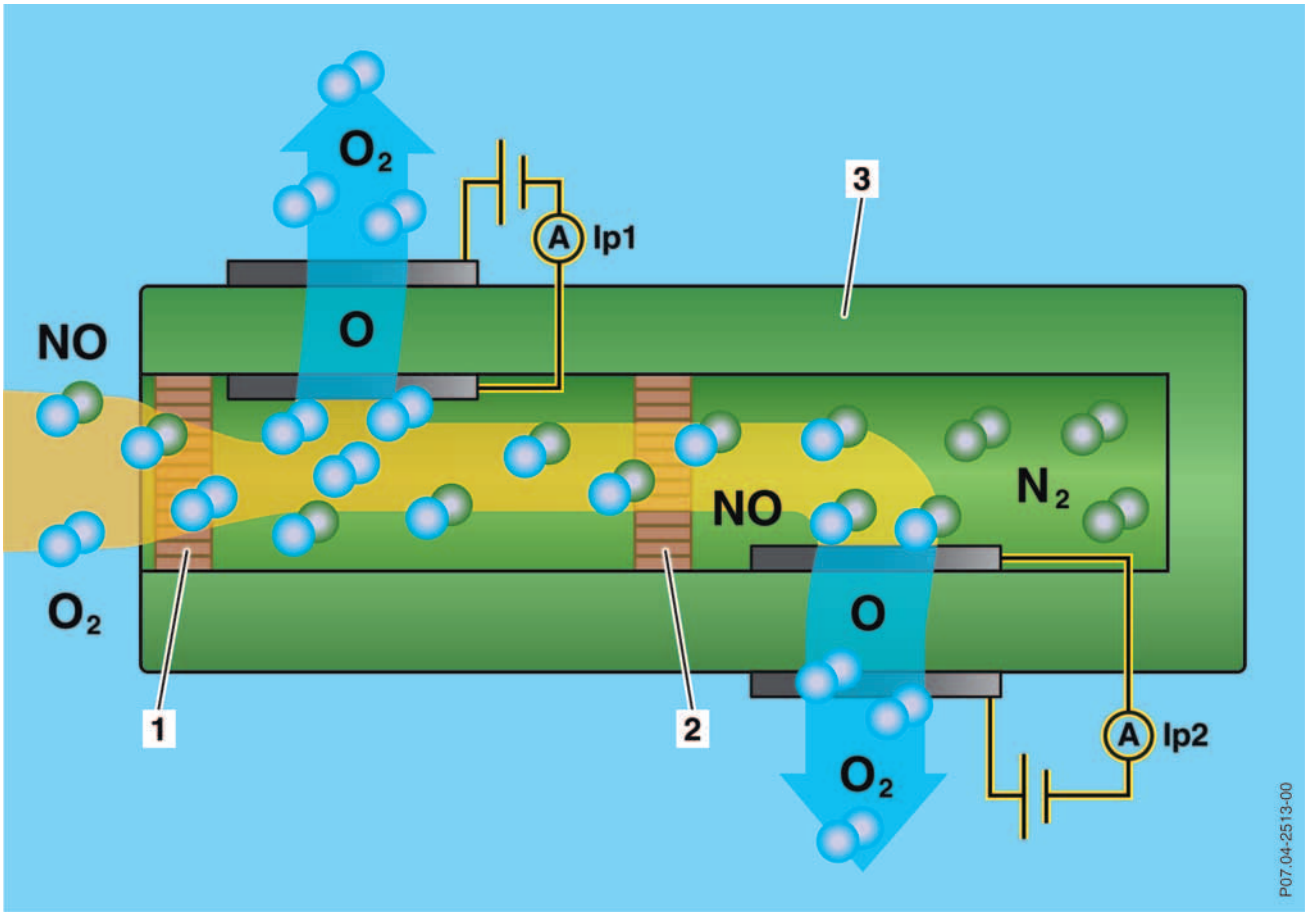
NO_x control unit with NO_x sensor

a	*Sensor cable*
b	*Connector*
N37/7	*NO_x control unit downstream of diesel particulate filter*
N37/7b1	*NO_x sensor downstream of diesel particulate filter*
N37/8	*NO_x control unit downstream of SCR catalytic converter*
N37/8b1	*NO_x sensor downstream of SCR catalytic converter*

NO_x control unit with NO_x sensors

The active ceramic probe body of the NO_x sensor consists of several layers with two reaction chambers (dual chamber sensor). In the first reaction chamber on the O_2 sensor upstream of the catalytic converter, the proportion of oxygen (O_2) in the exhaust gas is measured. This is achieved by applying a pump voltage to the electrodes in the first reaction chamber. This breaks down the O_2 molecules into two charged oxygen ions. These are pumped out of or into the first reaction chamber (depending on whether the mixture is rich or lean) until a voltage of 450 mV is reached at the electrodes. The level of the required pump current 1 (Ip1) indicates the oxygen concentration in the exhaust gas.

In the second reaction chamber, nitrogen oxides are broken down into nitrogen (N_2) and oxygen (O_2) at the NO_x measurement electrode. The oxygen (O_2) is pumped back out of the reaction chamber. Pump current 2 (Ip2) indicates the concentration of nitrogen oxides (NO_x) in the exhaust gas.



Operation of NO_x sensor

1 Diffusion gap 1
2 Diffusion gap 2
3 Solid electrolyte

Ip1 Pump current 1
Ip2 Pump current 2
A Current level

Instrument cluster/service indicators

The driver receives all of the necessary information about the BlueTEC system via the display on the instrument cluster.

The notification concept consists of the following areas:

- AdBlue® fill level
- Incorrect AdBlue® medium
- Unusual consumption +/– 50%
- NO_x sensor fault and refill result

The size of the AdBlue tank has been selected so that the customer does not have to refill AdBlue® within the service intervals. AdBlue® consumption may be higher depending on the operating conditions.

If the AdBlue® supply reaches the minimum level before Service A or B, a message appears on the instrument cluster in model series 164 and 152 prompting the driver to have the AdBlue® refilled at a workshop. On model series 212, the message for Service A or B appears on the instrument cluster.

Note

The driver's attention is drawn to the display messages by an acoustic signal.

AdBlue® fill level

Display messages	Eng. diag. indic. lamp	Causes/consequences
Refill AdBlue at Workshop See Operator's Manual	Off	Fill level in AdBlue® tank is below the fill level sensor (empty). The possible range until the AdBlue® tank is empty is approx. 1,600 km.
Refill AdBlue at Workshop No Start In: XXXX* km	Off	Remaining range of approx. 800 km calculated. AdBlue® fill level is sufficient for one full fuel tank at maximum consumption.
Refill AdBlue at Workshop Engine Start Not Possible	On	Range counter has reached 0 km. The engine can no longer be started.

* Range counter

Incorrect AdBlue® medium

Display messages	Eng. diag. indic. lamp	Causes/consequences
Check AdBlue See Operator's Manual	On	The AdBlue® system is faulty.
AdBlue No Start In: XXXX* km	On	After a further driving distance of 50 km.
AdBlue Engine Start Not Possible	On	Range counter has reached 0 km.

* Range counter

Unusual consumption +/– 50%

Display messages	Eng. diag. indic. lamp	Causes/consequences
Check AdBlue See Operator's Manual	On	The AdBlue® system is faulty.
AdBlue No Start In: XXXX* km	On	After a further driving distance of 50 km.
AdBlue Engine Start Not Possible	On	Range counter has reached 0 km.

* Range counter

NO_x sensor fault and refill result

Display messages	Eng. diag. indic. lamp	Causes/consequences
AdBlue No Start In: XXXX* km	On	The AdBlue® system is faulty.
AdBlue Engine Start Not Possible	On	Range counter has reached 0 km.

* Range counter

AdBlue®

AdBlue® is the brand name of a highly pure, colorless, synthetically manufactured urea solution which is used for the aftertreatment of exhaust gases with a SCR catalytic converter. AdBlue® is manufactured and sold in accordance with the quality standard ISO 22241. Emissions of nitrogen oxides (NO_x) are reduced by approximately 80% via selective catalytic reduction. The rights to the AdBlue® brand are owned by the Association of the German Automotive Industry (VDA). AdBlue® is produced by various manufacturers around the world.

Refill AdBlue®

The customer is also able to quickly and conveniently refill AdBlue® using a refill bottle. The procedure is shown on the bottle label by means of pictograms.

The refill bottle contains 1.89 liters. Depending on the model series and usage conditions, 1 liter lasts for approx. 1,000 km. Adding 2 bottles or 5 liters with an AdBlue® filling unit is sufficient because the AdBlue® tank will either be refilled or emptied and refilled at the next Service A or B.

Note

AdBlue® generally degrades well and can be recycled by microbes. AdBlue poses a very low risk to water systems and earth. However, if small quantities of AdBlue® are spilled, they should be cleaned up using absorbent material (sand, absorbent earth, universal binding agent). After removing the absorbent material, flush with plenty of water. The absorbent material must be disposed of properly.

Note

In order to prevent misunderstandings, the customer must always be informed about the procedures for refilling.

Note

A 5-liter container with a disposable hose is planned in addition to the refill bottle.

AdBlue® refill bottle

Special additives

Note

To prevent damage, only AdBlue® which complies with standard ISO 22241 may be used.

Do not mix with any special additives and do not dilute AdBlue® with water.

Purity

The purity of AdBlue® is particularly important to prevent exhaust aftertreatment faults.

If AdBlue® is pumped out of the AdBlue® tank, it may not be added again later because the purity of the fluid can no longer be guaranteed.

Note

Contamination of AdBlue® (e.g. by other operating fluids, cleaning agents, dust) results in increased emission levels, malfunctions, catalytic converter or engine damage.

High outside temperatures

AdBlue® can decompose if it is warmed to above 30 °C for extended periods of time. Ammonia can hereby be formed.

Note

Ammonia fumes can escape if the AdBlue® tank is opened at high temperatures. Ammonia fumes have a pungent odor and are irritating, especially to the skin, mucous membranes and eyes. You may experience a burning sensation in your eyes, nose and throat, you may feel the need to cough and your eyes may water.

Ensure that there is adequate ventilation. Do not breathe in any ammonia fumes that escape.

AdBlue®

Composition and information about individual components	
Chemical description	Urea in an aqueous solution
CAS no.	57-13-6
EINECS no.	200-315-5
Empirical formula	CH_4N_2O
Physical and chemical properties	
Delivery form	Aqueous liquid
Appearance	Clear, colorless
Odor	Almost odorless, possible weak odor of ammonia
Boiling range	100 - 110 °C
Thermal decomposition	Starts slowly at temperatures above approx. 30 °C forming ammonia and carbon dioxide Ammonia fumes are produced at elevated temperatures.
Solubility	Soluble in water at any concentration Poor solubility in non-polar hydrocarbons
pH	Slightly alkaline
Melting/freezing point	–11 °C
Density (20 °C)	1.09-1.26 g/cm^3 (heavier than water)
Toxicology information	
General information	Observe the first aid measures specified below and the safety information provided by the respective AdBlue® manufacturer.

Disposal information	
To be observed	The product and packaging must be disposed of in accordance with local and national legislation. Contact the manufacturer for more information.
Transport information	
General information	The product is dispatched by the manufacturer at a temperature of max. 30 °C.
First aid measures	
General information	Change clothing which has been contaminated with AdBlue®.
If breathed in	Move into an area with fresh air. Consult a physician if symptoms develop.
Upon contact with eyes	Immediately flush out with plenty of water. Use an eye wash/shower.
Upon contact with skin	Wash off thoroughly with plenty of water and soap.
If swallowed	Wash out mouth and drink plenty of water. Consult a physician if symptoms persist.
Firefighting measures	
Extinguishing agent	Fire extinguishing measures should be suitable for the surroundings.
Particular hazards	The following gases may be produced during a fire: ammonia, nitrogen oxides, carbon monoxide, carbon dioxide.
Protective equipment	Normal equipment for chemical fires.
Extinguishing agent	If necessary, use an indirect water spray to cool tanks/containers.

AdBlue®

Measures in the event of unintentional escape/release	
Personal safety precautions	Ensure adequate ventilation. Risk of slipping on escaped fluid. Avoid contact with skin and eyes.
Cleaning procedure	Ensure adequate ventilation. Cover with an absorbent material (sand, absorbent earth, universal binding agent). Dispose of the material properly once the fluid has been absorbed.
Handling	
Notes on safe handling	Ensure that the workplace is adequately ventilated. In order to work safely with AdBlue®, the workplace should be clean.
Refill AdBlue tank	The AdBlue® tank may only be refilled in a qualified specialist workshop. Filling the AdBlue® tank is part of the maintenance scope.
Storage	
Storage conditions	Specially designed storage and filling systems must be used for AdBlue® to ensure that the quality is not impaired and to prevent contamination. It is essential to ensure that the temperature in the AdBlue® storage room is between –5° C and 20 °C. AdBlue® becomes solid at –11 °C and thermal decomposition slowly starts at above 30 °C.

Storage	
Notes on storage	Do not store together with strong oxidizing chemicals, acids or with nitrites or nitrate salts.
Requirements of storage and transport containers, assemblies and equipment	The following materials are suitable for components which come into contact with the product: appropriately machined high-alloy austenitic Cr-Ni steels and Cr-Ni-Mo steels as per ISO 10088-1 to 3 and various plastics such as HDPE, HDPP and Viton. Copper, alloys containing copper and galvanized or unalloyed steels must not be used. Suitability tests must be performed before using other materials which come into direct contact with AdBlue®. The corrosion of the material and the contamination of the AdBlue® must be checked in the tests.
Hazard prevention and personal protective equipment	
Personal protective equipment	General work clothes for handling chemicals.
Eye protection	The wearing of safety glasses is recommended if there is a risk of the product being sprayed/ splashed.
Hand protection	The wearing of protective gloves is recommended if there is a risk of the product being sprayed/ splashed.
General protective and hygiene-related measures	The usual safety precautions for dealing with chemicals should be observed: keep the product away from foodstuffs, drinks and animal feed; do not eat, drink or smoke while working; immediately remove contaminated or soaked clothing. Wash hands and face before breaks and at the end of the working day. Shower at the end of the working day.

Exhaust aftertreatment

AdBlue® filling unit hose system		
Use	For non-drip filling of AdBlue® tank with AdBlue® without the need for transferring AdBlue® from MB-AdBlue® original container (10-liter can) A 004 989 04 20 12	
Details	• Easy to use • Can be used anywhere • Does not required compressed air or power • Integrated fixture to prevent overfilling of AdBlue® tank • Filling unit • 10-liter can (empty) as stopgap solution • Hose lengths 1.6 and 2 m • Weight 3.5 kg	
Article number	ABE 01_MB	
Category	D_09/14/49_01.1	
Supplier address	Leitenberger Autotestgeräte GmbH Bahnhofstrasse 33 72138 Kirchentellinsfurt Germany	Phone: +49 (0)7121-908-121 Fax: +49 (0)7121-908-200 H.Ramp@LR-Germany.de ATG-Info@Leitenberger.de

Extraction pump for AdBlue®	
Use	Extraction pump for AdBlue® tank during service operations.
Details	• 110 V/230 V, capacity 0.6 to 1 l/min • Extraction hose length with metal end cap 1.25 m • Delivery hose length with metal end cap 1.80 m
Article number	400.300.000
Category	D_09/14/49_01.2
Supplier address	GL GmbH Metall- und Werkstatttechnik Nürtinger Str. 23-25 72636 Frickenhausen Germany Phone: +49 (0) 7022/94 32 2-44 Fax: +49 (0) 7022/94 32 2-40 d.stier@gl-gmbh.de

BlueTEC test and measurement kit for AdBlue®		
Use	Test kit for measuring and determining quantity of urea in AdBlue® (optical handheld refractometer)	
Details	• Scale, 0-32% Brix, division 0.2% • Scale 0-33% urea content, division 0.2% • Transparent measuring cylinder, 500 ml, scale 10 ml • Metering bottle 1,000 ml, polyethylene • Glass pipette 230 mm as sample taker with rubber ball, outlet point and rubber hose (1 m) • 5 m silicone hose, 6 mm inside diameter, 9 mm outside diameter • Transport and storage case with foam insert	
Article number	M102000 (model: ATC)	
Category	D_09/14/49_01.0	
Supplier address	Mollenkopf Fr. GmbH & Co. KG Hospitalstrasse 35 70174 Stuttgart Germany Phone: +49 (0) 711/16 27 9-0 Fax: +49 (0) 711/16 27 9-25 info@mollenkopf-stuttgart.de	Autotestgeräte Leitenberger GmbH Bahnhofstr. 33 72138 Kirchentellinsfurt Germany Phone: +49 (0) 7121/90 8-0 Fax: +49 (0) 7121 90 8-200 ATG-Info@Leitenberger.de

Exhaust aftertreatment

BlueTEC test and measurement kit for AdBlue®	
Use	Test kit for measuring and determining quantity of urea in AdBlue® (digital handheld refractometer)
Details	• nD + temperature: 1.3425 nD + 20 °C • Measuring range: 1.3306 to 1.4436 nD • Accuracy: ± 0.0002 nD • Measuring time: 3 seconds • Measuring temperature: 5 to 45 °C • Sample size: 0.3 ml • Protection class: IP-64 • Power supply: alkaline battery • Dimension: 17 x 9 x 4 cm • Weight: 295 g
Article number	M102000 (model: ATC)
Category	D_09/14/49_01.0
Supplier address	KOCH+NAGY Labortechnische Systeme GmbH Porschestrasse 9 70736 Fellbach-Oeffingen Germany Phone: +49 (0) 711/95 19 51-11 Fax: +49 (0) 711/95 19 51-90 roesslein@koch-nagy.de

Rear apron protectors		
Use	Professional workshop covering for load area to protect against scratches and soiling	
Details	• Midnight blue imitation leather • Width: 1,200 mm • Weight: 0.2 kg	
Article number	D-M 10-02	
Category	K_68-80_01.0	
Supplier address	Datex-Werkstattschutzbezüge GmbH Bülowstrasse 92 45711 Datteln Germany Phone: +49 (0) 2363/3 45 79 Fax: +49 (0) 2363/3 44 44 service@datex.com	Linkowski Werkstattbedarf Im Wirrigen 38 45731 Waltrop Germany Phone: +49 (0) 2309/78 5-222 Fax: +49 (0) 2309/78 5-223 info@linkowksi.de

Note

For more information on workshop equipment, commercially available tools and special tools, see the following website:

http://gotis.aftersales.mercedes-benz.com/

Frequently Asked Questions

Where is AdBlue® produced?

AdBlue® conforming to quality standard ISO 22241 is produced by a number of manufacturers.

Manufacturers can be found at:

www.findadblue.com

Is there a reliable supply of AdBlue®?

The AdBlue® producers and the mineral oil industry will ensure pan-European supply upon introduction of the BlueTEC diesel technology. As the number of BlueTEC vehicles increases, universal distribution will be gradually established.

Is AdBlue® also used in other branches of industry?

Today, AdBlue® is already used to refine textiles, in the production of paper and insulating materials and in pharmaceutical and cosmetic products.

How much AdBlue® do I need?

On average, the consumption of AdBlue® corresponds to approximately 1% of diesel consumption.

How much further can I drive when the warning message "Refill AdBlue® at Workshop" is displayed?

You can still drive approx. 1,600 km when "Refill AdBlue at Workshop" is displayed on the instrument cluster. The last 800 km are counted down on the multifunction display. "Engine Start Not Possible" is displayed on the multifunction display when the remaining distance has been exceeded. Add 2 refill bottles of AdBlue® or 5 liters using the AdBlue® filling unit. The status of the indicator on the multifunction display changes and the engine can be restarted.

How much AdBlue® must be refilled in the workshop when the customer is coming up to Service B in the near future?

Do not fill up the AdBlue® tank. This is because the tank is emptied as part of Service B. Just add enough so that the customer can complete the remaining distance until the next service without any problems.

What happens to my vehicle when the AdBlue® supply runs out?

It is important that the AdBlue® tank is always adequately filled. If the AdBlue® tanks reaches empty, an acoustic signal is issued, an entry is made in the fault memory of the CDI control unit and the warning message "Refill AdBlue at Workshop, See Operator's Manual" is shown on the display of the instrument cluster.

When the calculated remaining distance is approx. 800 km (enough AdBlue® for one full diesel tank at maximum consumption), an acoustic signal is issued, an entry is made in the fault memory of the CDI control unit and the warning message "Refill AdBlue at Workshop. No Start In: XXXX km" is shown on the display of the instrument cluster. As of a remaining distance of 500 km, this message is shown every 100 km.

If the AdBlue® tank is empty, an acoustic signal is issued, the engine diagnosis indicator lamp is actuated, an entry is made in the fault memory of the CDI control unit and the warning message "Refill AdBlue at Workshop. Engine Start Not Possible" is shown on the display of the instrument cluster. The vehicle can no longer be operated. Add 2 refill bottles of AdBlue® or 5 liters using the AdBlue® filling unit. The status of the indicator on the multifunction display changes and the engine can be restarted.

How long can AdBlue® be stored for?

AdBlue® can be stored for around two years in a vehicle. AdBlue® is refilled during every Service A. Due to the limited durability of AdBlue®, the AdBlue® tank is completely emptied and refilled during every Service B.

Frequently Asked Questions

How can AdBlue® be stored?

AdBlue® can be stored in cans and in small indoor/outdoor filling stations (1 m³) etc. These systems may be heated or unheated depending on the climatic conditions.

Not all materials are suited to storing AdBlue®. Most containers made out of plastic or stainless steel are suitable. For detailed information, see ISO 22241.

Is the service life of a BlueTEC vehicle limited?

No, the engines meet today's generally high standards in terms of service life and reliability.

Are there additional service requirements?

The service scope for the overall BlueTEC system is only slightly greater than usual. The AdBlue® tank is refilled during Service A and completely emptied and refilled during Service B due to the limited durability of AdBlue®. A visual inspection of the underfloor is also performed. The required grade of oil and the frequency of oil change intervals are the same. All other system components are maintenance free. Vehicles with BlueTEC (SCR) are included in the extended maintenance strategy (optional PLUS package).

As an owner of a BlueTEC vehicle, where can I obtain AdBlue®?

Refill bottles are available from authorized Mercedes-Benz dealers.

How often is refilling necessary?

AdBlue® is refilled during every Service A. Due to the limited durability of AdBlue®, the AdBlue® tank is completely emptied and refilled during every Service B.

Can I use the product in an opened refill bottle at a later time?

No! You should use all of the product in a refill bottle at once and then put the empty bottle in the recycling bin. Opened bottles cannot be stored.

Where is the spare tire stored on vehicles with BlueTEC with AdBlue®?

No spare tire is necessary. The vehicles are equipped with a TIREFIT kit.

Are new vehicles already filled with AdBlue® when they leave the factory?

Yes, the first filling of new vehicles at the plant generally lasts until the first service interval.

What must be noted with regard to vehicles which are held in inventory and only delivered to the customer after a period of over a year?

The next service interval is in three years.

Does the AdBlue® tank have to be completely emptied before being refilled?

No. The AdBlue® tank must be completely emptied and refilled every two years. It does not have to be completely emptied within this period.

Is it possible to test AdBlue® for contamination or overage?

Mercedes-Benz dealers can perform a test using a handheld refractometer (see Workshop equipment).

Frequently Asked Questions

Does the AdBlue® tank have a pressure relief valve in case the temperature rises above 35 °C?

A pressure relief valve is installed. The AdBlue® tank incorporates a passive ventilation system. This system ensures that the AdBlue® tank is adequately ventilated in all operating conditions.

Does the heater for AdBlue® also operate when the vehicle is not running?

No, the AdBlue® heating elements only operate when the vehicle is running. The AdBlue® is pumped out of the pressure line when the engine is switched off during a regulated run-on period.

Where can I obtain more information about BlueTEC with AdBlue®?

More information is also available from: www.findadblue.com

$BaCO_3$

Barium carbonate

$Ba(NO_3)_2$

Barium nitrate

C

Carbon

CAN

Controller Area Network

CAS no.

Chemical Abstracts Registry Number

CO

Carbon monoxide

CO_2

Carbon dioxide

DPF

Diesel Particulate Filter

EINECS no.

No. of European Inventory of Existing Chemical Substances

EU

European Union

H_2O

Water

HC

Hydrocarbon

HDPE

High-density polyethylene

HDPP

High-density polypropylene

ISO

International Organization for Standardization

N_2

Nitrogen

NH_3

Ammonia

NO

Nitric oxide

NO_2

Nitrogen dioxide

NO_X

Nitrogen oxides

NSK

NO_x storage catalytic converter

NTC

Negative Temperature Coefficient

O_2

Oxygen

PPM

Parts Per Million

PWM

Pulse Width Modulation

SCR

Selective Catalytic Reduction

SO_x

Sulfur oxides

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Daimler AG, GSP/OI, HPC R 822, D-70546 Stuttgart
Order No. 6516 1378 02 – Printed in Germany – 07/09