64 51 Heating and air-conditioning unit (evaporator), switching elements

Resistance as a function of temperature	°C/kΩ	-5/11.4 ... 11.9 0/8.8 ... 9.2 5/6.8 ... 7.2 10/5.3 ... 5.6 15/4.2 ... 4.5 20/3.3 ... 3.6 25/2.6 ... 2.9 30/2.1 ... 2.3 35/1.7 ... 1.9

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64 51 Heating and air-conditioning unit (expansion valve), switching elements

Inlet pressure (excess pressure)	bar	14
Outlet pressure (excess pressure)	bar	1.8
Leak test with detector at excess pressure	bar	1 ... 2

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IMIB_Next

1 IMIB_Next

NOTICE

The training video is only available in English.



TECHNICAL INFORMATION

The training video shows how to use the special tool IMIB_Next.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

We can assume no liability for printing errors or inaccuracies in this document and reserve the right to introduce technical modifications at any time.

- Follow repair instructions!



TECHNICAL INFORMATION

The training video shows how to use the special tool IMIB_Next.

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TECHNICAL INFORMATION

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- Follow repair instructions!

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Form for equipotential bonding screw connections

Form for equipotential bonding screw connection

DANGER

Equipotential bonding in high-voltage system.

Danger to life if the equipotential bonding screw connection is not correct!

- Observe the safety requirements for the equipotential bonding screw connection.
- Clean contact faces and have then checked by a second person.
- Tighten the screws for equipotential bonding to the specified torque; have a second person check the torque.
- Correct execution of these tasks must be documented in the vehicle records by both persons.

This form must be completed in full and enclosed with the vehicle records!

Vehicle data:

Vehicle identification number	Order number	Order date	Kilometre reading

Equipotential bonding screw connections:

Screw application	Torque	Mechanic	Signature	Tester	Signature

By signing, the mechanic and tester assume liability for the correctness of the screw connection!

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5.1.1 Axles

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

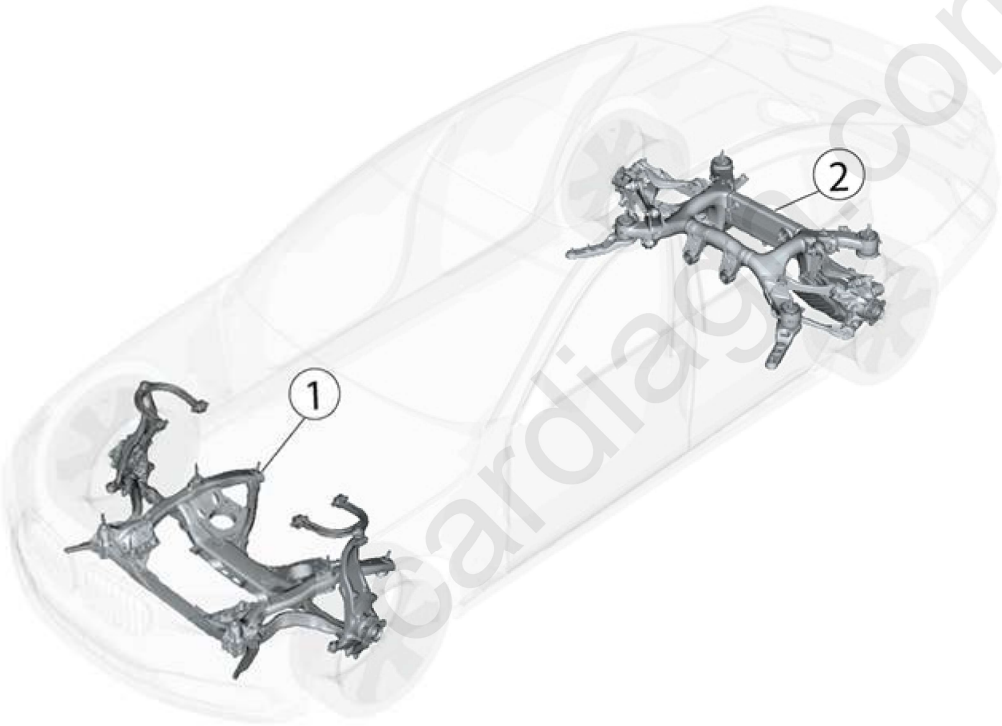
Visual inspection while the vehicle is positioned over an inspection pit or on a vehicle lift. Using wheel play detectors is permitted and recommended for vehicles with a maximum weight of over 3.5 metric tons.

Fault determination according to EG PTI:

a)	Axle fractured or deformed.
b)	Unsafe mounting on the vehicle. Stability impaired, operability impaired; excessive play at the attachment points.
c)	Modification relevant to safety. Stability and operability impaired, insufficient distance to other vehicle components or insufficient ground clearance.

Methods according to vehicle manufacturer

Axles



1 Front Axle

2 Rear Axle

Only 2 axles are installed in BMW, BMW i, MINI and Rolls-Royce vehicles.

7.1.1 Installation safety of the seat belts/seat belt buckles

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection

Fault determination according to EG PTI:

a)	Attachment point severely damaged. Stability impaired.
b)	Mounting loose.

Methods according to vehicle manufacturer

Seats with three-point seat belt



A seat with three-point seat belt including seat belt buckle and mountings is illustrated

1 Seat belt guide loop attachment point

2 Belt retraction system attachment point

3 Seat belt buckle attachment point

As a rule, BMW installs seats with three-point seat belts!

Methods according to vehicle manufacturer

Seats with three-point seat belt



A seat with three-point seat belt including seat belt buckle and mountings is illustrated

1 Belt retraction system attachment point

2 Seat belt buckle attachment point

As a rule, BMW installs seats with three-point seat belts!

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7.1.2 Status of the seat belts/seat belt buckles

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation.

Fault determination according to EG PTI:

a)	The specified belt is missing or has not been mounted.
b)	Belt damaged. Cut or signs of overstretching.
c)	Seat belt not as per regulations.
d)	Seat belt buckle damaged or not operating correctly.
e)	Retractor damaged or not operating correctly.

Methods according to vehicle manufacturer:

Three-point seat belt

Exclusively three-point seat belts have been illustrated.

1	Seat belt guide loop attachment point
2	Belt retraction system attachment point
3	Seat belt buckle attachment point



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Three-point seat belt

Exclusively three-point seat belts have been illustrated.

1	Belt retraction system attachment point
2	Seat belt buckle attachment point



Reversible electromotive reel (REMA) on the left and right

The REMA system involves the following functions:

- Removal of the belt slack after buckling up so that the seat belt lies optimally against the driver's resp. front passenger's body.
- Stabilisation of the seat position in a critical driving situation by pretensioning the seat belt for optimising the restraint system.

The REMA motor essentially consists of the following parts:

- e-motor.
- Control electronics.
- Gear with clutch (the clutch connects to the automatic reel).
- Automatic reel (mechanical function).

.

Functional description

The "Minimise belt slack" function only uses the signal of the seat belt buckle switch and the driving speed. From an encodable driving speed (currently 10 km/h) the control electronics activates the motor once for a certain time. With the help of the electric motor, the seat belt strap is rolled up, thus removing the belt slack. In critical driving situations or in the event of a potential accident, the control electronics also activates the motor. The duration is set in such a way that the motor is activated by the control unit until the end of a critical driving situation.

7.1.3 Belt force limiter

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Force limiter evidently missing or unsuitable for the vehicle.
b)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer

For electronic testing via the diagnostic interface (OBD socket), the read-out routines necessary for the EU testing organisation will be provided.

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7.1.4 Seat belt tensioner

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Seat belt tensioner evidently missing or unsuitable for the vehicle.
b)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer

For electronic testing via the diagnostic interface (OBD socket), the read-out routines necessary for the EU testing organisation will be provided.

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7.1.5 Airbag

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

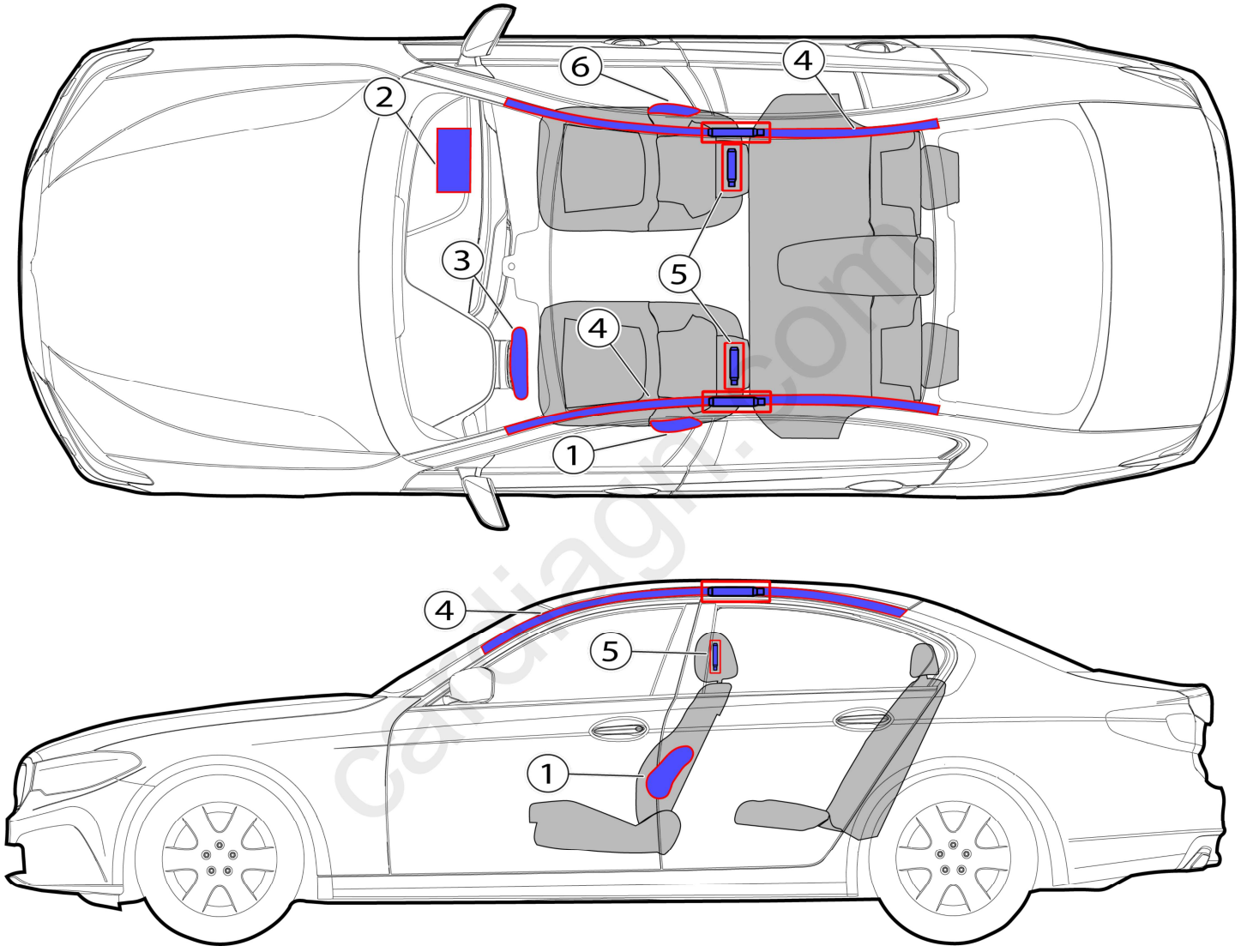
Visual inspection and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Airbag control light does not go out after ignition
b)	Airbag evidently missing or unsuitable for the vehicle
c)	System indicates an error via the electronic vehicle interface
d)	Airbag evidently not operational

Methods according to vehicle manufacturer

Airbag systems



1. Side airbag (B-pillar or seat)
2. Front passenger airbag
3. Driver's airbag
4. Head airbag
5. Head restraint airbag

The exact position of the airbag has been highlighted with "SRS" or "Airbag" labelling.

7.1.6 Supplementary restraint systems (SRS)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection of the airbag control light and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Airbag control light indicates errors in the system (does not go out)
b)	System displays an error message via the electronic vehicle interface

Methods according to vehicle manufacturer

For electronic testing via the diagnostic interface (OBD socket), the read-out routines necessary for the EU testing organisation will be provided.

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7.11 Odometer (if present)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Evident tampering (fraud) to reduce a vehicle's odometer reading or show an incorrect value.
b)	Evidently not operational.

Methods according to vehicle manufacturer

The information is integrated into the Aftersales Information Research system.

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7.12 Driving dynamics control (Electronic Stability Program, ESP) (if installed/required)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Wheel speed sensors missing or damaged.
b)	Cable damaged.
c)	Other components missing or damaged.
d)	Switch damaged or not operating correctly.
e)	DSC malfunction indicator lamp (MIL) indicates a fault in the system.
f)	System outputs a fault message via the electronic vehicle interface.

Methods according to vehicle manufacturer

For electronic testing via the diagnostic interface (OBD socket), the read-out routines necessary for the EU testing organisation will be provided.

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Cleaning the cylinder head intake ports and the combustion chamber with the walnut blaster

1 – Cleaning cylinder head intake ports using the walnut blaster



TECHNICAL INFORMATION

The training video illustrates the methodology for cleaning the intake ports of the cylinder head using the special tool, i.e. walnut blaster.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

- Follow repair instructions!

2 – Cleaning combustion chamber using the walnut blaster



TECHNICAL INFORMATION

The training video illustrates the methodology for cleaning the combustion chamber using the special tool, i.e. walnut blaster.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

- Follow repair instructions!

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Leak-testing the air-intake system

1 Air intake system leakage test



TECHNICAL INFORMATION

The training video illustrates the methodology for the leakage test of the air intake system.
The training video does not replace the repair instructions.
The training video is not subject to the update service.
No liability can be accepted for printing or other faults.
Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for the leakage test of the air intake system.
The training video does not replace the repair instructions.
The training video is not subject to the update service.
No liability can be accepted for printing or other faults.
Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for the leakage test of the air intake system.
The training video does not replace the repair instructions.
The training video is not subject to the update service.
No liability can be accepted for printing or other faults.
Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for the leakage test of the air intake system.
The training video does not replace the repair instructions.
The training video is not subject to the update service.
No liability can be accepted for printing or other faults.
Subject to changes of a technical nature

- Follow repair instructions!

Repair notes to renew the cylinder head

RISK OF DAMAGE

Engine damage due to lack of engine oil.

Lack of engine oil after the cylinder head or the engine has been renewed may cause damage to the valve gear.

- Do not start the engine after renewing the cylinder head or the engine without following the repair notes.
- The repair notes on renewing the cylinder head or the engine must be followed.
- For additional information, see: Repair notes on renewing the cylinder head or the engine

Problem

After replacing the cylinder head, a loud rattling noise occurs in the area of the cylinder head or cylinder head cover after starting the engine.

One or more roller cam followers can pop out.

Cause

The new part cylinder head does not contain any engine oil.

The oil supply to the valve clearance compensating elements on the exhaust side and in the area of the exhaust valve stems is not optimal at the first engine start.

Solution

TECHNICAL INFORMATION



- Observe the sign in the engine compartment! Only pour in approved engine oil with the correct SAE viscosity classification.

Before installing the cylinder head cover, the valve stems of all exhaust valves must be moistened with engine oil.

Engine oil

Technically suitable engine oils for BMW Group engines	

3.0 Technically appropriate engine oils for BMW Group engines

Before the first engine start, the engine only needs to be turned with the starter (without combustion) for a few seconds.. The maximum permissible uninterrupted operating period must not be exceeded.

Maximum permissible uninterrupted operating period of the starter motor

15 s

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To guarantee this, the electrical connections of all injectors must be disconnected.

Alternatively, the wiring harness for injection and ignition must be unplugged from the Digital Motor Electronics (DME).

For additional information, see: Repair instructions "11 00 039 Check compression of all cylinders", but without removing ignition coils and spark plugs. "Compression pressure test" service function.

Turning the engine with the starter (without combustion) ensures that the valve train has a sufficient oil supply to start the engine regularly afterwards.

Then reconnect the injectors or the wiring harness for injection and ignition to the Digital Motor Electronics (DME).

Delete the fault memory.

Start engine.

Additional Information

Overview Technical Data

Maximum permissible uninterrupted operating period of the starter motor
15 s

Links

Operating materials
3.0 Technically appropriate engine oils for BMW Group engines

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Replacing guide bearing

1 Replace guide bearing.



TECHNICAL INFORMATION

The training video illustrates the methodology for replacing the guide bearing shells.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for replacing the guide bearing shells.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for replacing the guide bearing shells.

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No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for replacing the guide bearing shells.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

6.1.9 Engine performance

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and/or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Emissions warning light does not go out
b)	Fault entry present
a)	Control changed, consequently impaired safety and/or environmental response
b)	Engine changed, consequently impaired safety and/or environmental response

Methods according to vehicle manufacturer

For electronic testing via the diagnostic interface (OBD socket), the read-out routines necessary for the EU testing organisation will be provided.

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Form for equipotential bonding screw connections

Form for equipotential bonding screw connection

DANGER

Equipotential bonding in high-voltage system.

Danger to life if the equipotential bonding screw connection is not correct!

- Observe the safety requirements for the equipotential bonding screw connection.
- Clean contact faces and have then checked by a second person.
- Tighten the screws for equipotential bonding to the specified torque; have a second person check the torque.
- Correct execution of these tasks must be documented in the vehicle records by both persons.

This form must be completed in full and enclosed with the vehicle records!

Vehicle data:

Vehicle identification number	Order number	Order date	Kilometre reading

Equipotential bonding screw connections:

Screw application	Torque	Mechanic	Signature	Tester	Signature

By signing, the mechanic and tester assume liability for the correctness of the screw connection!

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Fill cooling system

1 Fill cooling system



TECHNICAL INFORMATION

The training video illustrates the methodology for filling the cooling system.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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Vent cooling system

1 Vent cooling system



TECHNICAL INFORMATION

The training video illustrates the methodology for bleeding the cooling system.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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8.2.1.1 Emission control systems

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

Visual inspection

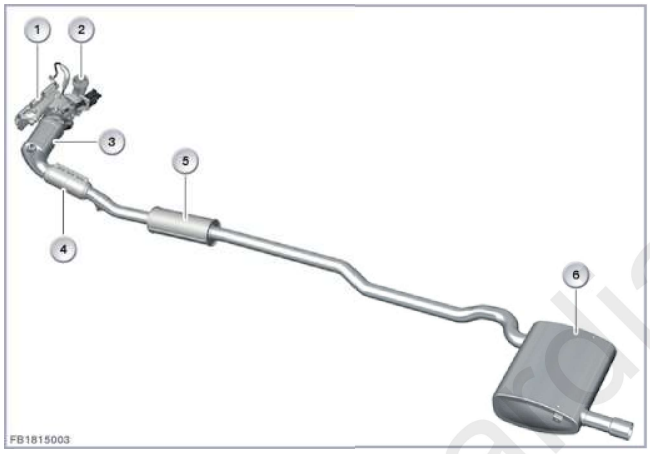
Fault determination according to EG PTI:

a)	The exhaust gas aftertreatment system installed by the manufacturer is missing, has been changed or it has evidently been damaged
b)	Leakages influencing emission measurement

Methods according to vehicle manufacturer:

System description

The engines form part of the so-called modular engines. Depending on the motorisation, different versions of the exhaust emission system are used. Apart from the exhaust manifolds and the exhaust turbochargers, the exhaust system has been designed very similarly for each modular engine. The exhaust emission systems essentially only differ in their varied volume and the number of exhaust tailpipes.



Exhaust emission system

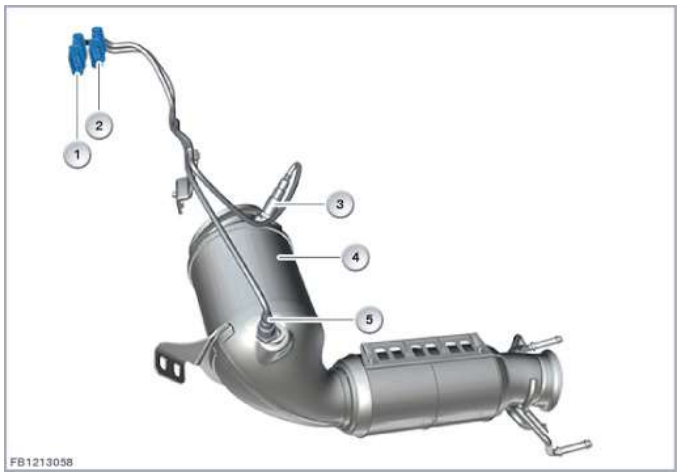
Index	Explanation
1	Exhaust manifold
2	Exhaust turbocharger
3	Catalytic converter
4	Decoupling element
5	Centre silencer
6	Rear silencer

The 3-cylinder petrol engine is equipped with a water-cooled exhaust manifold made of aluminium. The 4-cylinder petrol engine and the 6-cylinder petrol engine feature an exhaust manifold made of cast steel. The 3, 4 and 6-cylinder petrol engines feature one bank each. In all engines, the exhaust manifold and the exhaust turbocharger housing have been designed as one cast part and for this reason, they cannot be renewed individually. Both the 8-cylinder petrol engine and the 12-cylinder engine have 2 cylinder banks. As a result, the engine features 2 exhaust turbochargers which have not been integrated into the exhaust manifold.

Apart from the 3-cylinder petrol engine, the exhaust turbochargers have been designed as twin-scroll exhaust turbochargers to enable a quicker and more direct response. The engines feature one oxidation catalytic converter near the engine per bank. The charging pressure per exhaust turbocharger is controlled using an electrical wastegate valve.

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Oxygen sensors

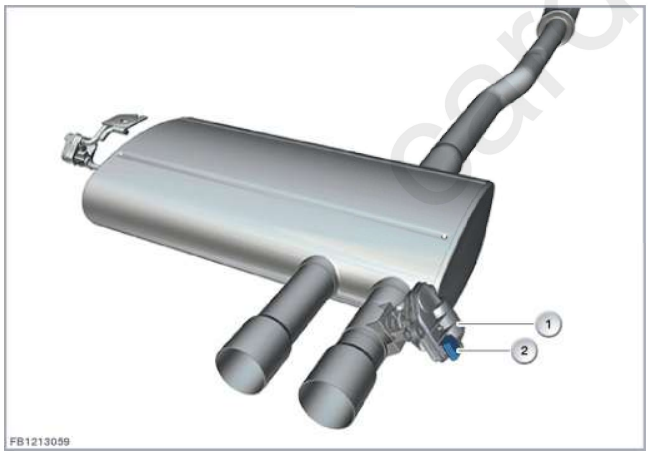


Index	Explanation
1	five-pin plug connection
2	five-pin plug connection
3	Oxygen sensor before catalytic converter
4	Catalytic-converter mounted close to the engine
5	Oxygen sensor after catalytic converter

The oxygen sensor consists of a ceramic coating made of zirconium dioxide (laminated). The heating element that has been inserted into the laminate quickly generates the required operating temperature of at minimum 750 °C. The oxygen sensor contains 2 cells, a measuring cell and a reference cell. The two cells are coated with electrode made of platinum.

It is possible to gradually measure an air/fuel ratio of between 0.65 and 2.5 using the oxygen sensor (constant characteristic curve). This oxygen sensor works with a lower heater output than a conventional oxygen sensor. In addition, this oxygen sensor is ready for operation more quickly. Current is applied at the measuring cell. Consequently O2 is pumped into the reference cell until a voltage of 450 mV has been established between the reference cell electrodes. The applied current at the measuring cell is the measured variable for the fuel-air ratio. This enables the oxygen sensor emissions control to set any desired air/fuel ratio in the combustion chamber.

Electrical exhaust flap (model-specific)



Index	Explanation
1	Electrical exhaust flap
2	five-pin plug connection

The exhaust control flap is driven via an axially arranged electric motor with integrated gearing and integrated electronics. The exhaust control flap is activated by the Digital Engine Electronics (pulse-width modulation). Input variables are:

- Engine speed
- Load
- Driving speed

The exhaust flap is integrated within the rear silencer. The exhaust flap reduces the noise level when the engine is idle and when the engine speed is close to idle. The exhaust flap guarantees active noise control and reduces the output by approximately 8 dB.

The electric exhaust control flap is connected via 4-pin plug connection. The drive for the electric exhaust control flap is supplied with terminal 15N.

The exhaust flap can be opened (10 % pulse width modulation) and closed (90 % pulse width modulation). The end positions are mechanical limit stops. Intermediate positions are not provided. The preferred position with a detected fault (for example failure of pulse-width modulated signal) or after having switched off the combustion engine is the open position.

TECHNICAL INFORMATION

The oxygen sensor requires ambient air within its interior in order to operate. The ambient air enters the interior via the plug connection through the cable. For this reason it is important to guard the plug connection against contamination from substances such as wax and sealants. When malfunctions occur in the lambda closed-loop control system the oxygen sensor's plug connection should always be checked. If necessary, the plug connection must be cleaned. Avoid all contact between the plug connection and contact spray, cleaning agents and solvents, as these substances could destroy the oxygen sensor.

TECHNICAL INFORMATION

If the exhaust flap is defective the exhaust system will emit a hissing noise a high engine speeds when it is closed. If the exhaust flap is defective and partially open a humming noise will be generated at idle.

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.

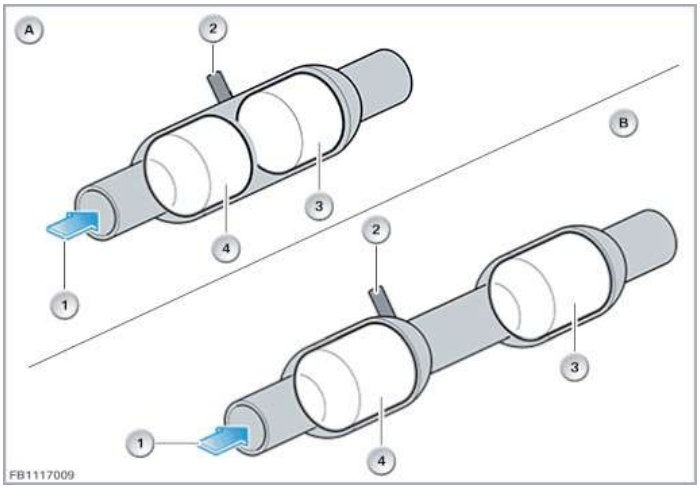


Overview:

Index	Explanation
1	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 install the petrol particulate filter near the engine together in one housing with the catalytic converter.

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Mounting orientation:

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

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.

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.



Exhaust gas pressure sensor:

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

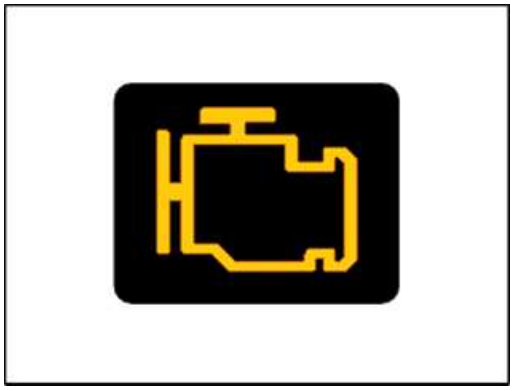
Unlike in diesel engines the differential pressure in petrol engines is not measured upstream and downstream of the microfilter. Instead, with petrol engines, the exhaust gas pressure sensor measures the exhaust gas pressure before the petrol particulate filter as well as the ambient pressure.

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.

Malfunction indicator lamp

The malfunction indicator lamp is also called as "Check engine light" in some countries.

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Activation in fault states

The malfunction indicator lamp is activated if an exhaust-related fault is detected in two consecutive driving cycles. The associated BMW fault code then receives the fault detail "fault is currently activating a warning light". If a fault disappears again, the fault memory remains stored for 40 driving cycles. The malfunction indicator lamp is deactivated again if the fault does not occur for three successive driving cycles. In this case, the fault detail for the associated BMW fault code changes back to "fault does not currently activate any warning light".

Activation without fault status

In the conditions listed below, the malfunction indicator lamp is also active. These conditions do not represent a fault status, however. Troubleshooting is therefore not necessary in these conditions.

- During the pre-drive check, i.e. for some seconds directly after activating driving readiness.
- If exclusively terminal 15 is switched on without driving readiness and/or without having started the engine.

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8.2.1.2 Gaseous emissions

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

— In vehicles up to emission categories Euro 5 and Euro V (7): Measurement with the help of one of the exhaust gas analysis unit 1 conforming to the regulations or reading out the on-board diagnosis system. The exhaust-gas test is basically performed using the exhaust emissions. The member states may allow the use of the on-board diagnosis system based on a equivalence assessment and in consideration of the relevant type approval regulations, in which the recommendations of the vehicle manufacturer and other requirements must be observed.

— In vehicles from emission categories Euro 6 and Euro VI (8): measure using an emission analysis device1 that meets the specifications or read out the on-board diagnosis system while taking into account the manufacturer's recommendations and other requirements1. No measurements are carried out in two-stroke engines.

Fault determination according to EG PTI:

a)	Exhaust gas exceeds the specific values as per manufacturer specifications
b)	Or (if there is no corresponding data available) the carbon monoxide emissions exceed i) — 4.5 % or — 3.5 % in vehicles without modern exhaust gas aftertreatment system, depending on the first registration or initial operation date as per specifications1; ii) in vehicles with modern exhaust gas aftertreatment system — when the engine is idling: 0.5 %, — at increased idle speed: 0.3 % or — when the engine is idling: 0.3 % (7), — at increased idle speed: 0.2 %, depending on the first registration or initial operation date as per specifications1.
c)	Oxygen sensor coefficient outside the range 1 ± 0.03 or not in compliance with manufacturer specifications
d)	On-board diagnosis system (OBD) shows significant fault.

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8.2.2.1 Emission control devices

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

Visual inspection

Fault determination according to EG PTI:

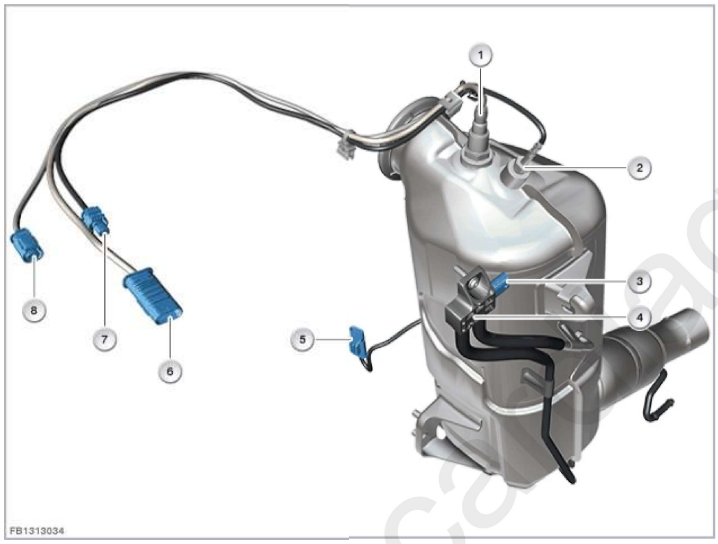
a)	The exhaust gas aftertreatment system installed by the manufacturer is missing or it has evidently been damaged.
b)	Leakages influencing emission measurement

Methods according to vehicle manufacturer:

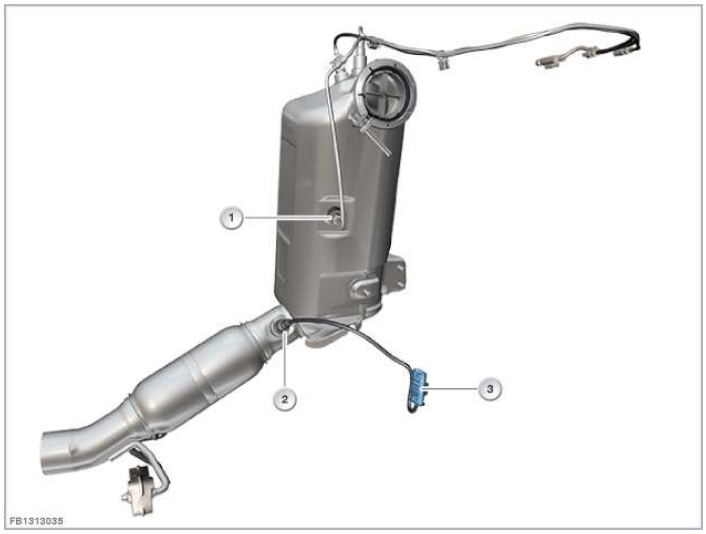
Diesel particulate filter

In order to comply with required particle emissions as per EURO5 and EURO6 exhaust emissions legislation all BMW diesel vehicles have been equipped with a diesel particulate filter.

The filter housing of the filter contains the oxidation catalytic converter and the actual diesel particulate filter. The oxidation catalytic converter is mounted upstream of the diesel particulate filter.



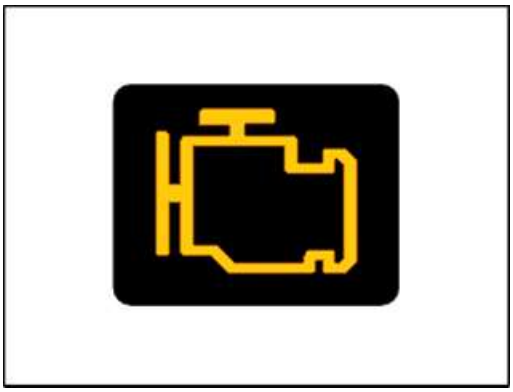
Index	Explanation
1	Oxygen sensor before catalytic converter
2	Exhaust temperature sensor upstream of catalytic converter
3	three-pin plug connection
4	Differential pressure sensor microfilter
5	two-pin plug connection
6	two-pin plug connection
7	two-pin plug connection
8	two-pin plug connection



Index	Explanation
1	Exhaust-gas temperature sensor after catalytic converter
2	Oxygen sensor after catalytic converter
3	five-pin plug connection

Malfunction indicator lamp

The malfunction indicator lamp is also called as "Check engine light" in some countries.



Activation in fault states

The malfunction indicator lamp is activated if an exhaust-related fault is detected in two consecutive driving cycles. The associated BMW fault code then receives the fault detail "fault is currently activating a warning light". If a fault disappears again, the fault memory remains stored for 40 driving cycles. The malfunction indicator lamp is deactivated again if the fault does not occur for three successive driving cycles. In this case, the fault detail for the associated BMW fault code changes back to "fault does not currently activate any warning light".

Activation without fault status

In the conditions listed below, the malfunction indicator lamp is also active. These conditions do not represent a fault status, however. Troubleshooting is therefore not necessary in these conditions.

- During the pre-drive check, i.e. for some seconds directly after activating driving readiness.
- If exclusively terminal 15 is switched on without driving readiness and/or without having started the engine.

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8.2.2.2 Exhaust gas opacity vehicles, vehicles registered or in operation prior to 01.01.1980 are excluded

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

— In vehicles up to emission categories Euro 5 and Euro V (7): measurement of the exhaust gas opacity during acceleration (without load) from idle to cutoff speed, whereby the gear selector lever must be in neutral interval stage and the clutch must not be pressed, or read out OBD. As a rule, the exhaust-gas test is carried out by checking the exhaust gases. Member states may permit the use of OBD on the basis of an equal assessment. However, recommendations by the vehicle manufacturer must be taken into account.

— In vehicles from emission categories Euro 6 and Euro VI (8): measurement of the exhaust gas opacity during acceleration (without load) from idle to cutoff speed, whereby the gear selector lever must be in neutral interval stage and the clutch must not be pressed, or read out OBD while taking into account the manufacturer recommendations and other requirements1

Vehicle preheating/precooling: 1. Vehicles can be checked without preheating/precooling. However, for reasons of safety the engine must be at operating temperature and in correct mechanical condition2. Preheating/precooling requirements: i) The engine has fully reached operating temperature, i.e. an engine oil temperature of at minimum 80°C or the usual operating temperature (if this value is lower) is measured using a measuring tube sensor or the engine block temperature measured using an infrared radiation sensor has reached at minimum this value. If the value cannot be measured in this way as a result of the vehicle configuration, the normal engine operating temperature can be determined using a different method, e.g. by starting up the engine fan. ii) The exhaust emission system is flushed after a minimum of three non-loaded acceleration cycles from idle speed to cutoff speed or with an equivalent procedure.

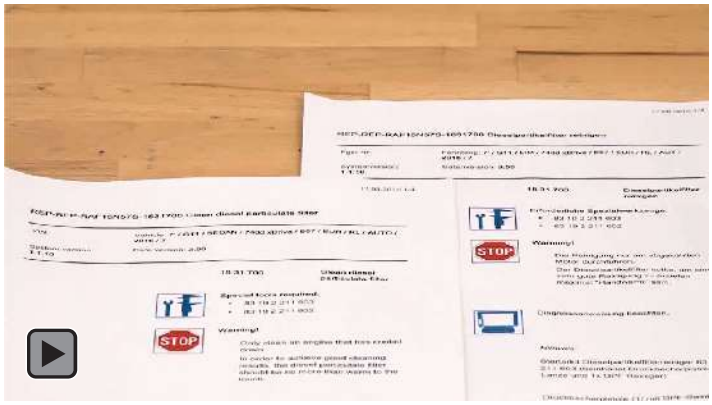
Checking process: 1. The engine and a potentially installed exhaust turbocharger must have reached idle speed prior to starting the non-loaded acceleration cycle. With heavy diesel engines it is necessary to wait for a minimum of 10 seconds after having released the accelerator pedal for this purpose. 2. In order to initiate the non-loaded acceleration cycle it is necessary to quickly and constantly press the accelerator pedal (within less than one second), yet it must not be forcefully pressed fully down so the injection pump reaches the maximum delivery rate. 3. During each non-loaded acceleration cycle the engine must reach the cutoff speed or in vehicles with automatic transmission the speed specified by the manufacturer or, if this data is not available, two thirds of the cutoff speed before the accelerator pedal is released. For instance, this can be checked by monitoring the engine speed or by pressing the accelerator pedal for long enough, i.e. in M 2, M 3, N 2 and N 3 class vehicles the period of time from having initially pressed the accelerator pedal to releasing it must be at minimum two seconds. 4. The check must exclusively be assessed as a fail if the arithmetic mean of at minimum three non-loaded acceleration cycles exceeds the limit value. When calculating this value, measurements that significantly deviate from the average measured value or the result of other statistical calculations that take into account the spread of measurements can be ignored. Member states can limit the number of test cycles to be carried out. 5. Member states can assess vehicle checks as fails where measured values significantly exceed the limit values after fewer than three non-loaded acceleration cycles or after the flushing cycles to avoid unnecessary checks. Member states can also assess vehicle checks as passes where measured values are significantly below the limit values after fewer than three non-loaded acceleration cycles or after the flushing cycles to avoid unnecessary checks.

Fault determination according to EG PTI:

a)	In vehicles that are initially registered or put into operation after the date specified in the regulations1: exhaust gas opacity exceeds the value stated on the manufacturer label on the vehicle
b)	If this information is not available or the use of reference values has not been specified in the regulations1: — Naturally aspirated engines: 2.5 m–1, — Engines with turbocharger: 3.0 m–1, — In vehicles specified as per relevant regulations1 or initially registered or put into operation after the date stated in said regulations: 1.5 m–1 (9) or 0.7 m–1 (10)

Clean diesel particulate filter

1 Clean diesel particulate filter



TECHNICAL INFORMATION

The training video illustrates the methodology for cleaning the diesel particulate filter.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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Form for equipotential bonding screw connections

Form for equipotential bonding screw connection

DANGER

Equipotential bonding in high-voltage system.

Danger to life if the equipotential bonding screw connection is not correct!

- Observe the safety requirements for the equipotential bonding screw connection.
- Clean contact faces and have then checked by a second person.
- Tighten the screws for equipotential bonding to the specified torque; have a second person check the torque.
- Correct execution of these tasks must be documented in the vehicle records by both persons.

This form must be completed in full and enclosed with the vehicle records!

Vehicle data:

Vehicle identification number	Order number	Order date	Kilometre reading

Equipotential bonding screw connections:

Screw application	Torque	Mechanic	Signature	Tester	Signature

By signing, the mechanic and tester assume liability for the correctness of the screw connection!

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Assessment of the rubber mounts on axle components

Evaluation criteria of rubber mounts

General information:

- Rubber mounts are generally not a safety component
- Tether is constructionally secured
- Separation of the adhesion and cracks are generally permitted
- Fluid loss and grease loss in hydraulic mounts is permitted

Specific test criteria:

- Tight fit of the ball bearing must be ensured
- Excessive play while jolting the component is not permitted (check with a loaded axle)
- Grinding marks and metallic noises while jolting the component are not permitted

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Replace wheel bearing

1 Replace wheel bearing



TECHNICAL INFORMATION

The training video illustrates the methodology for renewing the wheel bearing.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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2.6 Electronic hydraulic steering (EPS)

Validities

BMW passenger cars, BMW i, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

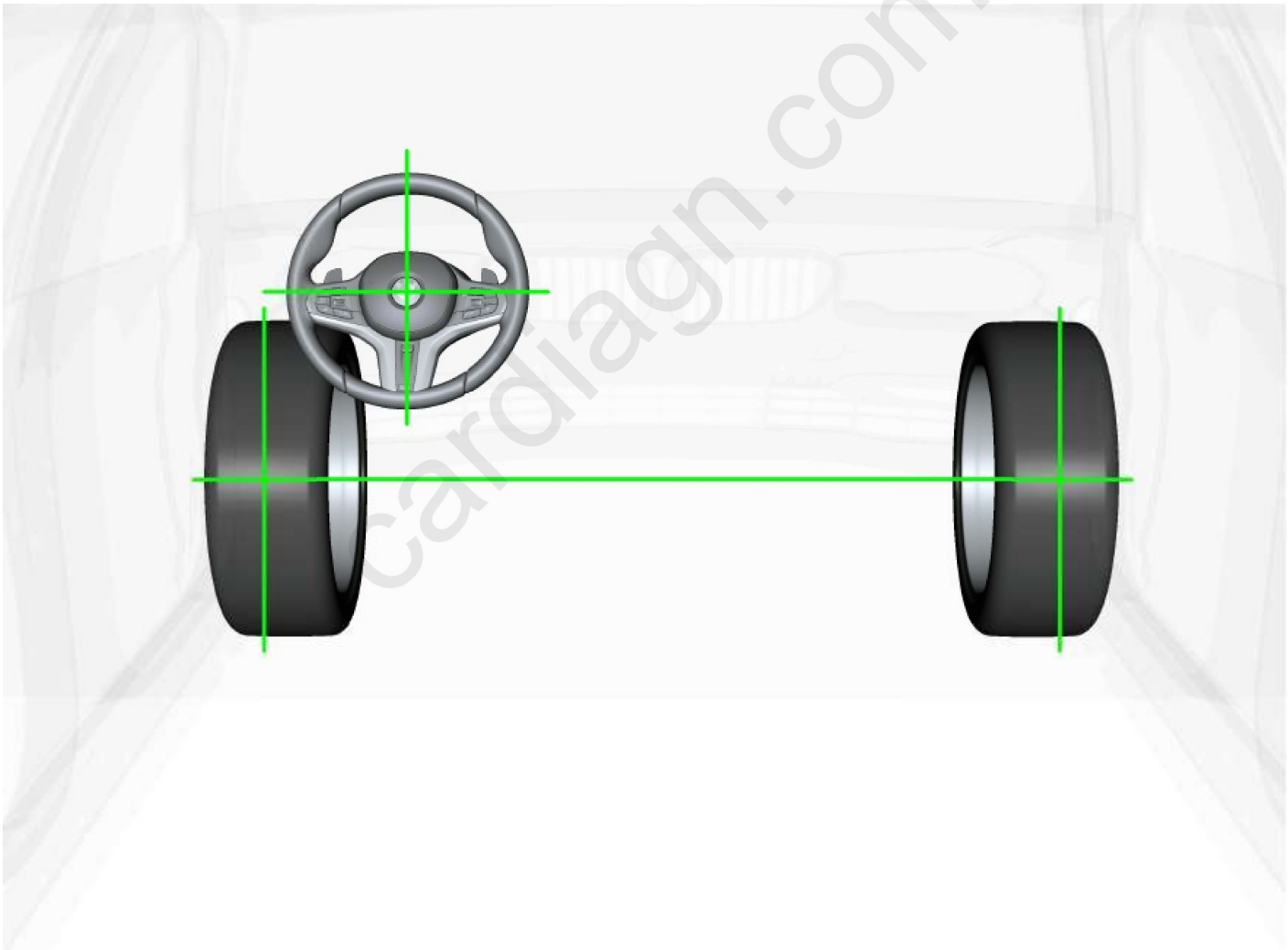
Visual inspection and checking whether the steering wheel angle and the wheels correspond when switching the engine on/off and/or using the electronic vehicle interface

Fault determination according to EG PTI:

a)	EPS malfunction indicator lamp (MIL) indicates a fault in the system.
b)	Discrepancy between the steering wheel angle and the wheel angle, steering impaired.
c)	Hydraulic steering not working.
d)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer:

Visual inspection: The wheels and steering wheel must be straight.



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1	Indicator light and Check Control symbol

In the event of failure of the electromechanical power steering (EPS), a Check Control symbol appears in the LCD. Simultaneously, the fixed indicator lamp comes on in the instrument cluster.

Assessment of the rubber mounts on axle components

Evaluation criteria of rubber mounts

General information:

- Rubber mounts are generally not a safety component
- Tether is constructionally secured
- Separation of the adhesion and cracks are generally permitted
- Fluid loss and grease loss in hydraulic mounts is permitted

Specific test criteria:

- Tight fit of the ball bearing must be ensured
- Excessive play while jolting the component is not permitted (check with a loaded axle)
- Grinding marks and metallic noises while jolting the component are not permitted

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Changing rear axle transmission fluid with the oil gun

1 Rear axle differential oil change with oil gun



TECHNICAL INFORMATION

The training video illustrates the methodology for changing the rear axle differential oil using the oil gun special tool.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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Assessment of the rubber mounts on axle components

Evaluation criteria of rubber mounts

General information:

- Rubber mounts are generally not a safety component
- Tether is constructionally secured
- Separation of the adhesion and cracks are generally permitted
- Fluid loss and grease loss in hydraulic mounts is permitted

Specific test criteria:

- Tight fit of the ball bearing must be ensured
- Excessive play while jolting the component is not permitted (check with a loaded axle)
- Grinding marks and metallic noises while jolting the component are not permitted

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1.2.1 Service brake: Effect

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

Operate the brakes on a brake test stand or, if this is not possible, during a road test gradually increasing up to the maximum brake force.

Fault determination according to EG PTI:

a)	Insufficient brake force at one or more wheels or no brake force at one or more wheels.
b)	Brake force at one wheel less than **70%** of the maximum brake force applicable at the other wheel of the same axle. Or, in the event of a road test, excessive deviation of the vehicle from straight-ahead running. Brake force at one wheel of steered axles less than **50%** of the maximum brake force applicable at the other wheel of the same axle.
c)	Brake force is not gradual (grabbing).
d)	Response time of the brake at one of the wheels too long.
e)	Heavy fluctuation of the brake force during every full wheel rotation.

Methods according to vehicle manufacturer

Braking on the test stand

TECHNICAL INFORMATION

With all-wheel drive vehicles, the test stand is detected automatically.

TECHNICAL INFORMATION

Only brake test stands with test speeds between 2.5 km/h and 6 km/h may be used.

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Necessary preliminary work:

- Check tyres for damage.
- Check tyre tread.
- Check the tyre pressure.
- The brakes must be at normal operating temperature. To that end, warm up and dry off the brake discs by braking the vehicle a few times.

Front brakes:

- Drive the front axle of the vehicle onto the brake test stand.
- Place the selector lever in selector lever position (N).
- Start brake test stand.
- Press service brake pedal.
- Read off maximum brake force on the left / right.

Rear brakes:

- Drive the front axle of the vehicle onto the brake test stand.
- Place the selector lever in selector lever position (N).
- Start brake test stand.
- Press service brake pedal.
- Read off maximum brake force on the left / right.

Braking on the test stand with F25 F26

Prerequisite

- Check tyres for damage.
- Check tyre tread.
- Check the tyre pressure.

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TECHNICAL INFORMATION

- Make sure the Hill Descent Control (HDC) is not active before driving on to the brake test rig!
  - The Hill Descent Control (HDC) indicator light must not be on!
  - Only brake test stands with test speeds between 2.5 km/h and 6 km/h may be used.
  - Max. bedding-in time 2 minutes.
  - You must follow without fail the regulation contained in the operating instructions of the relevant test stand manufacturer.

Attention!

The brakes must be at normal operating temperature. To do so, gently warm up the brake discs and brake drums while dry by braking the vehicle several times.

- **Failure to do so may result in damage to the vehicle and the system and also personal injury.**

Front axle on brake test rig: Attention!

- No gear or drive range must be engaged! Selector lever position "Neutral" on automatic transmission vehicles.
- Do not press accelerator!
- Disregard of these instructions will result in the transfer box engaging, forcing the vehicle off the brake test stand!

Drive vehicle on to brake test rig and carry out brake test.

Rear axle on brake test rig: Attention!

- No gear or drive range must be engaged! Selector lever position "Neutral" on automatic transmission vehicles.
- Do not press accelerator!
- Disregard of these instructions will result in the transfer box engaging, forcing the vehicle off the brake test stand!

Drive vehicle onto brake test stand

TECHNICAL INFORMATION

- The vehicle utilises a plausibility check (wheel speed comparison) to detect the brake test rig within a few seconds and switches to brake test rig mode.
  - The parking brake indicator light flashes slowly when brake test stand mode is activated and EMF actuators are released.

Following indicator lights are permanently on:

- Parking brake.
- Brake system.
- Dynamic Stability Control (DSC).
- Antilock Brake System (ABS).
- Press parking brake button according to the application of the brake pads.

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TECHNICAL INFORMATION

The parking brake indicator light flashes quickly when brake test stand mode is activated and EMF actuators are partially locked.

- Press parking brake button = test force 1.
- Press parking brake button = test force 2.
- Press parking brake button = test force 3.
- The parking brake is released again when the button is actuated in the Release direction.

TECHNICAL INFORMATION

- The parking brake indicator light is permanently activated when brake test stand mode is not detected and EMF actuators are fully locked.
  - Brake test stand mode is automatically terminated when the vehicle is driven off the brake test stand.
  - Brake test stand mode is automatically terminated when the vehicle is driven off the brake test stand.
  - All indicator lights go out automatically!

Braking at test stand i01 i12

TECHNICAL INFORMATION

- Only brake test stands with test speeds between 2.5 km/h and 6 km/h may be used.
  - Before using the brake test stand with the rear axle, roller operation must be activated on the instrument cluster (see the following instructions).
  - It is not possible to check the electromechanical parking brake on a plate test stand!
  - **i01**: It is not permissible to use the brake test stand with the rear axle if roller operation has not been activated!
  - When roller operation is activated, hold steering wheel in straight-ahead position, steering wheel movements deactivate roller operation!

Necessary preliminary work:

- Check tyres for damage.
- Check tyre tread.
- Check the tyre pressure.
- The brakes must be at normal operating temperature. To that end, warm up and dry off the brake discs by braking the vehicle a few times.



TECHNICAL INFORMATION

Before using the brake test stand with the rear axle, roller operation must be activated on the instrument cluster (see the following instructions).

Figure :I01

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Figure :I12

- Roller operation is activated using the kilometre reset button (1). Keep pressing reset button until the main menu is displayed in the centre of the instrument cluster.
- In main menu, select the "03 Start roller" menu item using the reset button.
- Quit the "03 Roller Operation" menu item by pressing the reset button.
- Roller operation is shown in the display with the message "Start ESC OFF". Press the reset button to start roller operation.
- The warning light and the message "Test operation ends during start of the journey" light up on the display. The brake test can now be performed.

Front brakes:

- Drive the front axle of the vehicle onto the brake test stand.
- Place the selector lever in selector lever position (N).
- Start brake test stand.
- Press service brake pedal.
- Read off maximum brake force on the left / right.

Rear brakes:

- Drive the rear axle of the vehicle onto the brake test stand.
- Place the selector lever in selector lever position (N).
- Start brake test stand.
- Press service brake pedal.
- Read off maximum brake force on the left / right.

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1.3.1 Auxiliary brake (emergency braking): Effect

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Apply the test procedure described in 1.2.1 for an auxiliary brake system that is separate from the service brake system.

Fault determination according to EG PTI:

a)	Insufficient or no brake force at one or more wheels.
b)	Brake force at one wheel less than 70% of the maximum brake force applicable at the other wheel of the same axle. Or, in the event of a road test, excessive deviation of the vehicle from straight-ahead running. Brake force at one wheel of steered axles less than 50% of the maximum brake force applicable at the other wheel of the same axle.
c)	Brake force is not gradual (grabbing).

Methods according to vehicle manufacturer

Refer to chapter 1.1.6 on the parking brake (electronic and mechanical), a separate system is not installed for BMW.

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Turning brake disc

1 Twist off the brake disc



TECHNICAL INFORMATION

The training video illustrates the methodology for turning the brake disc.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature.

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for turning the brake disc.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature.

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for turning the brake disc.

The training video does not replace the repair instructions.

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No liability can be accepted for printing or other faults. Subject to changes of a technical nature.

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the methodology for turning the brake disc.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature.

- Follow repair instructions!

1.1.6 Duo-servo parking brake

Validities

BMW passenger cars, MINI passenger cars, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection of the components when operating the brake system.

Fault determination according to EG PTI:

a)	Ratchet does not lock properly.
b)	Wear on lever bearing or ratchet mechanism.
c)	Excessive lever travel due to incorrect setting.
d)	Actuating device missing, damaged or inoperative.
e)	Faulty function, indicator light displays malfunction.

Required preliminary work for the test stand

TECHNICAL INFORMATION

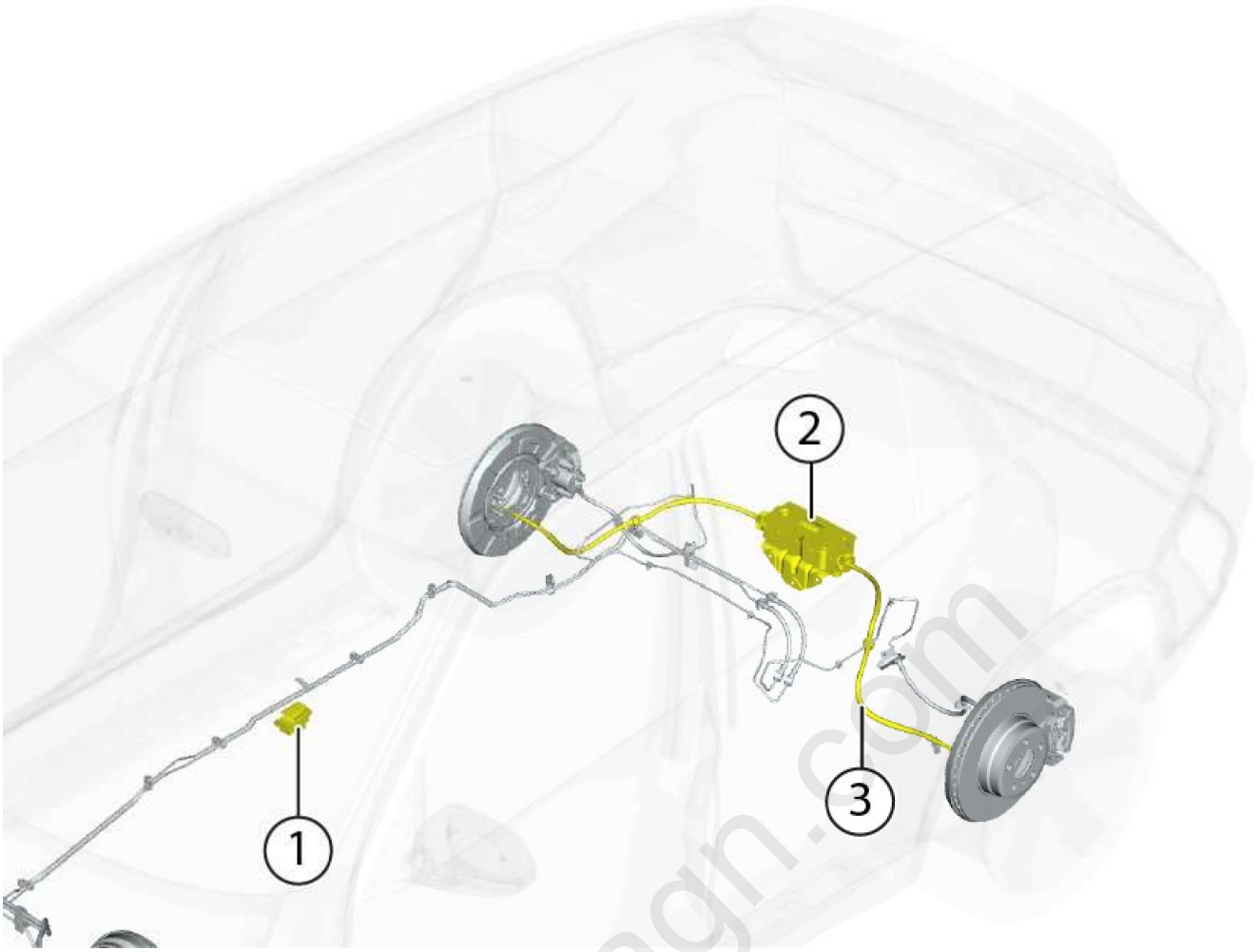
Only brake test stands with test speeds between 2.5 km/h and 6 km/h may be used.

- Check tyres for damage
- Check tyre treads
- Checking tyre pressure
- The brakes must be at normal operating temperature. To that end, warm up and dry off the brake discs by braking the vehicle a few times.

Methods according to vehicle manufacturer

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Duo-servo parking brake



1 Electromechanical parking brake button

2 Servomotor

3 Cable

TECHNICAL INFORMATION

The check may only be carried out when the engine is switched off, the selector lever is in selector lever position (N) and the ignition is switched on.

TECHNICAL INFORMATION

It is not possible to check the electromechanical parking brake on a plate test stand!

Brake test on test stand:

Parking brake

- Drive the rear axle of the vehicle onto the brake test stand.
- Place the selector lever in selector lever position (N).
- Stop engine.

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TECHNICAL INFORMATION

When the engine is running, additional braking effect will otherwise be exerted by the DSC system on all the wheels.

- Otherwise the DSC system generates an additional braking effect on all wheels.
- Switch on the ignition.
- Start brake test stand.

Activate the parking brake, for this purpose pull the button.

TECHNICAL INFORMATION

- Electromechanical holding brake indicator light lights up red on the display.
- Duo-servo parking brake (servomotor) is applied.
- Brake test stand switches off after wheels lock up (slip) or vehicle is pushed off the brake test stand.

- Read off maximum brake power on left / right
- Deactivate parking brake: - Press the button and simultaneously press the service brake pedal (*note*: duo-servo parking brake (servomotor) is released.)

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1.1.6 Electronic parking brake

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

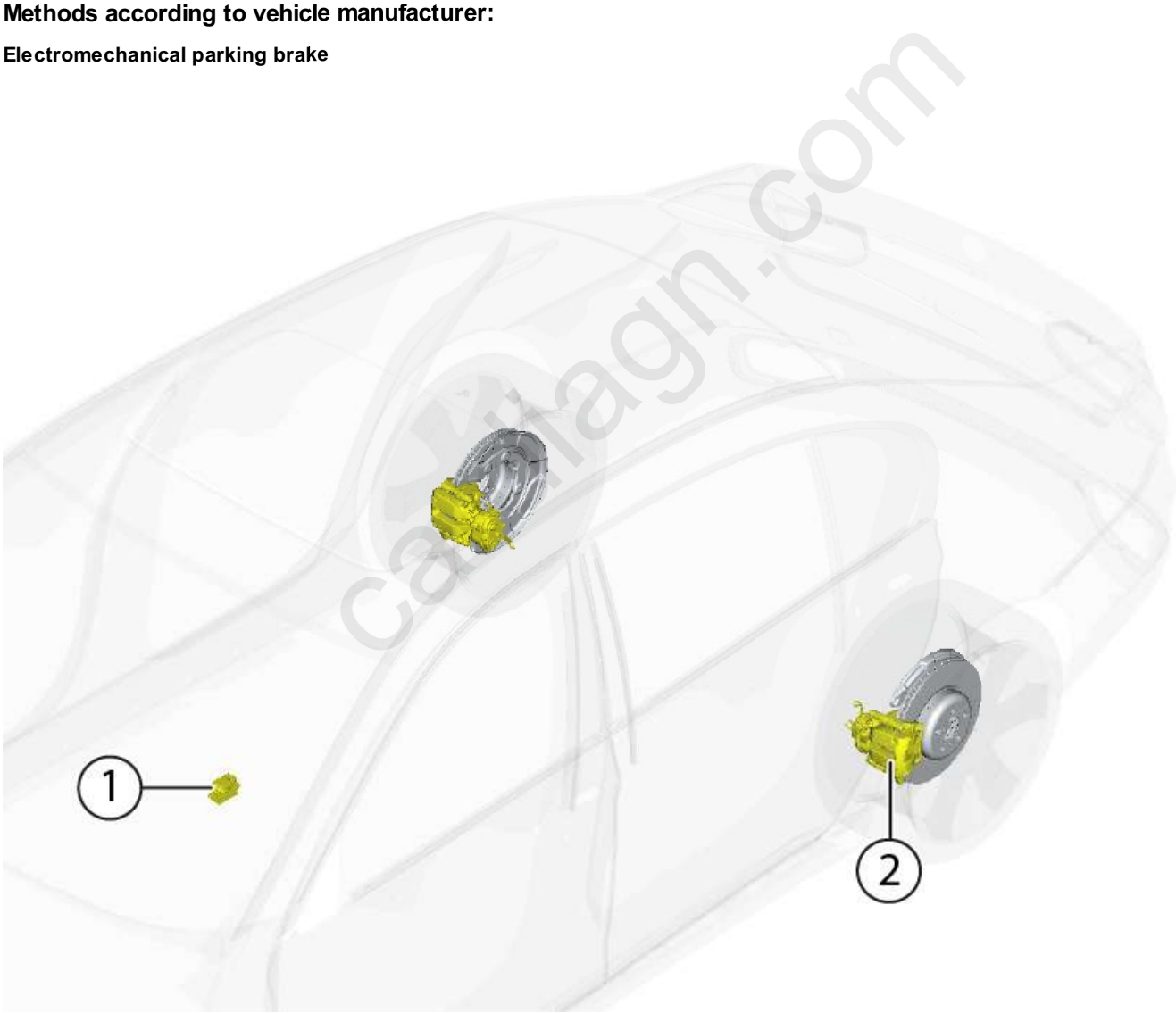
Visual inspection of the components when operating the brake system.

Fault determination according to EG PTI:

a)	Ratchet does not lock properly.
b)	Wear on lever bearing or ratchet mechanism.
c)	Excessive lever travel due to incorrect setting.
d)	Actuating device missing, damaged or inoperative.
e)	Faulty function, indicator light displays malfunction.

Methods according to vehicle manufacturer:

Electromechanical parking brake



1 Parking brake operation switch

2 Brake calliper

Prerequisite

- Check tyres for damage.
- Check tyre tread.
- Check the tyre pressure.
- The brakes must be at normal operating temperature.
- To that end, warm up and dry off the brake discs by braking the vehicle a few times.

TECHNICAL INFORMATION

Only brake test stands with test speeds between 2.5 km/h and 6 km/h may be used.

Check without brake test stand

- Switch the ignition on. In this process, ensure that no gear is engaged!
- Visual inspection whether indicator lights and warning lights light up in the instrument cluster.
- Indicator lights must go out after a maximum of 5 seconds.
- A fault has occurred if the indicator and warning lights do not light up upon switching on the ignition or if they fail to go out after approximately 2-3 seconds.

Description of the parking brake

TECHNICAL INFORMATION

Follow notes for Brake testing for test stand.

The parking brake test must be carried out on the dynamic brake test stand as follows.

- Release position (engine off/ignition on).
- Wheel circumferential force on the right/left ≤ 300 N.

Press the parking brake button (engine off/ignition on):

- Vehicle must be evenly pulled from the brake test stand and/or the motor of the brake test stand is switched off on both sides.

Parking brake functional check

- Drive vehicle onto brake test stand
- The electromechanical parking brake control unit detects the brake test stand within a few seconds with a plausibility check (comparison of wheel speeds) and it activates brake test stand mode.
- The parking brake indicator light flashes slowly when brake test stand mode is activated and EMF actuators are released.
- Press parking brake button according to the application of the brake pads.
- The parking brake indicator light flashes quickly when brake test stand mode is activated and EMF actuators are partially locked.
- Press parking brake button = test force 1.
- Press parking brake button = test force 2.
- Press parking brake button = test force 3.
- The parking brake is released again when the button is actuated in the Release direction.
- The parking brake indicator light is permanently activated when brake test stand mode is not detected and EMF actuators are fully locked.
- The brake test stand mode is automatically terminated when the vehicle is driven off the brake test stand.

F85, F86 parking brake description

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TECHNICAL INFORMATION

Only brake test stands with test speeds between 2.5 km/h and 6 km/h may be used.

Perform brake test on test stand

Necessary preliminary work:

- Check tyres for damage.
- Check tyre tread.
- Check the tyre pressure.
- The brakes must be at normal operating temperature. To that end, warm up and dry off the brake discs by braking the vehicle a few times.

TECHNICAL INFORMATION

The check may only be carried out when the engine is switched off, the selector lever is in selector lever position (N) and the ignition is switched on.

TECHNICAL INFORMATION

It is not possible to check the electromechanical parking brake on a plate test stand!

Parking brake:

- Drive the rear axle of the vehicle onto the brake test stand.
- Position the selector lever in selector lever position (N).
- Stop engine.

TECHNICAL INFORMATION

When the engine is running, additional braking effect will otherwise be exerted by the DSC system on all the wheels.

- Switch on the ignition.
- Start brake test stand.
- Activate the parking brake, for this purpose pull the button.

TECHNICAL INFORMATION

- Parking brake indicator light lights up red on the display.
- Duo-servo parking brake (servomotor) is applied.
- Brake test stand switches off after wheels lock up (slip) or vehicle is pushed off the brake test stand.

- Read off maximum brake force on the left / right.
- Deactivate parking brake: Press the button and simultaneously press the service brake pedal.

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TECHNICAL INFORMATION

Duo-servo parking brake (servomotor) is released.

Description of the parking brake

The parking brake test must be carried out on the dynamic brake test stand as follows:

- Release position (engine off/ignition on).
- Wheel circumferential force, right/left ≤ 300 N.

Press the parking brake button (engine off/ignition on):

- Vehicle must be evenly pulled from the brake test stand and/or the motor of the brake test stand is switched off on both sides.

Parking brake functional check

- Drive the rear axle of the vehicle onto the brake test stand.
- Place the selector lever in selector lever position (N).
- The electromechanical parking brake control unit detects the brake test stand within a few seconds with a plausibility check (comparison of wheel speeds) and it activates brake test stand mode.
- The parking brake indicator light flashes slowly when brake test stand mode is activated and EMF actuators are released. Start brake test stand.
- Press parking brake button according to the application of the brake pads.
- The parking brake indicator light flashes quickly when brake test stand mode is activated and EMF actuators are partially locked.
- Press parking brake button = test force 1.
- Press parking brake button = test force 2.
- Press parking brake button = test force 3.
- Read off maximum brake force on the left / right.
- The parking brake is released again when the button is actuated in the Release direction.
- The brake test stand mode is automatically terminated when the vehicle is driven off the brake test stand.

Description of the parking brake

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- Position the vehicle with its rear axle on the brake test stand.
- Position the selector lever in selector lever position N (neutral).
- **Run engine at idle speed.**
- The brake test stand starts automatically.
- The control unit runs a plausibility check (comparison of wheel speed) to identify within a few seconds that a vehicle is on the brake test stand and changes to brake test stand mode.
- If brake test stand mode has been activated and the EMF actuators are open, the indicator light for the electromechanical parking brake flashes slowly.
- Press the parking brake button: application of brake pads; when brake test stand mode is active and the EMF actuators have been partly applied, the indicator light for the electromechanical parking brake flashes quickly.
- Press the parking brake button: brake test with test force 1
- Press the parking brake button: brake test with test force 2
- Press the parking brake button: brake test with test force 3
- Read the maximum brake forces on the left and right.
- Release parking brake button 1. This releases the parking brake.
- Move the vehicle from the brake test stand. Brake test stand mode is automatically quit upon driving off the brake test stand.
- **After having completed the brake tests: Perform terminal change.**
- All indicator lights go out after having completed the terminal change.

Description of the parking brake

TECHNICAL INFORMATION

- It is not possible to check the electromechanical parking brake on a plate test stand!
  - i01: It is not permissible to use the brake test stand with the rear axle if roller operation has not been activated!
  - When roller operation is activated, hold steering wheel in straight-ahead position, steering wheel movements deactivate roller operation!

Necessary preliminary work:

- Check tyres for damage
- Check tyre treads
- Checking tyre pressure
- The brakes must be at normal operating temperature. To that end, warm up and dry off the brake discs by braking the vehicle a few times.



TECHNICAL INFORMATION

Before using the brake test stand with the rear axle, roller operation must be activated on the instrument cluster (see the following instructions).

Figure :I01

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Figure :I12

- Roller operation is activated using the kilometre reset button (1). Keep pressing reset button until the main menu is displayed in the centre of the instrument cluster.
- In main menu, select the "03 Start roller" menu item using the reset button.
- Quit the "03 Roller Operation" menu item by pressing the reset button.
- Roller operation is shown in the display with the message "Start ESC OFF". Press the reset button to start roller operation.
- The warning light and the message "Test mode ends during start of the journey" lights up on the display. The brake test can now be performed.

Parking brake:

- Drive the rear wheels of the vehicle onto the brake tester
- Place the selector lever in selector lever position (N)
- Start the brake test stand
- Wait until the parking brake indicator light flashes slowly
- Press parking brake button according to the application of the brake pads.
- The parking brake indicator light flashes quickly when brake test stand mode is activated and EMF actuators are partially locked.
- Press parking brake button = test force 1.
- Press parking brake button = test force 2.
- Press parking brake button = test force 3.
- The parking brake is released again when the button is actuated in the Release direction.

TECHNICAL INFORMATION

Roller operation is automatically deactivated after a terminal change!

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1.1.6 Parking brake, operating lever, reversible ratchet

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

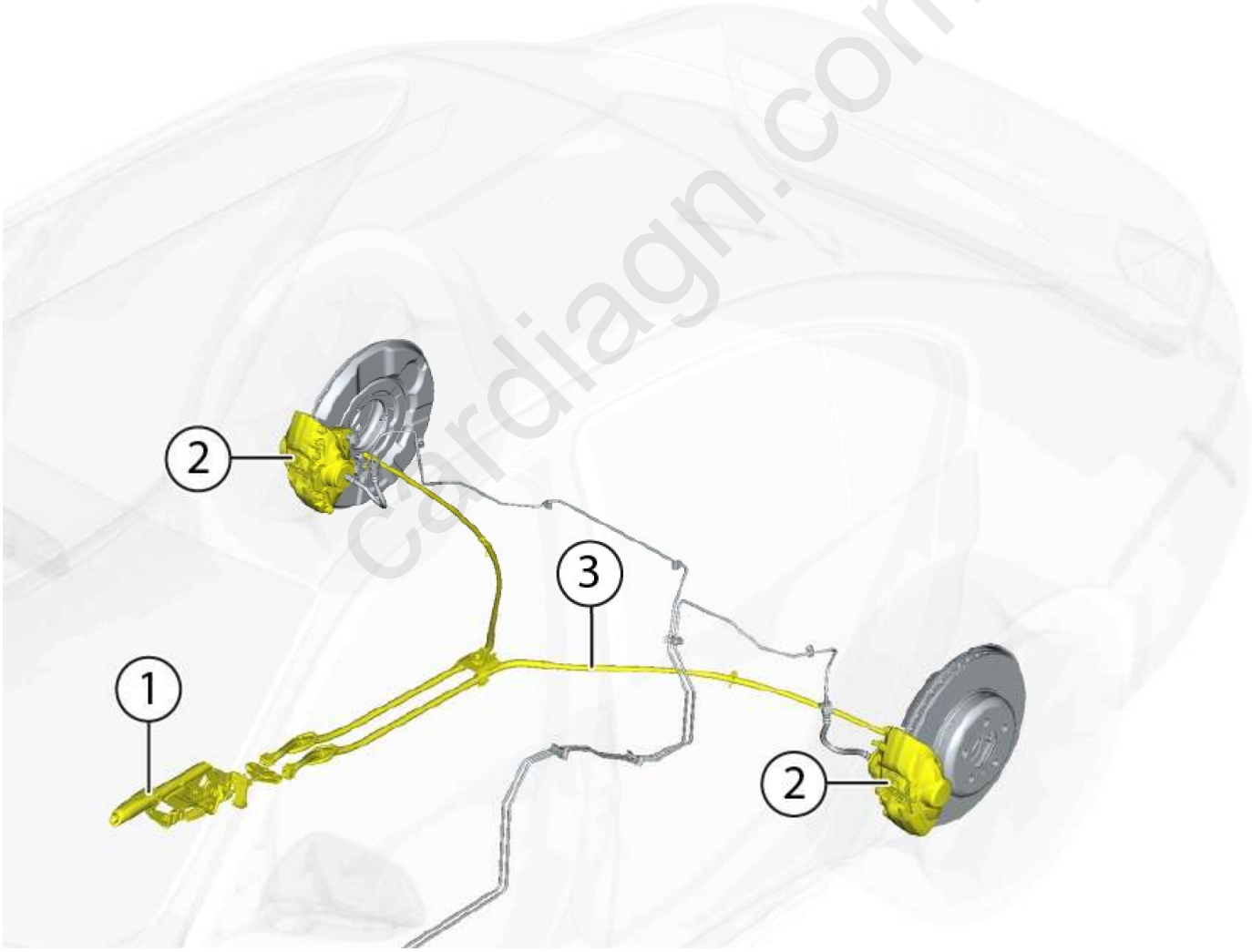
Visual inspection of the components when operating the brake system.

Fault determination according to EG PTI:

a)	Ratchet does not lock properly.
b)	Wear on lever bearing or ratchet mechanism.
c)	Excessive lever travel due to incorrect setting.
d)	Actuating device missing, damaged or inoperative.
e)	Faulty function, indicator light displays malfunction.

Methods according to vehicle manufacturer:

Mechanical parking brake



1 Parking brake lever

2 Brake calliper

3 Brake line

Preconditions

Switch the ignition on. In this process, ensure that no gear is engaged!

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Parking brake that directly acts upon the service brake pads or also separate brake shoes in separate brake drums via a cable using variable force applied by hand or with the foot which can be operated while the vehicle is moving.

Check by hand:

- When 1st ratchet is engaged, no braking force should be exerted.
- Braking with locked wheels must be possible with the parking brake.
- The parking brake must be readjusted if the operating travel at the parking brake lever is greater than ten teeth.

Check on the test stand:

1. Carry out the following conditioning prior to testing the actual effect:

- Pull the parking brake lever up to at maximum the 8th tooth three times.
- Drive the vehicle onto the brake test stand, apply the parking brake lever on the running test stand rollers until a wheel circumferential force of approximately 700 N applies (per wheel).
- Once again release the parking brake lever after 1 minute and carry out the actual brake force measurement.

2. Brake force measurement:

- Completely apply the parking brake lever.

3. Brake force assessment: The following applies to these parking brake designs:

- Minimum braking 16% of the permissible total weight or blocking limit.
- Permissible right/left deviation at maximum 50% of the corresponding, higher value.



Testing instructions for systems:

- Visual inspection whether indicator lights and warning lights light up in the instrument cluster.
- Indicator lights must go out after a maximum of 5 seconds.
- A fault has occurred if the indicator and warning lights do not light up upon switching on the ignition or if they fail to go out after approximately 2-3 seconds.

Examples of potential faults in the braking and stabilising system:

- (1) = Drive-off assistant failed (also lights up when the parking brake has been applied).
- (2) = Insufficient brake fluid quantity.
- (3) = Driving dynamics system including ABS failed.
- (4) = DSC (Dynamic Stability Control) suspension control systems failed.

Description of the parking brake

TECHNICAL INFORMATION

Follow notes for Brake testing for test stand.

TECHNICAL INFORMATION

If deviations are identified during the following check, the parking brake must be adjusted:

The parking brake test must be carried out on the dynamic brake test stand as follows:

- Release position (engine off/ignition on).
- Wheel circumferential force, right/left â‰¤ 300 N.

Press the parking brake button (engine off/ignition on):

- Vehicle must be evenly pulled from the brake test stand and/or the motor of the brake test stand is switched off on both sides.

Parking brake functional check

Drive vehicle onto brake test stand

Warm up the parking brake by applying it several times until the wheels block.

Check the parking brake:

- Vehicles with manual transmission: Gearshift lever in idle position.
- Vehicles with automatic transmission: Selector lever in selector lever position (N).
- Gradually apply the parking brake lever.
- Significantly measurable braking must be recorded from the 5th tooth.
- Keep applying the parking brake lever until the wheels block.
- Read the brake forces of the left and right rear wheel.

Assessment: The total of both wheel brake forces must be at minimum 16 % of the permissible total weight of the vehicle.

The maximum permitted brake force differential between right/left must not exceed 50 % (in relation to the greater brake value).

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1.4.1 Parking brake: Effect

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Brake actuation during the check on a brake test stand.

Fault determination according to EG PTI:

Brake without effect on one side or in the event of a road test, excessive deviation of the vehicle from straight-ahead running.

Methods according to vehicle manufacturer

Refer to chapter 1.1.6 on the parking brake (electronic and mechanical), a separate system is not installed for BMW.

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1.6 Antilock Brake System (ABS)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and check the warning device and/or use electronic vehicle interface.

Fault determination according to EG PTI:

a)	Warning device damaged.
b)	Warning device shows system malfunction.
c)	Wheel speed sensors missing or damaged.
d)	Cable damaged.
e)	Other components missing or damaged.
f)	System outputs an errors via the electronic vehicle interface.

Methods according to vehicle manufacturer



If the indicator light flashes yellow, the ABS is switched off due to a fault. The normal braking effect is present without restrictions. If the ignition is started in the vehicle, a PRE vehicle check is automatically run.

Assessment: Serious fault (e-motor)

- The indicator light in the instrument cluster goes out shortly after starting the engine.
- The indicator light lights up permanently: DSC is switched off via the button. Switch on DSC through button. Light goes out.
- The indicator light and the brake warning light glow permanently: DSC, fault code and Dynamic Brake Control are disturbed.

Assessment: Serious fault (e-motor)

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1.7 Electronic brake system (EBS)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and check the warning device and/or use electronic vehicle interface.

Fault determination according to EG PTI:

a)	Warning device damaged.
b)	Warning device shows system malfunction.
c)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer:

Status 01.01.2018: not relevant to BMW Group vehicles.

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1.1.13 Brake pads

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection

Fault determination according to EG PTI:

a)	Brake pad excessively worn (minimum thickness indicator reached).
b)	Brake pad dirty (oil, grease, etc.), impaired braking effect.
c)	Brake pad missing or incorrectly mounted.

Methods according to vehicle manufacturer



The wear indicator indicates an existing defect at the brake pads.

Exception: with series F56 it may be that no wear sensor has been installed. In this case carry out a visual inspection.

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1.1.14 Brake drums, brake discs

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection

Fault determination according to EG PTI:

a)	Brake drum or brake disc worn or severely worn, with excessive formation of grooves, component cracked, unsafe or fractured.
b)	Brake drum or brake disc dirty (oil, grease, etc.). Impaired braking effect.
c)	Brake drum or brake disc missing.
d)	Armature plate unsafe.

Methods according to vehicle manufacturer:

Minimum brake disc thickness

Test specification § 29 limit value for brake disc thickness:

- BMW, MINI and Rolls-Royce vehicles: **Nominal dimension minus** 2.4 mm
- BMW M GmbH vehicles (perforated brake disc): **Nominal dimension minus** 1.6 mm. This limit dimensions is also applicable to perforated brake discs which are fitted on BMW AG vehicles as optional accessories! This limit value does not apply to carbon ceramic brakes.
- **Minimum thickness of brake pads:** 3 mm**.** This corresponds to when the brake pad wear indicator initially lights up and applies to all BMW Group vehicles.

Falling below the aforementioned limit value must be assessed as 'significant damage' ("EM")!

Brake disc dimensions with 08.6 mm thickness

- 280x8.6

Brake disc dimensions with 10 mm thickness

- 259x10
- 280x10
- 296X10

Brake disc dimensions with 11 mm thickness

- 290X11

Brake disc dimensions with 14 mm thickness

- 312x14

Brake disc dimensions with 19 mm thickness

- 330x19

Brake disc dimensions with 20 mm thickness

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- 280x20
- 300X20
- 320x20
- 324x20
- 330X20

Brake disc dimensions with 22 mm thickness

- 200x22
- 280x22
- 282X22
- 284X22
- 294x22
- 300X22

Brake disc dimensions with 24 mm thickness

- 300x24
- 307x24
- 312x24
- 330x24
- 345x24
- 370X24
- 385x24
- 396X24

Brake disc dimensions with 26 mm thickness

- 396x26

Brake disc dimensions with 28 mm thickness

- 328x28
- 380X28
- 398x28

Brake disc dimensions with 29 mm thickness

- 340x29

Brake disc dimensions with 30 mm thickness

- 332x30
- 335X30
- 340x30
- 348x30
- 370x30
- 380X30
- 402x30

Brake disc dimensions with 36 mm thickness

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- 348x36
- 365x36
- 374x36
- 385x36
- 395x36
- 400X36
- 410X36

Brake disc dimensions with 38 mm thickness

- 400X38
- 400x38
- 410x38

Possible brake disc defects:



Figure shows faulty brake discs due to scoring.

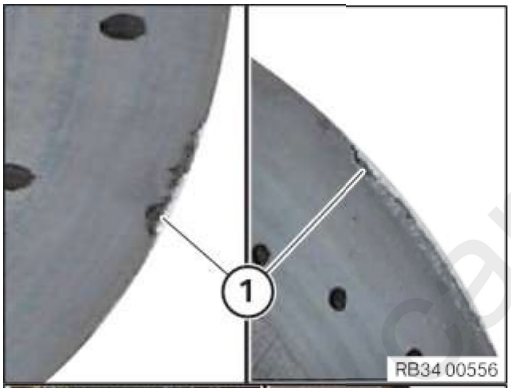


Figure shows faulty brake discs due to corrosion.



Figure shows faulty brake discs due to corrosion.

Potential carbon ceramic brake faults:



Sample image for flaking that is OK.



Sample image for flaking that is not OK (1)

Example fault patterns of edge flaking on the outer friction ring diameter due to improper handling = not OK → renew component!

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5.2.2 Wheels

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection of both sides of each wheel while the vehicle is positioned over an inspection pit or on a vehicle lift.

Fault determination according to EG PTI:

a)	Fracture or faulty weld.
b)	Rim rings mounted incorrectly. Danger of releasing!
c)	Wheel severely deformed or worn. Secure mounting on the wheel hub impaired; secure mounting of the tyre impaired.
d)	Wheel size, design, or wheel type not as per regulations or not compatible so that road safety is impaired.

Methods according to vehicle manufacturer

The corresponding PDF files are on the AOS portal **https://aos.bmwgroup.com/start**.

The files have been saved in **Application** - **AIR** - **START** - **Wheel/tyre+combinations (view document)**.

Now click the corresponding series (left-hand side). Available documents appear on the right-hand side.

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Cosmetic repairs on wheel rims

Cost-effectiveness of the repairs has been checked.

Arrangement of wheel rims

Type	Repair options
Cast aluminium wheel	see Point 2
Cast aluminium wheel (machine-polished)	see Point 3
Carbon-fibre wheel rim	see Point 4

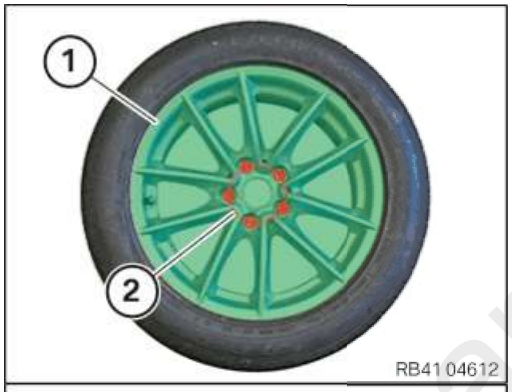
Cast aluminium rim

The rim must be replaced if damaged:

- All types of deformations
- All types of cracks
- All damage deeper than 1 mm of aluminium
- All damages on the inner surface of the wheel rim and in the rim base
- The radial runout and lateral runout prior to preparation exceed the production tolerance of 0.3 mm

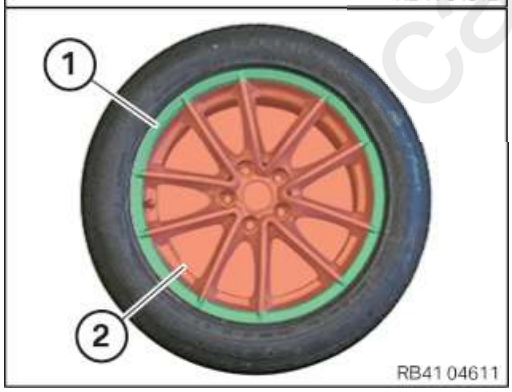
It is possible to repair the following damage:

- Maximum depth of damage to aluminium 1 mm
- The distance of the damage from the outer rim edge must not exceed 30 mm



Paintwork damage in area (1) can be repaired with paintwork.

Paintwork is not permitted in area (2).



In area (1) a repair to the aluminium up to a depth of 1 mm is allowed.

The wheel rim must be replaced if there is damage to the aluminium in area (2).

Repair procedure for cast aluminium wheel rim

1 – Preparing the wheel rim

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- Dismount tyres.
- Clean the aluminium rim with a steam-jet cleaner.
- Dry the aluminium rim.
- Pre-grind the aluminium rim (break sharp edges with a grain P180 grinding wheel).
- Blow off the aluminium rim.
- Clean damaged areas extensively with silicone remover.

General information:



CAUTION

Materials harmful to health.

Health risks in the event of contact with substances that are harmful to health!

- Observe and comply with the Safety Information on the containers and the notes on the manufacturer's safety data sheet.
- Conduct all work in appropriate personal protective equipment only.

Putty S1

Processing time 20 °C	90 min
Processing time 30 °C	60 min
Age-hardening duration 60 °C	60 min
Storage	15 °C ... 25 °C
Durability (note the expiration date on the cartridge)	12 Monate

The barrel can be squeezed out with a commercially available cartridge press. Only use cartridge presses with a piston rod.

2 – Repairing the wheel rim

2 – Prepare surface for application of body filler

- Grind surface to a metallic bright-finish.

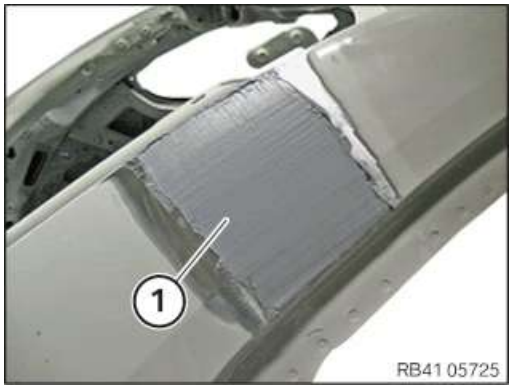
  For steel sheet, use grain 80.

  With aluminium sheet use grain 180.

  The surface must be clean, dry and free from grease.
- Clean surface with solvent cleaner R2 and leave to dry for 5 minutes.
- Clean surface with solvent cleaner R1 and leave to dry for 2-3 minutes.

2 – Apply body filler

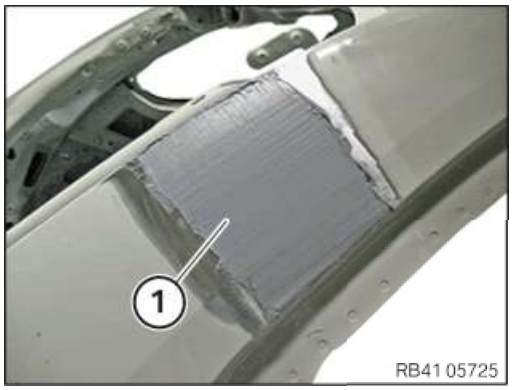
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- Fill area (1) with body filler S1.

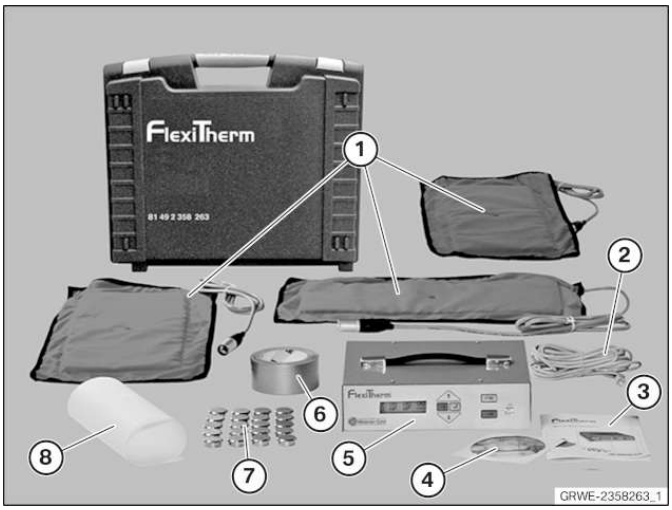
  Apply excess body filler S1.
- If possible, apply body filler S1 in one go to avoid air bubbles.

2 – Cure body filler



- Cure body filler S1.

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TECHNICAL INFORMATION

Optionally, various devices can be used.

- Cure body filler S1 with “FlexiTherm” heater pad system.
- Please comply with instructions in Owner's Handbook.

Select program in the control unit (5).

The control unit autonomously controls and regulates the temperature of each individual heating mat (1).

These are separately activated. The temperature sensor is located on the inside (red side).
The heating mats may only be used in connection with the anti-adhesive paper (8).

For trouble-free temperature measurements, the sensor must always be on the body filler (separated by anti-adhesive paper).

- Cure body filler S1 with infra-red heater.



RISK OF DAMAGE

Damage due to overheating

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler. The thermometers integrated in the infrared radiator only function reliably on large, even surfaces. On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured. This leads to actual surface temperatures of up to 130 °C, although only 70 °C is set on the infrared radiator. When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

- Check the surface temperatures on small component surfaces during the drying process with an external thermometer. The general rule is: The surface temperatures must not exceed 85°C.

- When the infrared heater is used for the first time, the correct distances for the desired temperatures must be determined.

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Switch the infra-red heater on and change the distance until the surface temperature of the body filler no longer changes for a period of 2 min.

Measure temperature using an optical thermometer.

If optical thermometers are used (Epsilon value 0.92-0.95), the heater must be switched off briefly during the measurement.

Record the measurement

- Standard optical thermometers can be used to measure surface temperatures.

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2 – Work body filler

CAUTION

Grinding dust when grinding components.

Hazardous to health!

- Directly draw off the grinding dust.
- Ensure adequate ventilation.
- Conduct all work in appropriate personal protective equipment only.

- Wear a fine dust mask with protection class P2-P3.
- Sand body filler S1 using a machine after cooling to 25 °C.

  Maximum permissible layer thickness after sanding is 5 mm.

  For steel sheet, use grain 80.

  With aluminium sheet use grain 180.
- Pores and faulty spots that become visible after grinding the surface must be closed with polyester filler (BMW Colour system).

  Use a drill bit with Ø40.2 mm. Turn the drill by hand to expand the pores in v shape. by tFill cavities with polyester filler.
- Clean surface with solvent cleaner R2 and leave to dry for 5 minutes.
- Clean surface with solvent cleaner R1 and leave to dry for 2-3 minutes.

3 – Painting the wheel rim

- Pre-grind to apply filler (grain P220 grinding wheel or superfine soft pad).
- Blow off the aluminium rim.
- Clean the aluminium rim with silicone remover.
- Mask the aluminium rim, rim base and contact surface of the hub.
- Mask the rear side of the rim flange.
- Apply the filler.
- Dry the filler.
- Grind the filler (grain P400 grinding wheel).
- Blow off the aluminium rim.
- Clean the aluminium rim with hydro cleaner.
- Mask the screw holes.
- Clean the aluminium rim before applying the base coat.
- Apply the base coat.
- Dry the base coat.
- Apply the clear coat.
- Dry the clear coat.

Cast aluminium wheel rim (machine-polished)

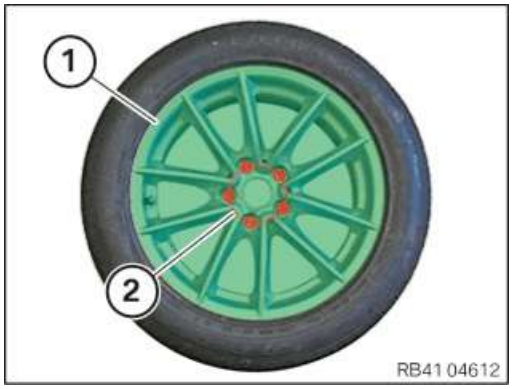
The rim must be replaced if damaged:

- All types of deformations
- All types of cracks
- All damage deeper than 1 mm of aluminium
- All damages on the inner surface of the wheel rim and in the rim base
- The radial runout and lateral runout prior to preparation exceed the production tolerance of 0.3 mm

No cosmetic repairs to aluminium are allowed.

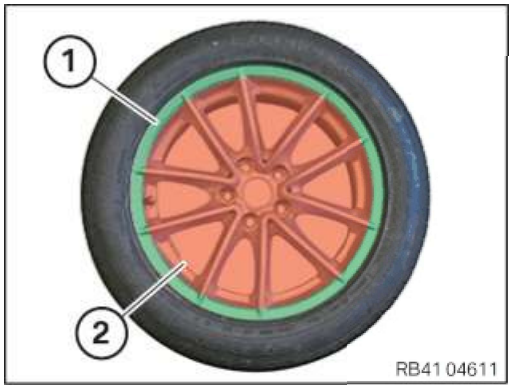
Only the clear coating may be repaired on the entire front side of the wheel rim of diamond polished cast aluminium wheels.

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Paintwork damage in area (1) can be repaired with paintwork.

Paintwork is not permitted in area (2).



In area (1) damage to aluminium up to a depth of 1 mm is permissible.

For technical reasons, the rim must not be replaced.

The wheel rim must be replaced if there is damage to the aluminium in area (2).

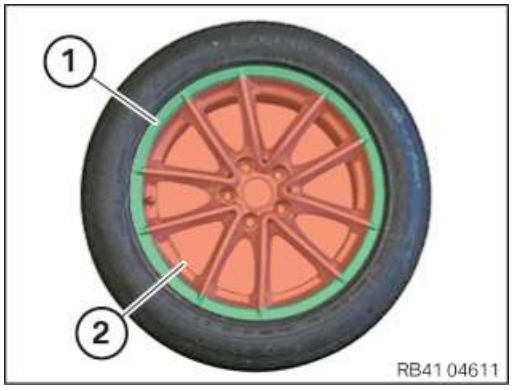
Carbon fibre wheel rims

No cosmetic repairs on carbon fibre wheel rims are permitted.

Assessment of damage to carbon fibre wheel rim

The wheel rim must be replaced in the event of the following damage:

- All types of deformations
- All types of cracks
- All damages greater than 1 mm depth
- The radial run-out and lateral run-out exceed the production tolerance of 0.3 mm

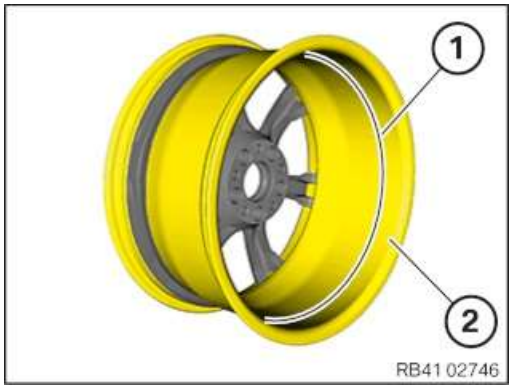


In area (1) damage up to a depth of 1 mm is permissible.

The wheel rim must not be replaced for technical reasons.

The rim will need to be replaced if there is damage in area (2).

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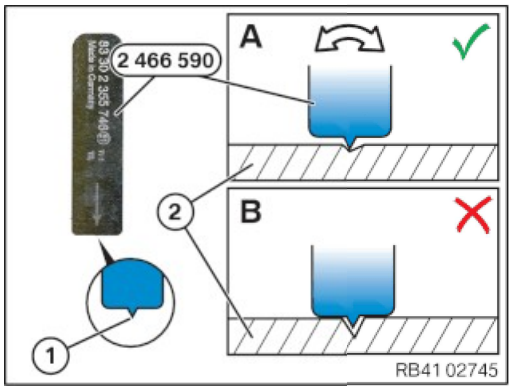
Radial scratches (1) on the interior (2) of the rim are permissible up to a depth of 0.4 mm.

The wheel rim must not be replaced for technical reasons.

The interior of the rim (2) can be coated with temperature-resistant matt paint.

The rim will need replacing if the depth of the scratches exceeds 0.4 mm.

4 – Determining depth of scratch



- Gauge has a test probe (1) with a height of 0.4 mm.
- If the test probe sits up at the deepest point of the scratch (figure A), it can be moved to the left and right. The scratch is less than 0.4 mm deep.
- If the test probe dips so deeply into the scratch that the gauge sits flat (figure B), the scratch is deeper than 0.4 mm and the part is damaged.

Additional Information

Overview of Special Tools

Overview Technical Data

Putty S1

Processing time 20 °C	90 min
Processing time 30 °C	60 min
Age-hardening duration 60 °C	60 min
Storage	15 °C ... 25 °C
Durability (note the expiration date on the cartridge)	12 Monate

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5.2.3 Tyres

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection of the entire tyre either while rotating the wheel when it has been lifted from the floor and the vehicle has been positioned over an inspection pit or on a vehicle lift, or when rolling the vehicle forwards and backwards over an inspection pit.

Fault determination according to EG PTI:

a)	Tyre size, load-carrying capacity, approval symbol or speed category not as per regulationsß1, so that road safety is impaired. Insufficient load-carrying capacity or speed category for the actual use, tyre touches other immovable vehicle components, which affects the driving safety.
b)	Differently sized tyres on the same axle or used as twin tyres.
c)	Tyres with different design (radial/diagonal tyres) installed on the same axle.
d)	Tyre severely damaged or cut, cord visible or damaged.
e)	Tread depth of the tyres: wear indicator becomes visible, tyre tread depth not as per regulationsß1.
f)	Tyre chafing on other components (flexible splash guards). Tyres rub on other components (driving safety not affected).
g)	Recut tyres not as per regulationsß1, cord protective layer impaired.
h)	Tyre pressure monitoring system faulty or obviously insufficient tyre pressure, evidently not suitable for operation.

Methods according to vehicle manufacturer

In principle, every BMW AG vehicle is equipped with tyre pressure control as standard.

The corresponding PDF files can be found on the **AOS portal** https://aos.bmwgroup.com/start.

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6.1.3 Fuel tank and fuel lines (including heater fuel tank and lines)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection while the vehicle is positioned over an inspection pit or on a vehicle lift, in case of CNG systems using a leak detector.

Fault determination according to EG PTI:

Visual inspection, while the vehicle stands over a test pit or on a vehicle lift, in case of compressed natural gas systems using leakage detector.

a)	Fuel tank or lines unsafe, consequently there is a particularly high risk of fire.
b)	Escaping fuel or missing or leaking fuel filler cap: risk of fire; excessive amount of escaping hazardous fluids.
c)	Lines chafing: Lines damaged.
d)	Fuel shut-off valve (if mandatory) not operating correctly.
e)	Risk of fire from:— escaping fuel/— poorly shielded fuel tank or exhaust system/— condition of the engine compartment.
f)	CNG or hydrogen system not according to regulations. Part of the system faulty.

Methods according to vehicle manufacturer:

Exemplary overview of fuel tank sizes of BMW passenger cars, BMWi, MINI and Rolls-Royce

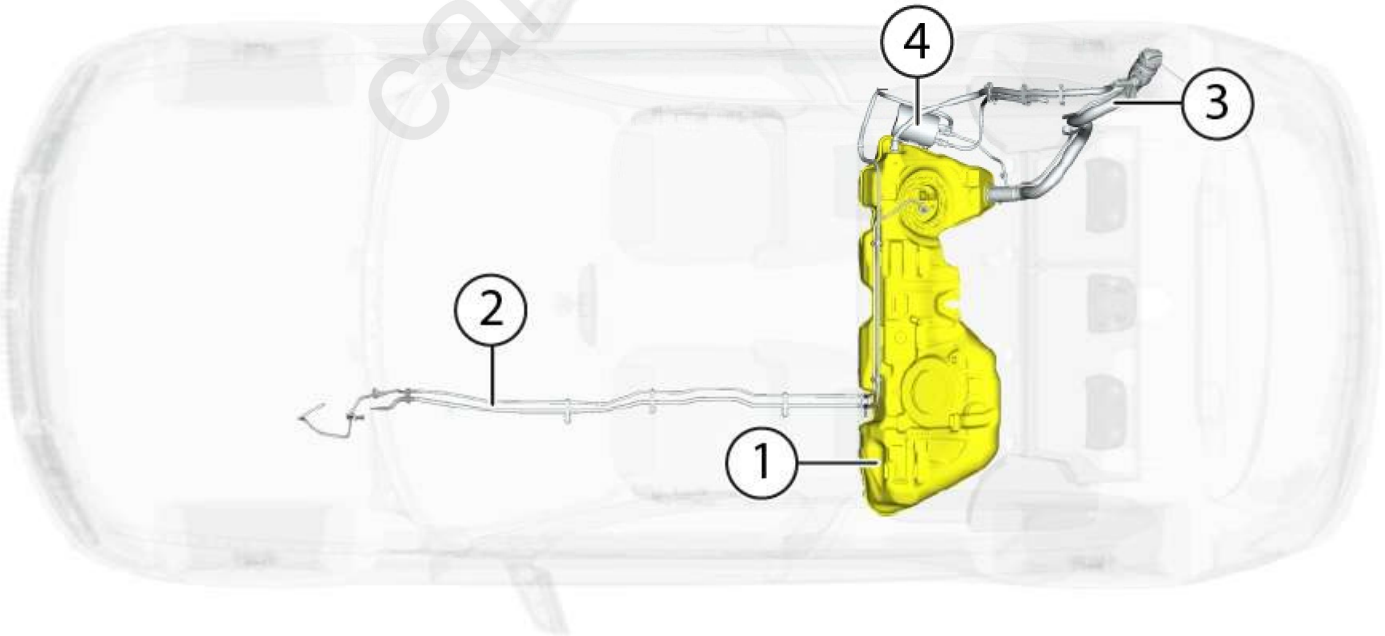
1-Series, 2-Series

1) Fuel tank

2) Fuel line

3) Fuel filler pipe

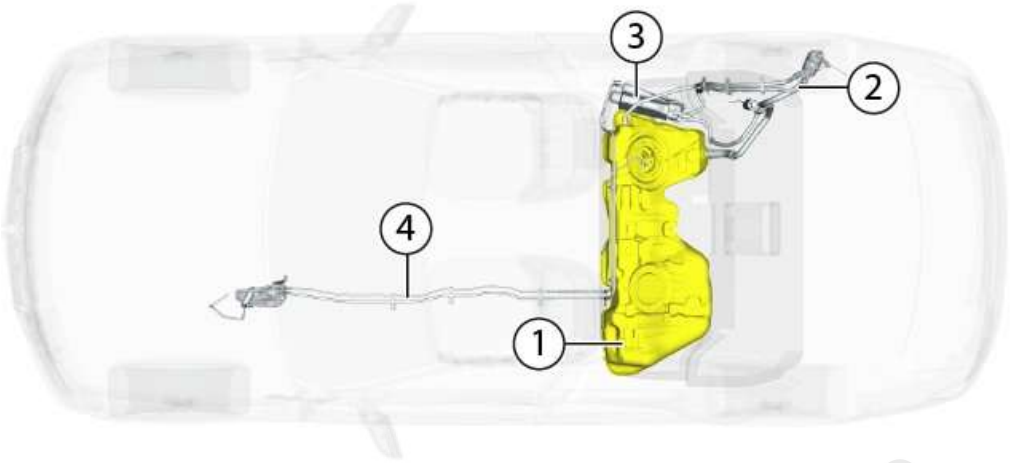
4) Carbon canister



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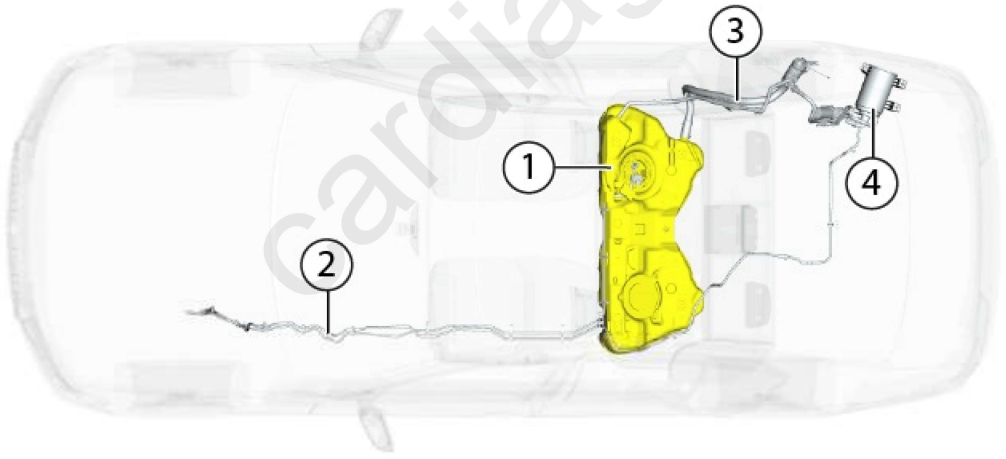
3-Series, 4-Series

1) Fuel tank
2) Fuel filler pipe
3) Carbon canister
4) Fuel line



5-Series, 6-Series

1) Fuel tank
2) Fuel line
3) Fuel filler pipe
4) Carbon canister



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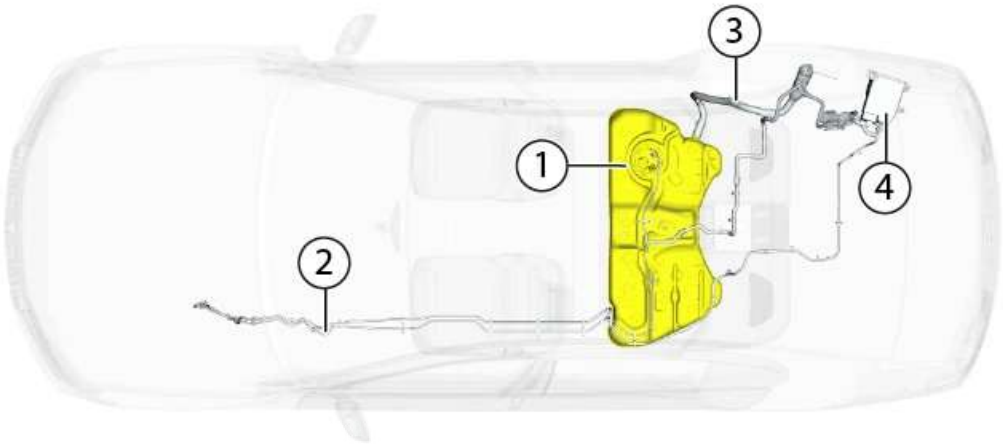
7-Series, 8-Series

1) Fuel tank

2) Fuel line

3) Fuel filler pipe

4) Carbon canister



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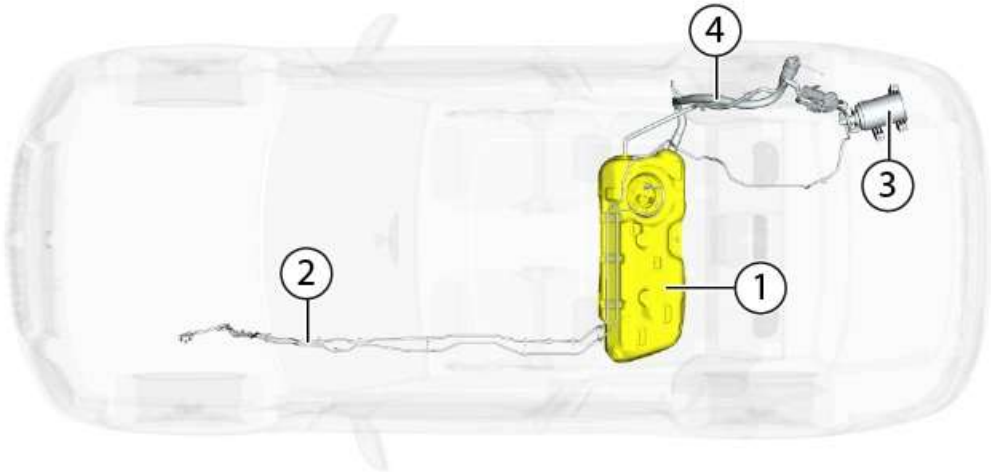
X3/X4

1) Fuel tank

2) Fuel line

3) Carbon canister

4) Fuel filler pipe



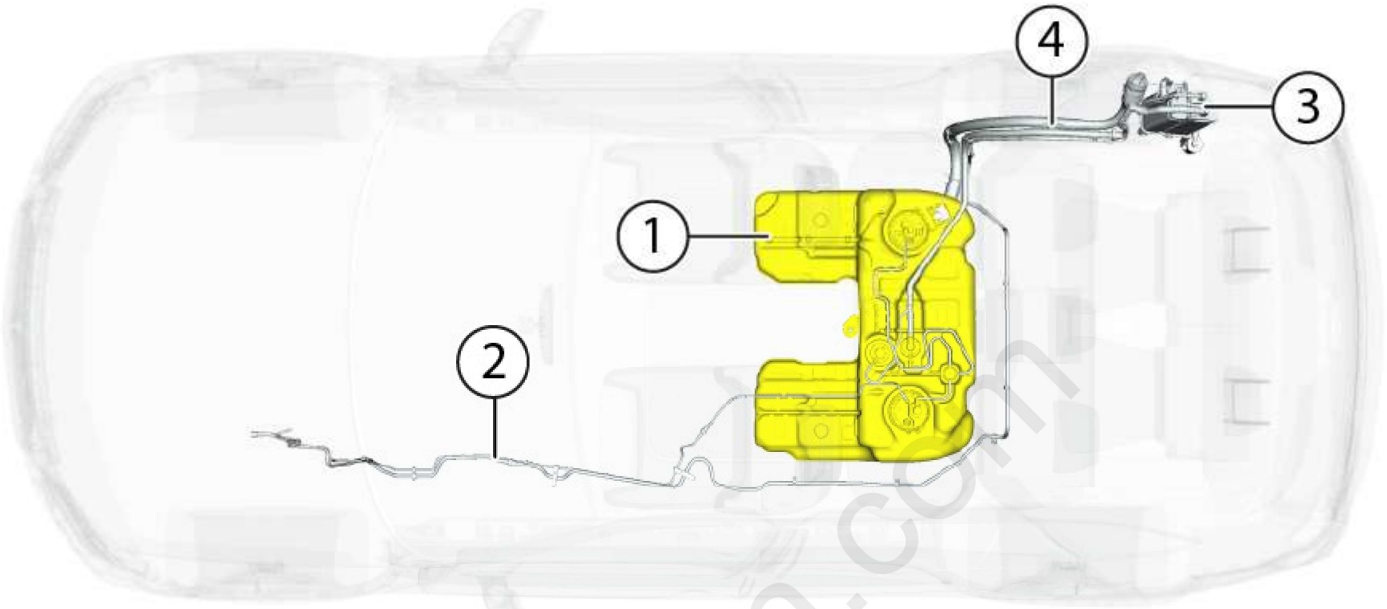
X5 / X6 /X7

1) Fuel tank

2) Fuel line

3) Carbon canister

4) Fuel filler pipe



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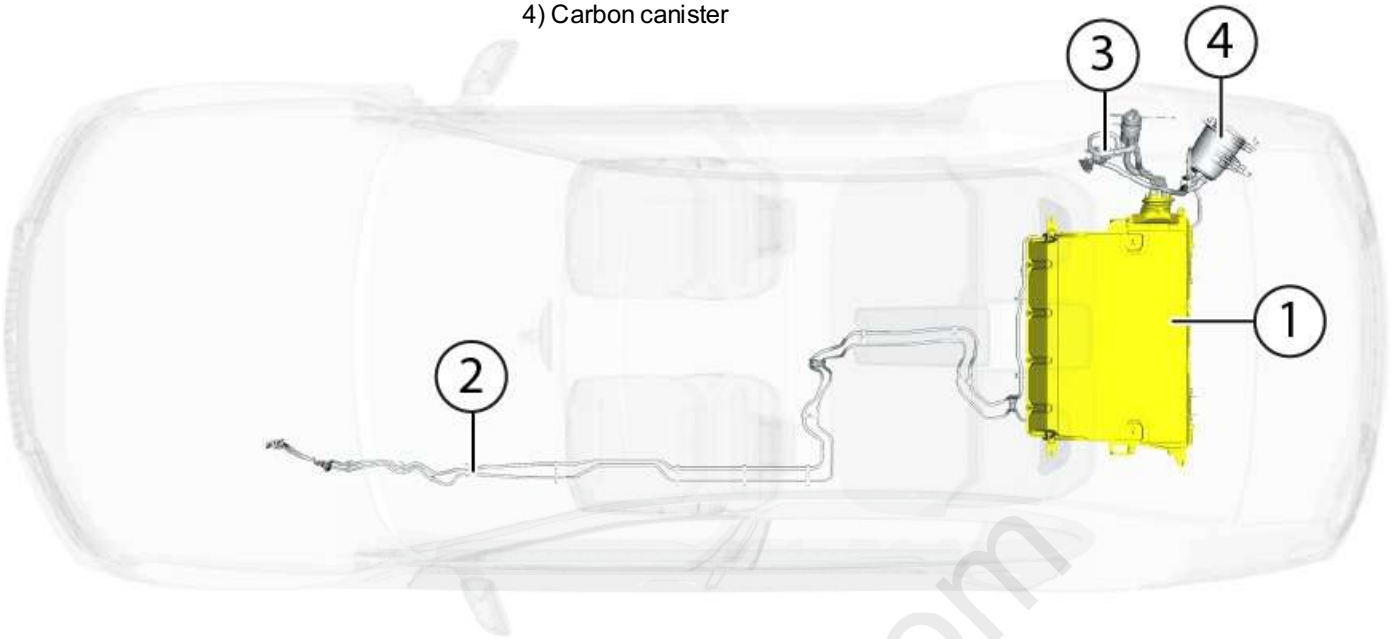
7 Series PHEV

1) Fuel tank

2) Fuel line

3) Fuel filler pipe

4) Carbon canister



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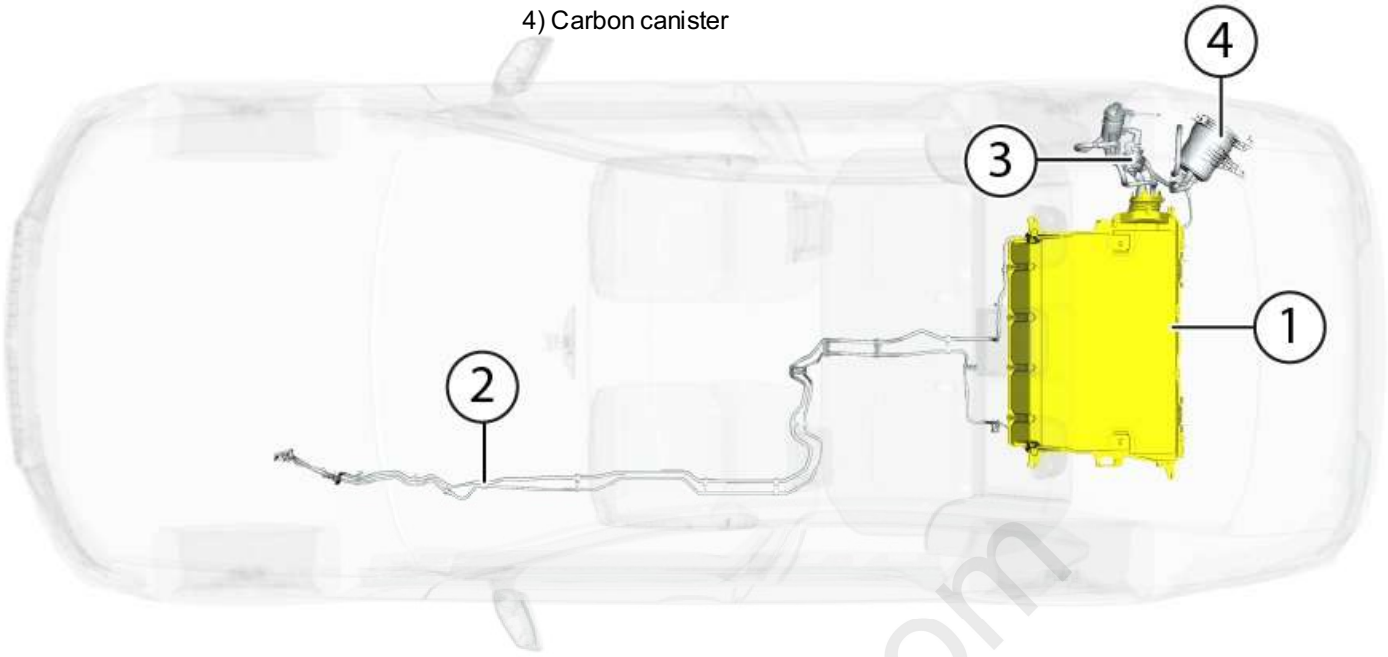
5 Series PHEV

1) Fuel tank

2) Fuel line

3) Fuel filler pipe

4) Carbon canister



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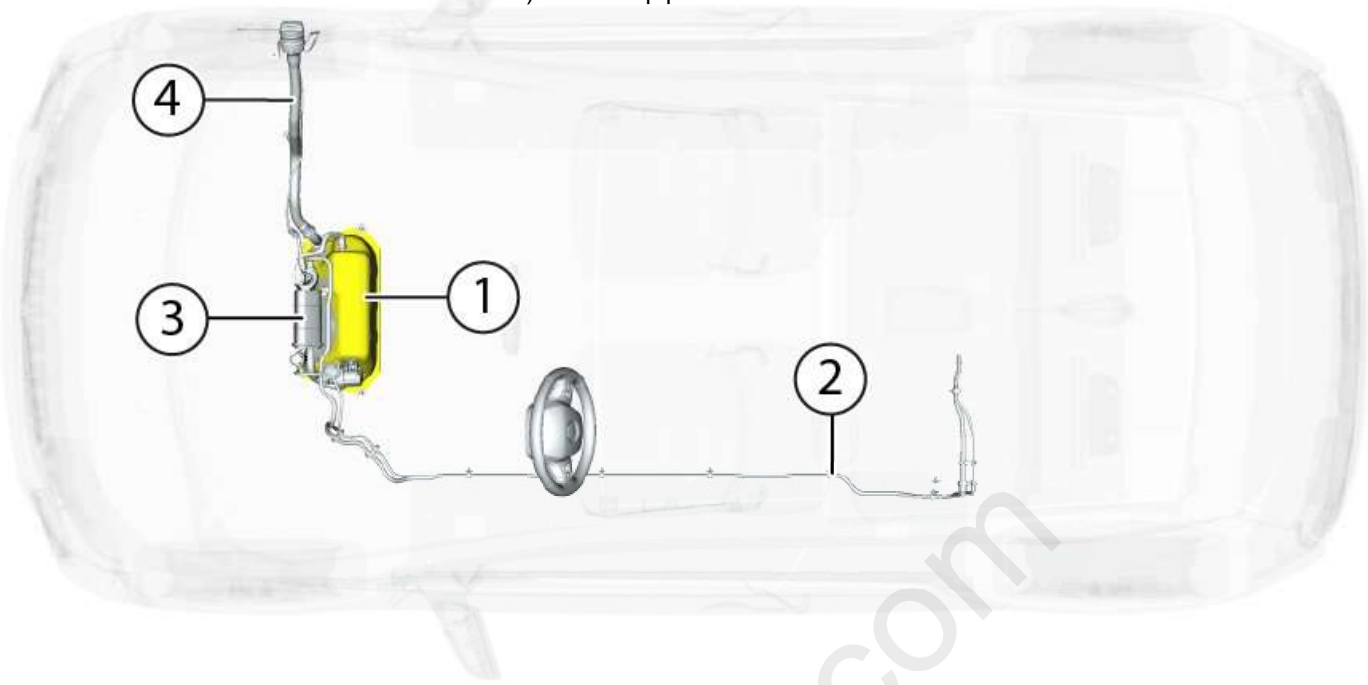
I01

1) Fuel tank

2) Fuel line

3) Carbon canister

4) Fuel filler pipe



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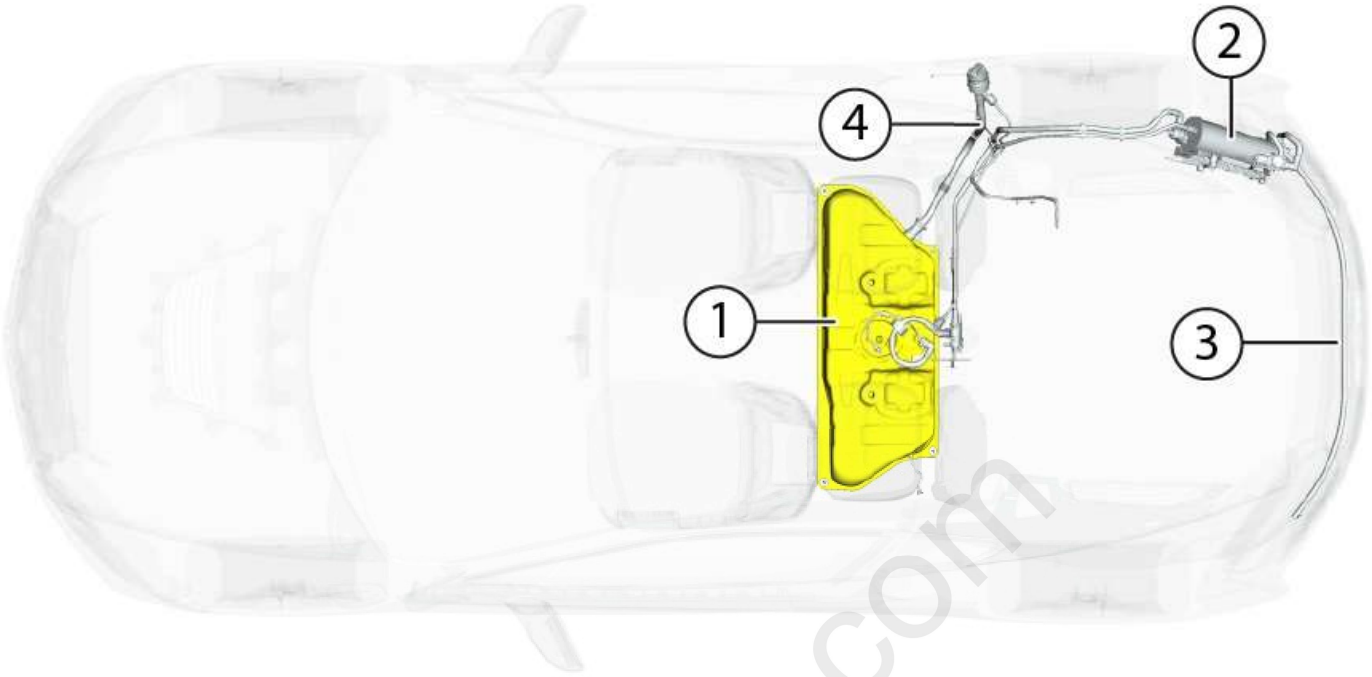
i8

1) Fuel tank

2) Carbon canister

3) Tank ventilation line

4) Fuel filler pipe



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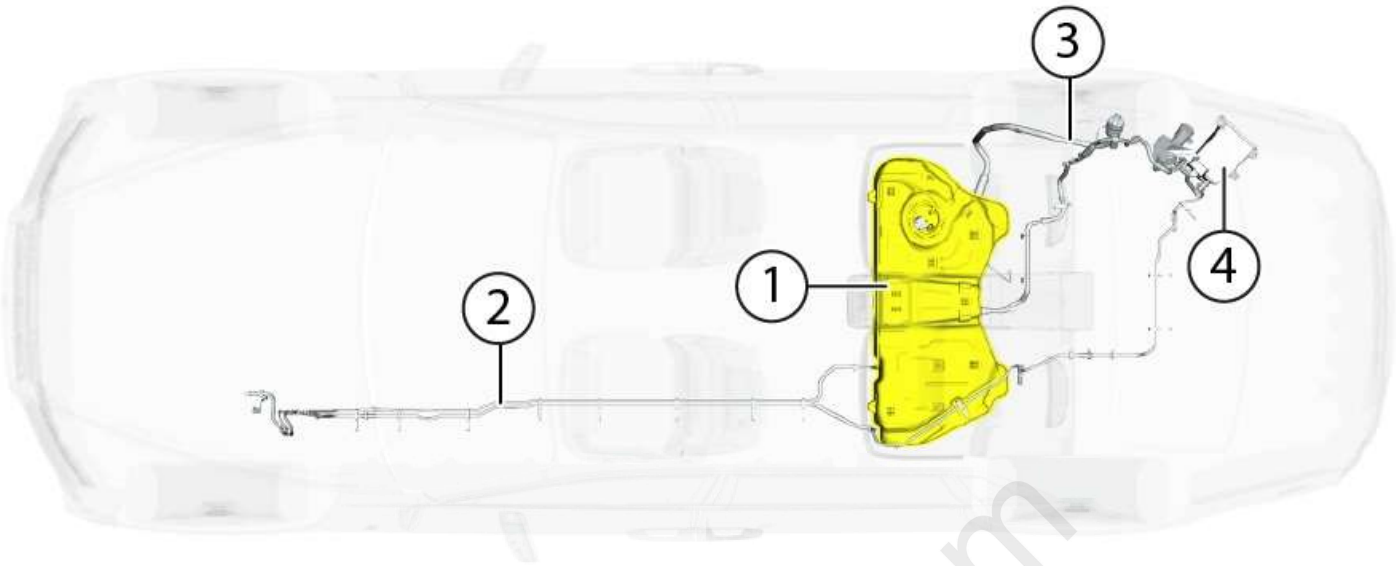
Rolls-Royce

1) Fuel tank

2) Fuel line

3) Fuel filler pipe

4) Carbon canister



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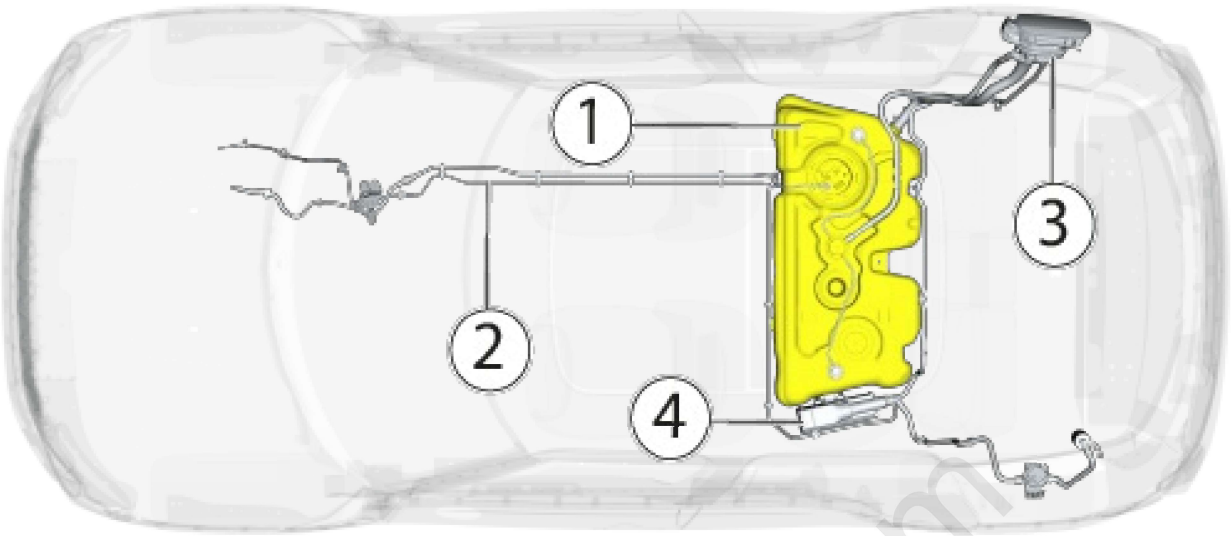
MINI , X1, X2

1) Fuel tank

2) Fuel line

3) Fuel filler pipe

4) Carbon canister



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Cosmetic repairs on wheel rims

Cost-effectiveness of the repairs has been checked.

Arrangement of wheel rims

Type	Repair options
Cast aluminium wheel	see Point 2
Cast aluminium wheel (machine-polished)	see Point 3
Carbon-fibre wheel rim	see Point 4

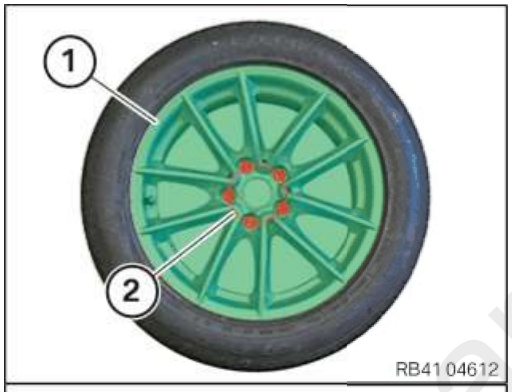
Cast aluminium rim

The rim must be replaced if damaged:

- All types of deformations
- All types of cracks
- All damage deeper than 1 mm of aluminium
- All damages on the inner surface of the wheel rim and in the rim base
- The radial runout and lateral runout prior to preparation exceed the production tolerance of 0.3 mm

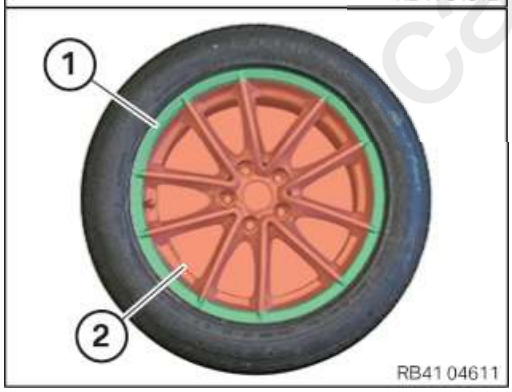
It is possible to repair the following damage:

- Maximum depth of damage to aluminium 1 mm
- The distance of the damage from the outer rim edge must not exceed 30 mm



Paintwork damage in area (1) can be repaired with paintwork.

Paintwork is not permitted in area (2).



In area (1) a repair to the aluminium up to a depth of 1 mm is allowed.

The wheel rim must be replaced if there is damage to the aluminium in area (2).

Repair procedure for cast aluminium wheel rim

1 – Preparing the wheel rim

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- Dismount tyres.
- Clean the aluminium rim with a steam-jet cleaner.
- Dry the aluminium rim.
- Pre-grind the aluminium rim (break sharp edges with a grain P180 grinding wheel).
- Blow off the aluminium rim.
- Clean damaged areas extensively with silicone remover.

General information:



CAUTION

Materials harmful to health.

Health risks in the event of contact with substances that are harmful to health!

- Observe and comply with the Safety Information on the containers and the notes on the manufacturer's safety data sheet.
- Conduct all work in appropriate personal protective equipment only.

Putty S1

Processing time 20 °C	90 min
Processing time 30 °C	60 min
Age-hardening duration 60 °C	60 min
Storage	15 °C ... 25 °C
Durability (note the expiration date on the cartridge)	12 Monate

The barrel can be squeezed out with a commercially available cartridge press. Only use cartridge presses with a piston rod.

2 – Repairing the wheel rim

2 – Prepare surface for application of body filler

- Grind surface to a metallic bright-finish.

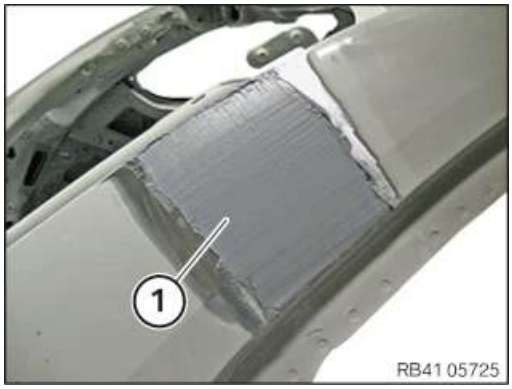
  For steel sheet, use grain 80.

  With aluminium sheet use grain 180.

  The surface must be clean, dry and free from grease.
- Clean surface with solvent cleaner R2 and leave to dry for 5 minutes.
- Clean surface with solvent cleaner R1 and leave to dry for 2-3 minutes.

2 – Apply body filler

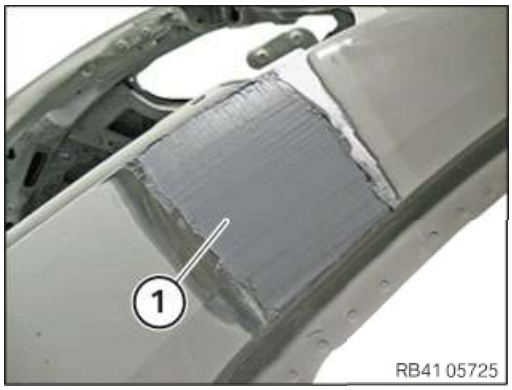
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- Fill area (1) with body filler S1.

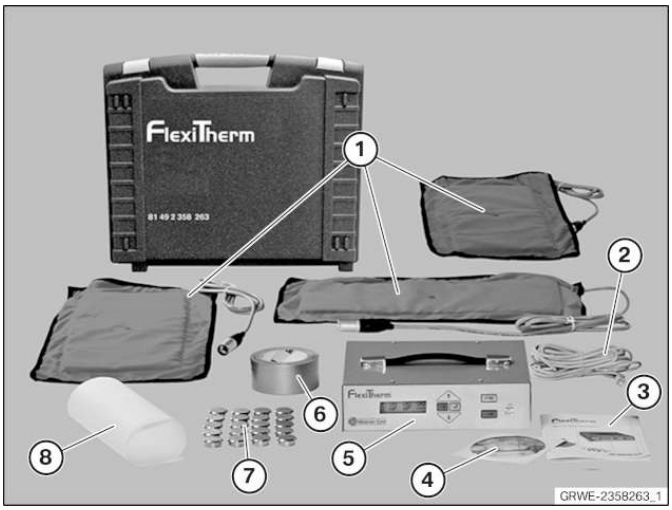
  Apply excess body filler S1.
- If possible, apply body filler S1 in one go to avoid air bubbles.

2 – Cure body filler



- Cure body filler S1.

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TECHNICAL INFORMATION

Optionally, various devices can be used.

- Cure body filler S1 with “FlexiTherm” heater pad system.
- Please comply with instructions in Owner's Handbook.

Select program in the control unit (5).

The control unit autonomously controls and regulates the temperature of each individual heating mat (1).

These are separately activated. The temperature sensor is located on the inside (red side).
The heating mats may only be used in connection with the anti-adhesive paper (8).

For trouble-free temperature measurements, the sensor must always be on the body filler (separated by anti-adhesive paper).

- Cure body filler S1 with infra-red heater.



RISK OF DAMAGE

Damage due to overheating

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler. The thermometers integrated in the infrared radiator only function reliably on large, even surfaces. On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured. This leads to actual surface temperatures of up to 130 °C, although only 70 °C is set on the infrared radiator. When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

- Check the surface temperatures on small component surfaces during the drying process with an external thermometer. The general rule is: The surface temperatures must not exceed 85°C.

- When the infrared heater is used for the first time, the correct distances for the desired temperatures must be determined.

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Switch the infra-red heater on and change the distance until the surface temperature of the body filler no longer changes for a period of 2 min.

Measure temperature using an optical thermometer.

If optical thermometers are used (Epsilon value 0.92-0.95), the heater must be switched off briefly during the measurement.

Record the measurement

- Standard optical thermometers can be used to measure surface temperatures.

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2 – Work body filler

CAUTION

Grinding dust when grinding components.

Hazardous to health!

- Directly draw off the grinding dust.
- Ensure adequate ventilation.
- Conduct all work in appropriate personal protective equipment only.

- Wear a fine dust mask with protection class P2-P3.
- Sand body filler S1 using a machine after cooling to 25 °C.

  Maximum permissible layer thickness after sanding is 5 mm.

  For steel sheet, use grain 80.

  With aluminium sheet use grain 180.
- Pores and faulty spots that become visible after grinding the surface must be closed with polyester filler (BMW Colour system).

  Use a drill bit with Ø40.2 mm. Turn the drill by hand to expand the pores in v shape. by tFill cavities with polyester filler.
- Clean surface with solvent cleaner R2 and leave to dry for 5 minutes.
- Clean surface with solvent cleaner R1 and leave to dry for 2-3 minutes.

3 – Painting the wheel rim

- Pre-grind to apply filler (grain P220 grinding wheel or superfine soft pad).
- Blow off the aluminium rim.
- Clean the aluminium rim with silicone remover.
- Mask the aluminium rim, rim base and contact surface of the hub.
- Mask the rear side of the rim flange.
- Apply the filler.
- Dry the filler.
- Grind the filler (grain P400 grinding wheel).
- Blow off the aluminium rim.
- Clean the aluminium rim with hydro cleaner.
- Mask the screw holes.
- Clean the aluminium rim before applying the base coat.
- Apply the base coat.
- Dry the base coat.
- Apply the clear coat.
- Dry the clear coat.

Cast aluminium wheel rim (machine-polished)

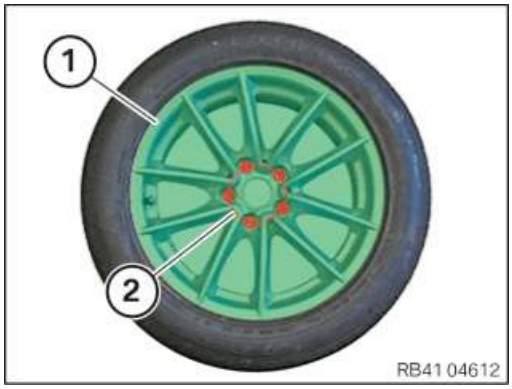
The rim must be replaced if damaged:

- All types of deformations
- All types of cracks
- All damage deeper than 1 mm of aluminium
- All damages on the inner surface of the wheel rim and in the rim base
- The radial runout and lateral runout prior to preparation exceed the production tolerance of 0.3 mm

No cosmetic repairs to aluminium are allowed.

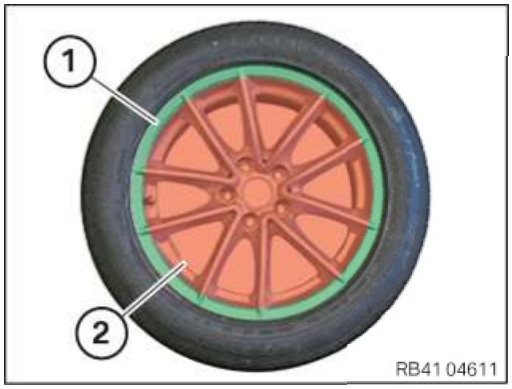
Only the clear coating may be repaired on the entire front side of the wheel rim of diamond polished cast aluminium wheels.

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Paintwork damage in area (1) can be repaired with paintwork.

Paintwork is not permitted in area (2).



In area (1) damage to aluminium up to a depth of 1 mm is permissible.

For technical reasons, the rim must not be replaced.

The wheel rim must be replaced if there is damage to the aluminium in area (2).

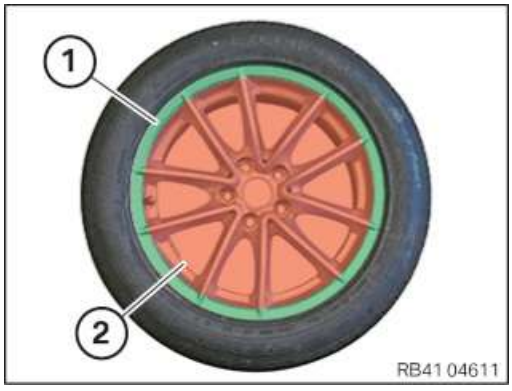
Carbon fibre wheel rims

No cosmetic repairs on carbon fibre wheel rims are permitted.

Assessment of damage to carbon fibre wheel rim

The wheel rim must be replaced in the event of the following damage:

- All types of deformations
- All types of cracks
- All damages greater than 1 mm depth
- The radial run-out and lateral run-out exceed the production tolerance of 0.3 mm

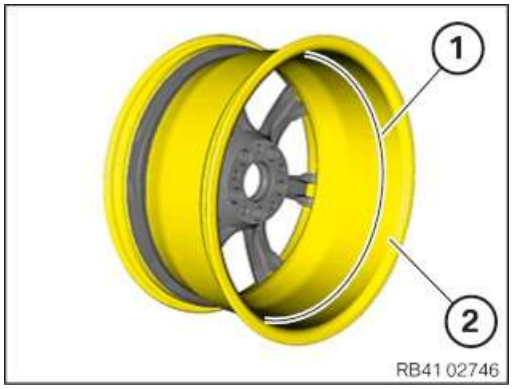


In area (1) damage up to a depth of 1 mm is permissible.

The wheel rim must not be replaced for technical reasons.

The rim will need to be replaced if there is damage in area (2).

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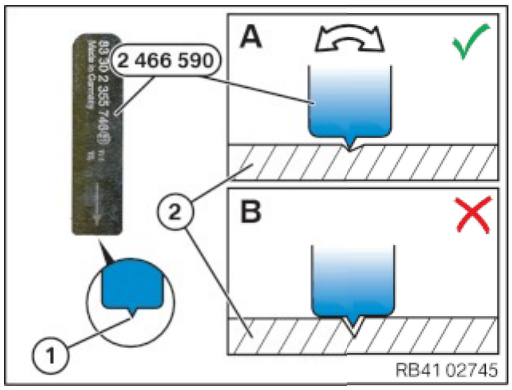
Radial scratches (1) on the interior (2) of the rim are permissible up to a depth of 0.4 mm.

The wheel rim must not be replaced for technical reasons.

The interior of the rim (2) can be coated with temperature-resistant matt paint.

The rim will need replacing if the depth of the scratches exceeds 0.4 mm.

4 – Determining depth of scratch



- Gauge has a test probe (1) with a height of 0.4 mm.
- If the test probe sits up at the deepest point of the scratch (figure A), it can be moved to the left and right. The scratch is less than 0.4 mm deep.
- If the test probe dips so deeply into the scratch that the gauge sits flat (figure B), the scratch is deeper than 0.4 mm and the part is damaged.

Additional Information

Overview of Special Tools

Overview Technical Data

Putty S1

Processing time 20 °C	90 min
Processing time 30 °C	60 min
Age-hardening duration 60 °C	60 min
Storage	15 °C ... 25 °C
Durability (note the expiration date on the cartridge)	12 Monate

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Gap dimensions, body

General notes

The dimensions stated in this document apply at an object temperature of 20 Â°C.

The aim of adjustment is to achieve a uniform gap.

Symmetry of the gaps between left and right sides of the vehicle has top priority.

In terms of door gaps the maximum deviation between the front and rear door gap must be 1.0 mm.

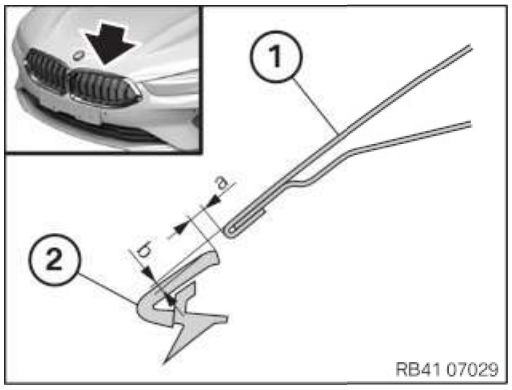
No gap dimension are specified for components which cannot be adjusted.

Gap dimensions

Gap dimensions

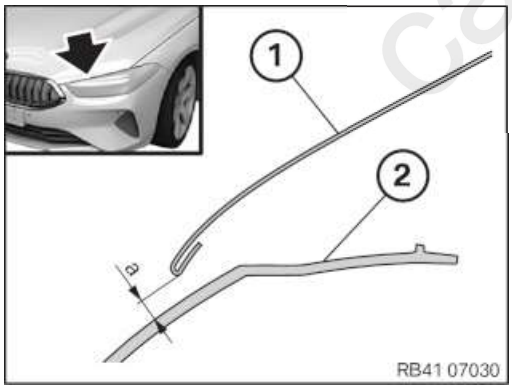
Gap dimension bonnet to ornamental grille surround

1 bonnet; 2 ornamental grille surround	
a	4,2 (3,2 - 5,2) mm
b	1,3 (-0,2 - 2,8) mm



Gap dimension bonnet to headlight

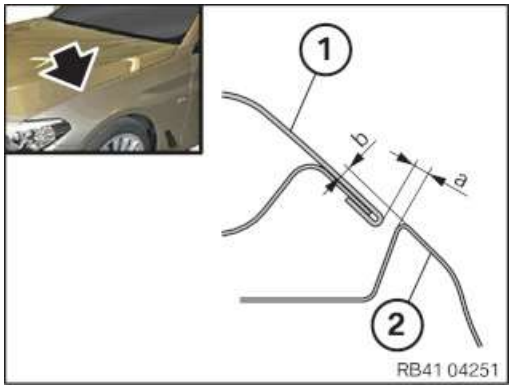
1 bonnet; 2 headlight	
a	6,4 (4,6 - 8,2) mm



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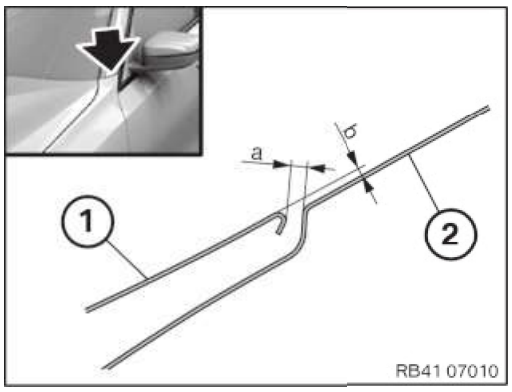
Gap dimension bonnet to front side panel

1 bonnet; 2 front side panel	
a	3,3 (2,3 - 4,3) mm
b	0,1 (-1,5 - 1,7) mm



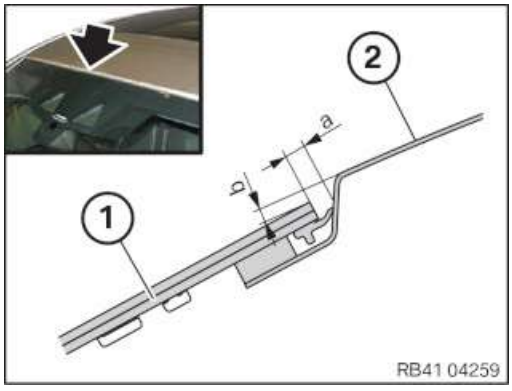
Gap dimension front side panel to A-pillar

1 front side panel; 2 A-pillar	
a	2,7 (1,6 - 3,8) mm
b	0 (-1,1 - 1,1) mm



Gap dimension windscreen to roof outer skin

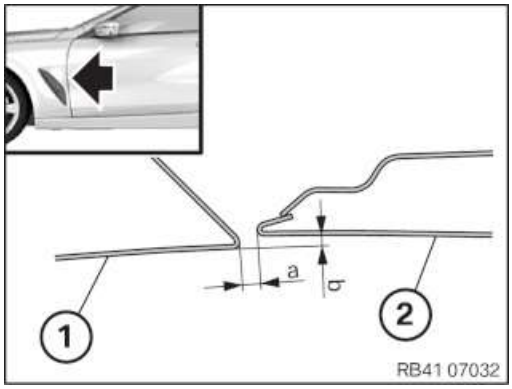
1 windscreen; 2 roof outer skin	
a	4,3 (3,1 - 5,5) mm
b	0,9 (-0,6 - 1,9) mm



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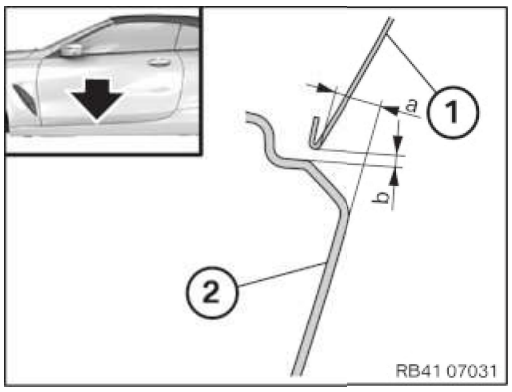
Gap dimension front side panel to front door

1 Front side panel; 2 front door	
a	3,8 (2,8 - 4,8) mm
b	0,8 (0 - 1,6) mm



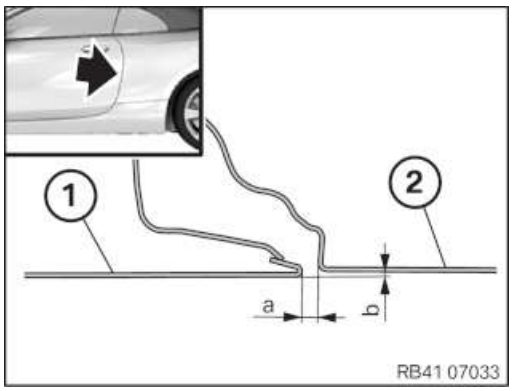
Gap dimension front door to side sill trim panel

1 front door; 2 side sill trim panel	
a	3,5 (2,3 - 4,7) mm
b	13.3 (12,0 - 13.6) mm



Gap dimension from front door to rear side panel

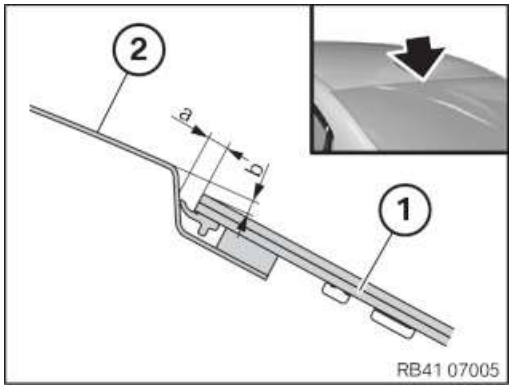
1 Front door; 2 Rear side panel	
a	3,8 (2,8 - 4,8) mm
b	0 (-0,3 - 1,3) mm



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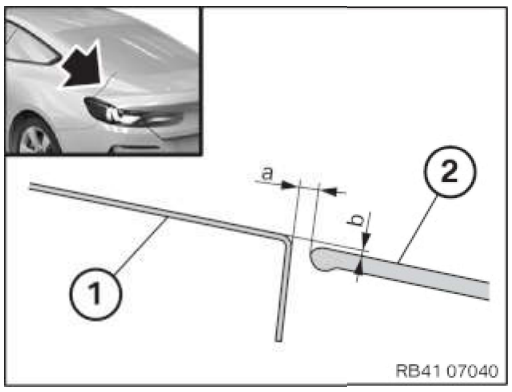
Gap dimension rear window to roof outer skin

1 rear window, 2 roof outer skin	
a	3,3 (2,0 - 4,6) mm
b	0,9 (-0,6 - 1,9) mm



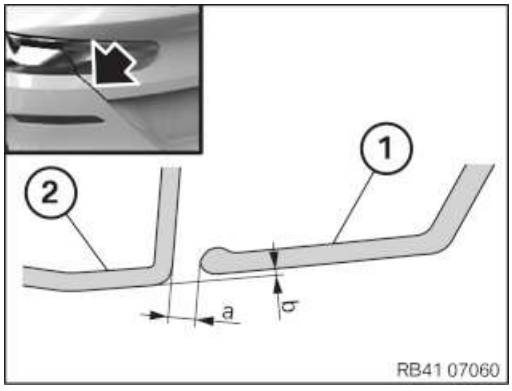
Gap dimension rear side panel to tailgate

1 rear side panel; 2 tailgate	
a	3,8 (2,6 - 5.0) mm
b	0,8 (-0,6 - 2,2) mm



Gap dimension tailgate to rear bumper panel

1 tailgate; 2 rear bumper panel	
a	4,3 (2,8 - 5,8) mm
b	0,4 (-1,3 - 2,1) mm



Gap dimensions

Additional Information

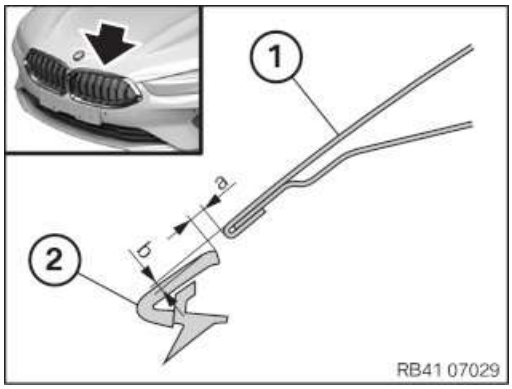
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Overview Technical Data

Gap dimension bonnet to ornamental grille surround

1 bonnet; 2 ornamental grille surround

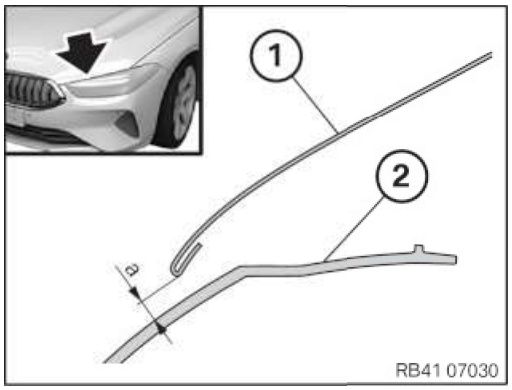
a	4,2 (3,2 - 5,2) mm
b	1,3 (-0,2 - 2,8) mm



Gap dimension bonnet to headlight

1 bonnet; 2 headlight

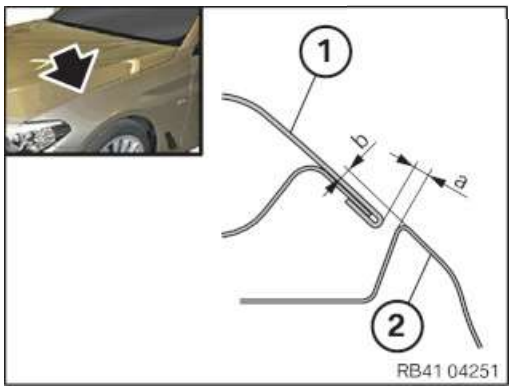
a	6,4 (4,6 - 8,2) mm



Gap dimension bonnet to front side panel

1 bonnet; 2 front side panel

a	3,3 (2,3 - 4,3) mm
b	0,1 (-1,5 - 1,7) mm

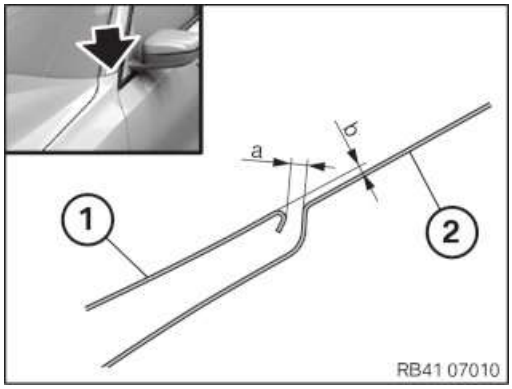


Gap dimension front side panel to A-pillar

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1 front side panel; 2 A-pillar

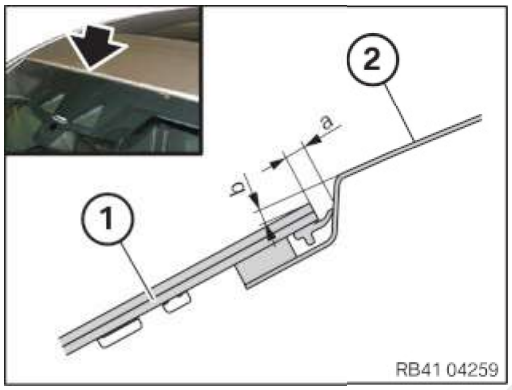
a	2,7 (1,6 - 3,8) mm
b	0 (-1,1 - 1,1) mm



Gap dimension windscreen to roof outer skin

1 windscreen; 2 roof outer skin

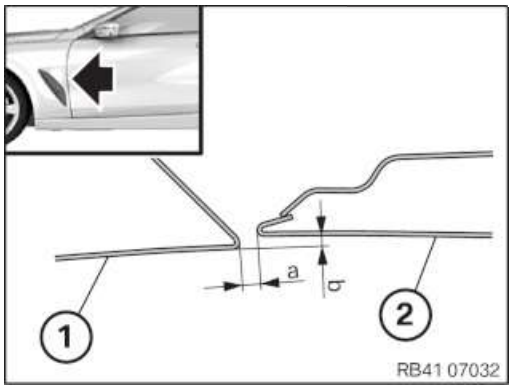
a	4,3 (3,1 - 5,5) mm
b	0,9 (-0,6 - 1,9) mm



Gap dimension front side panel to front door

1 Front side panel; 2 front door

a	3,8 (2,8 - 4,8) mm
b	0,8 (0 - 1,6) mm

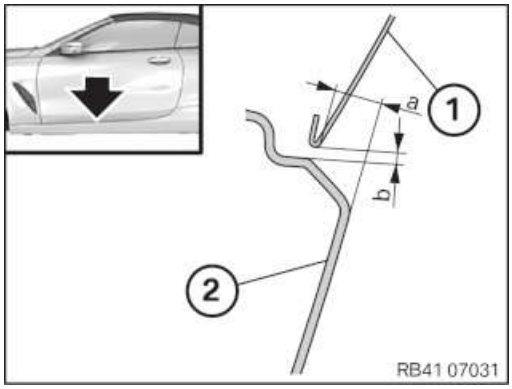


Gap dimension front door to side sill trim panel

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1 front door; 2 side sill trim panel

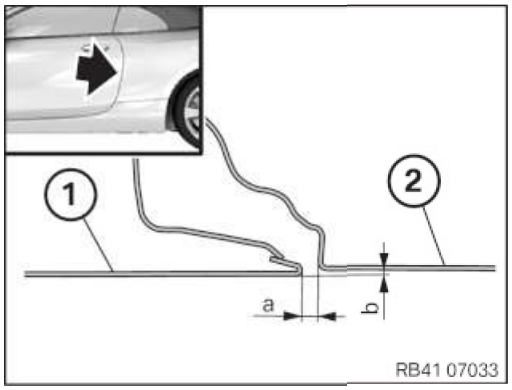
a	3,5 (2,3 - 4,7) mm
b	13.3 (12,0 - 13.6) mm



Gap dimension from front door to rear side panel

1 Front door; 2 Rear side panel

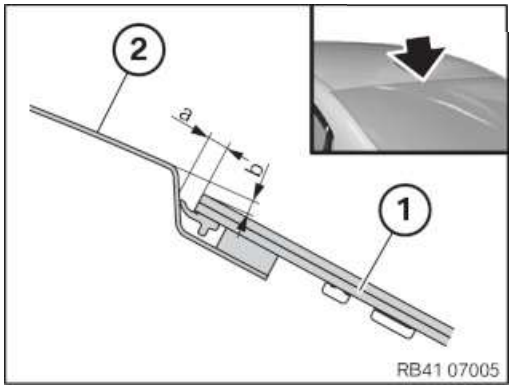
a	3,8 (2,8 - 4,8) mm
b	0 (-0,3 - 1,3) mm



Gap dimension rear window to roof outer skin

1 rear window; 2 roof outer skin

a	3,3 (2,0 - 4,6) mm
b	0,9 (-0,6 - 1,9) mm

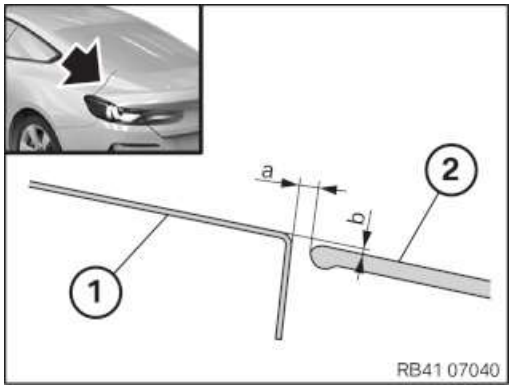


Gap dimension rear side panel to tailgate

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1 rear side panel; 2 tailgate

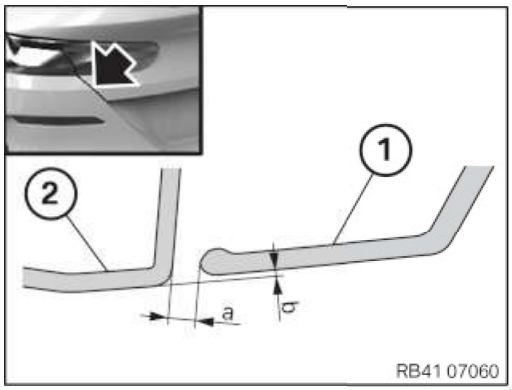
a	3,8 (2,6 - 5.0) mm
b	0,8 (-0,6 - 2,2) mm



Gap dimension tailgate to rear bumper panel

1 tailgate; 2 rear bumper panel

a	4,3 (2,8 - 5,8) mm
b	0,4 (-1,3 - 2,1) mm



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Transferring hole pattern

Transferring hole pattern

When renewing a body component, the existing hole pattern must be transferred from the body to the new part.

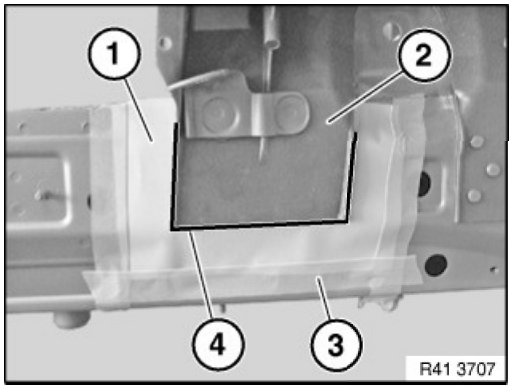
1 â€“ Transferring hole pattern

Prerequisite

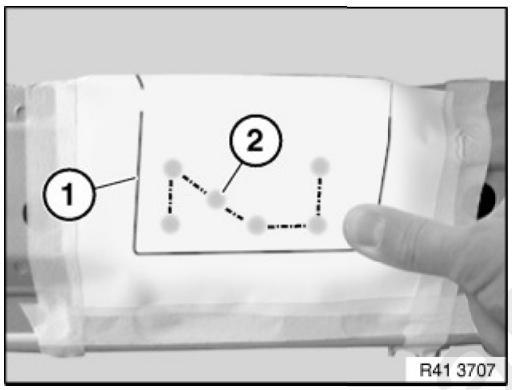
New part is adjusted.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

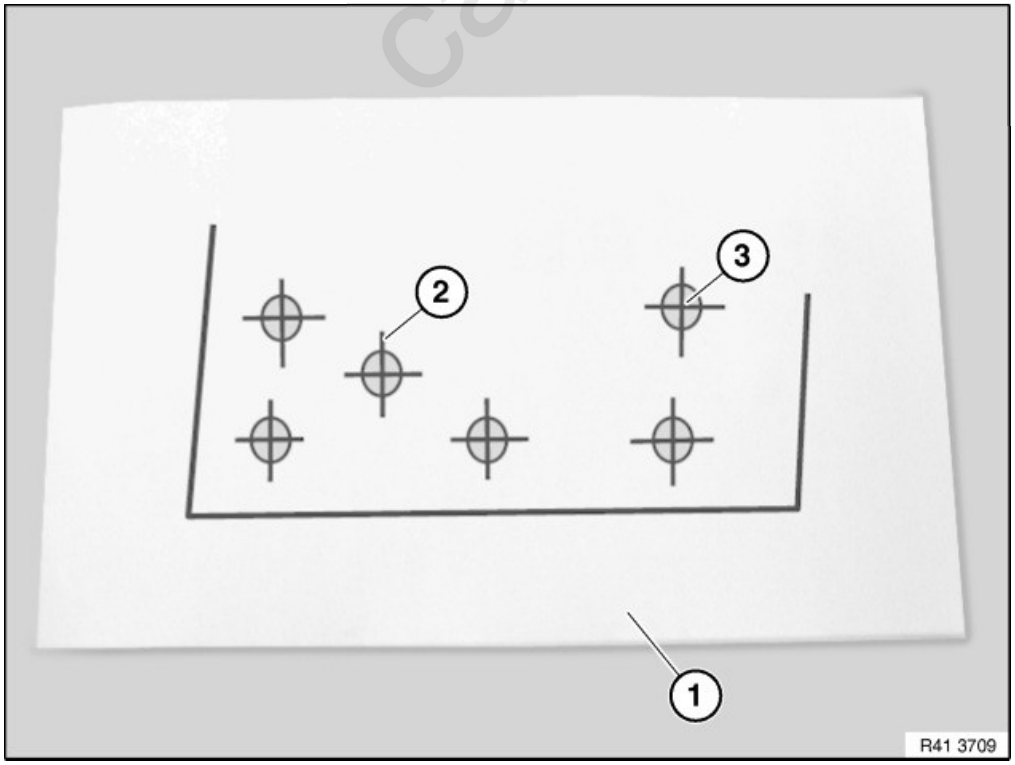


- Insert a template (paper template) (1) between the new part (2) and the body and secure it with adhesive tape (3).
- Transfer the outline (4) of the new part to the template.
- Remove the new part (2).



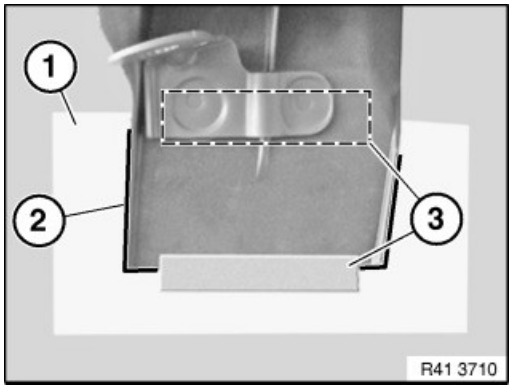
- Use your thumbs to press down on the positions of the bore holes (2) to transfer them to the template.

  The outline of the new part (1) provides better orientation.
- Remove the template.

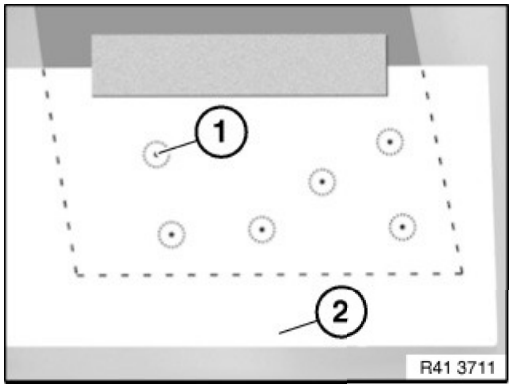


- Place the template (1) onto a flat surface.
- Mark the centre points of the bore holes with X (2).
- Use a sharp object to punch through the paper to transfer the centre points (3) of the bore holes.

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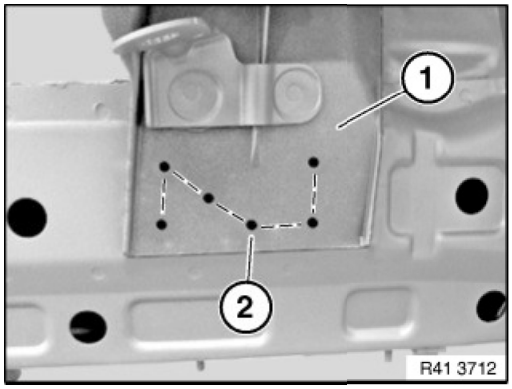
- Align the template (1) according to the outlines (2) on the inside of the new part.
- Secure the template (1) with adhesive tapes (3).



- Turn the new part around.

Note: The X marks must not be visible from this view.

- Set punch marks at the pressed through centre points (1). Provide counter support directly below the punch marks for punching.
- Remove the template (2).
- At the punch marks (1), drill out holes with an approximate diameter of 3 mm.



- Position the new part (1) on the vehicle.
- Drill out holes (2) to 6.8 mm diameter.

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Vehicle identification number, general

General information for vehicle identification numbers

Observe national/country-specific regulations.

In the factory, the vehicle identification number is engraved in the designated area and in accordance with the series is equipped with a foil to protect it from corrosion.

In the case of a repair, the vehicle identification number is generally incorporated in the substitute area. The substitute area is usually situated below the Vehicle identification number. The factory used BMW emblem is replaced with a + at the beginning and end to clearly differentiate the vehicle identification number.

The IGEF number is dropped when replacing the component.

General information for embossed vehicle identification numbers

This procedure is used for all vehicles on which the vehicle identification number can not be punched.

If replacing the carrier support or the body, new parts can normally be ordered via BMW Group Parts with an embossed vehicle identification number. If this is not possible, observe country-specific regulations.

If an additional second vehicle identification number is embossed into the substitute area, the existing vehicle identification number must be crossed out. Only use the designated product range from the needle embossing machine. Tape off the invalid vehicle identification number with a foil.

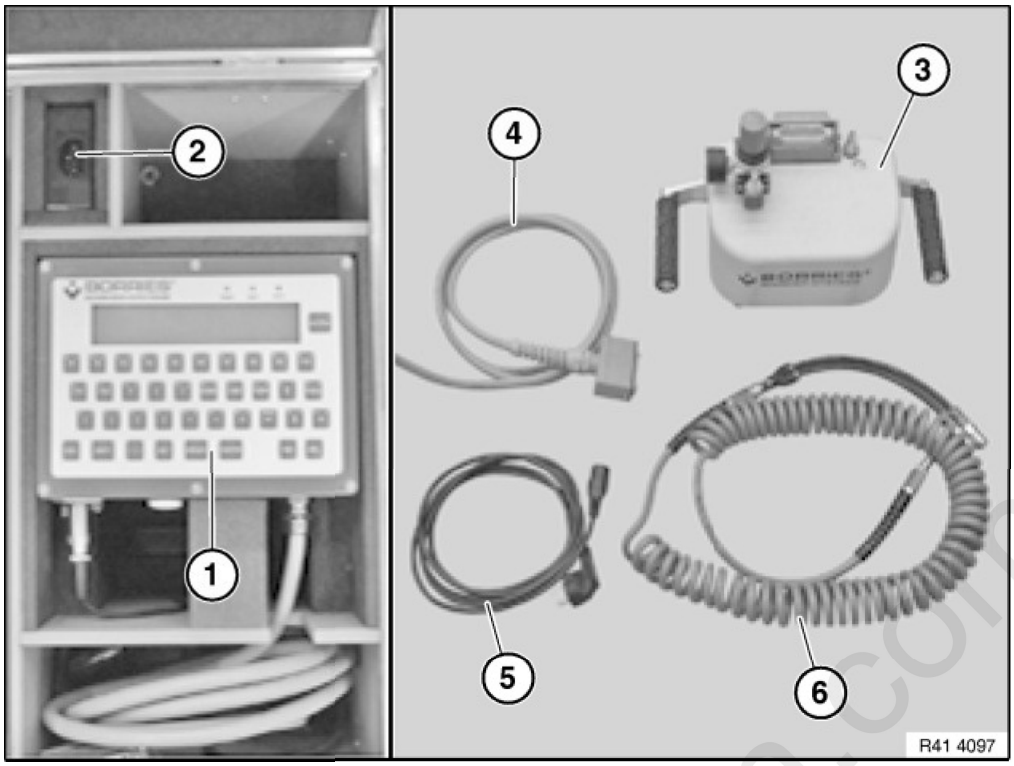
Paint the area around the vehicle identification number according to the BMW painting handbook. Ensure that layer thicknesses are small.

After painting, a new foil must be bonded on the vehicle identificat on number, if a foil was installed for the series as standard.

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1 – Emboss the VIN

Overview of needle embossing device



1 Display

2 Mains connection

3 Needle embossing device

4 Connecting cable

5 Mains lead

6 Compressed air hose A compressed air connection is required (approximately 6 bar, use only dry oil-free compressed air)

Sourcing reference: Request detailed information about the order process under specialtools@bmwgroup.com.

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General information for punched vehicle identification numbers

In the case of a repair, the vehicle identification number is engraved with a special tool before painting the new part.

Refer to the special tool number and the vehicle-specific repair instructions for the correct procedure.

If an additional second vehicle identification number is punched into the substitute area, the existing vehicle identification number must be crossed out. To do so, punch the letter I from the punch numbers lengthways through the existing vehicle identification number. Tape off the invalid vehicle identification number with a foil.

Paint the area around the vehicle identification number according to the BMW painting handbook. Ensure that layer thicknesses are small.

After painting, bond a new foil on the vehicle identification number, if a foil was installed for the series as standard.

Bonding the foil for the vehicle identification number

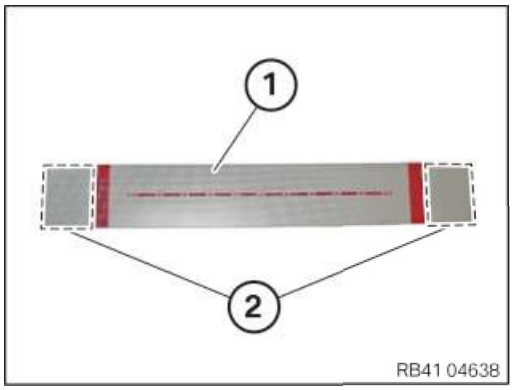
2 – Apply the foil (straight) for the VIN



- Clean the surface in area (1) with cleaning agent R2 and allow to dry.

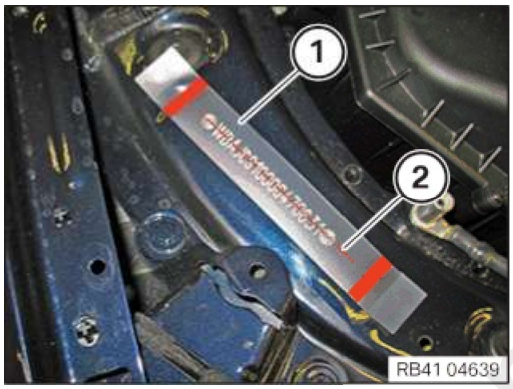
Expendable materials

Cleaning agent R2	500 ml	83190417324



- Pull off the protective film beginning at an edge.

  Touch the foil (1) only in the areas (2).



- Position the foil (1) with the line (2) in the centre above the VIN and press it on.



- Pull off the backing film (1) beginning on one side.

  If applicable, rub air bubbles out toward the edge.

3 – Apply the foil (bent) for the VIN

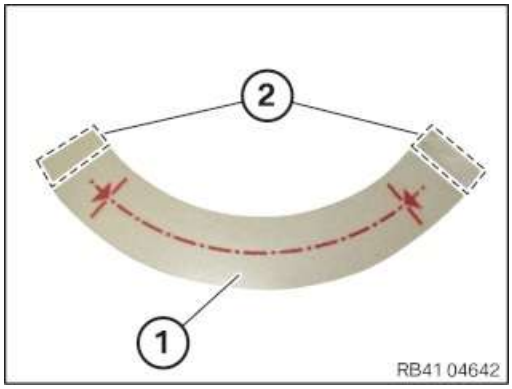


- Clean the surface in area (1) with cleaning agent R2 and allow to dry.

Expendable materials

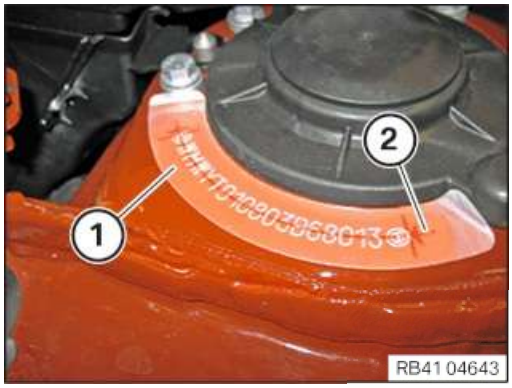
Cleaning agent R2	500 ml	83190417324

rdiagn.com

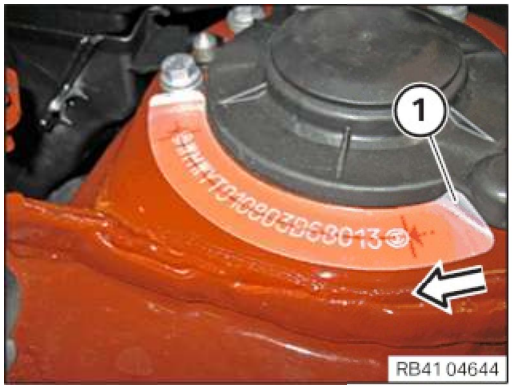


- Pull off the protective film beginning at an edge.

  Touch the foil (1) only in the areas (2).



- Position the foil (1) with the line (2) in the centre above the VIN and press it on.



- Pull off the backing film (1) beginning on one side.

  If applicable, rub air bubbles out toward the edge.

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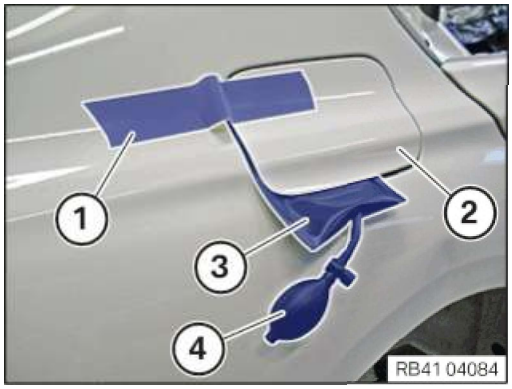
Fuel filler flap emergency release

If the servomotor is faulty, the fuel filler flap must be emergency-released if there is no cable.

1 â€“ Fuel filler flap emergency release



- Slide the special tool into the gap between the fuel filler flap (1) and the side panel.



- Bond the adhesive tape (1) to the side panel and the fuel filler cap (2) with a loop.

Expendable materials

Yellow plastic adhesive tape	83199410979

- Inflate the air cushion (3) with the hand pump (4), until the fuel filler cap (2) pops open.
- Pull off the adhesive tape (1).
- Repair the vehicle.

Additional Information

Overview of Special Tools

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Disassembling and assembling wing mirrors

1 – Disassemble exterior mirrors



TECHNICAL INFORMATION

The training video illustrates the methodology for assembling and disassembling the exterior mirror.
The training video does not replace the repair instructions.
The training video is not subject to the update service.

- Follow repair instructions!

2 – Assemble exterior mirror



TECHNICAL INFORMATION

The training video illustrates the methodology for assembling and disassembling the exterior mirror.
The training video does not replace the repair instructions.
The training video is not subject to the update service.

- Follow repair instructions!



TECHNICAL INFORMATION

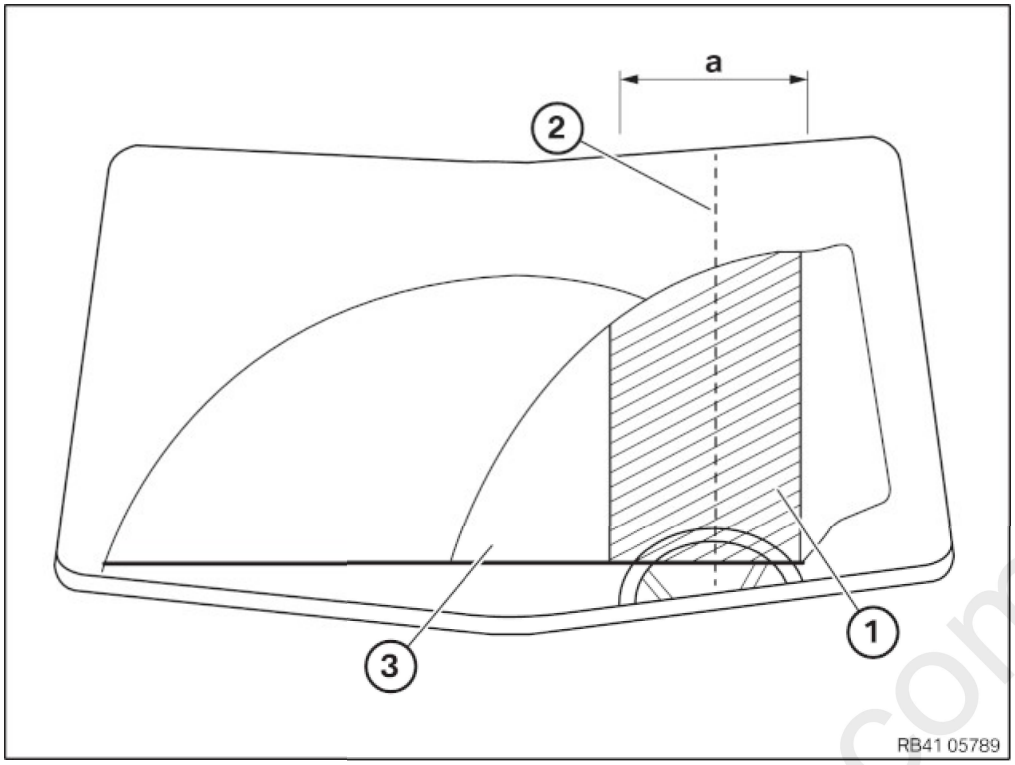
The training video illustrates the methodology for assembling and disassembling the exterior mirror.
The training video does not replace the repair instructions.
The training video is not subject to the update service.

- Follow repair instructions!

Repair of damage caused by stone chips on the windshied

General notes on repair of damage caused by stone chips

Definition of field of vision



1 Field of vision The field of vision is an approx. 30 cm wide strip (dimension a) centered above the steering wheel. The field of vision is bordered on the top and bottom by the wiper range.

2 Vertical line through the centre of the steering wheel

3 Wiper range

The repair of damage caused by stone chips is only permissible under the following conditions:

The conditions detailed below for repairing laminated safety glass conform to the legal regulations in Germany.

In other countries, the relevant regulations must be observed.

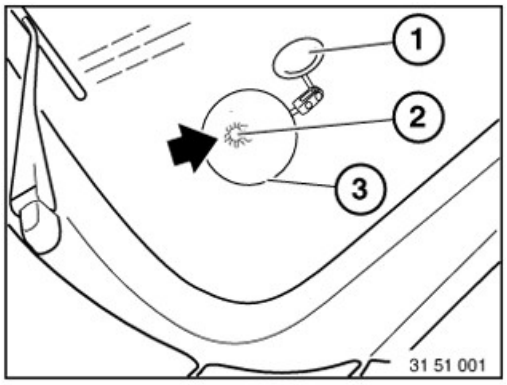
- The point of damage is located outside of the field of vision
- The point of damage is located outside of the contact surfaces of sensors and cameras
- Only the outer area of the windscreen was damaged
- The inner surface of the windscreen and the plastic film in between were not damaged
- The point of damage is free of moisture, dirt or similar
- The diameter of the point of damage is smaller than 5 mm
- Radial cracks originating from the point of damage are not longer than 50 mm
- Cracks do not reach to the outer edge of the windscreen
- Visibility through the repaired surface must be clear, transparent and with minimum distortion

1 – Repair of damage caused by stone chips on the windscreen

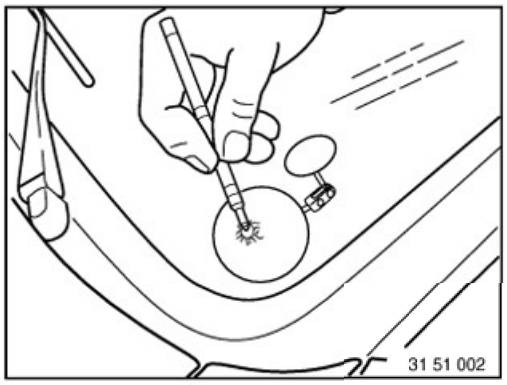
Prerequisite

Windscreen temperature greater than 20 °C. If necessary, heat the windscreen from the inside.

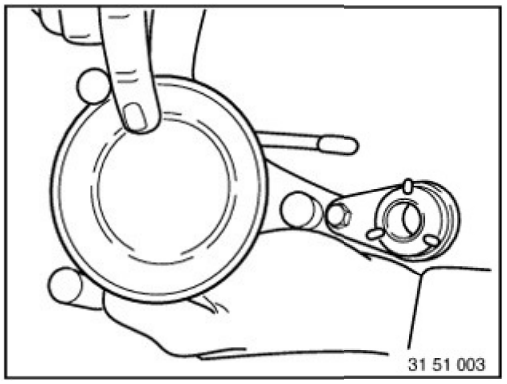
carjiagram.com



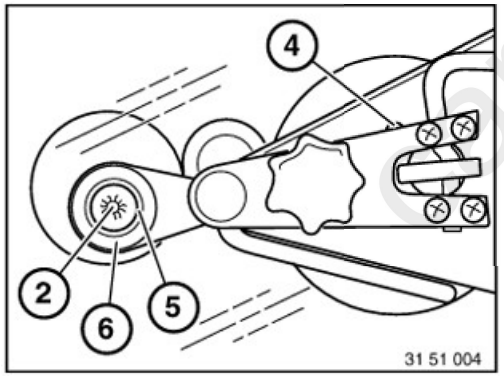
- Thinly coat the suction cup (1) of the concave mirror using the gel.
- Position the suction cup (1) on the windscreen from the inside so that the damaged area (2) can be viewed in the concave mirror (3) from the outside.



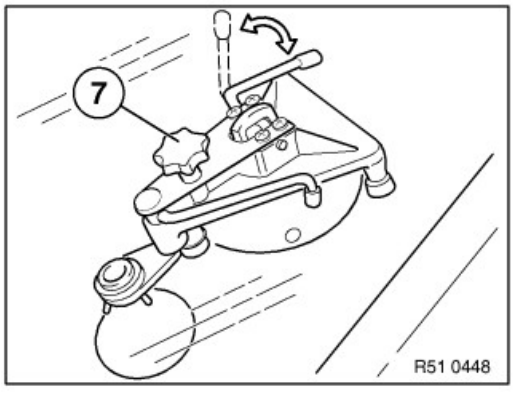
- Remove all glass shards from the damaged area using a scriber without enlarging the damaged area.



- Thinly coat the suction cup of the tool holder with the gel.

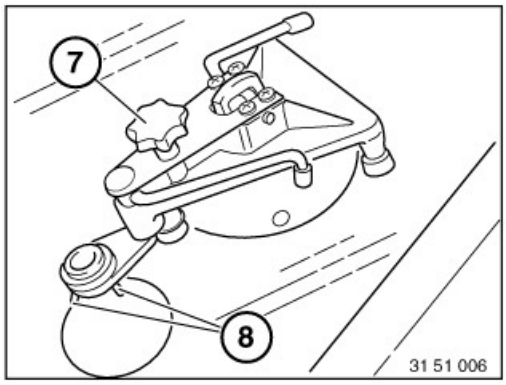


- Position the tool holder (4) on the windscreen from the outside so that the opening (5) of the head (6) is positioned exactly over the damaged area (2).

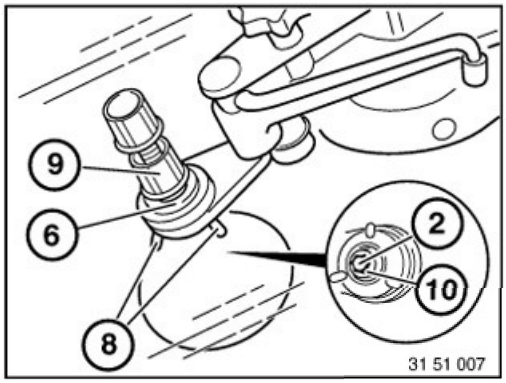


- Unscrew knurled screw (7).
- Move the stop lever towards the front and rear once until the suction cup has been secured to the windscreen.

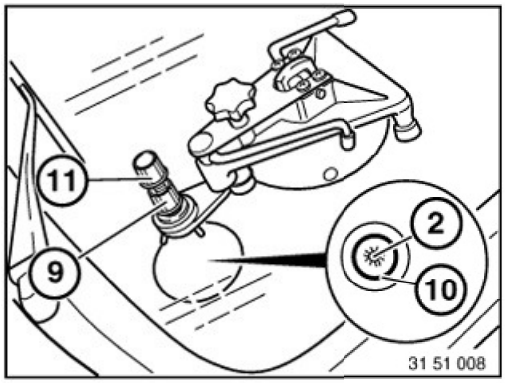
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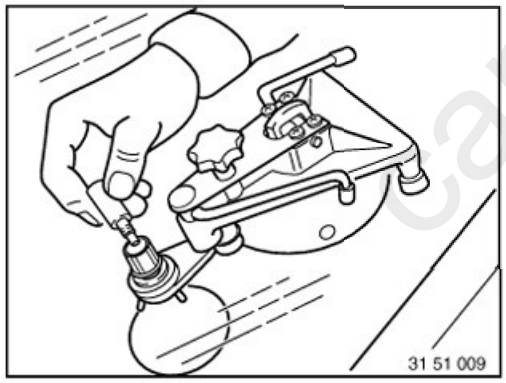
- Screw in the knurled screw (7) until the feet (8) are positioned straight and securely on the windscreen.



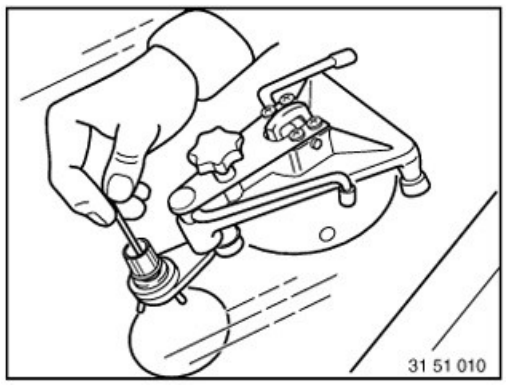
- Screw in the cylinder (9) into the head(6) until the rubber seal (10) firmly surrounds the damaged area (2) on the windscreen and the feet (8) just about lift slightly.



- Unscrew the injector (11) from the cylinder (9).
- Look into the cylinder (9) from the top and check whether the rubber seal (10) is centrally over the damaged area (2).
- Correct the position if necessary.

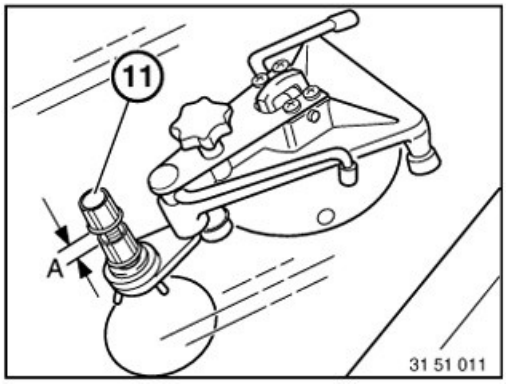


- Open the bottle of resin and fill approximately 1/3 of its contents into the cylinder.
- Once again close the bottle of resin.



- Stir out any potentially available air bubbles in the filled resin using a wooden stick.

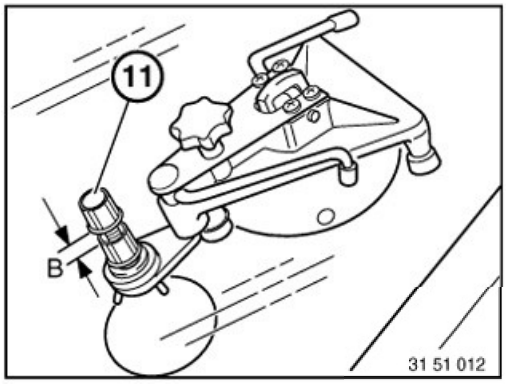
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- Screw the injector (11) into the cylinder up to dimension (A) (slightly perceptible resistance) and let it rest for approximately 5 minutes.

  Dimension (A) = 5 mm

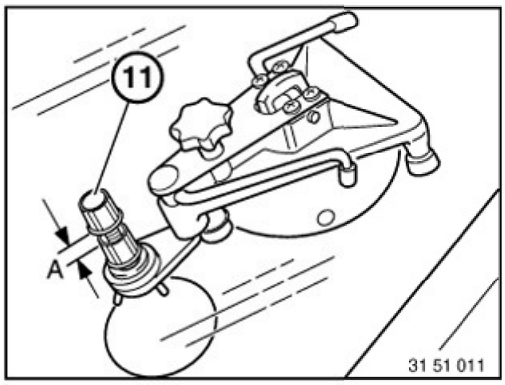
Note: In this position there is a pressure of approximately 16 bar. When monitoring the impact spot it is possible to see that the air trapped in the damaged area slowly escapes (noticeable as black shadows).



- Quickly unscrew the injector (11) to dimension (B).

  Dimension (B) = 12 mm

Note: In this position a vacuum now takes effect and extracts the remaining air from the damaged area.

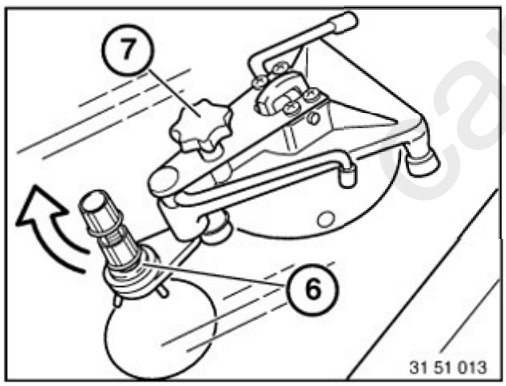


- Once again screw the injector (11) into the cylinder to dimension (A) (slightly perceptible resistance) and once again leave everything to rest for a few minutes.

  Dimension (A) = 5 mm

- Repeat the process of alternating between pressure and vacuum multiple times and then let the injector (11) rest in an intermediate setting between dimension (A) and dimension (B) for a few minutes.

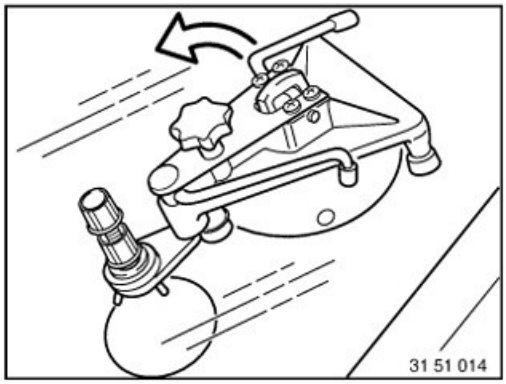
Note: If not all air has escaped yet, preheat the windscreen from the inside for a few seconds using a lighter during the pressure process.



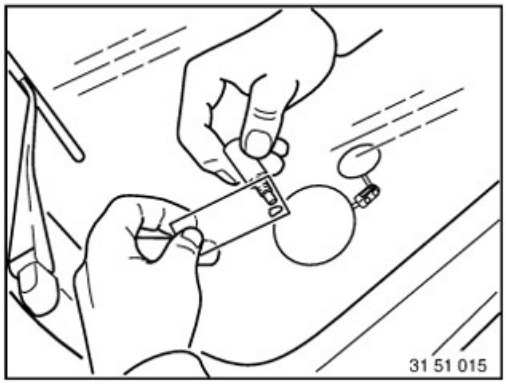
- Slacken the knurled screw (7).
- Swivel the head (6) to the side.
- Check the repair area from the top and in the concave mirror from different angles of view.

  There should no longer be visible air pockets.

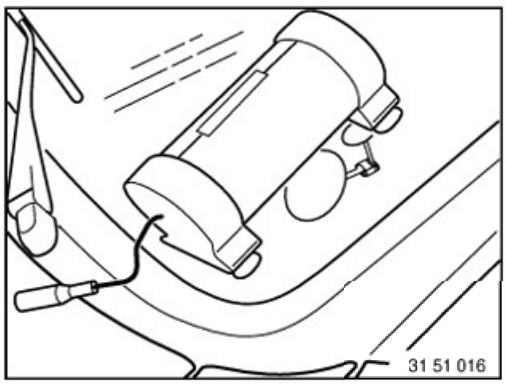
- If air pockets are still visible, swivel the head (6) back over the damaged area and screw in the knurled screw (7) as far as was previously the case.
- Repeat operations starting with pressure/vacuum process.



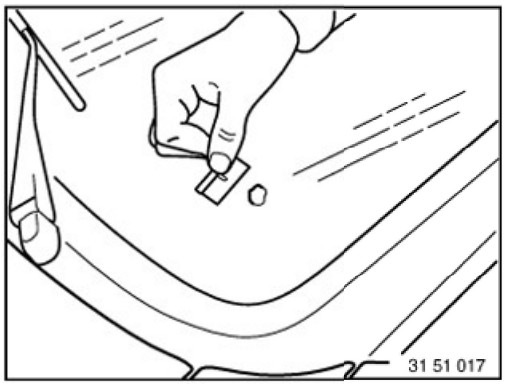
- Swivel the stop lever towards the front and remove the tool holder from the windscreen.



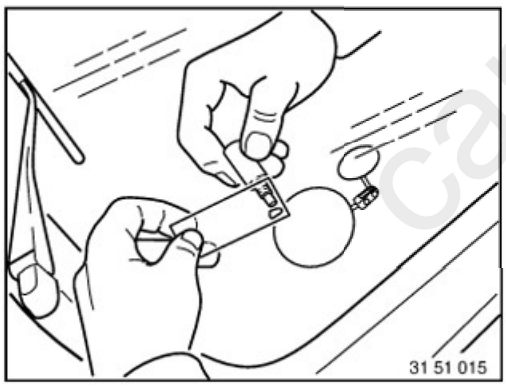
- Apply a drop of resin to the damaged area and cover with plastic film without applying pressure.



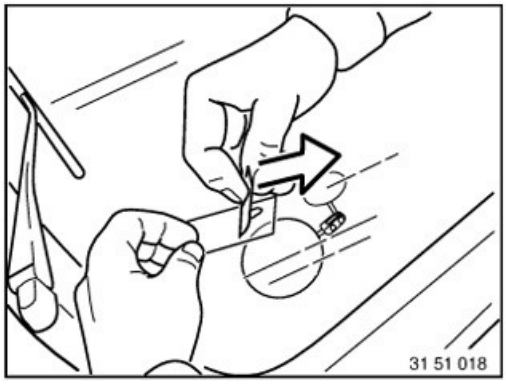
- Position the ultraviolet lamp over the repair area and severely press on the suction cups.
- Connect the ultraviolet lamp and allow the resin to harden for approximately 10 minutes.



- Remove the ultraviolet lamp.
- Pull off the plastic film.
- Scrape off protruding resin using a razor blade.

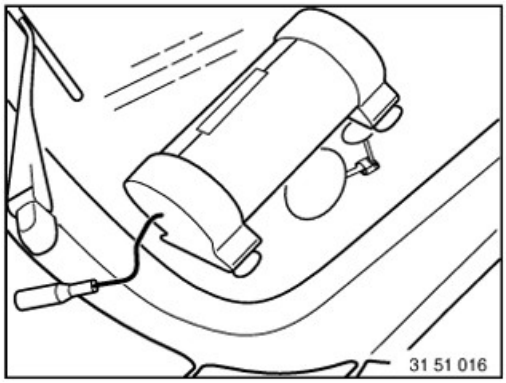


- Once again apply a drop of resin to the damaged area.
- Cover the area using a new sheet of plastic film.

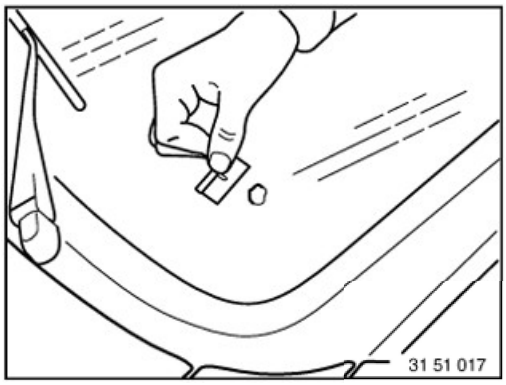


- Carefully rub over the plastic film with the razor blade so excess resin escapes at the sides.

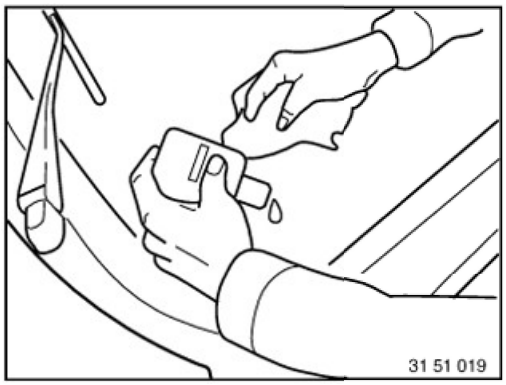
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- Position the ultraviolet lamp over the repair area and severely press on the suction cups.
- Connect the ultraviolet lamp and allow the resin to harden for approximately 10 minutes.



- Remove the ultraviolet lamp.
- Pull off the plastic film.
- Scrape off protruding resin around the damaged area with the razor blade.



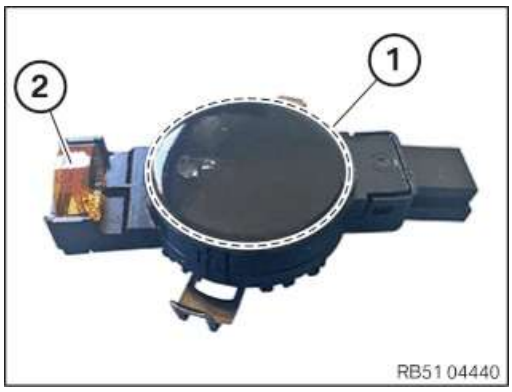
- Polish the repair area using a lint-free cloth and polish until the surface is clean and smooth.

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Replace the gel pad for rain-light-solar-condensation sensors

Not valid for sensors with 35 mm diameter.
Rain-light-solar-condensation sensor removed

1 – Replacing the gel pad



RISK OF DAMAGE

Damage to the surface.

The use of sharp-edged tools may damage the surface.

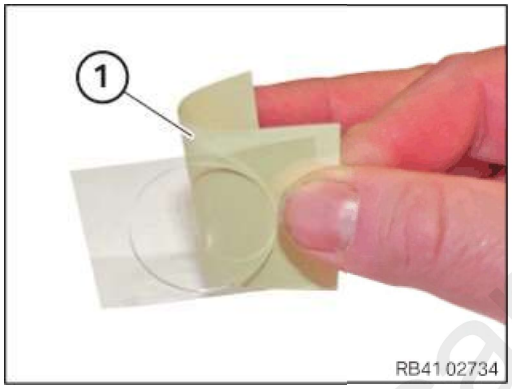
- Use only microfibre cloths.

- Remove the gel pad (1) by hand.

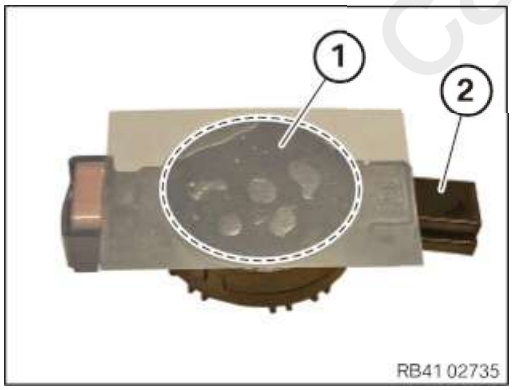
  Do not touch or damage the printed circuit (2).
- If necessary, remove any gel residue using a microfibre cloth.
- Clean the surface of the rain-light-solar-fogging sensor using a microfibre cloth R2 soaked in cleaning agent.

Expendable materials

Cleaning agent R2	500 ml	83190417324



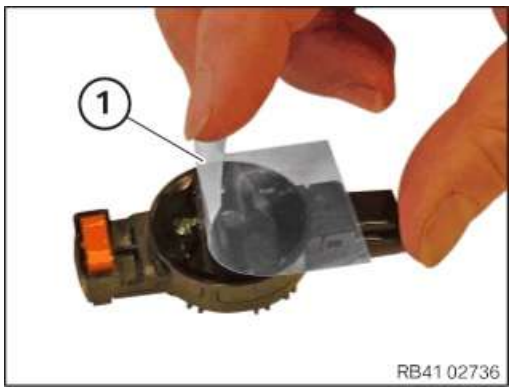
- Remove the yellow protective film (1).



- Place the gel pad (1) in the centre of the surface of the rain-light-solar-fogging sensor (2).

  Do not eliminate existing air bubbles.

  Air pockets disappear within 30 min after mounting the sensor on the windscreen.



- Remove transparent protective film (1).

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6.2.6 Other seats

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection

Fault determination according to EG PTI:

a)	Seats faulty or unsafe (secondary parts): Seats faulty or unsafe (primary parts)
b)	Seats not installed as specified: permissible number of seats exceeded; arrangements of seats not according to approval

Methods according to vehicle manufacturer:

The number of seats installed can be found on the registration certificate.

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4.11 Electrical wires

Validities

BMW passenger car, BMW i, MINI passenger car

Official method according to EG PTI:

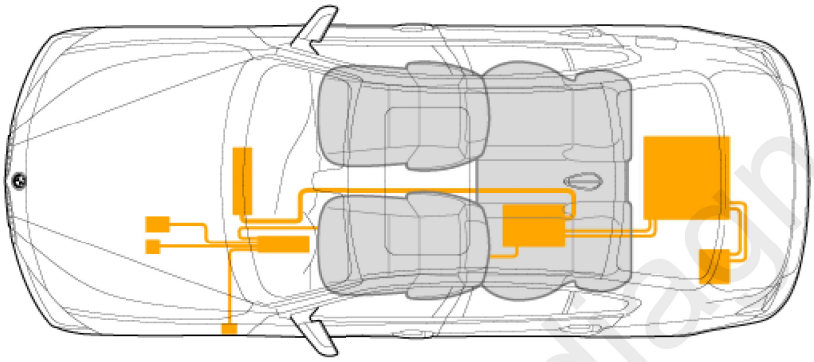
Visual inspection, including the engine compartment in some cases, while the vehicle is situated over an inspection pit or on a vehicle lift

Fault determination according to EG PTI:

a)	Lines unsafe or insufficiently secured, brackets loose, in contact with sharp edges, connections may release, lines may come into contact with hot parts, rotating parts or the floor; connections have been released (important parts for braking and steering).
b)	Lines with minor damage, lines with major damage, lights with extreme damage (important parts for braking and steering)
c)	Insulation damaged or faulty, danger of short circuit, imminent risk of fire, sparking

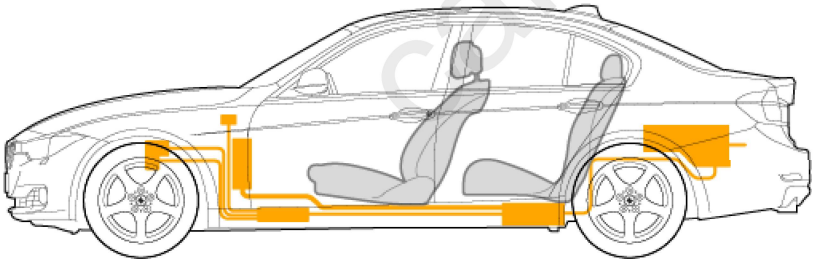
Visual inspection, including the engine compartment in some cases, while the vehicle is situated over an inspection pit or on a vehicle lift

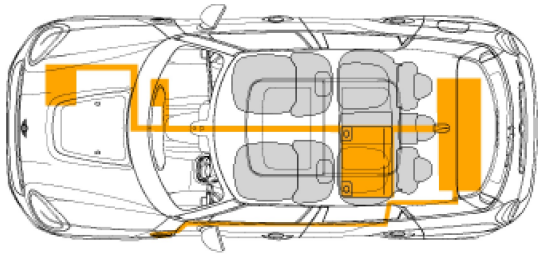
Methods according to vehicle manufacturer:



F30 PHEV

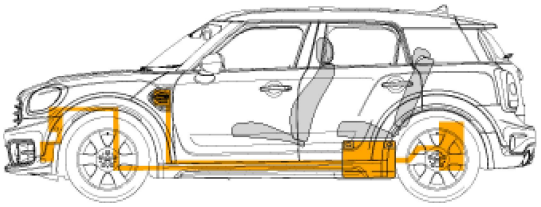
BMW 3 Series



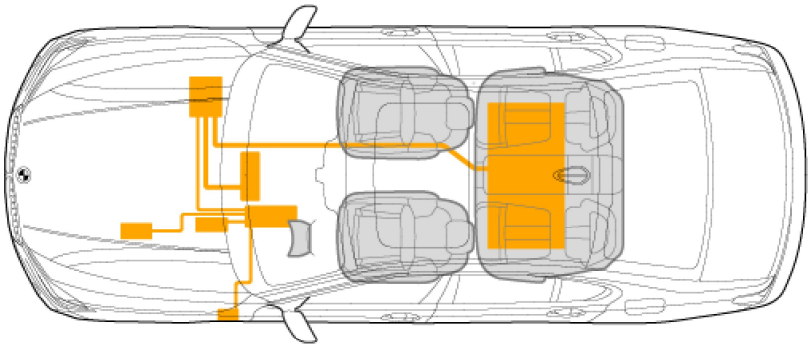


F60 PHEV

MINI Countryman

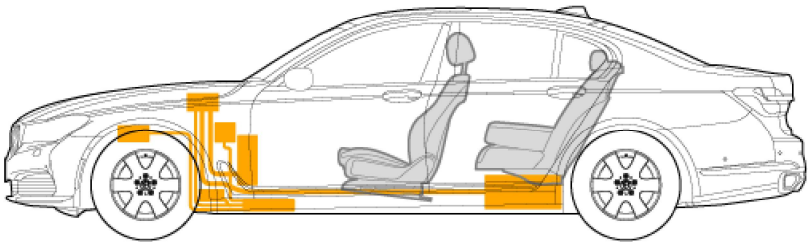


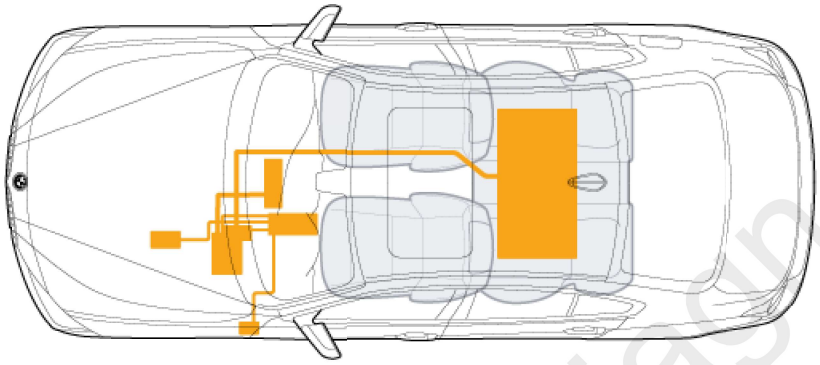
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G11/G12 PHEV

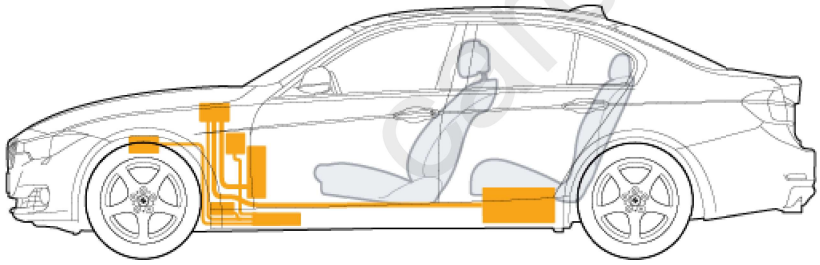
BMW 7 Series



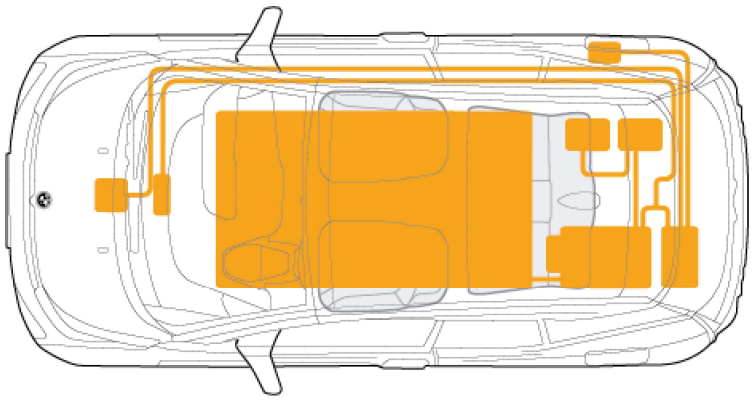


G30 PHEV

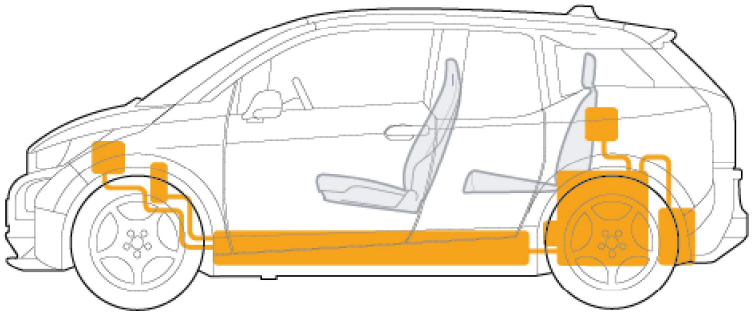
BMW 5 Series



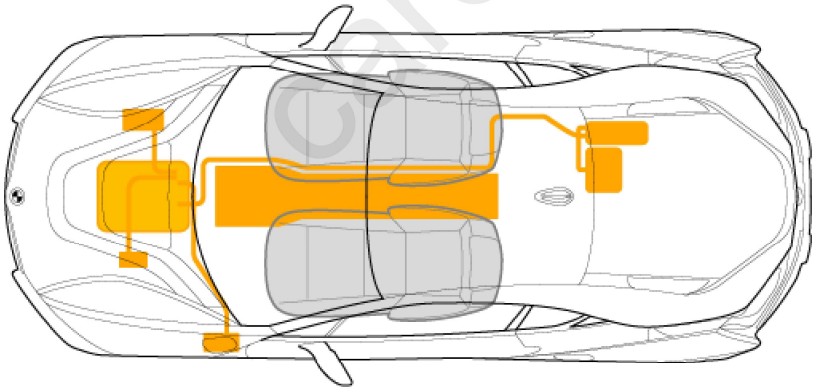
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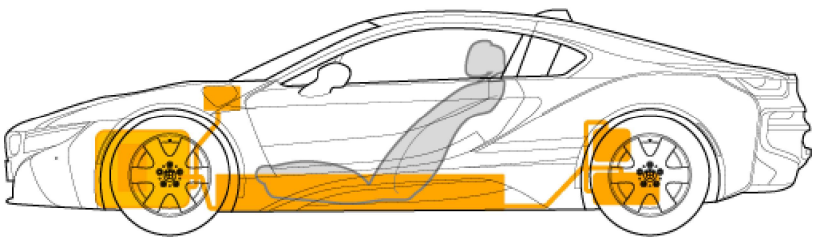
I3

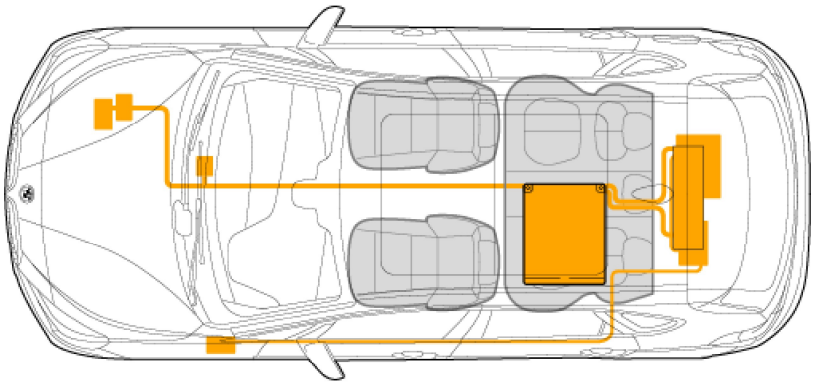


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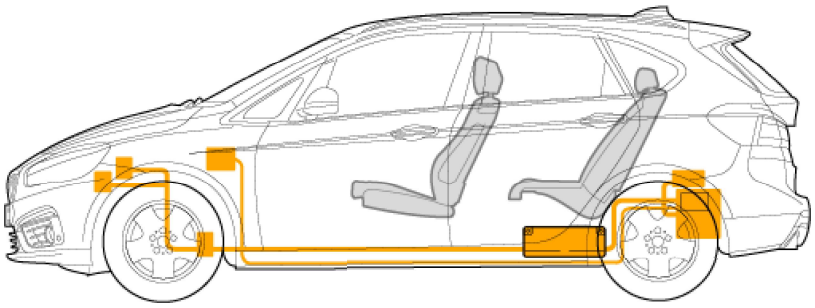


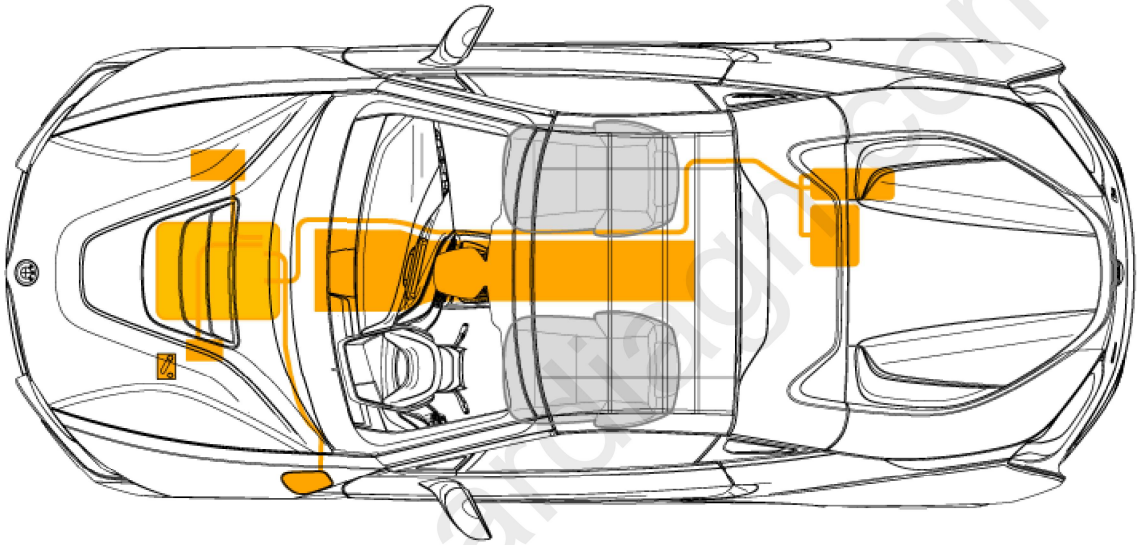
I8



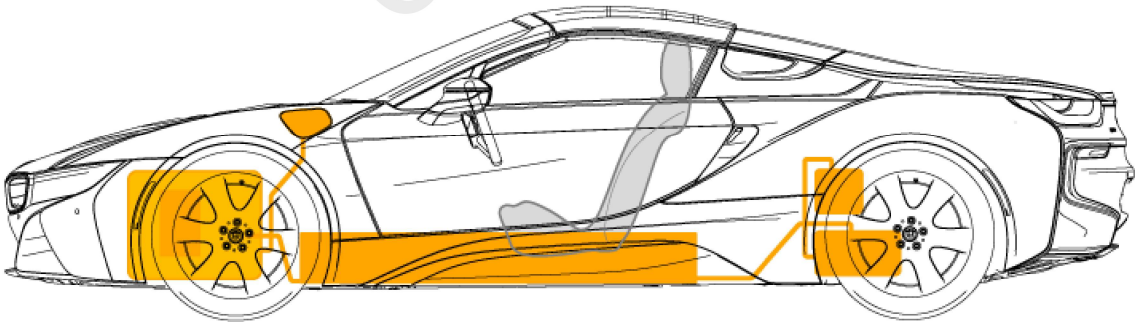


F45 PHEV

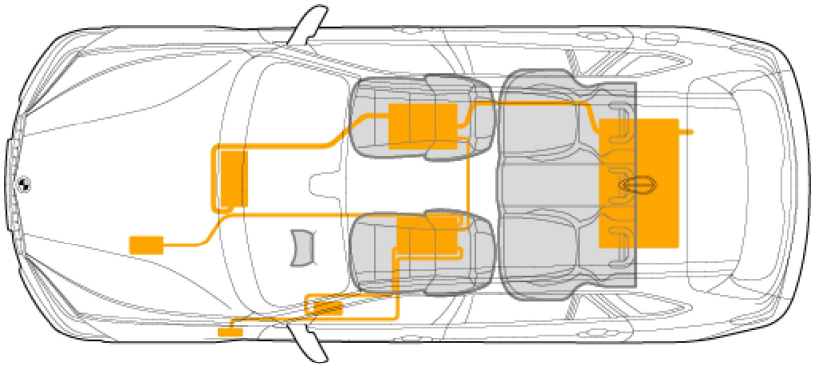




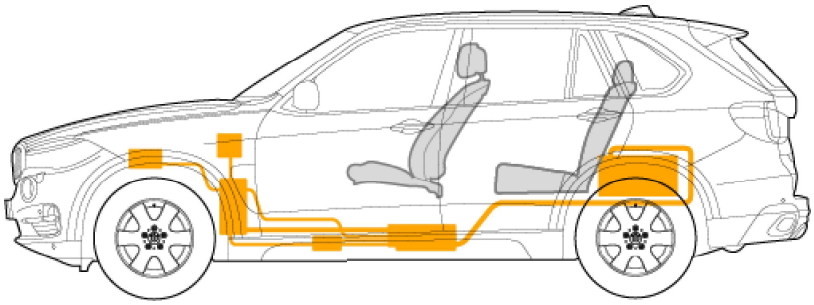
I15

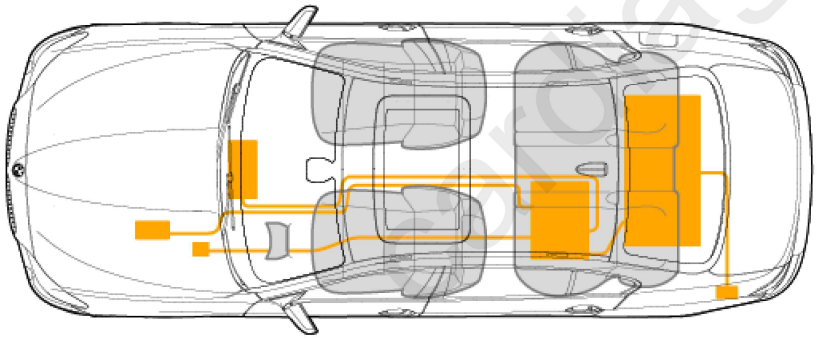


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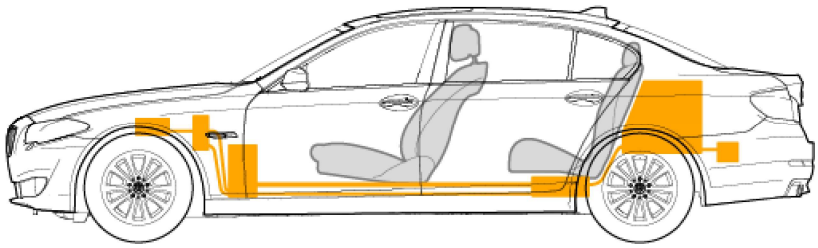


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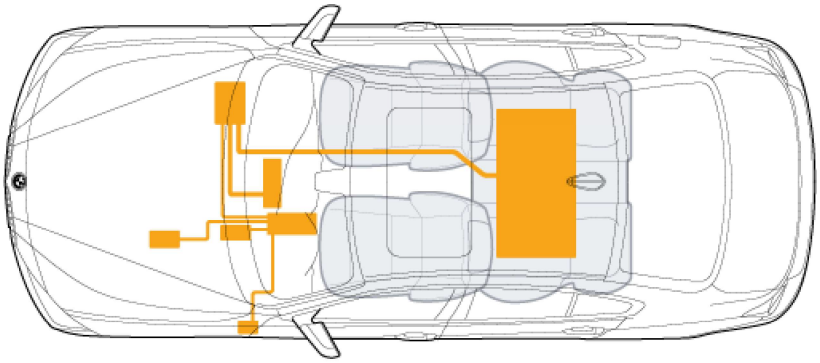




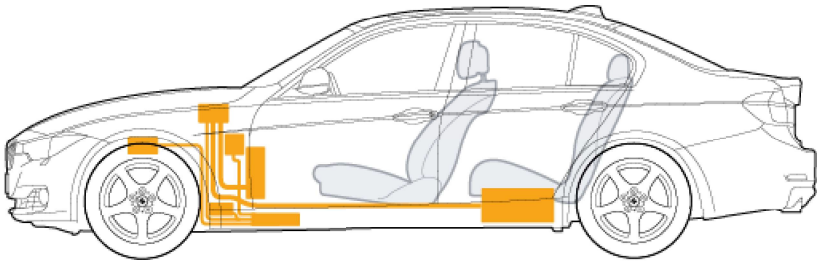
F18 PHEV



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G38 PHEV



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Battery exchange in vehicles with a high-voltage system

Faulty 12 V battery or vehicle electrical system unresponsive

If the vehicle electrical system for electrified vehicles is no longer responsive due to a faulty 12 V battery, proceed as follows:

- Connect the vehicle to an external battery booster or a jumper cable
- Unlock high-voltage safety connector
- Check for voltage disconnection display in the KOMBI
- Switch off the ignition
- Remove battery booster or jumper cable
- Change 12 V battery
- Check if vehicle electrical system is active again
- Register battery via service function

If the vehicle electrical system cannot be activated with an external battery booster or jumper cable, a BMW qualified electrician is required to determine voltage disconnection.

However, an accurate energy diagnosis is required before replacing the 12 V battery.

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Battery replacement information

Battery replacement information

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorisation and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

If the vehicle electrical system of electric vehicles is not accessible due to a faulty 12 V battery, proceed as follows:

- See additional information

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

The correct function of all of these comfort and safety functions requires a battery which conforms to the specifications and is correctly logged on to the vehicle.

Register battery exchange

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If performance readiness drops below a defined minimum, a CC message is generated to indicate to the driver that battery exchange is necessary.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system. Only this registration/logon will ensure that the corresponding CC message will go out again.

Register battery exchange via the following path:

- Service functions
- Body
- Voltage supply
- Register battery exchange

Retrofitting a more powerful battery

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specification.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data via the following path as per the specification:

- Service functions
- Body
- Voltage supply
- Battery retrofitting

Additional Information

Links

Repair instructions (PRE)
Battery exchange in vehicles with a high-voltage system

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Instructions for 12 V dual storage system

Instructions for 12 V dual storage system

Introduction

A 12 V dual storage system featuring 12 V lithium ion battery will be installed in the G05 and G15 for the first time from 07/2018. Model series 35 is then enabled for UP.

The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions.

A modern luxury-class vehicle has some 100 actuator motors that have to be fed with electrical current. Added to these are safety, environmental and comfort elements which are increasingly becoming standard features, such as Antilock Brake System (ABS), Dynamic Stability Control (DSC), electrical steering assistance, MSA, air conditioning and navigation system. Current consumption is considerable even when the vehicle is not in use.

In a **direct parallel circuit of (dual storage system) 12 V lithium ion battery and AGM battery** it is possible to benefit from the advantages of both systems in the event of a suitable equipment specification:

(Reduced) AGM battery:

- Guarantees starting capability and
- provides the required energy content in a cost-efficient manner.

Performance-oriented (dual storage system) 12 V lithium ion battery:

- Covers the largest proportion of cycle load during driving (up to 90 %)
- Enables efficient energy recovery (high to complete vehicle electrical system compensation)
- Charges and discharges the AGM battery even after having finished driving (passive system)

Consequently:

- The AGM battery state of charge is sustainably increased (availability improved and breakdowns reduced or prevented)
- The cycle load of this component is significantly reduced (quality, total cost of ownership)
- Fuel consumption and carbon dioxide pollutant emission are reduced.

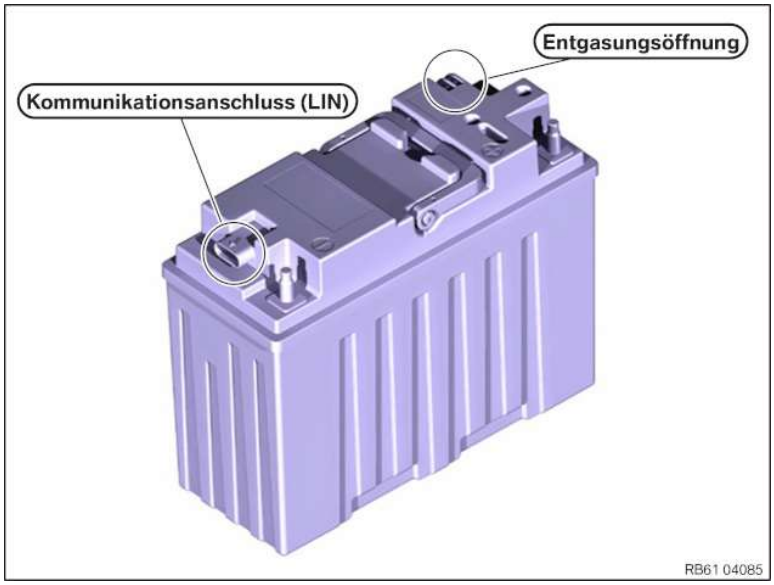
Brief component description (dual storage system) of the 12 V lithium ion battery:

The (dual storage system) lithium ion battery can be identified by the following characteristics:



- Notes on the label

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- Component size and weight
- LIN bus connection inside of the lid
- Large degassification connection in the lid
- M8 power interfaces in comparison to lead terminals
- "Magic Eye" is not available.
- (Dual storage system) lithium ion battery features a black housing like the AGM battery.

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An electronics system that has been integrated into the (dual storage system) 12 V lithium ion battery is used instead of the IBS at the negative terminal of the AGM battery which is responsible for similar elements.

- In addition an electronic disconnect switch (ETS) has been integrated into the (dual storage system) 12 V lithium ion battery.



Notes for Service department:

- **Caution! When handling the (dual storage system) 12 V lithium ion battery it is necessary to observe some special characteristics pertaining to battery exchange and charging:**

Load:

Existing devices can be used to charge (dual storage system) 12 V lithium ion battery. Default settings for lead chargers can be used (charging voltage 14.8V).

Warning!

- Do not exceed the maximum charging voltage of 15.6V when charging the (ISPI Dealer Self Support) 12 V lithium-ion battery.
- Do not use rapid-charging programs!
- The battery must be charged using the remote positive terminal only.

Caution!

- An excessive charging voltage may lead to the electronic disconnect switch (ETS) of the (dual storage system) 12 V lithium ion battery opening in exceptional cases. This does not damage the (dual storage system) 12 V lithium ion battery. The electronic disconnect switch (ETS) re-closes once a charging voltage of <15.5 V applies at the battery terminals.
- The (dual storage system) 12 V lithium ion battery must be charged at a battery temperature of > 5 °C only.
- Do not set a current limitation at the charger for this battery.

Electronic disconnect switch (ETS):

The (dual storage system) 12 V lithium ion battery features an electronic disconnect switch (ETS) that can switch off the battery to protect it. The voltage at the battery terminals cannot be measured when switched off.

- Consequently the (dual storage system) 12 V lithium ion battery is not necessarily faulty if it is no longer possible to measure voltage at the battery terminals.
- If the electronic disconnect switch (ETS) has activated, it is necessary to diagnose the (dual storage system) 12 V lithium ion battery using the diagnosis system.

The following table describes the response of the ETS in situations involving faults:

Fault situation	Condition for reactivation
Overvoltage (U>18V)	Overvoltage is no longer applied. Voltage at the battery terminals <17.4V
Undervoltage (protection from total discharge) U<7.8V.	Applying a voltage of > 13.6V for a period of > 30s at the battery terminal, e.g. with a charger.
Operation in high temperatures (T>75°C)	Operating temperature T<=70°C
Short circuit	Rectify short-circuit.

If it is necessary to apply a voltage at the battery terminals to reactivate the electronic disconnect switch (ETS) as per the aforementioned table, this can be carried out using a charger with a suitable voltage setting or by jump-starting with a running donor vehicle. As a result of the insufficient voltage output it is not possible to reactivate the electronic disconnect switch (ETS) using a second battery.

When using a charger it must feature a mode for deep-discharged batteries or manual starting of the charging procedure (so that U>13.6V) as otherwise the battery is not detected and the charging procedure is not started.

Housing:



Note for Service:

- Do not open lithium ion batteries!

Disposal/transport:

Assess the transport suitability before transporting the (dual storage system) 12 V lithium ion battery!

- See additional information.

It is also possible to permanently store the battery on its side. It is permitted to store it upside down for 6 weeks.

Note regarding the battery electronics ((dual storage system) 12 V lithium ion battery)

The basic function of the 12 V lithium ion battery electronics correspond with that of the intelligent battery sensor (IBS) of an AGM battery.

In contrast to the IBS, the electronics are a fixed component of the battery. In the event of a defect, the entire 12 V lithium ion battery must therefore be replaced.

Additionally, the electronics regulate the battery management that is required for lithium ion batteries, such as the adjustment of cell voltage or activation of the electronic disconnect switch (ETS).

Note!

Do not connect the trickle charger to the 12 V charging socket!

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. Charge the battery using the remote positive terminal only. Only then can the voltage supply be registered by the vehicle.

Caution!

Danger of destruction in event of mechanical strain!

Do not modify the ground cable. The ground cable also serves for heat dissipation.

Do not use force when disconnecting the pole shoe from the battery terminal:

- Do not pull on the ground cable.
- Do not place any tools under the terminal clip to lever off the pole shoe.
- The nut has been integrated into the cable shoe.

Use a torque wrench and set tightening torque in accordance with repair instructions.

Use the battery size (capacity) installed as standard when replacing the battery.

Register battery replacement via Service functions in diagnosis system.

Delete fault code entries in the Digital Engine Electronics (DME) associated with battery replacement.

Always proceed in accordance with the repair instructions.

Note:

The battery can be drained in spite of trouble-free battery electronics!

A (dual storage system) 12 V lithium ion battery can be drained (e.g. as a result of the lights or radio having been switched on) even when the battery electronics operate correctly in conjunction with power management.

However the DSS maintains an energy reserve to guarantee one-time emergency starting capability.

In the event of a corresponding message from the energy diagnosis test module, replace the (dual storage system) 12 V lithium ion battery!

- If a (dual storage system) 12 V lithium ion battery malfunction occurs, the (MSA) automatic engine start-stop function may consequently be restricted.

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Additional Information

Links

General repair instructions
61 25 ... Assessment of the transportability of the 12 V lithium ion starter battery in service workshops

Assessing the transport capability of high-voltage battery units in service workshops

Introduction

For analysis and disposal purposes, it is necessary to transport the already used high-voltage battery unit. This lithium-ion based high-voltage battery is to be classified as hazardous material according to UN 38.3, and may only be transported under particular prerequisites.

Obtaining the certified transportability between the assesment and delivery of the high-voltage battery unit to the disposal / transportation company is the responsibility of a qualified person. For shipping one also needs to take into account the influence of the storage requirements and other possible occurring events for the determined transportability. If there is a possibility that previously certified transportability is no longer valid, it must be reassessed using the guideline.

The transport in the sense of the hazardous goods legislation is organised in three areas:

- Assessment of the transportability
- Transport preparation
- Performing the transport

This document contains all the necessary information in order to assess the transportability of a used high-voltage battery unit. The transport preparation and execution is not an element of this document.

Further information on this can be found in the product information in the Aftersales Assistance Portal.

It will be explained which measures are necessary in order to assess the transportability. How these measures are to be performed individually depends on the particular situation at the location and is not an element of this document. These procedures are to be defined according to the local regulations / laws and recorded as valid local work instructions.

Prerequisites from a security perspective

The analysis and assessment of the high-voltage battery unit is to be performed by an "expert for working on HV intrinsically safe vehicles with high-voltage battery certification".

The certificate of the transportability is the responsibility of the qualified person.

In addition, the specifications for occupational health and safety must be observed for the storage of high-voltage battery units and cell modules.

This information can be found in the product information in the Aftersales Assistance Portal.

NOTICE

This document must be printed out and archived with the vehicle data.

Assessment of high-voltage battery unit

NAME	Date	Serial no.	Vehicle identification number
_____	_____	_____	_____

Signature
_____

The electrical assessment of the high-voltage battery unit takes place via the diagnosis and test module.

The de-energised state of the high-voltage battery unit is to be determined before it is removed from the vehicle.

Electrical assessment

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The electrical assessment of the high-voltage battery unit takes place via the diagnosis and test module.Â

De-energise the high-voltage system.

	Yes	No
No de-energised state could be established (if a de-energised state was established, then **No** must be ticked)		
Intrinsic safety not present according to diagnosis or test module		

The presence of voltage can be determined using the end-of-service tester when the high-voltage battery was already removed from the vehicle.

Visual assessment:

	Yes	No
Smoke		
Evidence of fire damage		
Heat development		
Crack or opening on the housing		
Dents in the housing, deformations, modifications (scratches up to 0.5 mm deep or 5 cm long are permitted)		
Corrosion weakened parts/components		
Loose connections, loose or damaged		
Serial number/label safety information cannot be read		
Suspected water damage		

Result

	Yes	No
High-voltage battery unit, transport capable		

The serial number must be clearly legible. If the type plate can no longer be read, the housing of the high-voltage battery unit must be clearly marked with the serial number.

The label of the safety information must be replaced if it is illegible.

The electrical and visual assessment must be set down in writing!

If one or more points is/are answered with **yes** the following procedure must be clarified with technical support!

Furthermore, the high-voltage battery unit that has been removed must be marked with a sign and blocked off with high-voltage barrier tape.

If the high-voltage battery unit is still in the vehicle, the vehicle must be made inaccessible, marked and blocked off.

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Form for equipotential bonding screw connections

Form for equipotential bonding screw connection

DANGER

Equipotential bonding in high-voltage system.

Danger to life if the equipotential bonding screw connection is not correct!

- Observe the safety requirements for the equipotential bonding screw connection.
- Clean contact faces and have then checked by a second person.
- Tighten the screws for equipotential bonding to the specified torque; have a second person check the torque.
- Correct execution of these tasks must be documented in the vehicle records by both persons.

This form must be completed in full and enclosed with the vehicle records!

Vehicle data:

Vehicle identification number	Order number	Order date	Kilometre reading

Equipotential bonding screw connections:

Screw application	Torque	Mechanic	Signature	Tester	Signature

By signing, the mechanic and tester assume liability for the correctness of the screw connection!

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Notes for opening and closing cable straps

Preconditions

The following procedure must be followed without exception to loosen cable straps on electric and hybrid cars and in the high-voltage battery unit!

Do not use pointed or sharp-edged tools.

The following tools are permitted: combination pliers and coolant pump pliers

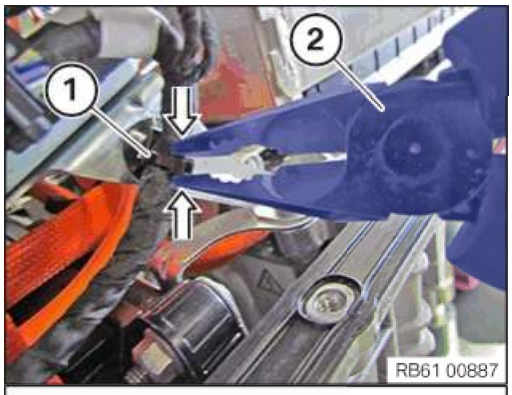
Technical support must be contacted in case of damaged high-voltage cables.

Remove the protruding end of the cable strap using the relevant special tool.

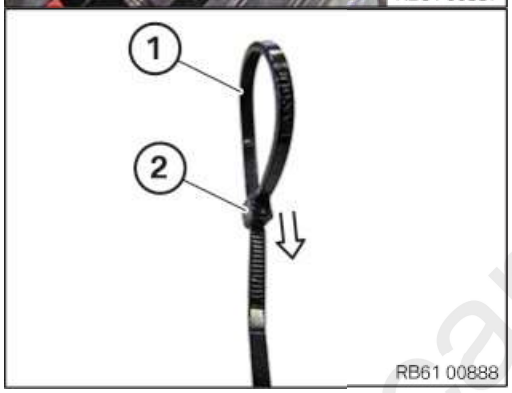
Sourcing reference:

See Aftersales Assistance Portal (ASAP) - Service/Technical - Workshop Equipment (Start BMW) - Shop Workshop Equipment Catalogue or at www.bmwgroup.com

Option 1



Grip and compress the cable strap (1) (as shown in the graphic) using the combination pliers or coolant pump pliers (2).



The cable strap (1) is opened at the closure (2) by pulling in the direction of arrow.

Option 2

DANGER



Damaged high-voltage cables, high-voltage connectors and high-voltage components.

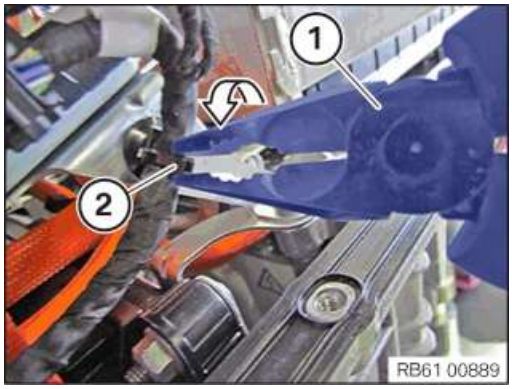
Danger to life through electric shock!

- Do not repair but always replace damaged high-voltage cables, high-voltage connectors and high-voltage components completely.
- Contact Technical Support immediately if high-voltage cables, high-voltage connectors and high-voltage components are damaged so that the touch protection is no longer intact.

TECHNICAL INFORMATION

If the closure does not open, the cable strap closure can also be twisted off.

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Grab the closure (2) with the combination pliers or coolant pump pliers (1) and twist off in direction of arrow.

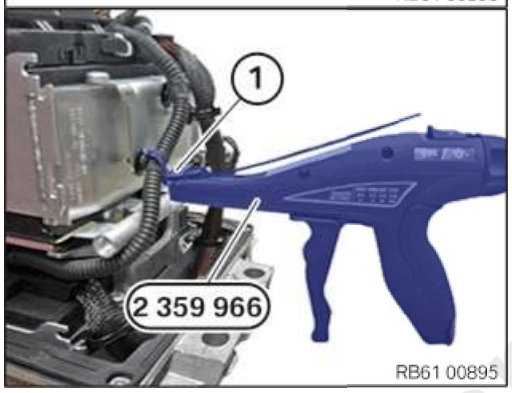
Closing cable straps



Setting the starting power above the rotary knob (1)

- Slide stop (2) in direction of arrow
- Hold stop (2) in position and rotate rotary knob (1) in the desired position.
- Release stop (2) again and let it be engaged.

Settings	0	1	2	3	4	5	6	7	8
Tensile force in N	20	38	51	68	85	104	125	143	165



Preload cable strap (1) by hand so that one stroke is enough for tightening and cutting-off.

Tighten cable strap (1) with special tool **2 359 966** until the protruding end of the cable strap is cut off.

For cable straps on high-voltage cables in the high-voltage battery unit special tool **2 359 966** must be adjusted to **stage 4**.

For cable straps on 12 V cables in the high-voltage battery unit special tool **2 359 966** must be adjusted to **stage 3**.

Additional Information

Overview of Special Tools

2 359 966 Pliers



Common	
Usage	For tightening and cleanly cutting off plastic cable straps in high-voltage battery units.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	02 05 14 (104)

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Notes on earth bonding screw connections

Equipotential bonding

Connecting high-voltage components to GND is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to GND.

For a correct ground connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.

Potential compensation wires, high-voltage cables and the battery earth lead of the electrical machine electronics have a safety screw connection! The following procedure must be adopted without fail:

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Correct execution of these tasks must be documented in the vehicle records by both persons.

The additional information contains a prepared form for printing.

Additional Information

Links

Repair instructions (PRE)
Form for equipotential bonding screw connections

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Notes on repair of high-voltage battery unit

Prerequisite

Various organisational prerequisites need to be fulfilled before the repair of a high-voltage battery unit is permitted and can be carried out in an expedient way. These prerequisites concern both, the commercial company and the service employee.

The repair of a high-voltage battery unit is intended to be carried out exclusively by commercial companies featuring the service format BMW i Service Extended Battery or BMW i Service Full.

A commercial company featuring the service format BMW i Service Basic is able to remove and install a high-voltage battery unit but cannot perform any repair work on or in the high-voltage battery unit. If a repair is required according to the test schedule in the diagnosis system, the vehicle or the high-voltage battery unit must be transported to a commercial company featuring the service format BMW i Service Extended Battery or BMW i Service Full. The repair is to be carried out in such a workshop.

The commercial company must make available the required special tools and a suitable workbay for the repair.

The most important special tools are the following:

- Mobile lift table MHT 1200 + set of adapters to remove and install the high-voltage battery unit.
- Charger for cell blocks of high-voltage battery unit.
- EoS tester for the repaired high-voltage battery unit.
- Lifting tool to remove and install cell blocks.
- Panel wedges made of plastic to remove clips within the high-voltage battery unit.
- Lifting traverse for the complete high-voltage battery unit.
- High-voltage barrier tape.
- Yellow cones relating to high-voltage recommended.

Sourcing reference:

See Aftersales Assistance Portal (ASAP) - Service/Technical - Workshop Equipment (StartÂ BMW) - Shop Workshop Equipment or at www.bmwgroup.com

Only service employees being qualified for the repair of the high-voltage battery unit may carry out this procedure.

This includes a training as "Qualified technicians for work on high-voltage intrinsically safe vehicles".

Before removing and opening the high-voltage battery unit, troubleshooting is to be carried out by means of the relative diagnosis system. Only if determined by the test plan and if the prerequisite "no mechanical damage on the outside" is satisfied, may the high-voltage battery unit be opened and the faulty component identified by the test plan exchanged. No other repair work relating to the high-voltage battery unit than the replacement of faulty components is planned.

It is essential to observe the operational steps specified in the repair instructions very precisely in order to carry out the replacement of a faulty component. The use of the special tools listed therein is absolutely essential as well.

Safety rules

The first step after opening the housing cover to repair the high-voltage battery unit is a visual inspection for mechanical damage.

A thorough visual inspection of the components inside the working area is required during and/or before and after every operation. When removing one component, all other involved components being accessible need to be checked for damages. If the housing or other internal high-voltage components are damaged, a qualified electrician or Technical Support must be contacted. All repair works relating to the high-voltage battery unit must be stopped immediately for safety reasons.

Check the correct latch mechanism of the connector of the insulation monitoring line at the control unit of the high-voltage battery unit. If this is not fully locked, an isolation fault may not have been detected.

The separation of the high-voltage cable between the cell modules mounted on the inside of the housing (across from the connection side of the high-voltage battery unit) is to be carried out before working on the opened high-voltage battery unit. This procedure ensures the interrupt of the series connection (additional safety).

The workbay required for the repair of the high-voltage battery unit must be clean (free of grease, dirt and swarf), dry (no leaking fluid) and free of flying sparks. Therefore, avoid close vicinity to areas intended for cleaning of vehicles and to workbays intended for repair work relating to the body. Use movable walls for separation, if needed.

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High-voltage barrier tape is required to secure the workbay against unauthorised access (insufficient qualification, customers, visitors, etc.). It is also required in case the high-voltage intrinsic safety is not established or the status is not determined yet. Placing yellow cones with lightning bolt to indicate high-voltage when leaving the working area is recommended.

Do not use tools or other objects with pointed and sharp blades/edges when working on high-voltage components or high-voltage cables and/or in their close vicinity. Diagonal cutting pliers, knives etc. are prohibited. Cable straps inside the low-voltage wiring harness may be opened by means of diagonal cutting pliers.

Allowed: **Plastic wedges** e.g. special tool **2 298 505**

Cable straps relating to high-voltage cables or 12V lines may not be cut open. Damaged clips remain on the high-voltage cable or 12V line. The remaining, damaged clip must be pushed to a position on the high-voltage line where the clip can not rub. A new clip must then be installed.

Defective or damaged high-voltage cables must be made unusable to ensure they are not reused.

No tools must be forgotten inside the high-voltage battery unit. Visually inspect the high-voltage battery unit before closing the housing cover.

Check the tools in the tool trolley are complete.

It is absolutely essential to remove all small parts/screws that fell into the high-voltage battery unit. The use of magnetized screws is generally recommended in order not to lose any screws in the high-voltage battery unit during the repair.

When interruptions of work occur: Secure housing cover against unintended opening by screwing in several screws. Enclose the working area by means of high-voltage barrier tape.

Due to the very slim construction of the radiator, the risk of damage during disassembly and installation is high. Careful handling is absolutely necessary as the cooling of the cell blocks may not be guaranteed when the radiator is damaged (bent, dented). The consequence is a major loss of the electrical range and of the power of the vehicle. In extreme cases, even a breakdown may occur.

Very careful handling is necessary when disconnecting and connecting the insulation monitoring line at the control unit of the high-voltage battery unit (safety box coming) since high-voltage is present in the thin orange lines. Do not pull on the lines (e.g. to unplug the connector etc.)! The connector must be locked securely when plugged in.

Make sure the plastic lids of the modules are not loosened when working on the cell modules (loosing screws, raising and lifting, etc.). The live cell contacting system is located thereunder. Continuing to work with the lid being removed is not permitted. A qualified electrician or Technical Support must be contacted.

A schematic diagram with limiting sample examples in the training is necessary to get to know the limits. This shows from when continuing work for "Qualified technicians for high-voltage inherently safe vehicles" is no longer possible due to lack of intrinsic safety. Contact technical support or a qualified electrician.

Remove residual moisture and coarse contamination around the lid of the high-voltage battery unit before beginning the disassembly.

Clean gaskets and sealing surfaces (venting unit, high-voltage connector, signal connector, radiator connection) with a specified cleaning agent before reassembly.

If contamination is present in the high-voltage battery unit, check the cause and carefully clean the affected areas.

Approved cleaning agent:

- Spirit
- Windscreen cleaner
- Glass cleaner
- Distilled water
- Vacuum cleaner with plastic top

Cleaning with compressed air from the high-voltage battery unit is **not** permitted. This is because dirt particles and swarf could get to the high-voltage components.

Visual inspection for contamination and damage of housing as well as of connections and degassing unit when installed (underfloor). A damaged diaphragm within the venting unit may indicate damaged storage cells. In this case, special carefulness is required when checking and opening the high-voltage battery unit.

Electrolyte

The majority of the electrolyte is a mixture of lithium-nickel-manganese-cobalt oxide in bound state. The quantity of free electrolyte in the high-voltage battery unit is very small. It is a noxious and irritant fluid. Absolutely avoid direct contact of skin with leaking fluid as acid burns may occur. In case of contact with eyes or skin, flush with

plenty of clear water and consult a doctor immediately. Burning or evaporating electrolyte is also hazardous. Careful, do not inhale! Ensure sufficient fresh air supply. If breathing ceases, apply artificial respiration and immediately consult a doctor. Notify fire brigade in case of fire. Clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger and use suitable extinguishant, e.g. water.

Repairing removed high-voltage battery units

The high-voltage battery unit is a component of large dimensions and heavy weight. Only the combination of the housing and the cell blocks mounted therein provides the high-voltage battery unit with complete stability (rigidity), as required for driving. Therefore, it is necessary to ensure that the housing is positioned on the relative mounting/adapter of the lifting table during replacement and fixation of cell blocks. This prevents the housing from jamming and the high-voltage battery unit from being installed in the vehicle in this condition.

It is extremely important to enter the serial numbers and the installation positions of the replaced components in the SME via the EoS tester, as well as transfer the data to the diagnosis system. Otherwise, the new installation position will be assigned automatically by the SME. The consequence is an incorrect location data, as the SME does not set correct installation positions. For a renewed repair of the high-voltage battery unit, the diagnosed faults for the incorrect installation position will be displayed. The consequence is that replacement is done at the wrong location.

In diagnosis, it is not possible to enter the serial numbers of the cell supervision circuits. The serial numbers are transmitted from the cell supervision circuit to the SME using the CAN bus. The SME then assigns corresponding location data. This assignment is not always fault-free. That is why the serial number and installation position of the exchanged cell supervision circuit must be checked in the diagnosis after completed repair. If the installation positions do not match, a position change can be performed with diagnosis. A new serial number of a cell supervision circuit is not entered.

Important: Do not use powered wrenches as the screws/threads located in the high-voltage battery unit may break due to the low torques!

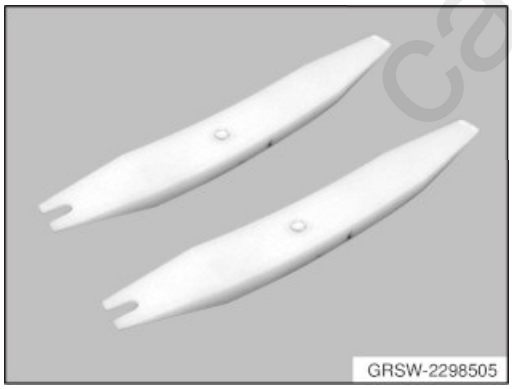
The seal must be renewed every time the housing cover is removed to guarantee tightness of the high-voltage battery unit.

The screws are thread-tapping, so pre-insert them manually before tightening them with a tool. Otherwise, the threads of the lower housing section may be damaged!

Additional Information

Overview of Special Tools

2 298 505 Wedge



Common	
Usage	Set (delivery of 2 pieces)
Included in the tool or work	
Storage location	C34
Replaced by	
In connection with	
SI-Number	01 03 12 (792)

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Overview of high-voltage battery unit cooling

Cooling types of the high-voltage battery unit

List of cooling types of high-voltage batteries installed in BMW, BMWi and MINI

BMW

Vehicle	Coolant cooling	Refrigerant cooling
E72		x
F01 Hybrid		x
F10 Hybrid		x
F30 Hybrid		x
F15PHEV		x
F30PHEV		x
F45PHEV		x
G11PHEV		x
G12PHEV		x
G30PHEV		x

BMW i

Vehicle	Coolant cooling	Refrigerant cooling
I01		x
I12		x
I15		x

MINI

Vehicle	Coolant cooling	Refrigerant cooling
F60PHEV		x

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Safety information for handling electric and hybrid vehicles

Qualification

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently save vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

Identification

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

Rules of conduct/protective measures:

Note operating instructions for handling high-voltage battery units.

Visually inspect the high-voltage components to be worked on before commencing work.

Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.

In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.

Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

Prevent escaping substances from entering drains, pits and the sewer system.

Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.

Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe.

A cut 2nd emergency separation point must be repaired with a butt connector.

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Measures before starting work

Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**

Required training is offered by the BMW Training Academy. It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.

The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:

- seat belt buckle unlocked **and**
- the driver's door is open **and**
- no brake activated **and**
- the accelerator pedal is not activated **and**
- Speed < 3 km/h (2 mph)

Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).

After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.

Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.

Work is only permitted to begin if:

Display in the KOMBI **High-voltage system deactivated**.

When a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.

If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** A qualified electrician must verify that the system is de-energised 1000 V AC with suitable measuring devices/measuring procedures before work can commence.

=> In this case, Technical Support must be contacted!

Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.

Battery charging may result in heating of the high-voltage battery unit. This may cause the electric fan to start running (switch-on request of the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

Measures during/after work

Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.

When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).

E72 only: It is not permitted to activate the high-voltage system when the "Power electronic box cover" has been removed. The high-voltage service disconnect must be used with a mounted "Power electronic box cover" only.

High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.

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When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.

The specified work steps in the repair instructions must be adhered to exactly.

High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.

Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/equipotential bonding measurement) are performed by the vehicle automatically and for this reason, manual measurement is not required.

For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Refer to the following REP for further information: **Painting notes**.

Removed high-boltage battery units must be stored in a manner that protects them from misuse and damage.

Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

Equipotential bonding

Potential compensation wires, high-voltage cables and the battery earth lead on the electrical machine electronics have a safety screw connection!

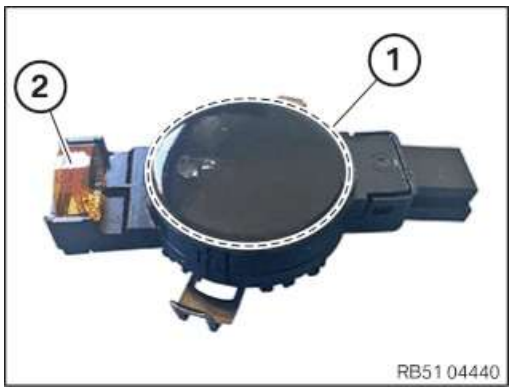
- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.

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Replace the gel pad for rain-light-solar-condensation sensors

Not valid for sensors with 35 mm diameter.
Rain-light-solar-condensation sensor removed

1 – Replacing the gel pad



RISK OF DAMAGE

Damage to the surface.

The use of sharp-edged tools may damage the surface.

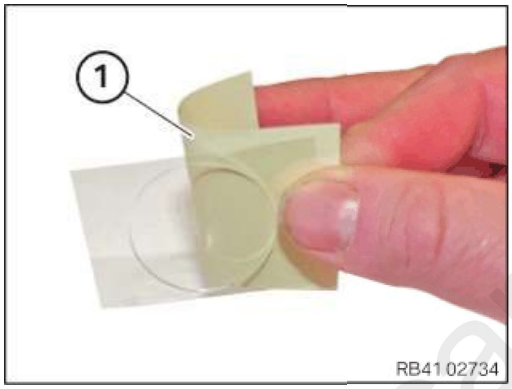
- Use only microfibre cloths.

- Remove the gel pad (1) by hand.

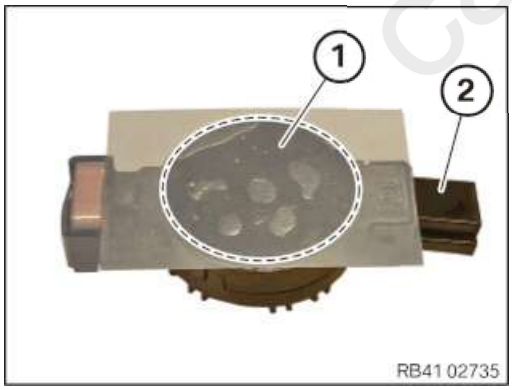
  Do not touch or damage the printed circuit (2).
- If necessary, remove any gel residue using a microfibre cloth.
- Clean the surface of the rain-light-solar-fogging sensor using a microfibre cloth R2 soaked in cleaning agent.

Expendable materials

Cleaning agent R2	500 ml	83190417324



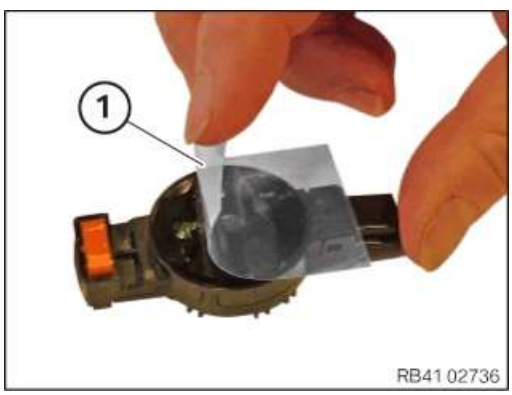
- Remove the yelow protective film (1).



- Place the gel pad (1) in the centre of the surface of the rain-light-solar-fogging sensor (2).

  Do not eliminate existing air bubbles.

  Air pockets disappear within 30 min after mounting the sensor on the windscreen.



- Remove transparent protective film (1).

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Roller operation

1 Rolling operation



TECHNICAL INFORMATION

The training video illustrates the activation of roller operation in the instrument cluster.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!



TECHNICAL INFORMATION

The training video illustrates the activation of roller operation in the instrument cluster.

The training video does not replace the repair instructions.

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No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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Service menu in the instrument cluster

1 Service menu in the instrument cluster

TECHNICAL INFORMATION

There are vehicles with instrument clusters with and without a trip distance recorder reset button.

The on-board computer button on the steering column switch must be used on vehicles with instrument clusters which do not have a trip distance recorder reset button.



TECHNICAL INFORMATION

The training video illustrates the activation of the service menu in the instrument cluster.

The training video does not replace the repair instructions.

The training video is not subject to the update service.

No liability can be accepted for printing or other faults. Subject to changes of a technical nature

- Follow repair instructions!

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4.1.2 Headlight alignment

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

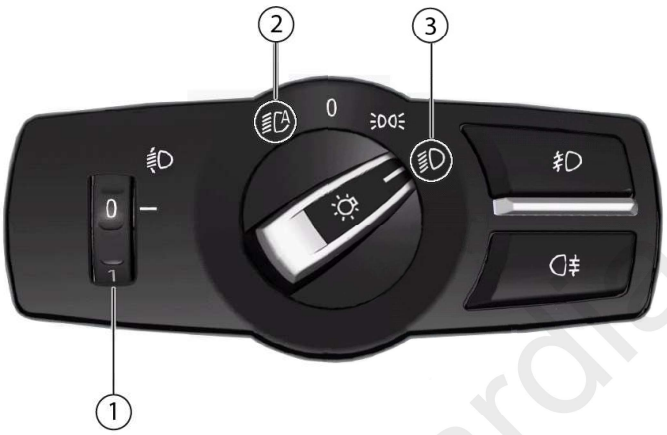
Use a headlight adjustment device to determine the horizontal setting of each headlight for the low-beam headlight or use the electronic vehicle interface.

Fault determination according to EG PTI:

a)	Headlight adjustment not within the prescribed limits.
b)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer:

Refer to document 4.1.3 for a description on how to activate the headlights.



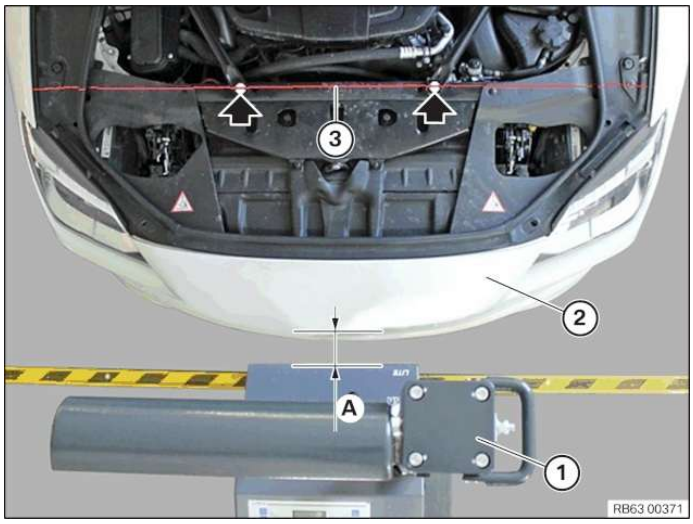
Test specifications:

- Park the vehicle on an even surface with the wheels in straight-ahead position.
- Faulty lenses and mirrors as well as light bulbs that have been tinted black are not permitted.
- Check tyre pressure and correct if necessary.
- Subject the driver's seat to the load of one person (approx. 75 kg).
- Vehicle with full fuel tank or appropriate additional weight in luggage compartment.

Carry out the test as instructed:

- Switch the ignition on.
- Manual headlight beam throw adjustment: Move handwheel to neutral position (1).
- The light switch must be in the low-beam headlight or driving light position (3).
- Do not run headlight adjustment in 'automatic driving lights control' (2) light switch position.
- Version with Xenon or LED (automatic headlight beam throw adjustment): Wait 80 s after having switched on the light. During this time, do not move the vehicle and avoid vibrations.

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TECHNICAL INFORMATION

- Correct measurement/adjustment requires exact positioning of the headlight adjustment device (1)!
- The headlight adjusting device (1) must stand vertically to the vehicle longitudinal axis!
- This applies to all headlights!

TECHNICAL INFORMATION

- Points must be vehicle proof!
- Points must be separated as wide as possible!
- Trim panels are not suitable!

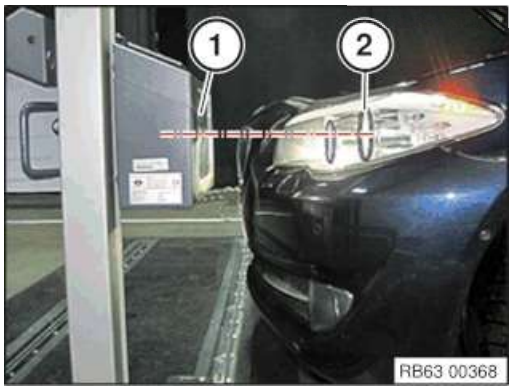
Position the headlight adjustment device (1) in the centre in front of the motor vehicle (2) at a distance (A) = 10 cm .

Align the headlight adjustment device (1) with the laser beam (3). The laser beam (3) must meet two suitable spots, e.g. highlighted by arrows.

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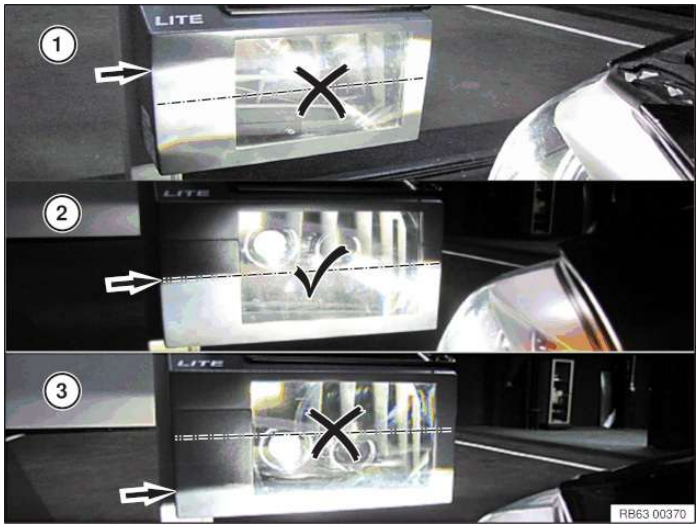
If the headlight adjusting device (1) does not have a laser beam (3), complete the alignment analogous with the line in the mirror.



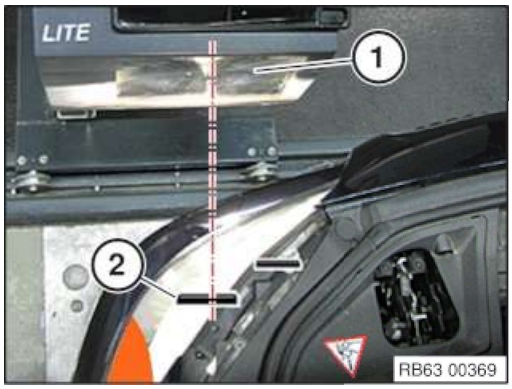
TECHNICAL INFORMATION

Always perform positioning of the headlight adjusting device (1) at the outer headlight (2)!

The centre of the collecting lens (1) must match the centre of headlight (2) horizontally. Corrections are made by raising or lowering the headlight adjusting device.



When positioned correctly, the light/dark boundary of the headlight (marked with arrow) must hit the collecting lens of the adjusting device in the centre: 1. Headlight adjustment device too far down. 2. Headlight adjustment device positioned correctly. 3. Headlight adjustment device too far at the top.



The centre of the collecting lens (1) must match the centre of headlight (2) vertically. Corrections are made by sliding the side of the headlight adjusting device to the left or right.

Light/dark boundary of headlights in headlight adjusting device

Setting dimension, headlights:

The value is indicated in % on the headlight housing.



The following value applies to saloons **1.0 %**: 1.0 % = -10 cm/10 m = - 1.0 % at the headlight adjustment device



The following value applies to Sports Utility Vehicles **1.1 %**: 1.1 % = -11 cm/10 m = - 1.1 % at the headlight adjustment device

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4.1.1 Headlamps status and function

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation

Fault determination according to EG PTI:

a)	Headlight/light source faulty or missing (multiple headlight/multiple light sources; for LED up to 1/3 not operational). Individual headlights/light sources; for LED visibility severely impaired.
b)	Projection system (reflector and lens and/or headlight lens or end lens) with minor damage, projection system (reflector and lens and/or headlight lens or end lens) severely damaged or not available.
c)	Light not attached safely.

Methods according to vehicle manufacturer:

In general, four different lighting systems are installed at BMW, which may vary based on the vehicle equipment.

The front headlight consist of two headlights with a low-beam headlight and high beam each. All installed bulbs and/or LEDs of this system must be fully functional.

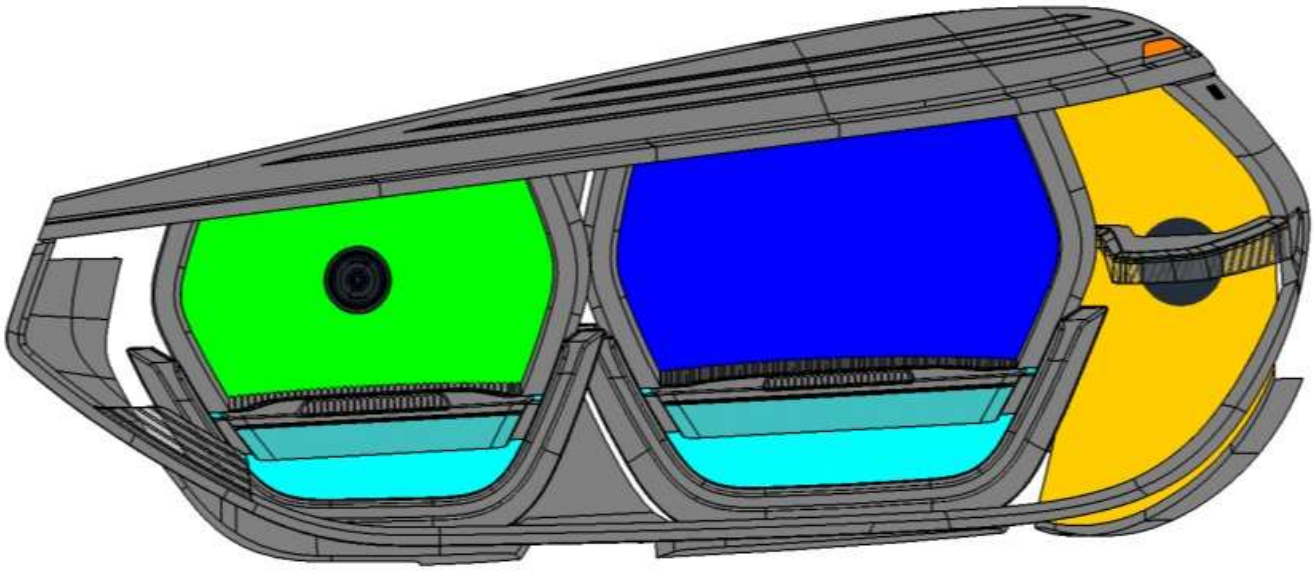
Following systems are installed:

The following descriptions come from examples of different models and may deviate in individual cases.

Halogen (H7) headlights

Manual headlight beam throw adjustment





	- The low-beam headlight (1) has been illustrated in dark blue.	1
	- The high beam (2) has been illustrated in green.	2
	- The daytime driving light (3) has been illustrated in light blue.	3
	- The turn indicator (4) has been illustrated in yellow/orange.	4

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Xenon headlights

Automatic headlight beam throw adjustment (legally prescribed as per regulation by the ECE).



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LED headlight

Low-beam headlight, high beam, daytime driving lights, front parking light.

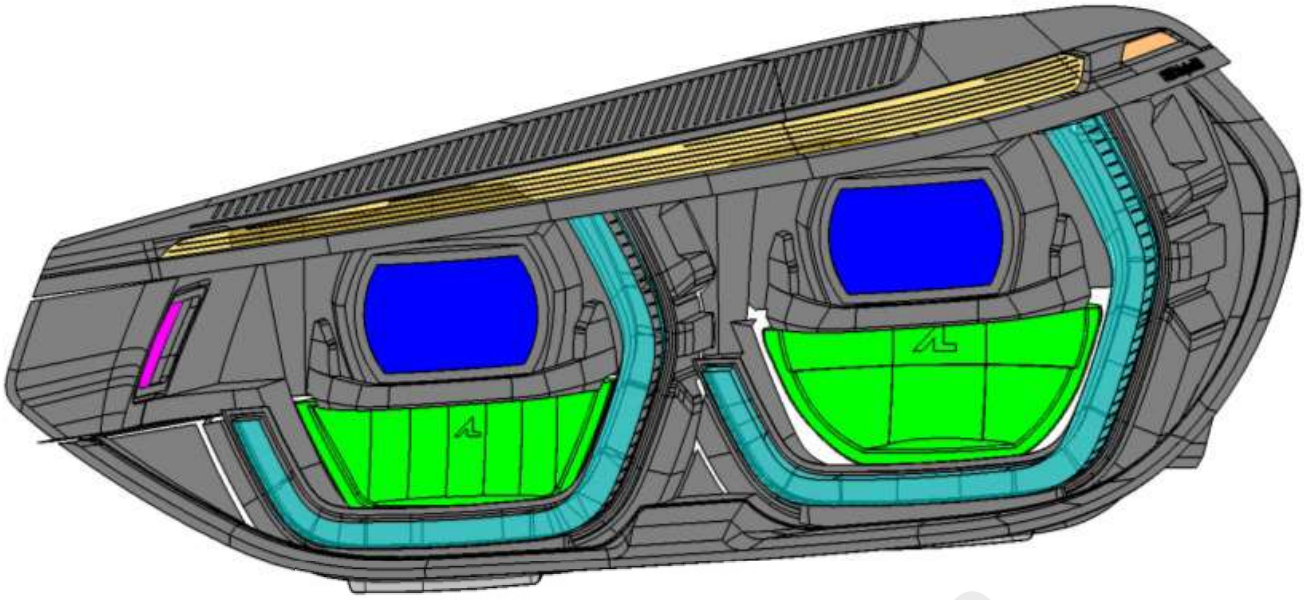
Automatic driving light (automatic driving lights control).

Automatic headlight beam throw adjustment (legally prescribed as per regulation by the ECE).



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For example G01 front light combination OE 552 symbol light



	- The cornering light (1) has been illustrated in purple.	1
	- The turn indicator (2) has been illustrated in orange or yellow.	2
	- The low-beam headlight (3) has been illustrated in dark blue.	3
	- The high beam (4) has been illustrated in green.	4
	- The daytime driving light (5) has been illustrated in light blue.	5

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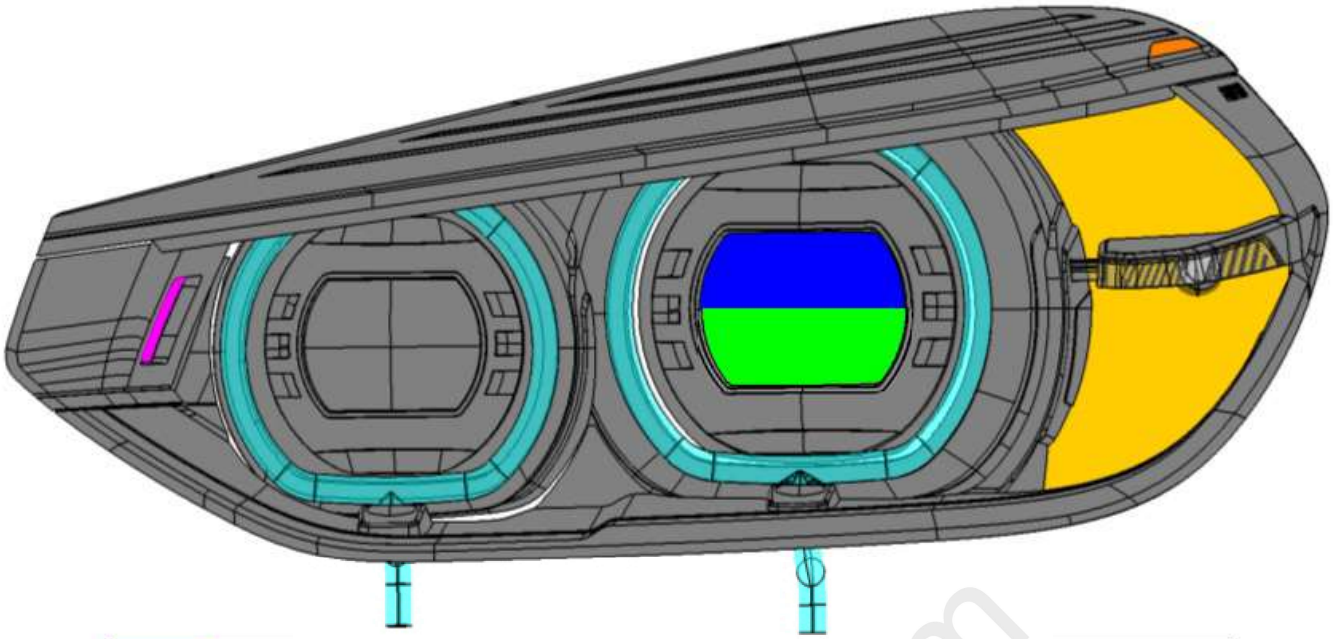
Laser light

Automatically switches on and irrelevant for the statutory vehicle inspection.



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Example G01 - front light combination (optional equipment 5A4)BiLED AHL



	- The cornering light (1) has been illustrated in purple.	1
	- The low-beam headlight (2) has been illustrated in dark blue.	2
	- The high beam (3) has been illustrated in green.	3
	- The daytime driving light (4) has been illustrated in light blue.	4
	- The turn indicator (5) has been illustrated in yellow.	5

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Operations

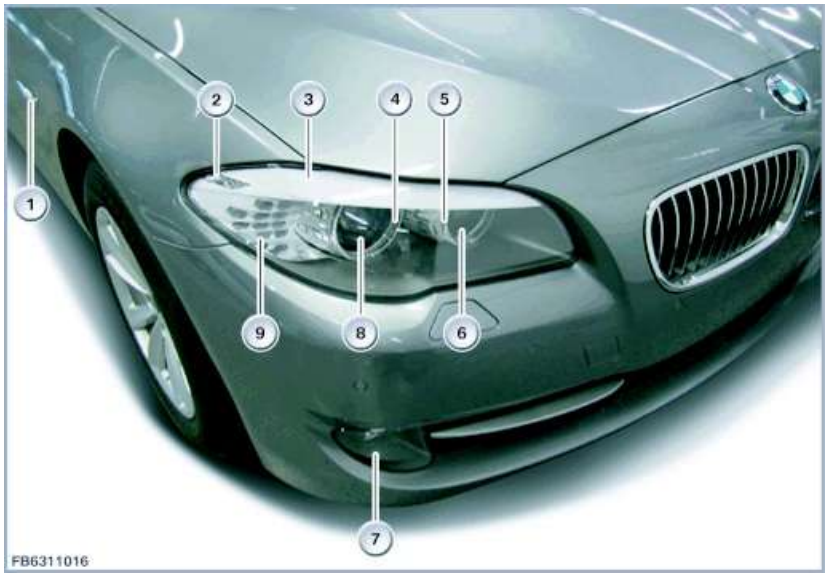
See Chapter 4.1.3.



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Headlight overview

Front headlights



1 **Side panel turn indicator**

2 **Side marker light**

3 **Accent light**

4 **Lighting ring for side lights and daytime driving lights in the low-beam headlight**

5 **Lighting ring for side lights and daytime driving lights in the high-beam headlight**

6 **High beam headlights**

7 **Fog lights**

8 **Bi-xenon headlight for low-beam headlight**

9 **LED turn indicator light**

Headlight condensation

NOTICE

Certain weather conditions can lead to fogging on the inside of the headlight lens.
This is not necessarily a fault that requires replacement of the headlight.



Top row (A): Permissible fogging. **Headlight need not be replaced!**

Bottom row (B): Impermissible fogging. Replace the headlight.

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4.1.6 Headlight cleaning system (if required)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation (if possible).

Fault determination according to EG PTI:

Device not working with gas discharge bulb (xenon headlights) and LED headlight.

Methods according to vehicle manufacturer:

As legally prescribed, BMW installs a headlight cleaning system for xenon and LED headlights as well as laser light. With halogen headlights it depends on the equipment specification of the corresponding vehicle type.

The position of the operating levers for the corresponding vehicle type has been described in Chapter **'6.2.7 Activation units'** of the EG PTI documentation!



The headlight cleaning system is always linked to the window washer system at BMW.

Upon having operated the window washer system five times the headlight cleaning system is automatically started once.

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4.1.5 Self-levelling suspension devices (if required)

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation (if possible) or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Device inoperative.
b)	Manual device cannot be operated from the driver's seat.
c)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer:

The overview graphic illustrates the operation of manual self-levelling suspension. There is no knurled wheel (6) available if the vehicle features automatic self-levelling suspension.

TECHNICAL INFORMATION

Note:
There is no way of switching the control through the electronic interface.

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Self-levelling suspension equipment

Light operating unit



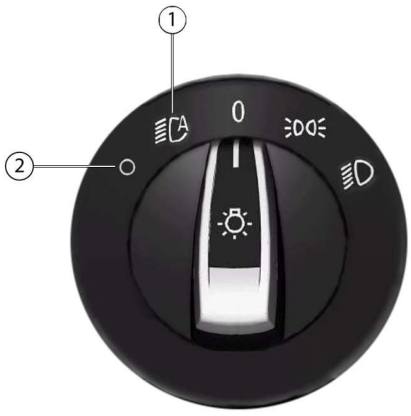
1 Button for rear fog lamp

2 Fog light button

3 Rotary switch for side lights and low-beam headlights

4 Knurled wheel for manual headlight beam throw adjustment

5 Knurled wheel for instrument lighting



Rotary switch for side light and low-beam headlight:

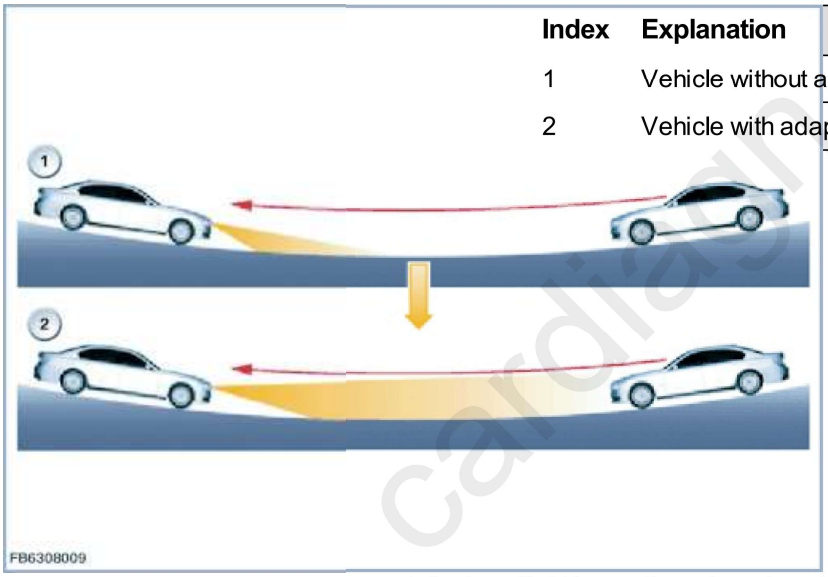
Index	Explanation
1	Switch position 'A' for Adaptive Headlight and automatic driving lights control
2	Indicator light (green LED) for the Adaptive Headlight and automatic driving lights control

Adaptive headlight beam throw adjustment:



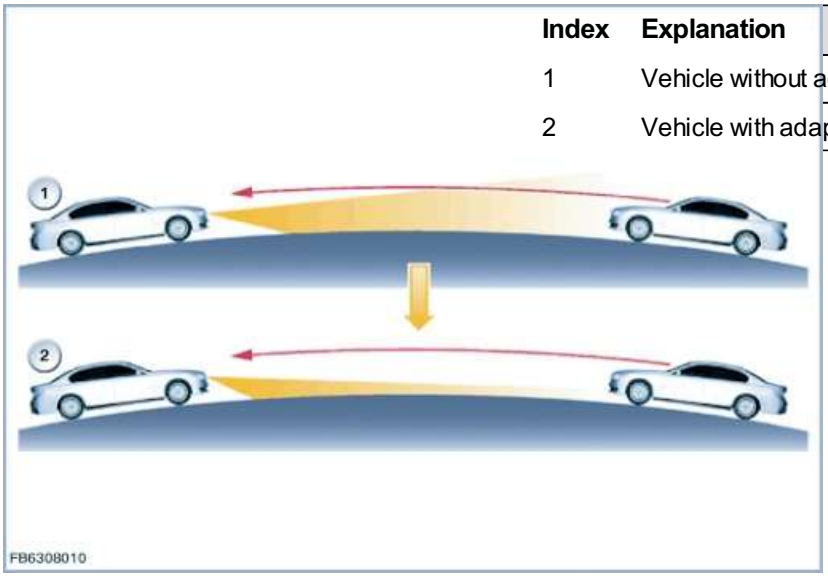
The following graphic shows the light cone's primary motion patterns during operation of the automatic headlight beam throw adjustment.

The adaptive headlight beam throw adjustment is employed when driving through dips and over crests. In accordance with a request from the footwell module (FRM), the headlight driver module activates the swivel module via the stepper motors and in this way adjusts the headlight beam throw. When the vehicle passes through a dip, the headlight beam throw is increased. The swivel module is moved up slightly. The roadway is illuminated a greater distance ahead.



Index	Explanation
1	Vehicle without adaptive headlight beam throw adjustment
2	Vehicle with adaptive headlight beam throw adjustment

When the vehicle passes over a crest, the headlight beam throw is reduced somewhat. The swivel module is moved down slightly. This reduces dazzling effect of an oncoming vehicle.



Index	Explanation
1	Vehicle without adaptive headlight beam throw adjustment
2	Vehicle with adaptive headlight beam throw adjustment

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4.2.1 Rear lights status and function

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation

Fault determination according to EG PTI:

a)	Light source faulty.
b)	Headlight lens/end lens faulty.
c)	Light not attached safely. Very high risk of falling.

Methods according to vehicle manufacturer:

All vehicles are equipped with daytime running lights in the in headlights as standard. Daytime running lights in the rear lights are nevertheless only fitted in certain countries.

There are 2 - 4 rear lights on a vehicle depending on the model.

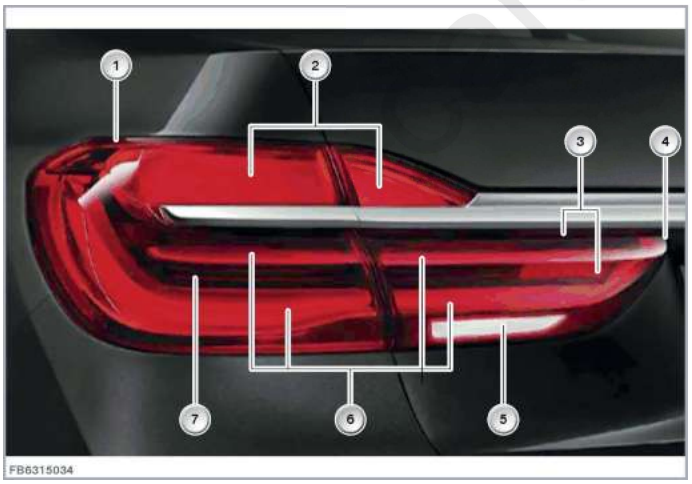
The rear lights have been integrated in pairs into the rear outer vehicle wall on the left and right.

At BMW both rear lights must be the same as a result of the design. The following lighting functions are integrated irrespective of the series:

- Brake light and tail light.
- Turn indicator.
- Side marker light, integrated into the rear light assembly at the outside of the vehicle.
- Reversing light.
- Rear fog light.

Damaged glass panes can be easily identified as part of a visual inspection. It is considerably harder to detect a failure of individual LEDs as part of a visual inspection, however the OBD interface outputs this as an error.

The following section illustrates examples of rear lights for BMW passenger cars, BMW i, MINI passenger cars and ROLLS-ROYCE passenger cars.

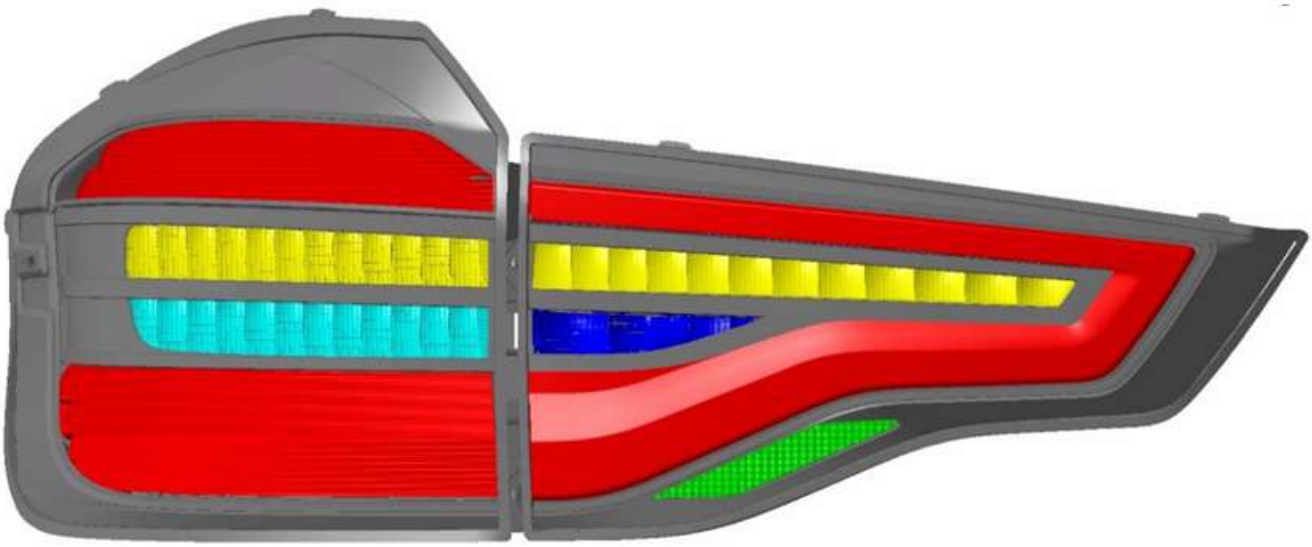


BMW passenger cars:

The graphic below shows a simplified representation of the outer left rear light and the inner left rear light using the G12 as an example.

Index	Explanation	Index	Explanation
1	Rear light, outer left	2	Direction indicator
3	Rear fog light	4	Rear light, inner left
5	Reversing lights	6	Tail light
7	Brake light		

Example of the G01 rear light cluster (OE 552)



	- The tail light (1) has been highlighted in red.	1
	- The turn indicator (2) has been illustrated in yellow.	2
	- The brake light (3) has been illustrated in light blue.	3
	- The reversing light (4) has been illustrated in green.	4
	- The fog light (5) has been illustrated in dark blue.	5

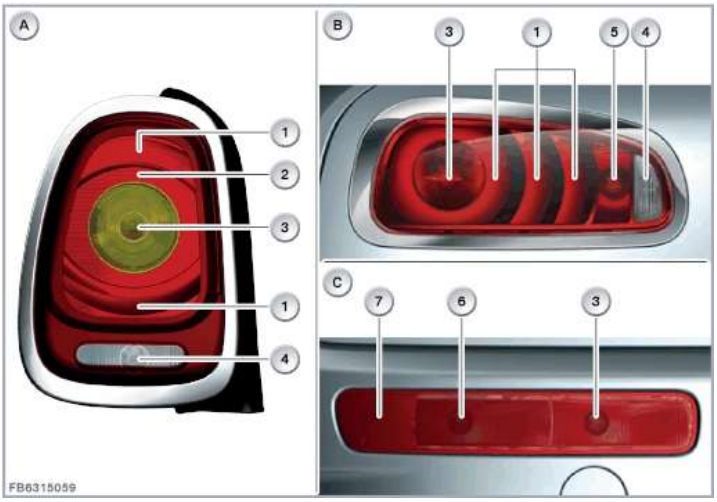
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BMW i:

The following graphic shows the rear lights using the example of I12.

Index	Explanation	Index	Explanation
1	Rear right turn indicator	2	Top right rear light (tail light and brake light)
3	Bottom right rear light (reversing light and rear fog light)	4	Number plate light, right
5	Number plate light, left	6	Bottom left rear light (reversing light and rear fog light)
7	Top left rear light (tail light and brake light)	8	Rear left turn indicator



MINI passenger cars:

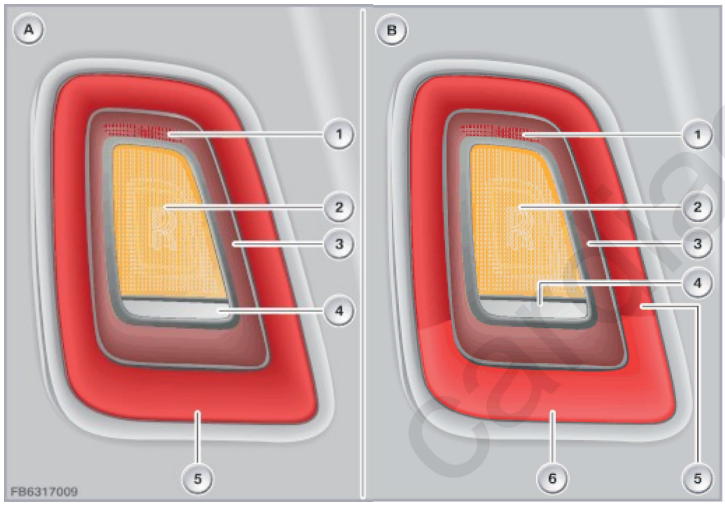
The following graphic shows a simplified representation of the left rear light in combination with LED headlights.

Index	Explanation	Index	Explanation
A	Rear light, outer left	B	Rear light, top left
C	Rear light, bottom left	1	Tail light
2	Brake light	3	Indicator light (turn indicator)
4	Reversing lights	5	Rear fog light
6	Brake light and tail light	7	Reflector

ROLLS-ROYCE passenger cars:

The lighting functions of the rear lights are produced by LEDs.

The following graphic shows a simplified representation of the rear light using the RR12 as an example.



Index	Explanation	Index	Explanation
A	Rear light, shown here: Rear fog light is not activated	B	Rear light, shown here: Rear fog light is activated
1	Rear fog light	2	Indicator light (turn indicator)
3	Reflector	4	Reversing lights
5	Tail light and brake light (light area runs all around when rear fog light is inactive)	6	Tail light (limited light surface when rear fog light is active)
7	Brake light (limited light surface when rear fog light is active)		

The hot monitoring is based on current measurement of the individual bulb outputs. A faulty bulb is detected within approximately 2 s.

4.3.2 Brake lights switch

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Switch cluster function not as per regulations. Delayed operation. No function.
b)	Impaired activation unit function.
c)	System outputs a CC message via the electronic vehicle interface.
d)	Emergency brake light not operating or not operating correctly.

Methods according to vehicle manufacturer

For electronic testing via the diagnostic interface (OBD socket), the read-out routines necessary for the EU testing organisation will be provided.

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4.1.3 Headlamp switch

Validities

BMW PASSENGER CAR, BMW i, MINI PASSENGER CAR, ROLLS-ROYCE

Official method according to EG PTI:

Visual inspection and operation or use of electronic vehicle interface.

Fault determination according to EG PTI:

a)	Switch cluster function not as per regulations (number of simultaneously activated headlights). Maximum permissible light intensity exceeded towards the front.
b)	Impaired activation unit function.
c)	System outputs an error via the electronic vehicle interface.

Methods according to vehicle manufacturer:

The front headlights are switched on using the standard light switch.

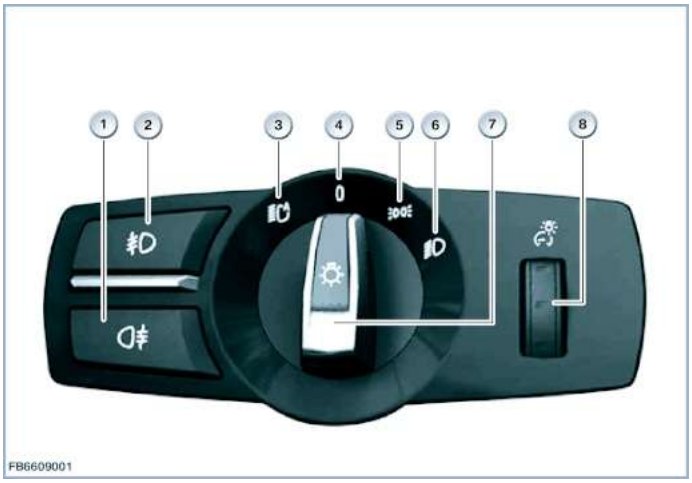
The figures of the light operating units shown here are merely examples and they may deviate in respective vehicle types and vehicle models.



Standard light switch (3) for vehicles with halogen headlights and manual headlight beam throw adjustment.

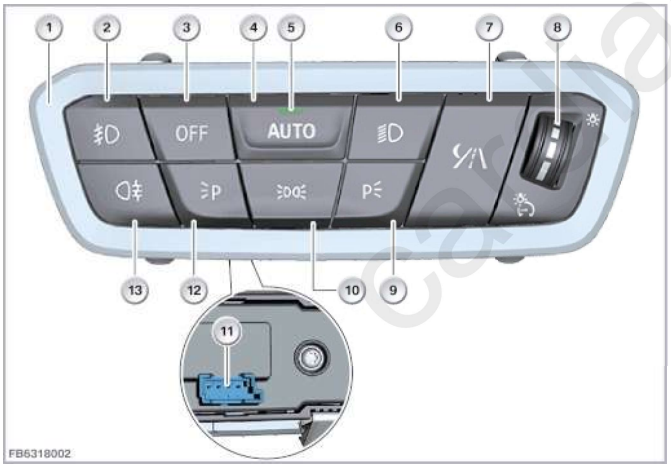
Index	Explanation
1	Front fog light switch
2	Rear fog light switch
3	Light switch (see next graphic for details)
4	Knurled wheel for manual headlight beam throw adjustment
5	Dimmer for instrument lighting

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Standard light switch (7) for vehicles with bi-xenon and automatic headlight beam throw adjustment.

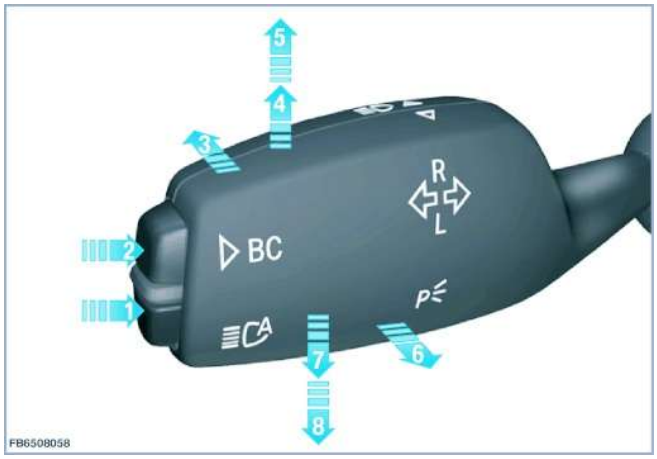
Index	Explanation
1	Rear fog light switch
2	Front fog light switch
3	Position A for automatic driving lights control (optional equipment)
4	Position 0 for daytime driving lights
5	Position 1 for side lights
6	Position 2 for driving lights
7	Light switch
8	Dimmer for instrument lighting



Standard light switch (5) as example X5

Index	Explanation
1	Light operating unit
2	Fog light button
3	OFF button
4	Automatic driving lights control button (AUTO button)
5	Function indicator light for automatic driving lights control
6	Low-beam headlight button
7	Night Vision camera button
8	Knurled wheel for the dimmable instrument lighting
9	Right parking light button
10	Side light button
11	4-pin plug connection
12	Left parking light button
13	Rear fog light button

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The turn signal/high beam switch signal is controlled by the steering column switch cluster (SZL).

Index	Explanation	Index	Explanation
1	FLA button	5	Continuous flashing, right
2	On-board computer button	6	Headlight flasher
3	High-beam headlight	7	One-touch flashing, left
4	One-touch flashing, right	8	Continuous flashing, left

TECHNICAL INFORMATION

Note:

The automatic driving lights control is also active in switch position 0 of the light switch.

For all models with series launch from 02/2015 and depending on the national-market version, automatic driving lights control is also active when the light switch is in switch position 0.

TECHNICAL INFORMATION

A fault check can also be performed using the vehicle's OBD interface.

The location of the OBD interface is described in chapter **'6.2.7 Operating devices'** of the EG PTI documentation.

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4.13 Battery (batteries) 7 series, 8 series

Validities

BMW PASSENGER CAR

Official method according to EG PTI:

Visual inspection

Fault determination according to EG PTI:

a)	Unsafe, incorrectly secured; risk of short circuit
b)	Leakage, escaping hazardous substances
c)	Switch (if required) faulty
d)	Fuses (if required) faulty
e)	Insufficient ventilation (if required)

Methods according to vehicle manufacturer:

For the voltage supply of the low-voltage vehicle electrical system, up to 4 different 12 V batteries (colour in illustration: yellow) are used depending on the vehicle equipment::

- AGM battery
- Auxiliary battery in the engine compartment
- Auxiliary battery in the boot
- Lithium ion battery

For the vehicle electrical system support, an auxiliary battery is used in the engine compartment. For a vehicle with electrical ARS, the two actuators of the anti-roll bars are also supplied by it.

For the voltage supply of the high-voltage on-board power supply the following high-voltage batteries (shown in orange in the representation) are used:

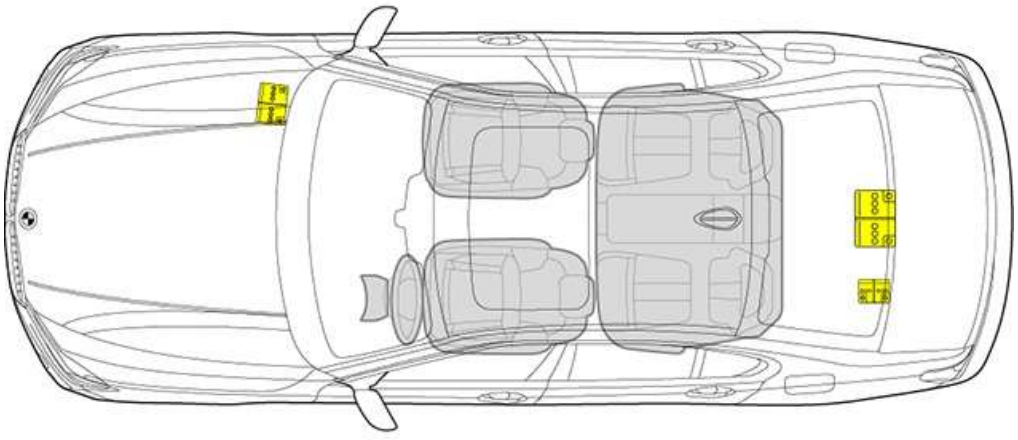
- High-voltage battery

Number of batteries

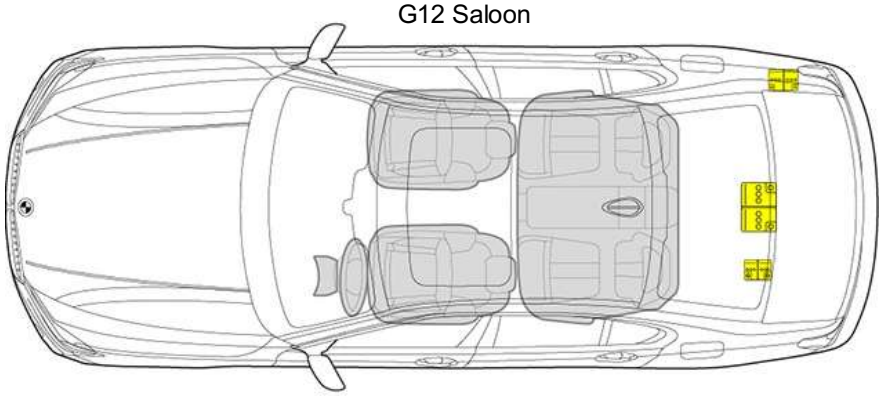
Up to 5 batteries can be used in one vehicle. Due to optional equipment, the number of batteries is variable. A fault is displayed via the corresponding warning light in the instrument cluster.

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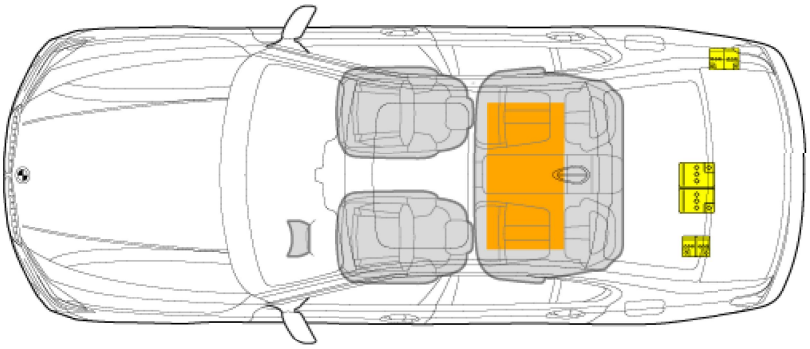
G11 Saloon

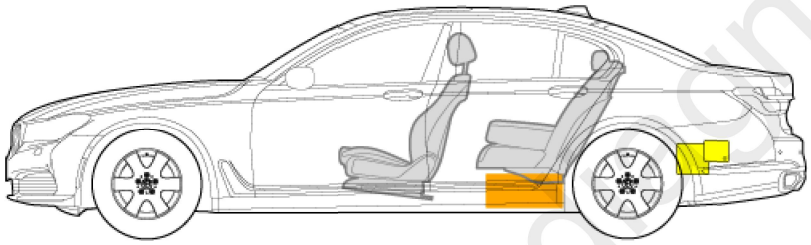


G12 Saloon

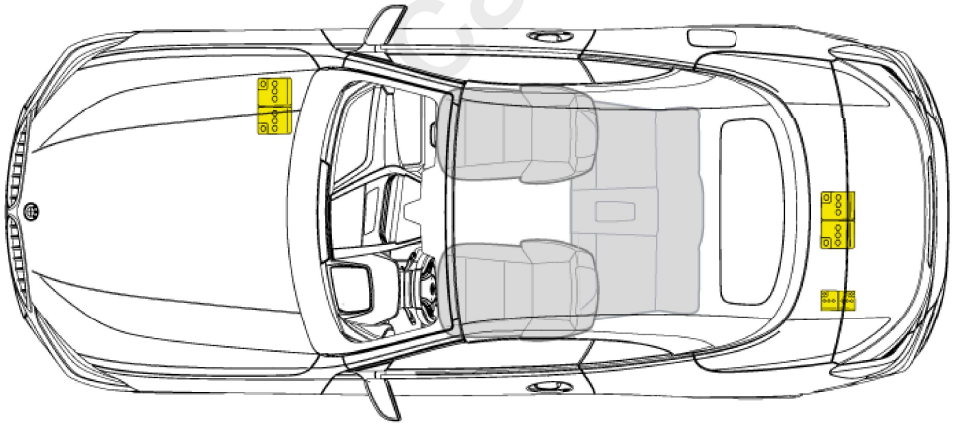


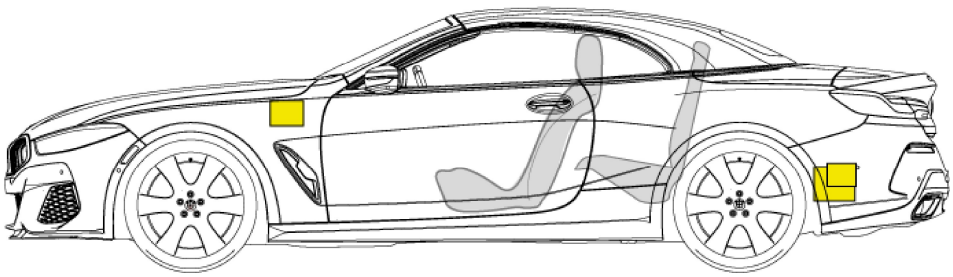
G11, G12 Limousine, Plug-in Hybrid Electric Vehicle



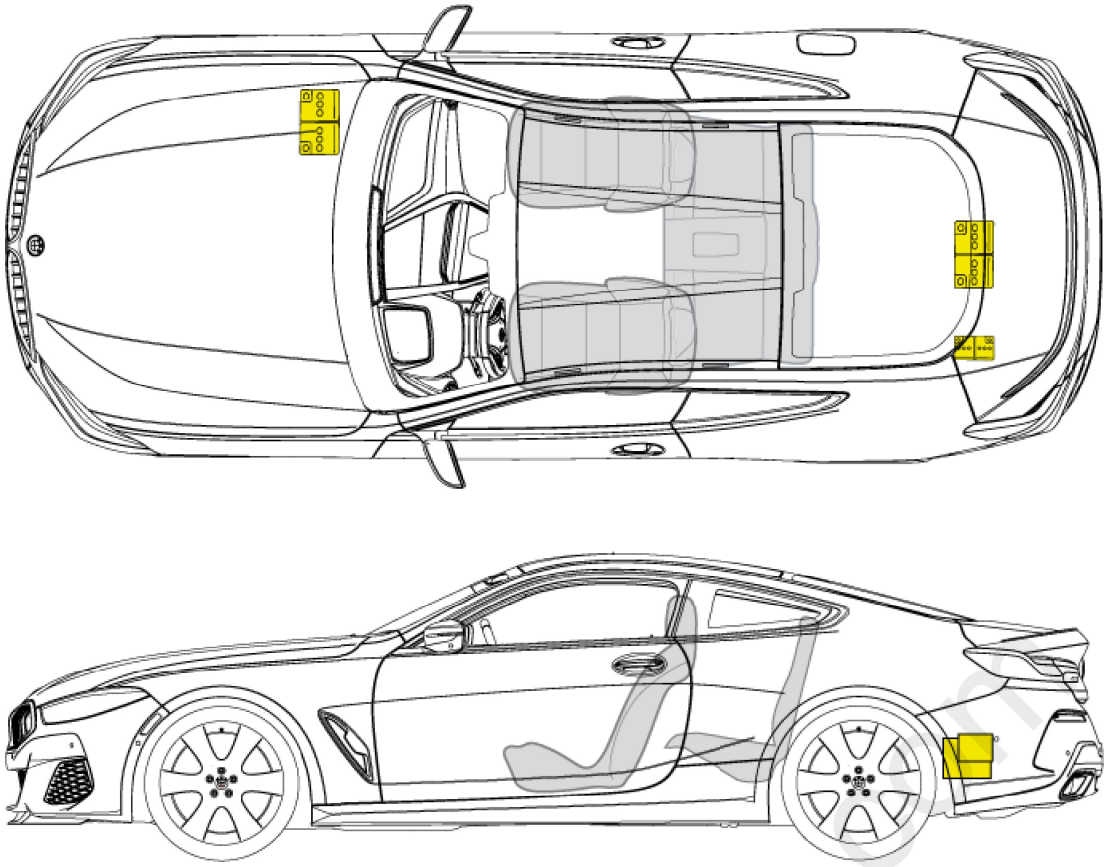


G14 Saloon





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Special design for high-voltage batteries

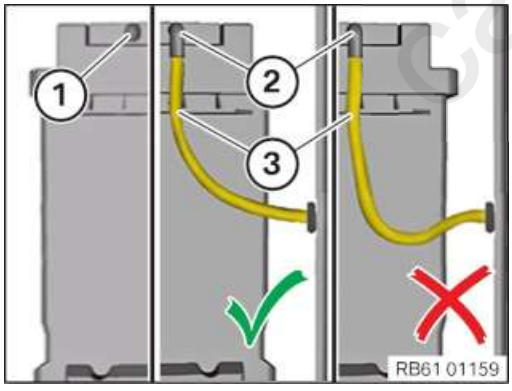
There are no special BMW devices with respect to the high-voltage batteries. There are only standard parts.

Vehicle identification number specific information related to the battery switch [Yes/No]

There is no specific information on the battery switches.

Vehicle identification number specific information related to the battery fuse [Yes/No]

There is no specific information on the battery fuse.



Vehicle identification number specific information related to the battery vent [Yes/No]

A battery has two vent holes (1, 2). One vent hole (1) must be closed correctly with a dummy plug. The vent hose (3) must be connected correctly at the other vent holeÂ (2) .

Vehicle identification number specific information related to the operating principle.

There is no specific information related to the operating principle.

Draw off the contaminated R1234yf refrigerant and dispose of it

Engine **at operating temperature** and switched off.

Draw off the contaminated R1234yf refrigerant and dispose of it

Parts required: See additional information

TECHNICAL INFORMATION

Exclusively apply the following procedure if the A/C service station detects contaminated R1234yf refrigerant prior to drawing off the refrigerant circuit. **Observe national/country-specific regulations.**

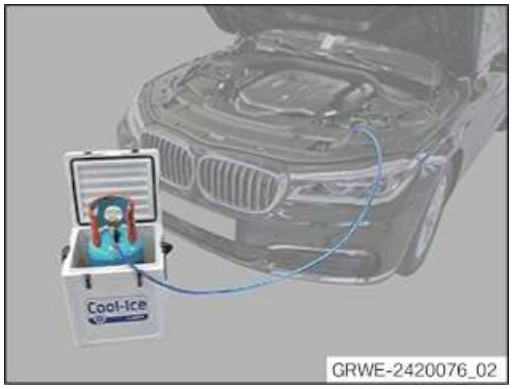
WARNING

Contact with hazardous substances.

Danger of injury!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

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- Observe additional information!
- Position the cool box in front of the vehicle as shown.
- Insert the mounting for the pressure cylinder into the cool box.
- Adjust the position of the pressure cylinder in the cool box.
- Connect the connecting hose at the pressure cylinder valve.
- Open the pressure cylinder valve.
- Run the air conditioning blower at a medium-high level.
- **Put on safety goggles and protective gloves.**
- Connect the connecting hose at the low-pressure connection of the vehicle.
- Prepare operating fluid for cooling (see additional information)
- Fill the cool box with operating fluid for cooling **to the side** of the pressure cylinder and distribute evenly.
- **Do not cover the upper section of the pressure cylinder including the valve with operating fluid for cooling!**
- Open the low-pressure connection in the vehicle.
- Draw off the refrigerant circuit for 30 min.
- Close the low-pressure connection of the vehicle and the valve on the pressure cylinder.
- Remove the connecting hose.
- Place the cool box including pressure cylinder in a location that is as warm as possible to allow the remaining operating fluid for cooling to evaporate.
- Take off protective equipment.
- Remove air conditioning compressor.
- Drain the refrigerant oil from the air conditioning compressor into a measuring cup.
- Take a note of the drained amount of refrigerant oil.
- Dispose of drained refrigerant oil.
- Fill new refrigerant oil that has been approved for the vehicle: capacity = quantity you wrote down + 15 ml
- Install the air conditioning compressor.
- ***Evacuate the refrigerant circuit twice***.
- Fill the refrigerant circuit using R1234yf (amount of refrigerant as per type plate).
- Complete the delivery note and hand over the pressure cylinder to the waste disposal company.

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Additional Information

Links

Special tool service information
Disposal equipment for contaminated R134a / R1234yf refrigerant

Special tool service information
Disposal equipment for contaminated R134a / R1234yf refrigerant

8.1.1 Acoustic insulation system

Validities

BMW i, BMW passenger cars, MINI passenger cars, Rolls-Royce passenger cars

Official method according to EG PTI:

Subjective assessment (unless the tester finds that the noise level is at the limit range, then carry out a noise check at standstill using a noise level measuring device)

Fault determination according to EG PTI:

a)	Noise level exceeds the maximum value specified in the regulations1.
b)	A noise damping system component has come loose, is damaged, has been mounted incorrectly, is missing or has been evidently modified so that the noise level is affected. **Very high risk of the equipment falling off**

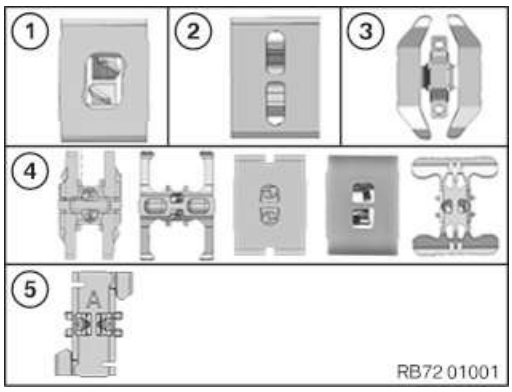
Methods according to vehicle manufacturer:

The information can be found on the registration certificate.

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Overview of the clips and unlocking tools for head airbag fastening

Clips and related release tools



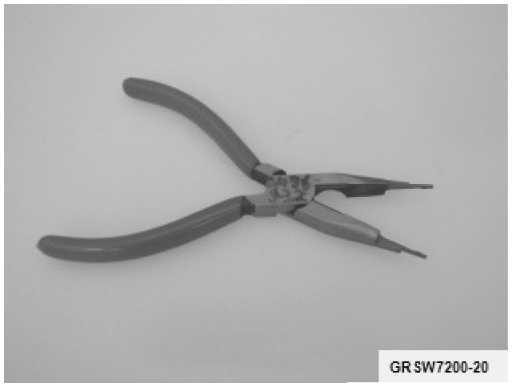
Clips are released with the following release tools:

1. Screwdriver
2. Special tool **0 496 932 (72 0 020)**
3. Long-nose pliers, circlip pliers
4. Special tool **2 456 786**
5. Special tool

Additional Information

Overview of Special Tools

0 496 932 (72 0 020) Release tool



Common	
Usage	Tool to unlock the clips on the head airbag
Included in the tool or work	
Storage location	A34
Replaced by	
In connection with	
SI-Number	01 12 11 (724)

2 456 786 Release tool



Common	
Usage	for releasing the clips on the head airbag, replaces special tool 83 30 2 230 142
Included in the tool or work	
Storage location	C29
Replaced by	
In connection with	
SI-Number	01 13 17 (498)

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Cosmetic repairs on wheel rims

Cost-effectiveness of the repairs has been checked.

Arrangement of wheel rims

Type	Repair options
Cast aluminium wheel	see Point 2
Cast aluminium wheel (machine-polished)	see Point 3
Carbon-fibre wheel rim	see Point 4

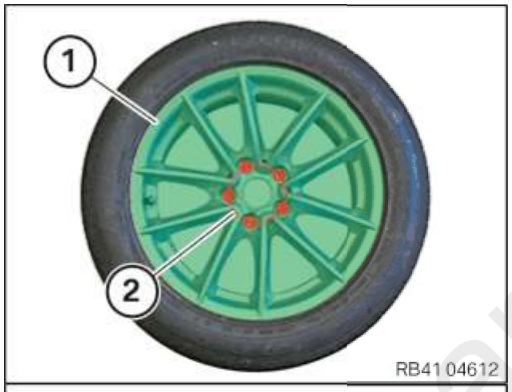
Cast aluminium rim

The rim must be replaced if damaged:

- All types of deformations
- All types of cracks
- All damage deeper than 1 mm of aluminium
- All damages on the inner surface of the wheel rim and in the rim base
- The radial runout and lateral runout prior to preparation exceed the production tolerance of 0.3 mm

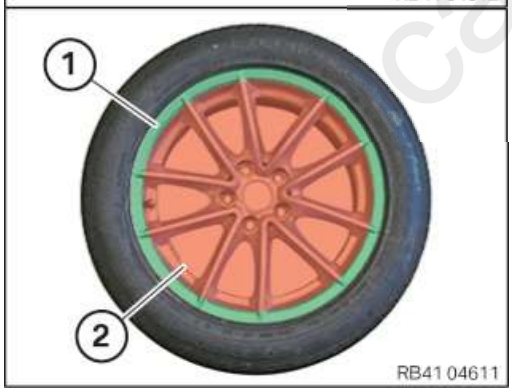
It is possible to repair the following damage:

- Maximum depth of damage to aluminium 1 mm
- The distance of the damage from the outer rim edge must not exceed 30 mm



Paintwork damage in area (1) can be repaired with paintwork.

Paintwork is not permitted in area (2).



In area (1) a repair to the aluminium up to a depth of 1 mm is allowed.

The wheel rim must be replaced if there is damage to the aluminium in area (2).

Repair procedure for cast aluminium wheel rim

1 – Preparing the wheel rim

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- Dismount tyres.
- Clean the aluminium rim with a steam-jet cleaner.
- Dry the aluminium rim.
- Pre-grind the aluminium rim (break sharp edges with a grain P180 grinding wheel).
- Blow off the aluminium rim.
- Clean damaged areas extensively with silicone remover.

General information:



CAUTION

Materials harmful to health.

Health risks in the event of contact with substances that are harmful to health!

- Observe and comply with the Safety Information on the containers and the notes on the manufacturer's safety data sheet.
- Conduct all work in appropriate personal protective equipment only.

Putty S1

Processing time 20 °C	90 min
Processing time 30 °C	60 min
Age-hardening duration 60 °C	60 min
Storage	15 °C ... 25 °C
Durability (note the expiration date on the cartridge)	12 Monate

The barrel can be squeezed out with a commercially available cartridge press. Only use cartridge presses with a piston rod.

2 – Repairing the wheel rim

2 – Prepare surface for application of body filler

- Grind surface to a metallic bright-finish.

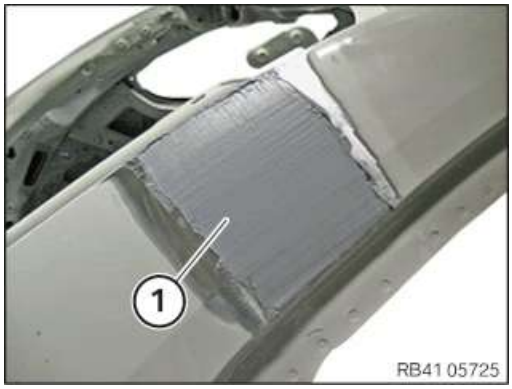
  For steel sheet, use grain 80.

  With aluminium sheet use grain 180.

  The surface must be clean, dry and free from grease.
- Clean surface with solvent cleaner R2 and leave to dry for 5 minutes.
- Clean surface with solvent cleaner R1 and leave to dry for 2-3 minutes.

2 – Apply body filler

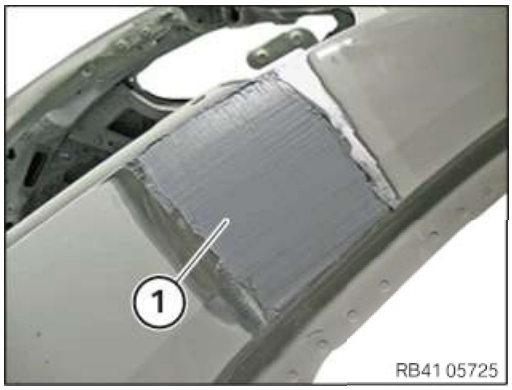
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- Fill area (1) with body filler S1.

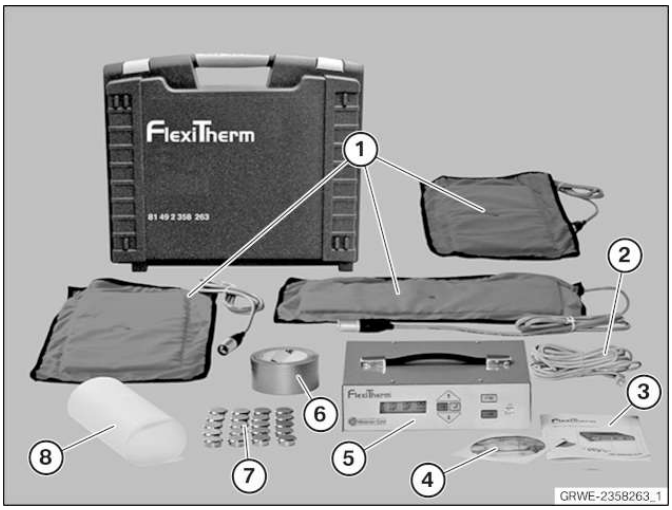
  Apply excess body filler S1.
- If possible, apply body filler S1 in one go to avoid air bubbles.

2 – Cure body filler



- Cure body filler S1.

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TECHNICAL INFORMATION

Optionally, various devices can be used.

- Cure body filler S1 with “FlexiTherm” heater pad system.
- Please comply with instructions in Owner's Handbook.

Select program in the control unit (5).

The control unit autonomously controls and regulates the temperature of each individual heating mat (1).

These are separately activated. The temperature sensor is located on the inside (red side).
The heating mats may only be used in connection with the anti-adhesive paper (8).

For trouble-free temperature measurements, the sensor must always be on the body filler (separated by anti-adhesive paper).

- Cure body filler S1 with infra-red heater.



RISK OF DAMAGE

Damage due to overheating

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler. The thermometers integrated in the infrared radiator only function reliably on large, even surfaces. On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured. This leads to actual surface temperatures of up to 130 °C, although only 70 °C is set on the infrared radiator. When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

- Check the surface temperatures on small component surfaces during the drying process with an external thermometer. The general rule is: The surface temperatures must not exceed 85°C.

- When the infrared heater is used for the first time, the correct distances for the desired temperatures must be determined.

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Switch the infra-red heater on and change the distance until the surface temperature of the body filler no longer changes for a period of 2 min.

Measure temperature using an optical thermometer.

If optical thermometers are used (Epsilon value 0.92-0.95), the heater must be switched off briefly during the measurement.

Record the measurement

- Standard optical thermometers can be used to measure surface temperatures.

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2 – Work body filler

CAUTION

Grinding dust when grinding components.

Hazardous to health!

- Directly draw off the grinding dust.
- Ensure adequate ventilation.
- Conduct all work in appropriate personal protective equipment only.

- Wear a fine dust mask with protection class P2-P3.
- Sand body filler S1 using a machine after cooling to 25 °C.

  Maximum permissible layer thickness after sanding is 5 mm.

  For steel sheet, use grain 80.

  With aluminium sheet use grain 180.
- Pores and faulty spots that become visible after grinding the surface must be closed with polyester filler (BMW Colour system).

  Use a drill bit with Ø40.2 mm. Turn the drill by hand to expand the pores in v shape. by tFill cavities with polyester filler.
- Clean surface with solvent cleaner R2 and leave to dry for 5 minutes.
- Clean surface with solvent cleaner R1 and leave to dry for 2-3 minutes.

3 – Painting the wheel rim

- Pre-grind to apply filler (grain P220 grinding wheel or superfine soft pad).
- Blow off the aluminium rim.
- Clean the aluminium rim with silicone remover.
- Mask the aluminium rim, rim base and contact surface of the hub.
- Mask the rear side of the rim flange.
- Apply the filler.
- Dry the filler.
- Grind the filler (grain P400 grinding wheel).
- Blow off the aluminium rim.
- Clean the aluminium rim with hydro cleaner.
- Mask the screw holes.
- Clean the aluminium rim before applying the base coat.
- Apply the base coat.
- Dry the base coat.
- Apply the clear coat.
- Dry the clear coat.

Cast aluminium wheel rim (machine-polished)

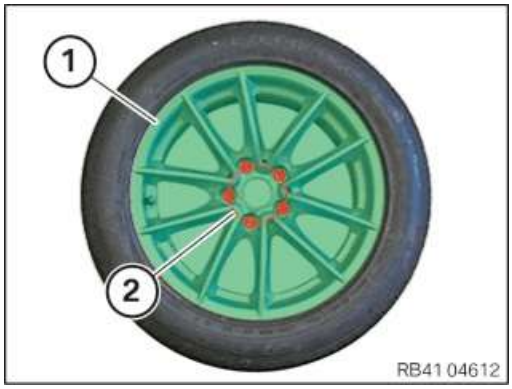
The rim must be replaced if damaged:

- All types of deformations
- All types of cracks
- All damage deeper than 1 mm of aluminium
- All damages on the inner surface of the wheel rim and in the rim base
- The radial runout and lateral runout prior to preparation exceed the production tolerance of 0.3 mm

No cosmetic repairs to aluminium are allowed.

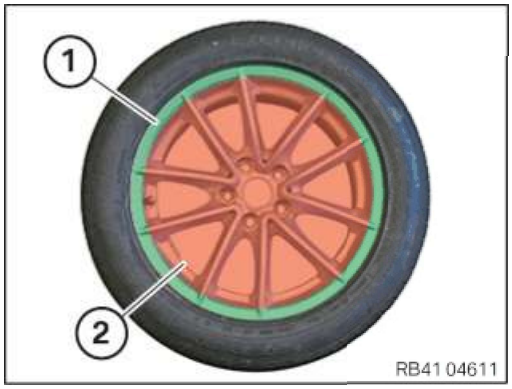
Only the clear coating may be repaired on the entire front side of the wheel rim of diamond polished cast aluminium wheels.

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Paintwork damage in area (1) can be repaired with paintwork.

Paintwork is not permitted in area (2).



In area (1) damage to aluminium up to a depth of 1 mm is permissible.

For technical reasons, the rim must not be replaced.

The wheel rim must be replaced if there is damage to the aluminium in area (2).

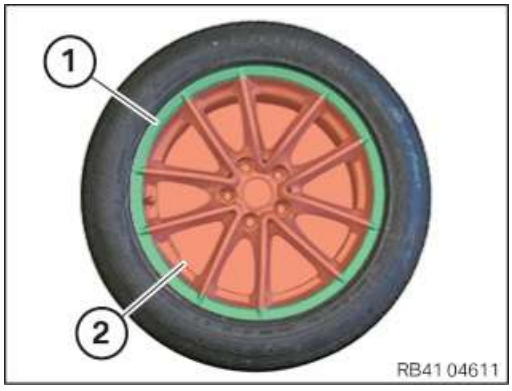
Carbon fibre wheel rims

No cosmetic repairs on carbon fibre wheel rims are permitted.

Assessment of damage to carbon fibre wheel rim

The wheel rim must be replaced in the event of the following damage:

- All types of deformations
- All types of cracks
- All damages greater than 1 mm depth
- The radial run-out and lateral run-out exceed the production tolerance of 0.3 mm

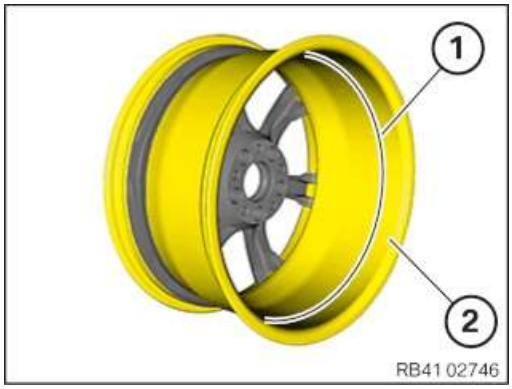


In area (1) damage up to a depth of 1 mm is permissible.

The wheel rim must not be replaced for technical reasons.

The rim will need to be replaced if there is damage in area (2).

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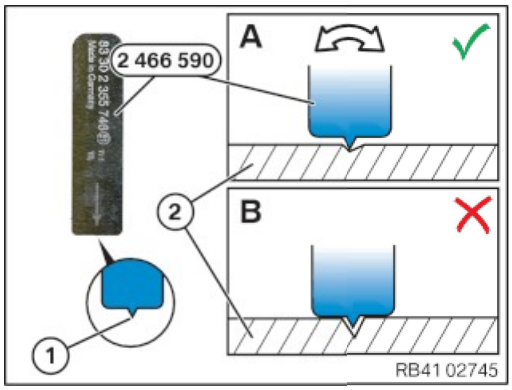
Radial scratches (1) on the interior (2) of the rim are permissible up to a depth of 0.4 mm.

The wheel rim must not be replaced for technical reasons.

The interior of the rim (2) can be coated with temperature-resistant matt paint.

The rim will need replacing if the depth of the scratches exceeds 0.4 mm.

4 – Determining depth of scratch



- Gauge has a test probe (1) with a height of 0.4 mm.
- If the test probe sits up at the deepest point of the scratch (figure A), it can be moved to the left and right. The scratch is less than 0.4 mm deep.
- If the test probe dips so deeply into the scratch that the gauge sits flat (figure B), the scratch is deeper than 0.4 mm and the part is damaged.

Additional Information

Overview of Special Tools

Overview Technical Data

Putty S1

Processing time 20 °C	90 min
Processing time 30 °C	60 min
Age-hardening duration 60 °C	60 min
Storage	15 °C ... 25 °C
Durability (note the expiration date on the cartridge)	12 Monate

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Enclosure 1 to SI 00 13 96 (137), edition 02/2019

These Operating Fluids Specifications show measures that are required for the approval and application in BMW Group vehicles. The operating fluid are listed, sorted by Unified Parts Groups, for all important assemblies. When using operating fluids, make sure that the specification and the manufacturer designations on the container of the particular operating fluid match those of this specification list. These Operating Fluids Specifications include notes and information that is important for you.

All operating fluids have been tested in detail prior to approval on test stands in the laboratory and during test drives to ensure that they can be used without any problems. Only these approved fluids form part of the warranty conditions.

The supplements that are distributed via Service Information sheets render the previous editions invalid. Therefore, an exchange is very important.

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Enclosure 2 to SI 00 13 96 (137), edition 02.2019

The following conditions must be met for the approval of a product:

1. The product must meet the requirements of the BMW Group.
2. The product disclosure must match with regard to specification and manufacturer name.
3. The applicant accepts the approval requirements of the BMW Group with his/her signature.
4. The necessary costs that arise for checking and approving will be billed depending on the work scope (possibly a prorated portion).
5. A flat rate must also be paid if it is merely a matter of publication in the Operating Fluids Specification catalogue.
6. Changes related to company name and address are free of charge.

It will be *added to the Operating Fluids Specification* if the following requirements are met.

1. Only the approved product may be sold under the approved designation.
2. Labelling on the containers and in the documentation must be complete and clear and correspond to the approved operating fluids.
3. All publications must be made in compliance with the regulations on operating fluids by the BMW Group.
4. The BMW Group must be notified of any change in the operating fluid or its name in a timely manner. The approval is void whenever there is a change.
5. The BMW Group can withdraw the approval at any time.
6. No claim can be derived from the approval for obtaining the operating fluid from the BMW Group or their BMW Service Partner.

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00 00 ... Vehicle care measures for inventory vehicles (new and used vehicles) as well as vehicles to be taken off the road that are in the hands of customers

Action	Vehicles	Execution
Remove the protective transportation film	New vehicles	Do not remove the protective film if the vehicle is kept outdoors; Note the instructions on how to remove protective film
Release parking brake	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Engage gear or selector lever position "P" for automatic transmission	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Check the covers of the interior equipment	New vehicles	In general
Increase the tyre pressure to 3.5 bar	New vehicles	In general
	Used vehicles	In general
	Customer	In general

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	vehicles to be taken off the road (note to customers)	
Charge battery	New vehicles	See battery charging calendar
	Used vehicles	See battery charging calendar
	Customer vehicles to be taken off the road (note to customers)	Every 6 weeks; Every 12 weeks for vehicle batteries that have been disconnected from the vehicle electrical system; Notify customers of vehicle-specific procedures for electric or hybrid vehicles
Change the brake fluid and reset CBS	Used vehicles	Change before vehicle handover to customer if service is due shortly (see CBS display -> Brake fluid service)
Check convertible top for potential damage	New vehicles	Generally before handover to the customer
	Used vehicles	Generally before handover to the customer
If possible, keep convertibles in roofed areas	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road	In general

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	(note to customers)	
Check for damage to paint, the exterior or interior	New vehicles	Generally before handover to the customer
	Used vehicles	Generally before handover to the customer
Change engine oil and oil filter at engine operating temperature	New vehicles	No change
	Used vehicles (not applicable to vehicles with Premium Selection certificate)	Prior to handover to customers as from a 12 month immobilisation period
	Customer vehicles to be taken off the road (note to customers)	Prior to handover to customers as from a 12 month immobilisation period
Check coolant composition	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Dry the parking brake and footbrake by applying the brake	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general

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Apply surface protection: vehicle surface wash including interior vehicle cleaning and subsequent paint and chrome-part care. Clean the rubber seals of the flaps and doors and apply talc or rubber care product. Use materials approved by BMW for cleaning and vehicle preservation to recondition engines, engine compartments, vehicle underbodies, axles and assemblies.	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Switch on the air conditioning for approximately 10 min each month	New vehicles	Required to ensure circulation of the refrigerant oil
	Used vehicles	Required to ensure circulation of the refrigerant oil
	Customer vehicles to be taken off the road (note to customers)	Required to ensure circulation of the refrigerant oil

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Enclosure 4 to SI 00 13 96 (137), edition 02.2019

Litres	Gallons (US)	Pints (US)
0,5	0.132	1.056
1.0	0.264	2.113
2,0	0.528	4.226
3,0	0.792	6.339
4,0	1.056	8.452
5.0	1.320	10.565
6,0	1.584	12.678
7,0	1.848	14.791
8,0	2.112	16.904
9.0	2.376	19.017
10,0	2.640	21.130
11.0	2.904	23.243
12,0	3.168	25.356
13.0	3.432	27.469
14,0	3.696	29.582
15,0	3.960	31.695

Litres	Gallons (imp)	Pints (ip)
0,5	0.110	0.880
1.0	0.220	1.760
2,0	0.440	3,520
3,0	0.660	5.279
4,0	0.880	7.039
5.0	1.100	8.799
6,0	1.320	10.559
7,0	1.540	12.319
8,0	1.760	14.078
9.0	1.980	15.838
10,0	2,200	17.598
11.0	2.420	19.358
12,0	2.640	21.118
13.0	2.860	22.877
14,0	3.080	24.637

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15,0	3.300	26.397

Conversion factors

Litre to gallons (imp) x 0.2199	**Litre to gallons (US) x 0.264**
Gallons (imp) to litre x 4.546	Gallons (US) to litre x 3.785
Litre to pints (imp) x 1.759	Litre to pints (US) x 2.113
Pints (imp) to litre x 0.568	Pints (US) to litre x 0.473

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Enclosure 1 to SI 11 07 96 (138), edition 02/2019

The type of engine oil used is a decisive factor when it comes to ensuring proper functioning of and a long service life for an engine.

The engine oil is expected to overcome very wide-ranging tasks under all the operating conditions that may arise.

What is required is not just that the engine is always filled with an adequate oil quantity, but that the quality and viscosity of the oil matches the technical status of the engine and the operating conditions. The requirements made of engine oils depend on the engine design, the operating conditions, the oil service interval and the fuel grade.

A modern engine oil must fulfil a range of tasks that extend far beyond their actual function as a lubricant. The main requirements are:

- *High level of protection against wear and reduction of friction:*

  Friction losses lead to a reduction in the efficiency of engines. They must therefore be kept as low as possible by the engine oil.

  In general, the term wear is used to refer to a wear or surface damage to the frictional partners. High wear values lead either to reduced service life (e.g. bearing, piston ring or cam wear) or to acute malfunctions (seizing marks).

- *Favourable viscosity/temperature characteristics:*

  The viscosity is a measurement for the internal friction of a fluid. The viscosity of engine oil must not be too high when the engine is cold in order to make starting easier, to enable rapid oil supply to the lubricating points and to keep the fuel consumption low. At high temperatures and engine speeds, however, a minimum viscosity is required, in order to minimise contact between the frictional partners by means of an adequately thick lubricating film.

- *High residue-scavenging, cleaning and neutralising capability (good dispersant/detergent effect):*

  While an engine is running, combustion residues and oxidation products (some of which are acidic in nature), as well as abrasion and dirt particles from the intake air find their way into the oil circuit. The engine oil must neutralise the acidic components, prevent the residues from settling and agglomerating and keep sludge and coke deposits on all the engine components lubricated by the oil as low as possible.

- *High thermal stability:*

  There must be no impermissible decomposition and change in viscosity even when the oil is subjected to extreme thermal loading.

- *High oxidation and ageing stability:*

  Oxidation is the absorption of oxygen by the hydrocarbons contained in the oil. Oxidation products change the viscosity, promote corrosion on certain metals and encourage sludge formation. The term oil ageing is used for oxidation as well as any other chemical and physical change of the oil during engine operation.

- *Slight tendency to vaporise:*

  Ay engine oil consists of components with a different volatility. The "apparent" oil consumption due to evaporation of highly volatile compounds must be as low as possible.

- *Favourable foaming characteristics:*

  When the engine is running, the oil is swirled around to a great extent with air. Severe churning leads to lower lubricity and a reduced oil flow rate. The oil should therefore absorb as little air as possible while tend not to form stable foams. After absorbing air, the oil must give it off again immediately.

- *Good corrosion protection:*

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The engine oil must prevent corrosion of engine components not only during engine operation, but also when the vehicle is immobile over a longer period.

- *Unproblematic mixability / compatibility:*

  All engine oils must always be mixable at any ratio, i.e. including **synthetic, mineral oil containing** oils, without causing reactions due to incompatibility. Another prerequisite is the compatibility with all materials covered by the oil, in particular sealing materials, hoses and paints.

- *High thermal conductivity / good cooling capability:*

  The oil also has an important role to play in engine cooling. It must transport heat not only away from the friction points, but also a major proportion of the heat generated during combustion, e.g. by means of oil spray on the pistons and cylinder barrels.

- *Restricted tendency to form combustion residues:*

  When the engine is running, a limited amount of oil inevitably finds its way into the combustion chambers and is combusted there. Residues that build up in the combustion chambers lead to an unwanted increase in compression ratio and encourage auto-ignition.

- *Long shelf life:*

  When stored properly in closed containers, engine oil must be able to be stored for a long time without suffering any reduction in quality.

Not even very good base oils are able to fulfil all these requirements on their own. Oils for today's engine generations therefore contain a high proportion of carefully matched additives. It is these that bestow the required characteristics on the oil.

Initial-running or breaking-in oils

Factory fill oil, i.e. oils that provide extra protection against corrosion and better breaking-in characteristics, are to be regarded as a special case with respect to operation and operating conditions, and are not intended for use in Service.

In engine works a few engines are subject to a hot test. To be able to detect possible oil leakages, fluorescent agent is mixed with the engine oil. This agent causes discolouration of the engine oil. Depending on the mixture ratio the engine oil can take a red colour or green/yellow colour and smell like automatic transmission fluid. The mixing of fluorescent agent has no impact on the consistency and characteristics of the engine oil. The fluorescent agent remains in the engine and is washed out during the first engine oil change.

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Enclosure 2 to SI 11 07 96 (138), edition 02/2019

Depending on the engine and vehicle type, BMW specifies different oil grades. Specifications other than those stated here or terms such as ”Low-viscosity oil, fully synthetic" etc. do not provide any indication about the suitability for use in engines from the BMW Group.

Longlife-01 oils

BMW Longlife-01 engine oils are a minimum requirement for all BMW Group petrol engines without petrol particulate filter from model year 2002 and for BMW Group diesel engines without particulate filter from model year 2003. Aside from that, BMW Longlife-01 engine oils are also permitted for use in older BMW Group engines.

Longlife-01 FE oils

BMW Longlife-01 FE engine oils are released worldwide for all petrol engines without petrol particulate filter as from model year 2002. There is no release for diesel engines.

Longlife-04 oils

BMW Longlife-04 engine oils were developed to guarantee an optimum service life of the diesel particulate filters and petrol particulate filters.

BMW Longlife-04 engine oils are approved worldwide for all diesel engines with and without diesel particulate filter and petrol engines with petrol particulate filters. For petrol engines without petrol particulate filter, BMW Longlife-04 engine oils are only approved for the European region including Norway, Switzerland and Liechtenstein.

Longlife-12 FE oils

BMW Longlife-12 FE engine oils are released for certain BMW Group diesel engines from model year 2014 with the designation 14d, 16d, 18d, 20d and 30d (exception F3x 30d from model year 2019). BMW Longlife-12 FE engine oils are generally permitted for BMW petrol engines with petrol particulate filters. For BMW Group petrol engines without petrol particulate filter from model year 2002, BMW Longlife-12 FE engine oil is only approved for the European region including Norway, Switzerland and Liechtenstein.

Longlife-14 FE+ oil

BMW Longlife-14 FE+ engine oils are only approved for certain BMW Group petrol engines without petrol particulate filter as from model year 2014 in the region of Europe including Norway, Switzerland, Liechtenstein as well as the USA and Canada. There is no release for diesel engines.

Longlife-17 FE+ oil

BMW Longlife-17 FE + engine oils are only permitted for certain BMW Group petrol engines with and without petrol particulate filter from model year 2014. There is no release for diesel engines.

Viscosity classifications

The viscosity is a measurement for the consistency of an engine oil. It is highly dependent on the engine oil temperature, i.e. the higher the temperature, the lower the viscosity. The engine oil temperature in turn depends among other things on the ambient temperature at which the vehicle is operated.

The oil must not be too viscous at low ambient temperatures so that all lubrication points are supplied quickly when the engine is cold. At high engine oil or engine temperatures, the oil must have a certain minimum viscosity in order to generate an adequate lubricating film thickness.

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Modern multigrade oils combine good low temperature properties with adequate lubrication even at high engine oil temperatures. This means that oil changes due purely to different seasons can be avoided through selection of a suitable viscosity class.

When using engine oils as per Enclosure 3 the following rules apply to selecting the suitable viscosity class:

BMW Longlife oils as specified for all BMW models as from 1998 are tested by BMW to ensure that they can be used worldwide all-year round at any ambient temperatures. It is therefore not necessary to pay attention to the viscosity class of BMW longlife oils. Exception M47TÜ2; a lower temperature limit of -20°C applies to SAE 5W-X oils; cold starting may be adversely affected if the temperature falls below that limit. In countries where the ambient temperatures frequently drop below -20 °C, we thus recommend the use of 0W instead of 5W products.

The viscosity classes SAE 0W-20 and SAE 5W-20 are not suitable for diesel engines.

Viscosity classes with a high viscosity can increase fuel consumption.

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Certain properties of the oils can be checked with the help of laboratory tests. However, the performance spectrum of an engine oil cannot be adequately described with this. Numerous tests, e. g. in special test engines, are required in order to obtain adequately reliable information on the performance in the engine under operating conditions.

To assess the engine oil quality, different institutes have created specifications that contain numerous test procedures. For use in BMW Group engines, only the European ACEA* (CCMC)* specification or the API** classification applies. The different requirements of petrol engines for the engine oil are taken into account in the corresponding *test procedures*.

*) ACEA = Association des Constructeurs Européens d'Automobiles (Association of European Automobile Manufacturers) CCMC = Comité des Constructeurs d'Automobiles du Marché Commun (Association of Automobile Manufacturers of the European Market / was replaced by ACEA in 1991)

**) API = American Petroleum Institute

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Enclosure 10 to SI 11 07 96 (138), edition 02/2019

All BMW Group engines are designed such that, when using today's highly developed engine oils, no oil additives are required.

BMW rejects oil additives of any kind. There are also no plans to test them in the future.

Possible consequences and effects caused by the use of oil additives are not the responsibility of the BMW Group.

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Enclosure 3 to SI 11 07 96 (138), edition 02/2019

Colour-coded engine oils are recommended for the respective engine.

3.1 Technically suitable engine oils for petrol engines:

Note:

Viscosity classes with a high viscosity can increase fuel consumption.

Engine	BMW Longlife-01 Please refer to Enclosure 4.	BMW Longlife-01 FE Please refer to Enclosure 5.	BMW Longlife-04 Please refer to Enclosure 6.	BMW Longlife-12 FE Please refer to Enclosure 7.	BMW Longlife-14 FE+ Please refer to Enclosure 8.	BMW Longlife-17 FE+ Please refer to Enclosure 9.	SAE 10W-60 Please refer to Enclosure 10.
2 Cylinder :							
W20	X	X	X (1)				
3 Cylinder :							
B32	X	X					
B36	X	X	X (1)	X (1)	X (5)	X	
B38 without petrol particulate filter(4)	X	X	X (1)	X (1)	X (5)	X	
B38 with petrol particulate filter(4)			X	X		X	
4-cylinder:							
B42	X	X					
B46	X	X	X (1)	X (1)	X (5)	X	
B48, with the SA1AE Flexible Fuel	X	X					
B48 without petrol particulate filter(4)	X	X	X (1)	X (1)	X (5)	X	
B48 with petrol particulate filter(4)			X	X		X	
N12	X	X	X (1)	X (1)			

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N13	X	X	X (1)	X (1)			
N14	X	X	X (1)	X (1)			
N16	X	X	X (1)	X (1)			
N18	X	X	X (1)	X (1)			
N20	X	X	X (1)	X (1)	X (5)	X	
N20, with the SA1AE Flexible Fuel	X	X					
N26	X	X	X (1)	X (1)	X (5)	X	
N40	X	X	X (1)	X (1)			
N42	X	X	X (1)	X (1)			
N43	X	X	X (1)	X (1)			
N45	X	X	X (1)	X (1)			
N46	X	X	X (1)	X (1)			
M43TU	X		X (1)				
M43/CNG			X (1)				
W10	X		X (1)				
W11	X		X (1)				
6-cylinder:							
B58 without petrol particulate filter(4)	X	X	X (1)	X (1)	X (5)	X	
B58 with petrol particulate filter(4)			X	X		X	
N51	X	X	X (1)	X (1)			
N52	X	X	X (1)	X (1)			
N53	X	X	X (1)	X (1)			
N54	X	X	X (1)	X (1)			
N55	X	X	X (1)	X (1)			
N56	X	X	X (1)	X (1)			
M52	X		X (1)				
M54	X		X (1)				
M56	X		X (1)				
S54							X

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S55 without petrol particulate filter[4]	X	X	X [1]	X [1]			
S55 with petrol particulate filter[4]			X	X			
S58 without petrol particulate filter[4]	X	X	X [1]	X [1]			
S58 with petrol particulate filter[4]			X	X			
8-cylinder:							
N62	X	X	X [1]	X [1]			
N63 without petrol particulate filter[4]	X	X	X [1]	X [1]			
N63 with petrol particulate filter[4]			X	X			
M62LEV	X		X [1]				
S62							X
S63 without petrol particulate filter[4]	X	X	X [1]	X [1]			
S63 with petrol particulate filter[4]			X	X			
S65							X
10-cylinder:							
S85							X
12-cylinder:							
N73	X	X	X [1]	X [1]			
N74 without petrol particulate filter[4]	X	X	X [1]	X [1]			

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N74 with petrol particulate filter(4)			X	X			
M73	X		X (1)				
Other engines:							
Other AG engines(2)	X		X (1)				
Other M engines(3)	X		X (1)				X

1) For petrol engines, only BMW Longlife-04 and BMW Longlife-12 FE oils are permitted in Europe (EU plus Switzerland, Norway and Liechtenstein). They must not be used outside this area.

2) ”Others” includes all AG engines/models which are not listed in the above table, for example M10, M20, M30, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, etc.

3) ”Others” includes all Motorsport engines/models which are not listed in the above table, for example S14, S38, S50, S50U, S52, S70, etc.

4) Vehicles with a petrol engine and petrol particulate filter can be identified on the vacuum hose, which is installed on the petrol particulate filter, as well as on the optional equipment SA1DEA RDE exhaust emissions standard.

5) BMW Longlife-14 FE+ oils are only approved for petrol engines in Europe (EU plus Switzerland, Norway and Liechtenstein), USA and Canada. They must not be used outside this area.

3.2 Technically suitable engine oils for diesel engines:

Engine	BMW Longlife-01 Please refer to Enclosure 4.	BMW Longlife-04 Please refer to Enclosure 6.	BMW Longlife-12 FE Please refer to Enclosure 7.	SAE 10W-60 Please refer to Enclosure 10.
3 Cylinder :				
B37C15K0		X	X	
B37C15U0		X	X	
B37D15K0		X	X	
B37D15U0		X	X	
B37C15K1		X	X	
B37C15U1		X	X	
4-cylinder:				
B47C20U0		X	X	
B47C20O0		X	X	
B47C20T0		X		
B47D20K0		X	X	
B47D20U0		X	X	
B47D20O0		X	X	
B47D20T0		X		

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B47C20T1		X		
B47C20U1		X	X	
B47C20O1		X	X	
B47D20U1		X	X	
B47D20O1		X	X	
B47D20T1		X		
N47 uL; N47 oL		X		
N47 S (5)				X
N47 S (5) (from 9/08)		X		
N47C16K1		X	X (6)	
N47C16U1		X	X (6)	
N47C20K1		X	X (6)	
N47C20U1		X	X (6)	
N47D16U1		X	X (6)	
N47D16K1		X	X (6)	
N47D20K1		X	X (6)	
N47D20U1		X	X (6)	
N47D20O1		X	X (6)	
N47D20O1 US		X	X (6)	
N47D20T1		X		
M41	X	X		
M47, M47TU (5)	X	X		
M47TU (5) (from 03/03)	X	X		
M47TU2 (1), (5)	X (3)	X		
W16D16		X		
W17D14	X	X		
6-cylinder:				
B57D30O0		X	X	
B57D30T0		X		
B57D30S0		X		
N57		X		
N57N		X		
N57X		X		
N57D30O1		X		

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N57D30O1 US		X	X [6]	
N57D30T1		X		
N57D30S1		X		
M21	X	X		
M51	X	X		
M57	X	X		
M57TU [5] (from 09/02)	X	X		
M57TU [5] (E60, E61 from 03/04)	X [2]	X		
M57Top [5] (from 09/04)		X		
M57TU2 [5] (from 03/05)	X [4]	X		
M57TU2Top [5] (from 09/06)		X		
8-cylinder:				
M67 (E38)	X	X		
M67 (E65)	X	X		
M67TU (from 03/05)	X [4]	X		

1) In countries where the ambient temperature frequently falls below --20 °C, we recommend the use of 0W instead of 5W products.

2) To increase the service life of the diesel particle filter, Longlife-04 oils are recommended as soon as they available.

3) Can be used on vehicles without DPF.

4) Recommended for vehicles without DPF and for non-EU countries.

5) TU2 = T2 / TOP = S

6) Valid as from model year 2014

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4.0 BMW Longlife-01

BMW Longlife-01 engine oils are a minimum requirement for all BMW Group petrol engines without petrol particulate filter from model year 2002 and for BMW Group diesel engines without particulate filter from model year 2003. Aside from that, BMW Longlife-01 engine oils are also permitted for use in older BMW Group engines.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 5W-30

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine Oil LL-01 5W-30	1000 ml,TU	83 21 2 405 947**	83 21 2 405 947**	83 21 2 405 947**	83 21 2 405 947**
MINI Engine Oil LL-01 5W-30	1000 ml,TU	83 21 2 406 986**	83 21 2 406 986**	83 21 2 406 986**	83 21 2 406 986**
MINI Original Engine OilLL-01 5W-30	1 litre	83 21 2 466 455	83 21 2 465 860	83 21 2 465 867	83 21 2 465 844*
BMW TwinPower Turbo LL-01 5W-30	1 litre	83 21 2 466 454	83 21 2 465 859	83 21 2 465 866	83 21 2 465 843*
BMW TwinPower Turbo LL-01 5W-30	5 litre	---	---	83 21 2 465 868	---
BMW GroupLL-01 5W-30	1000 litres Ibc	---	---	---	83 21 2 465 846*
BMW GroupLL-01 5W-30	209 litres	83 21 2 466 456	83 21 2 465 861	83 21 2 465 869	83 21 2 465 845*
BMW GroupLL-01 5W-30	Fuel tank	---	83 21 2 465 862	---	83 21 2 465 847*

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* Please order from **www.markethub.shell.com** or contact your local Shell partner.

** TU = trade unit. TU numbers cannot be ordered! Only for invoicing purposes!

*** Only in South Korea

**** Only in Japan

Please order from www.markethub.shell.com or contact your local Shell partner.
TU = trade unit. TU numbers cannot be ordered! Only for invoicing purposes!
Only in South Korea.
Only in Japan

MINI Engine Oil LL-01 5W-30 SAE 5W-30

83 21 2 406 986**

Trade name	BMW part number	Container
MINI Original Engine Oil LL-01 5W-30		1 litre

BMW Engine Oil LL01 5W30 SAE 5W-30

83 21 2 405 947**

Trade name	BMW part number	Container
BMW TwinPower Turbo LL-01 5W-30		1 litre
BMW TwinPower Turbo LL-01 5W-30		5 litre

BMW Engine Oil LL01 5W30 SAE 5W-30

83 21 2 405 947**

Trade name	BMW part number	Container
BMW GROUP LL-01 5W-30		1000 litres Ibc
BMW GROUP LL-01 5W-30		209 litres
BMW GROUP LL-01 5W-30		Fuel tank

Named approved oils

Trade name	Viscosity	Producer
Addinol Eco light	SAE 5W-40	Addinol Lube Oil GmbH
Addinol Super Light 0540	SAE 5W-40	Addinol Lube Oil GmbH
ADDINOL Super power MV 0537	SAE 5W-30	Addinol Lube Oil GmbH
AKTUAL FULLY SYNTH	SAE 5W-40	Petronas Lubricants International
AREXONS 3x B4	SAE 5W-40	Petronas Lubricants International
AVENO FS Excellence	SAE 0W-40	Deutsche Ölwerke Lubmin GmbH
AVENO FS Select	SAE 5W-30	Deutsche Ölwerke Lubmin GmbH
Aral HighTronic M	SAE 5W-40	Aral
Aral HighTronic M	SAE 5W-40	Aral AG
Aral SuperSynth	SAE 0W-40	Aral
Aral SuperSynth	SAE 0W-40	Aral AG
Aral SuperTronic G	SAE 0W-40	Aral AG
BNO Diamond 5W-40 SN	SAE 5W-40	Lub-rref (Bangladesh) Ltd.
BOOSTER 600 PLUS	SAE 5W-40	Additive Products (M) SDN BHD
BP Super V Plus	SAE 5W-40	BP Oil International
BP Super V Plus	SAE 5W-40	BP Plc
BP Visco 5000	SAE 5W-40	BP Oil International
BP Visco 5000	SAE 5W-40	Castrol Limited
BP Visco 5000	SAE 5W-30	BP plc
BP Visco 5000	SAE 5W-30	BP Plc
BP Visco 5000	SAE 5W-40	BP Plc
Biloxxi	SAE 5W-30	MCC Trading Deutschland GmbH
CEPSA GENUINE 5W40 SYNTHETIC	SAE 5W-40	CEPSA Comercial Petroleo S.A.U
Castrol Edge 0W-30 A3/B4	SAE 0W-30	Castrol Limited
Castrol Edge Professional A3	SAE 0W-30	Castrol Limited
Castrol Edge Professional LL01	SAE 0W-30	Castrol Limited
Castrol Edge Professional LL01	SAE 5W-40	Castrol Limited
Castrol EDGE Supercar 0W-40	SAE 0W-40	Castrol Limited

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A3/B4		
Castrol Edge 0W-30 A3/B4	SAE 0W-30	Castrol Limited
Castrol Edge 0W-40 A3/B4	SAE 0W-40	Castrol Limited
Castrol Edge 5W-30 A3/B4	SAE 5W-30	Castrol Limited
Castrol Edge 5W-40 A3/B4	SAE 5W-40	Castrol Limited
Castrol Edge 5W-40 SN	SAE 5W-40	Castrol Limited
Castrol Edge Professional A3	SAE 0W-40	Castrol Limited
Castrol Edge Professional A3	SAE 5W-40	Castrol Limited
Castrol Edge Professional A3	SAE 0W-30	Castrol Limited
Castrol Edge Professional A3	SAE 5W-30	Castrol Limited
Castrol Edge Professional LL01	SAE 5W-30	Castrol Limited
Castrol Edge Professional LL01	SAE 0W-30	Castrol Limited
Castrol Edge Professional LL01	SAE 0W-40	Castrol Limited
Castrol Edge Professional LL01	SAE 5W-40	Castrol Limited
Castrol Edge Professional OE	SAE 5W-40	Castrol Limited
Castrol Edge SAE 5W-40 US version	SAE 5W-40	Castrol Limited
Castrol GTX 5W-40 A3/B4	SAE 5W-40	Castrol Limited
Castrol GTX High Mileage	SAE 5W-40	Castrol Limited
Castrol GTX Professional A3	SAE 5W-30	Castrol Limited
Castrol Magnatec 5W-30 A3/B4	SAE 5W-30	Castrol Limited
Castrol Magnatec 5W-40 A3/B4	SAE 5W-40	Castrol Limited
Castrol Magnatec Professional A3	SAE 5W-30	Castrol Limited
Castrol Magnatec Professional A3	SAE 5W-40	Castrol Limited
Castrol Magnatec stop-start 5W-30 A3/B4	SAE 5W-30	Castrol Limited
Charger Xtreem	SAE 5W-40	Bahrain Petroleum Company
Divinol Syntholight	SAE 0W-40	Zeller + Gmelin
Drive Power 37 +	SAE 5W-40	Additive Products (M) SDN BHD
ELF Evolution 900	SAE 5W-40	TOTAL Lubrifiants
ELF Evolution 900 FT	SAE 5W-40	TOTAL Lubrifiants
ELF Evolution 900 FT	SAE 0W-40	TOTAL Lubrifiants
ELF Evolution 900 Turbo	SAE 5W-40	TOTAL Lubrifiants
ENERGY RELEASE 5W-40 RS (ER 5W-40 RS)	SAE 5W-40	DKR PETROLEUM CO., LTD.
Eni i-Sint	SAE 5W-40	Eni S.p.A.
Eurol Synergy	SAE 0W-40	Eurol BV
FASTRON GOLD	SAE 5W-40	Pt. Pertamina LUBRICANTS
FK European version	SAE 5W-40	Ban Hon International Co., Ltd.
FK European version	SAE 0W-40	Ban Hon International Co., Ltd.
FUCHS TITAN Supersyn LONGLIFE	SAE 5W-40	FUCHS PETROLUB SE
FUCHS TITAN Supersyn LONGLIFE	SAE 0W-40	FUCHS PETROLUB SE
Feu Vert	SAE 5W-40	Motul
G-Energy F Synth	SAE 5W-30	Gazpromneft-lubricants Ltd
G-Energy Service Line MS	SAE 5W-30	Gazpromneft-lubricants Ltd
GALP FORMULA ENERGY 5W40	SAE 5W-40	PETROGAL S.A.
GD 7.1	SAE 5W-40	Additive Products (M) SDN BHD

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GT-1® Euro Motor Oil	SAE 5W-30	Kendall Motor Oil
GT-1® Euro Motor Oil	SAE 5W-40	Kendall Motor Oil
Gulf Formula GX	SAE 5W-40	Gulf Oil International
Gulf Formula GX	SAE 5W-30	Gulf Oil International
Gulf Formula GX	SAE 0W-40	Gulf Oil International
Gulf Formula S	SAE 5W-40	TOTAL Lubrifiants
HPR 5	SAE 5W-40	Penrite Oil Company Pty Ltd.
Havoline Fully Synthetic E	SAE 0W-40	Chevron Lubricants
Havoline Pro DS Fully Synthetic	SAE 0W-40	NV CHEVRON BELGIUM
Havoline Pro DSFull Synthetic Motor Oil	SAE 5W-40	NV CHEVRON BELGIUM
Havoline ProDS Fully Synthetic	SAE 5W-40	Chevron Global Lubricants
Havoline Synthetic	SAE 5W-40	Chevron Lubricants
Havoline Synthetic Engine Oil	SAE 5W-40	Chevron Global Lubricants
Havoline Ultra	SAE 5W-40	Chevron Lubricants
INA Ultra Sint	SAE 5W-30	INA Maziva Ltd.
LUBREX VELOCITY NANO PLUS	SAE 5W-40	LUBREX FZC
LUKOIL GENESIS ARMORTECH	SAE 5W-40	OOO LLK-International
LUKOIL GENESIS POLARTECH	SAE 0W-40	OOO LLK-International
LUKOIL GENESIS SPECIAL	SAE 0W-40	OOO LLK-International
LUKOIL GENESIS SPECIAL POLAR	SAE 0W-40	OOO LLK-International
Leichtlauf High Tech LL	SAE 5W-30	LIQUI MOLY GmbH
Liqui Moly Leichtlauf High Tech	SAE 5W-40	Liqui Moly GmbH
Liqui Moly Pro-Engine M900	SAE 5W-40	Liqui Moly GmbH
Liqui Moly Special Tec LL	SAE 5W-30	Liqui Moly
Lotos Syntetic Plus	SAE 5W-40	Lotos Oil
Mol Dynamic Synt	SAE 5W-30	MOL-LUB Lubricant Ltd.
MOTOREX XPERIENCE FS-X	SAE 0W-40	BUCHER AG LANGENTHAL
MOTUL 6100 SYN-NERGY	SAE 5W-30	MOTUL
MOTUL 8100 X-MAX	SAE 0W-40	Motul S.A.
Meisteröl LL	SAE 5W-30	Epro GmbH
Midland synqron	SAE 5W-40	Oel-Brack AG
Miocar MX Syntra	SAE 5W-40	Migros Genossenschafts Bund
Mobil 1 Formula	SAE 0W-40	ExxonMobil
Mobil Formula X2	SAE 5W-40	ExxonMobil
Mobil Super 3000 Formula B	SAE 5W-40	ExxonMobil
Mobil Super 3000 X1	SAE 5W-40	ExxonMobil
Mobil Super 3000 X1	SAE 5W-40	Exxon Mobil
Mobil Super 3000 X2	SAE 5W-40	ExxonMobil
Mobil Super Synthetic Euro	SAE 5W-40	ExxonMobil
Mobil Super Synthetic Formula B	SAE 5W-40	ExxonMobil
Motul 6100 ECO FLEX	SAE 5W-30	Motul S.A.
Motul 6100 Flexmax	SAE 5W-30	Motul S.A.
Motul 6100 Flexmax	SAE 5W-30	Motul SA
Motul 8100 X-CESS	SAE 5W-30	MOTUL
Motul 8100 X-CESS	SAE 5W-40	MOTUL
Motul 8100 X-cess	SAE 5W-40	Motul S.A.
Motul Expert M	SAE 5W-40	Motul S.A.
Motul Specific LL-01	SAE 5W-30	Motul SA

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Motul Synergie	SAE 5W-40	Motul S.A.
OLEOBLITZ PULSAR C.R.	SAE 5W-40	Petronas Lubricants International
Omera Lube 1	SAE 5W-40	MJL Bangladesh Ltd.
PENTOSPEED SUPER PERFORMANCE	SAE 5W-40	FUCHS SCHMIERSTOFFE GMBH
PETRONAS SYNTIUM 3000	SAE 5W-40	Petronas Lubricants International
Pennzoil Platinum Euro	SAE 5W-30	Shell International Petroleum Company
Pennzoil Platinum Euro	SAE 5W-40	Shell International Petroleum Company
Pennzoil Platinum Euro	SAE 5W-30	Shell International Petroleum Co.Ltd.
Pennzoil Platinum Euro	SAE 5W-40	Shell International Petroleum Co.Ltd.
Pennzoil Ultra Euro	SAE 5W-40	Shell International Petroleum Company
Pennzoil Ultra Euro 5W-40 Full Synthetic Motor Oil	SAE 5W-40	Shell International Petroleum Company
Petronas Syntium 7000	SAE 0W-40	Petronas
Professional Series Full Synthetic Motor Oil	SAE 5W-40	Red Line Synthetic Oil
QS Ultimate Durability European	SAE 5W-40	Shell International Petroleum Company
QS Ultimate Durability European	SAE 5W-30	Shell International Petroleum Company
Quaker State Ultimate Durability European	SAE 5W-40	Shell International Petroleum Co.Ltd.
Ravenol HCL	SAE 5W-30	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL HST	SAE 5W-40	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL RSP	SAE 5W-30	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL Super Synthetik Öl SSL	SAE 0W-40	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL VollSynth Turbo VST	SAE 5W-40	Ravensberger Schmierstoffvertrieb GmbH
REPSOL ELITE COMMON RAIL	SAE 5W-30	REPSOL LUBRICANTES Y ESPECIALIDADES S.A
REPSOL ELITE COMPETICION	SAE 5W-40	REPSOL LUBRICANTES y ESPECIALIDADES S.A
REPSOL ELITE COSMOS HIGH PERFORMANCE	SAE 0W-40	REPSOL LUBRICANTES Y ESPECIALIDADES S.A
REV-1 TITANIUM	SAE 0W-40	Spare-Parts Zone Pte Ltd
ROWE HIGHTEC SYNT RS HC-D	SAE 5W-40	ROWE MINERALÖLWERK GMBH
Repsol Elite Common Rail	SAE 5W-30	Repsol YPF
Repsol Elite Competicion	SAE 5W-40	Repsol YPF
SINOPEC JUSTAR J700F Premium	SAE 5W-30	SINOPEC LUBRICANT CO.,LTD.
SPC SYN ACE SUPREME API SN	SAE 5W-40	Singapore Petroleum Company Ltd.
SRS ViVA 1 ecosynth plus	SAE 0W-40	SRS Schmierstoff Vertrieb GmbH
SRS ViVA 1 Longlife	SAE 5W-30	SRS Schmierstoff Vertrieb GmbH
SRS ViVA 1 topsynth	SAE 5W-40	SRS Schmierstoff Vertrieb GmbH

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SRS ViVA 1 topsynth plus	SAE 5W-40	SRS Schmierstoff Vertrieb GmbH
SRS Viva 1 Longlife	SAE 5W-30	SRS Schmierstoff Vertrieb GmbH
STAR GOLD	SAE 5W-40	Orlen Oil Sp. z o.o.
STAR SYNT S	SAE 5W-40	Orlen OilSp z o.o.
Shell Helix HX6	SAE 5W-40	Shell International Petroleum Company
Shell Helix Ultra	SAE 5W-30	Shell International Petroleum Company
Shell Helix Ultra	SAE 5W-40	Shell International Petroleum Company
Shell Helix Ultra	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra	SAE 5W-40	Shell International Petroleum Co.Ltd.
Shell Helix Ultra Professional ABB	SAE 5W-40	Shell International Petroleum Company
Shell Helix Ultra Professional ABB	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra Professional ABB	SAE 5W-40	Shell International Petroleum Co.Ltd.
Shell Helix Ultra Professional AM	SAE 5W-40	Shell International Petroleum Company
Shell Helix Ultra X	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra l	SAE 5W-30	Shell International Petroleum Company
Shell Helix Ultra l	SAE 5W-40	Shell International Petroleum Company
Shell Helix Ultra l	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra l	SAE 5W-40	Shell International Petroleum Co.Ltd.
Shield® Euro-Tech Motor Oil	SAE 5W-40	Phillips 66 Company
Shield® Euro-Tech Motor Oil	SAE 5W-30	Phillips 66 Company
Swd Rheinol Primus CVS	SAE 5W-30	Swd Lubricants GmbH & Co.KG
Swd Rheinol Primus VS	SAE 0W-40	Swd Lubricants GmbH & Co.KG
SynPower engine oil	SAE 5W-30	Valvoline EMEA
SynPower engine oil	SAE 5W-40	Valvoline
Synthetic PC	SAE 5W-30	eni S.p.A.
TNK Magnum Ultratec	SAE 5W-40	TNK Lubricants, LLC
TOTAL Quartz 9000	SAE 5W-40	TOTAL Lubrifiants
Total Quartz 9000 Energy	SAE 0W-40	TOTAL Lubrifiants
Titan Supersyn Longlife	SAE 5W-40	Fuchs Petrolub AG
TongYi SN	SAE 5W-40	TongYi Petroleum Chemical Co., Ltd.
Total Activa 9000	SAE 5W-40	Total
Total Activa 9000 Essence	SAE 5W-40	Total
Total quartz 9000	SAE 5W-40	Total
Total Quartz 9000 Energy	SAE 5W-40	Total
Triathlon Formula LL	SAE 5W-30	Adolf Würth GmbH & Co. KG
Triathlon Premium	SAE 5W-40	Würth International Trading (Shanghai) Co,. Ltd.
VR 7.1	SAE 5W-40	Additive Products (M) SDN BHD
Valvoline Advanced	SAE 0W-40	Valvoline

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Valvoline SynPower	SAE 5W-30	Valvoline
Valvoline SynPower HST	SAE 5W-30	Valvoline
Valvoline SynPower HST	SAE 5W-40	Valvoline
Valvoline SynPower motor oil	SAE 0W-40	Valvoline EMEA
WOLF VITALTECH	SAE 5W-40	Wolf Oil Corporation NV.
Weco TXI Syntholube	SAE 5W-40	Weco
Westfalen Gigatron	SAE 0W-40	Westfalen AG
Westfalen Megatron	SAE 5W-40	Westfalen AG
Yacco VX 1000	SAE 5W-40	Yacco S.A.S.
Yacco VX 1000 LL	SAE 5W-40	Yacco S.A.S.
eni i-Sint	SAE 0W-40	eni Schmiertechnik GmbH
eni i-Sint PC 4AM	SAE 5W-40	eni Schmiertechnik GmbH
eni i-Sint PC 4AM	SAE 5W-30	eni Schmiertechnik GmbH
maxxpower 5W30 Synergie	SAE 5W-30	Swd Lubricants GmbH & Co.KG
Megol Motorenoel High Condition	SAE 5W-40	Meguin GmbH & Co. KG
Megol Motorenoel Quality	SAE 5W-30	Meguin GmbH & Co. KG

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5.0 BMW Longlife-01 FE

BMW Longlife-01 FE engine oils are released worldwide for all petrol engines without petrol particulate filter as from model year 2002. There is no release for diesel engines.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 0W-30

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine Oil LL-01FE 0W-30	1000 ml, TU	83 21 2 405 945**	83 21 2 405 945**	83 21 2 405 945**	
MINI Engine OilLL-01FE 0W-30	1000 ml, TU	83 21 2 406 984**	83 21 2 406 984**	83 21 2 406 984**	
BMW TwinPower Turbo LL-01 FE 0W-30	1 litre	83 21 2 365 950	83 21 2 410 200	83 21 2 365 511	83 21 2 365 934*
BMW TwinPower Turbo LL-01 FE 0W-30	5 litre	---	---	83 21 2 365 710	83 21 2 365 710*
MINI Original Engine OilLL-01 FE 0W-30	1 litre	83 21 2 365 953	83 21 2 410 201	83 21 2 365 512	83 21 2 365 937*
BMW GroupLL-01 FE 0W-30	209 litres	83 21 2 405 849	83 21 2 410 731	83 21 2 365 516	83 21 2 405 098*
BMW GroupLL-01 FE 0W-30	Fuel tank	83 21 2 449 994	---	---	---

* Please order from **www.markethub.shell.com** or contact your local Shell partner.

** TU = trade unit. TU numbers cannot be ordered! For invoicing purposes only.

*** Only in South Korea

**** Only in Japan

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TU = trade unit. TU numbers cannot be ordered! Only for invoicing purposes!
Only in South Korea.
Only in Japan

BMW Engine Oil LL01FE 0W30 SAE 0W-30

83 21 2 405 945**

Trade name	BMW part number	Container
BMW TwinPower Turbo LL-01 FE 0W-30		1 litre
BMW TwinPower Turbo LL-01 FE 0W-30		5 litre

MINI Engine Oil LL-01 FE 0W-30 SAE 0W-30

83 21 2 406 984**

Trade name	BMW part number	Container
MINI Original Engine Oil LL-01 FE 0W-30		1 litre

BMW Engine Oil LL01FE 0W30 SAE 0W-30

83 21 2 405 945**

Trade name	BMW part number	Container
BMW GROUP LL-01 FE 0W30		209 litres
BMW GROUP LL-01 FE 0W30		Fuel tank

Named approved oils

Trade name	Viscosity	Producer
Agip 7007	SAE 0W-30	ENI S.p.A. Refining & Marketing Division

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6.0 BMW Longlife-04

BMW Longlife-04 engine oils were developed to guarantee an optimum service life of the diesel particulate filters and petrol particulate filters.

BMW Longlife-04 engine oils are approved worldwide for all diesel engines with and without diesel particulate filter and petrol engines with petrol particulate filters. For petrol engines without petrol particulate filter, BMW Longlife-04 engine oils are only approved for the European region including Norway, Switzerland and Liechtenstein.

The document "Technically appropriate engine oils for BMW Group engines" must be referred to for detailed release information.

SAE 0W-30

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine Oil LL-04 0W-30	1000 ml, TU	---	---	---	83 21 2 405 950**
MINI Engine Oil LL-04 0W-30	1000 ml, TU	---	---	---	83 21 2 406 989**
MINI Original Engine OilLL-04 0W-30	1 litre	---	---	---	83 21 2 465 855*
BMW GroupLL-04 0W-30	1000 litres Ibc	---	---	---	83 21 2 465 857*
BMW GroupLL-04 0W-30	209 litres	---	---	---	83 21 2 465 856*
BMW GroupLL-04 0W-30	Fuel tank	---	---	---	83 21 2 465 858*
BMW TwinPower Turbo LL-04 0W-30	1 litre	---	---	---	83 21 2 465 854*

SAE 5W-30

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine Oil LL-04 5W-30	1000 ml, TU	83 21 2 405 948**	83 21 2 405 948**	83 21 2 405 948**	83 21 2 405 948**
MINI Engine Oil LL-04 5W-30	1000 ml, TU	83 21 2 406 987**	83 21 2 406 987**	83 21 2 406 987**	83 21 2 406 987**
BMW GroupLL-04 5W-30	1000 litres Ibc	---	---	---	83 21 2 465 852*
BMW GroupLL-04 5W-30	209 litres	83 21 2 466 459	83 21 2 465 865	---	83 21 2 465 851*
BMW GroupLL-04 5W-30	Fuel tank	---	---	---	83 21 2 465 853*
BMW TwinPower Turbo LL-04 5W-30	1 litre	83 21 2 465 457	83 21 2 465 863	83 21 2 465 870	83 21 2 465 849*

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MINI Original Engine OilLL-04 5W-30	1 litre	83 21 2 466 458	83 21 2 465 864	---	83 21 2 465 850*

* Please order from **www.markethub.shell.com** or contact your local Shell partner.

** TU = trade unit. TU numbers cannot be ordered! For invoicing purposes only**.**

*** Only in South Korea

**** Only in Japan

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TU = trade unit. TU numbers cannot be ordered! Only for invoicing purposes!
Only in South Korea.
Only in Japan

MINI Engine Oil LL-04 0W-30 SAE 0W-30

83 21 2 406 989**

Trade name	BMW part number	Container
MINI Original Engine Oil LL-04 0W-30		1 litre

BMW Engine Oil LL04 0W30 SAE 0W-30

83 21 2 405 950**

Trade name	BMW part number	Container
BMW GROUP LL-04 0W-30		1000 litres Ibc
BMW GROUP LL-04 0W-30		209 litres
BMW GROUP LL-04 0W-30		Fuel tank

BMW Engine Oil LL04 0W30 SAE 0W-30

83 21 2 405 950**

Trade name	BMW part number	Container
BMW TwinPower Turbo LL-04 0W-30		1 litre

BMW Engine Oil LL04 5W30 SAE 5W-30

83 21 2 405 948**

Trade name	BMW part number	Container
BMW GROUP LL-04 5W-30		1000 litres Ibc
BMW GROUP LL-04 5W-30		209 litres
BMW GROUP LL-04 5W-30		Fuel tank

BMW Engine Oil LL04 5W30 SAE 5W-30

83 21 2 405 948**

Trade name	BMW part number	Container
BMW TwinPower Turbo LL-04 5W-30		1 litre

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MINI Engine Oil LL04 5W30 SAE 5W-30

83 21 2 406 987**

Trade name	BMW part number	Container
MINI Original Engine Oil LL-04 5W-30		1 litre

Named approved oils

Trade name	Viscosity	Producer
4CT-S	SAE 5W-30	Wako Chemical Company
4CT-S	SAE 5W-40	Wako Chemical Company
77 MOTOR OIL LE	SAE 5W-30	77 Lubricants
A.Z.Meisterteile engine oil MT-8PD	SAE 5W-40	MOL-LUB Kft
ADDINOL Giga Light MV 0530 LL	SAE 5W-30	Addinol Lube Oil GmbH
ADDINOL Premium 0530 C3-DX	SAE 5W-30	ADDINOL Lube Oil GmbH
AVENO HC Synth. 5W-40 LS UN	SAE 5W-40	Deutsche Ölwerke Lubmin GmbH
AVENO WIV-Multi LL	SAE 5W-30	Deutsche Ölwerke Lubmin GmbH
AVIA DYNETIC-GM	SAE 5W-30	AVIA AG
AVIA DYNETIC-LL	SAE 5W-30	AVIA AG
AVIASYNTH DPF PLUS C3	SAE 5W-30	Astris SA, Via Industrie 27, CH-6745 Giornico
Adnoc Voyager Gold	SAE 5W-40	Adnoc Distribution
Adnoc Voyager Gold	SAE 5W-30	Adnoc Distribution
Alpine Longlife III	SAE 5W-30	Mitan Mineralöl GmbH
Alpine RSL 5W-30 LA	SAE 5W-30	Mitan Mineralöl GmbH
Alpine RSL 5W-40 C3	SAE 5W-40	Mitan Mineralöl GmbH
Alpine RSL 5W30 LA	SAE 5W-30	Mitan Mineralöl GmbH
Aral HighTronic	SAE 5W-40	Aral
Aral HighTronic	SAE 5W-40	Aral AG
Aral HighTronic G	SAE 5W-30	Aral AG
Aral SuperTronic	SAE 0W-40	Aral
Aral SuperTronic Diesel	SAE 0W-40	Aral
Aral SuperTronic Longlife III	SAE 5W-30	Aral
Astris DPF Plus C3	SAE 5W-30	Astris SA
Aviaticon Unique BM	SAE 5W-30	Finke Mineralölwerk GmbH
Aviaticon Unique LongLife WIV	SAE 5W-30	Finke Mineralölwerk GmbH
BG SAE 5W-30 Synthetic Engine Oil	SAE 5W-30	BG Products Inc.
BMW Genuine Flushing Oil	SAE 5W-30	Shell International Petroleum Co.Ltd.
BP Visco 5000 C	SAE 5W-40	BP Plc
BP Visco 5000 M	SAE 5W-30	BP
BP Visco 7000	SAE 0W-40	BP Oil International
BP Visco 7000	SAE 5W-30	BP Oil International
BP Visco 7000 C	SAE 5W-40	BP
Biloxxi 5W-30 III	SAE 5W-30	MCC Trading Deutschland GmbH
Biloxxi 5W-40 HC	SAE 5W-40	MCC Trading Deutschland GmbH
Booster Premium	SAE 5W-40	LubriDutch B.V.
CAR1 SAE 5W-30 LA	SAE 5W-30	Mitan Mineralöl GmbH

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CAR1 SAE 5W-30 Longlife III	SAE 5W-30	Mitan Mineralöl GmbH
CARAT Longlife III 5W-30 20th anniversary edition	SAE 5W-30	CARAT Systementw.- und Marketing GmbH & Co. KG
CARTEC SAE 5W-30 LA	SAE 5W-30	Mitan Mineralöl GmbH
CARTEC SAE 5W-30 Longlife III	SAE 5W-30	Mitan Mineralöl GmbH
COFRAN SINTOLUX FORCE 3	SAE 5W-30	Fuchs Lubrifiants France
CONCEP-TECH VX	SAE 5W-30	Swd Lubricants GmbH & Co. KG
COUGAR FULLY SYNTHETIC MOTOR OIL	SAE 5W-40	Power International Chemical & Corp
Caltex Havoline Ultra V	SAE 5W-30	Chevron Global Lubricants
Cartechnic Motorenöl 5W-30 MF	SAE 5W-30	Auto-Teile-Ring GmbH
Cartechnic Engine Oil 5W-30 Multi	SAE 5W-30	Auto-Teile-Ring GmbH
Cartechnic Motorenöl SEA 5W-30 MF	SAE 5W-30	Auto-Teile-Ring GmbH
Cartechnic Motroenöl SEA 5W-30 Multi	SAE 5W-30	Auto-Teile-Ring GmbH
Castrol EDGE 5W-30 M	SAE 5W-30	Castrol Limited
Castrol Edge Professional LL04	SAE 0W-30	Castrol Limited
Castrol Edge Professional LL04	SAE 5W-30	Castrol Limited
Castrol Edge	SAE 5W-30	Castrol Limited
Castrol Edge	SAE 0W-40	Castrol Limited
Castrol Edge	SAE 0W-30	Castrol Limited
Castrol Edge	SAE 5W-40	Castrol Limited
Castrol Edge 5W-30 C3	SAE 5W-30	Castrol Limited
Castrol Edge Professional C3	SAE 0W-30	Castrol Limited
Castrol Edge Professional OE	SAE 5W-30	Castrol Limited
Castrol Edge Professional OE-X	SAE 5W-30	Castrol Limited
Castrol Edge Turbo Diesel	SAE 0W-30	Castrol Limited
Castrol Edge Turbo Diesel	SAE 5W-40	Castrol Limited
Castrol GTX 5W-30 C3	SAE 5W-30	Castrol Limited
Castrol GTX 5W-30 M	SAE 5W-30	Castrol Limited
Castrol GTX 5W-30 MP	SAE 5W-30	Castrol Limited
Castrol GTX 5W-40 C3	SAE 5W-40	Castrol Limited
Castrol MAGNATEC 5W-30 SN/C3	SAE 5W-30	Castrol Limited
Castrol MAGNATEC 5W-40 C3	SAE 5W-40	Castrol Limited
Castrol MAGNATEC 5W-40 SN/C3	SAE 5W-40	Castrol Limited
Castrol MAGNATEC Professional C3	SAE 5W-30	Castrol Limited
Castrol Magnatec Professional MP	SAE 5W-30	Castrol Limited
Castrol MAGNATEC Stop-Start 5W-30 C3	SAE 5W-30	Castrol
Castrol MAGNATEC Stop-Start 5W-30 SN/C3	SAE 5W-30	Castrol Limited
Castrol Magnatec 5W-30 C3	SAE 5W-30	Castrol Limited
Castrol Magnatec 5W-40 C3	SAE 5W-40	Castrol Limited
Castrol Magnatec 5W-40 SN/C3	SAE 5W-40	Castrol Limited
Castrol Magnatec Diesel 5W-40 DPF	SAE 5W-40	Castrol Limited
Castrol Magnatec Professional	SAE 5W-40	Castrol Limited

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C3		
Castrol Magnatec Professional MP	SAE 5W-30	Castrol Limited
Castrol Magnatec Professional OE	SAE 5W-40	Castrol Limited
Castrol Magnatec stop-start 5W-30 C3	SAE 5W-30	Castrol Limited
Concep-Tech DX	SAE 5W-30	Con Lubricants Duisburg GmbH
Concep-Tech Synth.	SAE 5W-40	Con Lubricants Duisburg GmbH
DS 5W30 PERFORMANCE LONGLIFE III	SAE 5W-30	Mitan Mineralöl GmbH
Divinol Syntholight 505.01	SAE 5W-40	Zeller+Gmelin
Divinol Syntholight DPF	SAE 5W-30	Zeller+Gmelin
Divinol Syntholight HC-FE	SAE 5W-30	Zeller+Gmelin
ELF Evolution Full-Tech C3	SAE 5W-30	Total
ELF Evolution Full-Tech MSX	SAE 5W-30	Total
ENERGY RELEASE 5W-30 (ER 5W-30)	SAE 5W-30	DKR PETROLEUM CO., LTD.
ENERGY RELEASE 5W-30 C3 (ER 5W-30 C3)	SAE 5W-30	DKR PETROLEUM CO., LTD.
ENERGY RELEASE 5W-40 (ER 5W-40)	SAE 5W-40	DKR PETROLEUM CO., LTD.
EUROLUB CLEANTEC	SAE 5W-30	Eurolub GmbH
EUROLUB WIV ECO	SAE 5W-30	Eurolub GmbH
Edeka Gut & Günstig 5W-30 LA engine oil	SAE 5W-30	Mitan Mineralöl GmbH
Edeka Gut & Günstig 5W-30 Longlife III Engine Oil	SAE 5W-30	Mitan Mineralöl GmbH
Edeka Gut & Günstig 5W-40 engine oil	SAE 5W-40	Mitan Mineralöl GmbH
Elf Evolution Full-Tech LLX	SAE 5W-30	Total Lubrifiants
Elf Evolution Full-Tech TDI	SAE 5W-30	Total Lubrifiants
Enoc Protec Green	SAE 5W-40	Emirates National Oil Cy
Equus Blue Gold	SAE 5W-30	PHI OIL GmbH
Eurol Fluence DXS	SAE 5W-30	Eurol BV
Eurol Syntence	SAE 5W-30	Eurol B.V.
Eurol Turbo DI	SAE 5W-40	Eurol BV
Evolution OEM Series-04	SAE 5W-40	Top 1 Oil Products Company
FEU VERT MULTI NORMES	SAE 5W-30	Motul SA
FK European version	SAE 5W-30	Ban Hon International Co., Ltd.
FK EURO PLUS	SAE 5W-30	Ban Hon International Co., Ltd.
FUCHS PENTO SUPER PERFORMANCE III	SAE 5W-30	FUCHS PETROLUB SE
FUCHS TITAN GT1 FLEX 23	SAE 5W-30	FUCHS PETROLUB SE
FUCHS TITAN GT1 PRO C-3	SAE 5W-30	FUCHS PETROLUB SE
Feu Vert C3	SAE 5W-30	Feu Vert
Feu Vert Multi Normes	SAE 5W-40	Feu Vert
G TECH 5W-30 MULTI PERFORMANCE	SAE 5W-30	Swd Lubricants GmbH & Co. KG
G-Energy Service Line W	SAE 5W-30	Gazpromneft-lubricants Italia S.P.A
GECCO engine oil SY	SAE 5W-40	ZEUS Zentrale für Einkauf und Service GmbH & Co. KG

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GTE Special Edition 5W-30 Longlife III	SAE 5W-30	CARAT GmbH & Co.KG
Galp Active 3000 M-LS	SAE 5W-30	Petrogal SA
Gulf Formula CX	SAE 5W-30	Gulf Oil International
Gulf Formula GVX	SAE 5W-30	Gulf Oil International
Gulf Formula ULE	SAE 5W-30	Gulf Oil International
Gulf Formula ULE	SAE 5W-40	Gulf Oil International
Gulf Progress Efficiency	SAE 5W-40	Total
Gulf Progress Extended	SAE 5W-30	Total
Gulf Progress Intensia	SAE 5W-30	Total Lubrifiants
HEM Longlife III	SAE 5W-30	Deutsche Tamoil GmbH
HIGH STAR C3	SAE 5W-30	Addinol Lube Oil GmbH
HIGH STAR C3-DX	SAE 5W-30	ADDINOL Lube Oil GmbH
Havoline Fully Synthetic	SAE 5W-40	Chevron Lubricants
Havoline Pro DS Full Synthetic Euro Motor Oil	SAE 5W-40	NV CHEVRON BELGIUM
Havoline ProDS Fully Synthetic LE	SAE 5W-40	NV CHEVRON BELGIUM
Havoline ProDS Fully Synthetic LE	SAE 5W-40	Chevron Lubricants
Havoline ProDS M	SAE 5W-30	Chevron Products Company
Havoline ProDS V	SAE 5W-30	Chevron Products Company
Havoline Ultra S	SAE 5W-30	Chevron Global Lubricants
Havoline Ultra S	SAE 5W-40	Chevron Global Lubricants
Havoline Ultra S	SAE 5W-30	Chevron Products Company
Havoline Ultra S	SAE 5W-40	Chevron Products Company
Helar SP 5W-30 LL-03	SAE 5W-30	Kroon-Oil
I.G.A.T PLATIN DLS	SAE 5W-30	I.G.A.T AG
I.G.A.T PLATIN DPF	SAE 5W-30	I.G.A.T AG
IME 1701679-B	SAE 5W-30	Infineum
INA Star	SAE 5W-40	INA d.d., Rafinerija nafte Rijeka
INA Ultra Star FE	SAE 5W-30	INA Maziva Ltd.
Igol Profive Diamant	SAE 5W-40	Igol France, S.A.
Igol Profive Emeraude	SAE 5W-30	Igol France, S.A.
JMC Extra MU	SAE 5W-30	Johannes J. Matthies GmbH & Co. KG
JMC Extra OP	SAE 5W-30	Johannes J. Matthies GmbH & Co. KG
Jet Top Level	SAE 0W-40	ConocoPhillips GmbH
K-Classic engine oil 5W-30 LA	SAE 5W-30	kaufland Warenhandel GmbH & Co. KG
K.Classic Engine Oil 5W-30 Longlife III	SAE 5W-30	kaufland Warenhandel GmbH & Co. KG
KA NASA KEN RACING MASTER	SAE 5W-30	POWER INTERNATIONAL CHEMICAL & OIL CORPORATION
KIXX PAO LL04	SAE 5W-40	GS Caltex Corporation
KLOBOlub Longlife III	SAE 5W-30	KLOBOmotive GmbH
KLOBOlub Multi	SAE 5W-30	KLOBOmotive GmbH
Krypton XT LA	SAE 5W-30	PAKELO
LIQUI MOLY Profi Longlife III	SAE 5W-30	LIQUI MOLY GmbH
LUBRIZOL OS 222112	SAE 5W-30	Lubrizol
LUKOIL GENESIS	SAE 5W-30	OOO LLK-International

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ARMORTECH VN		
LUKOIL GENESIS SPECIAL C3	SAE 5W-40	OOO LLK-International
LUKOIL GENESIS SPECIAL VN	SAE 5W-30	OOO LLK-International
Liqui Moly Nachfüll-Öl	SAE 5W-40	Liqui Moly
Liqui Moly Pro Engine M 600	SAE 5W-30	Liqui Moly GmbH
Liqui Moly Pro-Engine M 400	SAE 5W-40	Liqui Moly
Liqui Moly Pro-Engine M 500	SAE 5W-30	Liqui Moly GmbH
Liqui Moly Top Tec 4100	SAE 5W-40	Liqui Moly
Liqui Moly Top Tec 4200	SAE 5W-30	Liqui Moly GmbH
Liqui Moly Top Tec 4600	SAE 5W-30	Liqui Moly GmbH
Liqui Moly Top Tec 4605	SAE 5W-30	Liqui Moly GmbH
Longtime High Tech	SAE 5W-30	LIQUI MOLY GmbH
Lotos Quazar	SAE 5W-40	Lotos Oil
Lotos Quazar C3	SAE 5W-30	Lotos Oil
Lotos Quazar LLIII	SAE 5W-30	Lotos Oil
Lubrizol OS 267675	SAE 0W-30	Lubrizol
MAPO Fulltec C3	SAE 5W-30	MAPO -Schmierstofftechnik Handel GmbH
MAPO SUPER PDI	SAE 5W-40	MAPO -Schmierstofftechnik Handel GmbH
MOL Dynamic Prima	SAE 5W-40	MOL-LUB Lubricant Ltd.
MOTOREX Xperience C3 FS-X	SAE 0W-30	BUCHER AG Langenthal
Motul Specific LL-04	SAE 0W-30	MOTUL SA
MPM Motor Oil 5W-30 Premium Synthetic C3 DPF	SAE 5W-30	MPM International Oil Company BV
MPM Motor Oil 5W-30 Premium Synthetic ESP	SAE 5W-30	mpm International Oil Company
Mabanol Xenon Alpha LA	SAE 5W-30	Schmierstoffraffinerie Salzbergen
Mabanol Xenon Ultra Synth Longlife	SAE 5W-30	Schmierstoffraffinerie Salzbergen
Meisteröl RPF	SAE 5W-40	Epro GmbH
Midland crypto-3	SAE 5W-30	Oel-Brack AG
Midland® Synova	SAE 5W-40	Oel-Brack AG
Midland® Synova	SAE 5W-30	Oel-Brack AG
Miocar MX Syntra	SAE 5W-30	Migros Genossenschafts Bund
Mobil 1 ESP	SAE 0W-40	ExxonMobil
Mobil 1 ESP Formula	SAE 5W-30	ExxonMobil
Mobil 1 ESP Formula B	SAE 0W-30	ExxonMobil
Mobil Super 3000 XE	SAE 5W-30	ExxonMobil
Mobil Super 3000 XE	SAE 5W-40	ExxonMobil
Mobil Super 3000 XE1	SAE 5W-40	ExxonMobil
Mobil Super 3000 XE1	SAE 5W-30	ExxonMobil
Mogul Extreme LFIII	SAE 5W-30	Orlen Oil Sp. z o o
Monza GP Longlife III	SAE 5W-30	Mitan Mineralöl GmbH
Monza Super Combi	SAE 5W-30	Mitan Mineralöl GmbH
Motor Oil LE	SAE 5W-30	Transnational Blenders B.V.
Motor Oil LE	SAE 5W-40	Transnational Blenders B.V.
Motor Oil Longlife-III Synth	SAE 5W-30	Transnational Blenders B.V.
Motorex Select LA-X	SAE 5W-30	Bucher AG
Motorex Select SP-X	SAE 5W-40	Bucher AG
Motorex Select SP-X	SAE 5W-30	Bucher AG
Motul 8100 X-Clean	SAE 5W-40	Motul S.A.

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Motul 8100 X-Clean	SAE 5W-30	Motul S.A.
Motul 8100 X-Clean +	SAE 5W-30	Motul S.A.
Motul 8100 X-Clean	SAE 5W-40	MOTUL
Motul 8100 X-clean EFE	SAE 5W-30	Motul SA
Motul Expert LL	SAE 5W-30	Motul S.A.
Motul Specific LL-04	SAE 5W-40	Motul S.A.
Motul Synergie LL+	SAE 5W-30	Motul SA
OMV BIXXOL special C3	SAE 5W-30	OMV AG
OMV Bixxol special UP	SAE 5W-30	OMV Refining & Marketing GmbH
OPALJET FUTURA	SAE 5W-40	Unil Opal
OPALJET LONGLIFE 3	SAE 5W-30	Unil Opal
Oest Gigant LS Plus	SAE 5W-30	Georg Oest Mineralölwerk
PANOLIN AVANIS M-C3	SAE 0W-30	PANOLIN
PANOLIN DAYTONA LA	SAE 5W-40	PANOLIN
PAZ Extreme LL-04	SAE 5W-30	PAZ Lubricants & Chemicals
PETRONAS SYNTIUM 3000 AV	SAE 5W-40	Petronas Lubricants International
PETRONAS SYNTIUM 5000 XS	SAE 5W-30	Petronas Lubricants International
PLATINUM PRO XD	SAE 5W-30	Orlen Oil Sp. z o.o.
Pennzoil Euro L	SAE 5W-30	Shell International Petroleum Company
Pennzoil Euro L	SAE 5W-30	Shell International Petroleum Co.Ltd.
Pennzoil Platinum Euro L	SAE 5W-30	Shell International Petroleum Company
Pennzoil Platinum Euro L	SAE 5W-30	Shell Global Solutions Duschland GmbH
Pennzoil Ultra Euro L	SAE 5W-30	Shell International Petroleum Company
Pento High Performance II	SAE 5W-40	Deutsche Pentosin-Werke
Pento Super Performance III	SAE 5W-30	Deutsche Pentosin-Werke
Pentosynth HC	SAE 5W-40	Deutsche Pentosin-Werke
Pentosynth HC	SAE 5W-40	Deutsche Pentosin-Werke GmbH
Platinum MaxEnergy Euro4	SAE 5W-30	Orlen Oil Sp. z o.o.
Platinum Pro V	SAE 5W-30	Orlen
Power Oil Syntec 5W-30 LA	SAE 5W-30	Mitan Mineralöl GmbH
Presteza MSP	SAE 5W-30	Kroon-Oil
Prista Ultra Plus	SAE 5W-40	Prista Oil EAD
Q European Engine Ultra Diesel	SAE 5W-30	Pennzoil-Quaker State
Q8 Formula M Long-Life	SAE 5W-40	Kuwait Petroleum
Q8 Formula Special G Long Life	SAE 5W-30	Kuwait Petroleum
Quaker State Ultimate Durability European L	SAE 5W-30	Shell International Petroleum Co.Ltd.
RAVENOL Arctic Low SAPS ALS	SAE 0W-30	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL HLS	SAE 5W-30	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL REP Racing Extra Performance	SAE 5W-30	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL RUP	SAE 5W-40	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL SMP	SAE 5W-30	Ravensberger Schmierstoffvertrieb GmbH
RAVENOL VMO	SAE 5W-40	Ravensberger

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		Schmierstoffvertrieb GmbH
RAVENOL VMP	SAE 5W-30	Ravensberger Schmierstoffvertrieb GmbH
REPSOL ELITE EVOLUTION	SAE 5W-40	REPSOL LUBRICANTES Y ESPECIALIDADES S.A
RN005963AAAC	SAE 0W-30	ExxonMobil
ROWE HIGHTEC MULTI FORMULA	SAE 5W-40	ROWE MINERALÖLWERK GMBH
ROWE HIGHTEC SYNT RS DLS	SAE 5W-30	Rowe Mineralölwerk GmbH
ROWE Multi Synt DPF	SAE 5W-30	Rowe Mineralölwerk GmbH
RW Auto Force XCE	SAE 5W-30	DEEP OIL TRADING COMPANY LP
RYMCO Orpheus LL-II	SAE 5W-30	VPS International B.V.
Repsol Elite Evolution	SAE 5W-40	Repsol YPF
Repsol Elite Evolution Long Life	SAE 5W-30	Repsol YPF
Rowe Synt RS 5W-30 DLS	SAE 5W-30	Rowe Mineralölwerk GmbH
SRS VIVA 1 SLV plus	SAE 5W-30	SRS Schmierstoff Vertrieb GmbH
SRS VIVA 1 topsynth alpha LA	SAE 5W-30	SRS Schmierstoff Vertrieb GmbH
STRUB Partsynt LA-C3 5W/30	SAE 5W-30	STRUB + Co. AG
Selenia K Pure Energy	SAE 5W-40	Petronas Lubricants International
Shelix Helix Ultra Professional AM-L	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Diesel Ultra AB-L	SAE 5W-30	Shell International Petroleum Company
Shell Helix Diesel Ultra Extra	SAE 5W-30	Shell International Petroleum Company
Shell Helix HX7 E	SAE 5W-30	Shell International Petroleum Company
Shell Helix HX7E	SAE 5W-30	Shell International Petroleum Company
Shell Helix HX8 ECT	SAE 5W-40	Shell International Petroleum Company
Shell Helix HX8 ECT	SAE 5W-30	Shell International Petroleum Company
Shell Helix HX8 ECT C3	SAE 5W-30	Shell International Petroleum Company
Shell Helix HX8 ECT C3	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra ECT C3	SAE 5W-30	Shell Global Solutions Duschland GmbH
Shell Helix Ultra AM-L	SAE 5W-30	Shell International Petroleum Company
Shell Helix Ultra AT-L	SAE 5W-40	Shell International Petroleum Company
Shell Helix Ultra ECT	SAE 0W-30	Shell International Petroleum Company
Shell Helix Ultra ECT	SAE 5W-30	Shell International Petroleum Company
Shell Helix Ultra ECT	SAE 0W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra ECTC3	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra ECT Diesel	SAE 5W-30	Shell International Petroleum Company
Shell Helix Ultra Extra	SAE 5W-30	Shell International Petroleum

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		Company
Shell Helix Ultra Professional AB-L	SAE 5W-30	Shell International Petroleum Co.Ltd.
Shell Helix Ultra Professional AM-L	SAE 5W-30	Shell International Petroleum Company
Specialsynth Gold	SAE 5W-30	PHI OIL GmbH
Specialsynth Gold	SAE 5W-40	Phi Oil GmbH
Swd Rheinol Primus DX	SAE 5W-30	Swd Lubricants GmbH & Co. KG
Swd Rheinol Primus LLX	SAE 5W-30	Swd Lubricants GmbH & Co. KG
SynPower MST C3	SAE 5W-40	Valvoline EMEA
Synergy Synthetic EuroSyn	SAE 5W-40	Northland Products Company
TBO&S Action Engine Oil	SAE 5W-30	TBO&S
Tecar Leichtlauf engine oil	SAE 5W-40	Techno-Einkauf GmbH
Tecar Leichtlauf engine oil	SAE 5W-40	TECAR International GmbH
TECAR Engine Oil Special 50400/50700	SAE 5W-30	Techno-Einkauf GmbH
TECAR Special DXII engine oil	SAE 5W-30	Techno-Einkauf GmbH
TECTROL SPEED 530	SAE 5W-30	BayWa AG
TECTROL SPEED LL 530	SAE 5W-30	BayWa
TECTROL SPEED LL 530	SAE 5W-30	BayWa AG
TITAN Supersyn B	SAE 5W-30	Fuchs Petrolub SE
TOTAL QUARTZ INEO MC3	SAE 5W-30	Total Lubrifiants
TSH	SAE 5W-40	Minerva Oil SAS
TSV	SAE 5W-30	MINERVA-OIL SAS
Tamoil Sint Future Energy	SAE 5W-30	Tamoil Italia S.p.A.
Tamoil Sint Future Extra	SAE 5W-40	Tamoil Italia S.p.A.
Texaco Havoline Ultra V	SAE 5W-30	Chevron Global Lubricants
Titan GT1	SAE 5W-40	Fuchs Petrolub AG
Titan GT1 Pro Flex	SAE 5W-30	Fuchs Petrolub AG
Titan GT1 Pro Gas	SAE 5W-40	Fuchs Petrolub AG
Titan GT1 Pro Gas	SAE 5W-30	Fuchs Petrolub AG
Tor Extendo NF	SAE 5W-30	De Oliebron BV
Tor Prolong LSP	SAE 5W-30	De Oliebron BV
Tor Specialsynth BL4	SAE 0W-30	De Oliebron BV
Tor Specialsynth NF	SAE 5W-30	De Oliebron BV
Tor Specialsynth NF	SAE 5W-40	Tor Specialsynth NF
Total Activa Ineo Long Life	SAE 5W-30	Total Lubrifiants
Total Quartz INEO MC3	SAE 5W-40	Total
Total Quartz INEO MC3	SAE 5W-30	Total
Total Quartz Ineo Efficiency	SAE 0W-30	Total
Total Quartz INEO Long Life	SAE 5W-30	Total Lubrifiants
Triathlon Endurance III	SAE 5W-30	Adolf Würth GmbH
Triathlon Endurance III	SAE 5W-30	Adolf Würth GmbH & Co. KG
Triathlon Performance	SAE 5W-40	Adolf Würth GmbH & Co. KG
Ultron Race	SAE 5W-40	Petron Corporation
Valvoline Advanced MST	SAE 5W-40	Valvoline
Valvoline Advanced XL-III	SAE 5W-30	Valvoline
Valvoline SynPower MST	SAE 5W-40	Valvoline
Valvoline SynPower MST	SAE 5W-30	Valvoline
Valvoline SynPower XL-III	SAE 5W-30	Valvoline
Valvoline SynPower MSTC3	SAE 5W-30	Valvoline

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Valvoline VPS Combi C3 SAE 5W-30 Synthetic	SAE 5W-30	Valvoline
Veedol Powertron Ultra	SAE 5W-40	Veedol International
Veedol Sintron C3	SAE 5W-30	Veedol International
Veedol Sintron LongLife III	SAE 5W-30	Veedol International
Velox Ultra SX	SAE 5W-30	Agean Oil SA
Wave Power LE	SAE 5W-30	Transnational Blenders B.V.
Wave Power LL	SAE 5W-30	North Sea Lubricants B.V.
Westfalen LIFETRON	SAE 5W-30	Westfalen AG
Wolf Masterlube Synflow Longlife III	SAE 5W-30	Wolf Oil Corporation N.V.
Wolf Officialtech 5W-30 C3	SAE 5W-30	Wolf Oil Corporation N.V.
Wolf Officialtech 5W-30 LL III	SAE 5W-30	Wolf Oil Corporation N.V.
XADO ATOMIC OIL 5W-40 SM/CF	SAE 5W-40	XADO LUBE B.V.
XTAR 5W30 504 507	SAE 5W-30	CEPSA Comercial Petóleo, S.A.
XTAR 5W30 C3/D2 DPF	SAE 5W-30	CEPSA Comercial Petroleo S.A.U
XTC S9	SAE 5W-30	Bardahl Asia Pacific Pte Ltd
XTeer TOP 5W30	SAE 5W-30	HYUNDAI OILBANK CO.LTD
YACCO LUBE DE	SAE 5W-30	Yacco S.A.S.
Yacco Lube DE	SAE 0W-30	Yacco S.A.S.
Yacco VX 1000 FAP	SAE 5W-40	Yacco S.A.S.
ZIC A+	SAE 5W-30	SK Energy Co., Ltd
ZIC XQ LS	SAE 5W-30	SK Lubricants
ZIC XQ RV	SAE 5W-40	SK Energy Co., Ltd
ad-High Tech 5W-30 Longlife III	SAE 5W-30	CARAT GmbH & Co.KG
ad-High Tech 5W-30 Longlife III	SAE 5W-30	CARAT Systementw.- und Marketing GmbH & Co. KG
ad-High Tech 5W-30 d2	SAE 5W-30	CARAT Systementw.- und Marketing GmbH & Co. KG
ad-High Tech 5W--40 DPF	SAE 5W-40	CARAT Systementw.- und Marketing GmbH & Co.KG
eni i-Sint	SAE 5W-30	eni Schmiertechnik GmbH
eni i-Sint MS	SAE 5W-40	eni Schmiertechnik GmbH
eni i-Sint MS	SAE 5W-30	eni Schmiertechnik GmbH
masteroil c-tec power vario	SAE 5W-30	masteroil GmbH
megol Motorenoel Compatible	SAE 5W-30	Meguin GmbH & Co. KG
megol Engine Oil Efficiency	SAE 5W-30	Meguin GmbH & Co. KG
megol Engine Oil Efficiency G	SAE 5W-30	Meguin GmbH & Co. KG
megol Engine Oil Low Emission	SAE 5W-40	Meguin GmbH & Co. KG
megol Engine Oil New Generation	SAE 5W-30	Meguin GmbH & Co. KG
multilub 5W-40 DPF	SAE 5W-40	Globus Fachmärkte GmbH & Co. KG
swd Primus DXM	SAE 5W-40	Swd Lubricants GmbH & Co. KG

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7.0 BMW Longlife-12 FE

BMW Longlife-12 FE engine oils are released for certain BMW Group diesel engines from model year 2014 with the designation 14d, 16d, 18d, 20d and 30d (exception F3x 30d from model year 2019). BMW Longlife-12 FE engine oils are generally permitted for BMW petrol engines with petrol particulate filters. For BMW Group petrol engines without petrol particulate filter from model year 2002, BMW Longlife-12 FE engine oil is only approved for the European region including Norway, Switzerland and Liechtenstein.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 0W-30

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine OilLL-12FE 0W-30	1000 ml, TU	83 21 2 405 946**	83 21 2 405 946**		83 21 2 405 946**
MINI Engine OilLL-12FE 0W-30	1000 ml, TU	83 21 2 406 985**	83 21 2 406 985**		83 21 2 406 985**
BMW GroupLL-12 FE 0W-30	209 litres	83 21 2 405 080	83 21 2 405 634	---	83 21 2 405 097*
BMW GroupLL-12 FE 0W-30	55 litre	---	---	---	83 21 2 405 666*
BMW M TwinPower TurboLL-12 FE 0W-30	1 litre	---	83 21 2 469 985	---	83 21 2 469 984*
BMW TwinPower Turbo LL-12 FE 0W-30	1 litre	83 21 2 365 951	83 21 2 405 601	---	83 21 2 365 935*
MINI Original Engine OilLL-12 FE 0W-30	1 litre	83 21 2 365 952	83 21 2 405 602	---	83 21 2 365 936*
Rolls-Royce Genuine OilLL-12 FE 0W-30	2 litre	83 21 2 462 944	---	83 21 2 462 939	83 21 2 462 942*

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7.0 BMW Longlife-12 FE

BMW Longlife-12 FE engine oils are released for certain BMW Group diesel engines from model year 2014 with the designation 14d, 16d, 18d, 20d and 30d (exception F3x 30d from model year 2019). BMW Longlife-12 FE engine oils are generally permitted for BMW petrol engines with petrol particulate filters. For BMW Group petrol engines without petrol particulate filter from model year 2002, BMW Longlife-12 FE engine oil is only approved for the European region including Norway, Switzerland and Liechtenstein.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 0W-30

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine OilLL-12FE 0W-30	1000 ml, TU	83 21 2 405 946**	83 21 2 405 946**		83 21 2 405 946**
MINI Engine OilLL-12FE 0W-30	1000 ml, TU	83 21 2 406 985**	83 21 2 406 985**		83 21 2 406 985**
BMW GroupLL-12 FE 0W-30	209 litres	83 21 2 405 080	83 21 2 405 634	---	83 21 2 405 097*
BMW GroupLL-12 FE 0W-30	55 litre	---	---	---	83 21 2 405 666*
BMW M TwinPower TurboLL-12 FE 0W-30	1 litre	---	83 21 2 469 985	---	83 21 2 469 984*
BMW TwinPower Turbo LL-12 FE 0W-30	1 litre	83 21 2 365 951	83 21 2 405 601	---	83 21 2 365 935*
MINI Original Engine OilLL-12 FE 0W-30	1 litre	83 21 2 365 952	83 21 2 405 602	---	83 21 2 365 936*
Rolls-Royce Genuine OilLL-12 FE 0W-30	2 litre	83 21 2 462 944	---	83 21 2 462 939	83 21 2 462 942*

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Rolls-Royce Genuine Oil LL-12 FE 0W-30 SAE 0W-30

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Trade name	BMW part number	Container
12FE		
Swd Rheinol Primus LLB	SAE 0W-30	Swd Lubricants GmbH & Co.KG
TBX	SAE 0W-30	MINERVA-OIL
Top Tec 6100	SAE 0W-30	LIQUI MOLY GmbH
Tor Specialsynth B12	SAE 0W-30	Smeermiddelen Industrie De Oliebron B.V.
Total Quartz Ineo Dynamics	SAE 0W-30	Total Lubrifiants
Valvoline SynPower LL-12 FE	SAE 0W-30	Valvoline
Veedol Sintron B	SAE 0W-30	Veedol International
YACCO LUBE BM-12	SAE 0W-30	Yacco S.A.S.
masteroil c-tec special B FE	SAE 0W-30	masteroil GmbH
megol motor oil Future LL 12 FE	SAE 0W-30	Meguin GmbH & Co. KG

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8.0 BMW Longlife-14 FE+

BMW Longlife-14 FE+ engine oils are only approved for certain BMW Group petrol engines without petrol particulate filter as from model year 2014 in the region of Europe including Norway, Switzerland, Liechtenstein as well as the USA and Canada. There is no release for diesel engines.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 0W-20

Trade name	Container size	BMW Group part number USA, Canada	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine OilLL-14FE+ 0W-20	1000 ml, TU	83 21 2 405 949**	---	---	83 21 2 405 949**
MINI Engine OilLL-14FE+ 0W-20	1000 ml, TU	83 21 2 406 988**	---	---	83 21 2 406 988**
BMW TwinPower Turbo LL-14 FE+ 0W-20	1 litre	83 21 2 365 954	---	---	83 21 2 365 926*
MINI Original Engine OilLL-14 FE+ 0W-20	1 litre	83 21 2 365 955	---	---	83 21 2 365 927*
BMW GroupLL-14 FE+ 0W-20	209 litres	83 21 2 405 079	---	---	83 21 2 405 096*
BMW GroupLL-14 FE+ 0W-20	55 litre	---	---	---	83 21 2 405 669*
BMW GroupLL-14 FE+ 0W-20	Fuel tank	83 21 2 457 111	---	---	---

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BMW Engine Oil LL14FE+ 0W20 SAE 0W-20

83 21 2 405 949**

Trade name	BMW part number	Container
BMW TwinPower Turbo LL-14 FE+ 0W-20		1 litre

MINI Engine Oil LL-14 FE+ 0W-20 SAE 0W-20

83 21 2 406 988**

Trade name	BMW part number	Container
MINI Original Engine Oil LL-14 FE+ 0W-20		1 litre

BMW Engine Oil LL14FE+ 0W20 SAE 0W-20

83 21 2 405 949**

Trade name	BMW part number	Container
BMW GROUP LL-14 FE+ 0W-20		209 litres
BMW GROUP LL-14 FE+ 0W-20		55 litre
BMW GROUP LL-14 FE+ 0W-20		Fuel tank

Named approved oils

Trade name	Viscosity	Producer
Castrol EDGE Professional LL 14 FE+	SAE 0W-20	Castrol Limited
MOTOREX CONCEPT B-XL SAE 0W/20	SAE 0W-20	BUCHER AG LANGENTHAL
Motul Specific LL-14 FE+	SAE 0W-20	Motul
PENTOSPEED LL-14	SAE 0W-20	FUCHS SCHMIERSTOFFE GMBH
Quantum Ultra B	SAE 0W-20	FUCHS PTEROLUB SE
TITAN GT1 EVO	SAE 0W-20	Fuchs Petrolub SE

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9.0 BMW Longlife-17 FE+

BMW Longlife-17 FE + engine oils are only permitted for certain BMW Group petrol engines with and without petrol particulate filter from model year 2014. There is no release for diesel engines.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 0W-20

Trade name	Container size	BMW Group part number USA, Canada	BMW Group part number Rest of World
BMW Engine Oil LL17FE+ 0W20	1000 ml, TU	83 21 2 463 695**	83 21 2 463 695**
MINI Engine Oil LL17FE+ 0W20	1000 ml, TU	83 21 2 463 696**	83 21 2 463 696**
BMW TwinPower Turbo LL-17 FE+ 0W-20	1 litre	83 21 2 461 988	83 21 2 463 697*
MINI Original Engine Oil LL-17 FE+ 0W-20	1 litre	83 21 2 461 989	83 21 2 463 698*
BMW GROUP LL-17 FE+ 0W-20	209 litres	83 21 2 461 990	---
BMW GROUP LL-17 FE+ 0W-20	Fuel tank	83 21 2 461 991	--

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Only in South Korea.
Only in Japan

BMW Engine Oil LL-17 FE+ 0W20 SAE 0W-20

83 21 2 463 695**

Trade name	BMW part number	Container
BMW TwinPower Turbo LL-17 FE+ 0W-20		1 litre

BMW Engine Oil LL-17 FE+ 0W20 SAE 0W-20

83 21 2 463 695**

Trade name	BMW part number	Container
BMW GROUP LL-17 FE+ 0W-20		209 litres
BMW GROUP LL-17 FE+ 0W-20		Fuel tank

MINI Engine Oil LL-17 FE+ 0W20 SAE 0W-20

83 21 22 463 696**

Trade name	BMW part number	Container
MINI Original Engine Oil LL-17 FE+ 0W-20		1 litre

Named approved oils

Trade name	Viscosity	Producer
ELF EVOLUTION FULL-TECH APX	SAE 0W-20	TOTAL Lubrifiants
Mabanol Xenon Alpha FE	SAE 0W-20	Mabanol GmbH & Co. KG
RAVENOL EFS	SAE 0W-20	Ravensberger Schmierstoffvertrieb GmbH
ROWE HIGHTEC SYNT RS C5	SAE 0W-20	ROWE MINERALÖLWERK GMBH
SRS ViVA 1 ecosynth FE	SAE 0W-20	SRS Schmierstoff Vertrieb GmbH
TOTAL QUARTZ INEO DYNAMICS	SAE 0W-20	TOTAL Lubrifiants

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10.0 SAE 10W-60

The engine oil SAE 10W-60 is released for certain petrol engines of the BMW M vehicles. For diesel engines, there is only one release for the engine N47S up to production date 09/2008.

Refer to the document "Technically appropriate engine oils for BMW Group engines" for detailed release information.

Product availability may vary depending on specific market.

SAE 10W-60

Trade name	Container size	BMW Group part number USA, Canada, Mexico	BMW Group part number Japan, Indonesia, Thailand, South Korea	BMW Group part number China	BMW Group part number Rest of World
BMW Engine Oil10W-60	1000 ml, TU	83 21 2 405 943**	83 21 2 405 943**	83 21 2 405 943**	83 21 2 405 943**
BMW M TwinPower Turbo10W-60	1 litre	83 21 2 365 944	83 21 2 405 600	83 21 2 365 509	83 21 2 365 924*
BMW GROUP10W-60	55 litre				83 21 2 405 672*
BMW GROUP10W-60	209 litres	83 21 2 405 081			83 21 2 405 094*

* Please order from **www.markethub.shell.com** or contact your local Shell partner.

** TU = trade unit. TU numbers cannot be ordered! For invoicing purposes only.

Names of approved oils for petrol engines

Trade name	Viscosity	Manufacturer
Castrol Edge Professional TWS	SAE 10W-60	Castrol Limited
Castrol Edge	SAE 10W-60	Castrol Limited

Names of approved oils for diesel engine N47S up to production date 09/2008

Trade name	Viscosity	Manufacturer
Castrol Edge Professional TWS	SAE 10W-60	Castrol Limited
Castrol Edge	SAE 10W-60	Castrol Limited
Mobil 1	SAE 5W-50	Exxon Mobil

In future an engine oil for which BMW has not given its approval will be sold under the previous trade name!

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Enclosure 7 to SI 11 07 96 (138), edition 02/2019

Many customer complaints about engine oil consumption are caused by incorrect measuring procedures.

An engine oil consumption measurement should be carried out after a mileage of 7500 km, since the engine run-in process is essentially complete by this time, and the engine oil consumption has stabilised.

The level of engine oil consumption that may arise with a particular engine can be determined by the customer only from the amount of engine oil he or she tops up with. As soon as the engine oil level falls below the maximum mark on the dipstick, many customers top up the engine oil without paying attention to a number of basic rules, such as the vehicle must be standing on level ground, a certain period of time must be left to allow the engine oil to flow back to the sump. In such cases, the available container sizes (e.g. 1-litre can) make it easy to top up above the maximum mark. Excess engine oil can cause engine damage and is consumed more quickly due to the effects of splash.

For this reason, our advice is to let the oil level drop to the minimum mark and only then to top up the required oil quantity. The distance between the two marks is approximately 2.0 litres.

The procedure for checking the engine oil level is given in the Owner's Handbook for the vehicle concerned.

The service delegates will only deal with claims made under warranty if exact measurements by weighing are available (see below).

Engine oil consumption measurement by balancing out

To assess a warranty or goodwill claim, only the following engine oil consumption measurement method by balancing out can be accepted (this must have been carried out by a BMW authorised workshop):

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Note:

The engine must not leak any oil.

Engine oil may only be drained off when the engine is at its normal operating temperature. The engine oil temperature must be at least 95 °C and read off on the diagnosis system.

1. Eliminate any leaks before measuring the engine oil consumption.
2. Allow the engine to run at idling speed for 5 minutes, during which the engine oil temperature must not drop below 90 °C.
3. Unscrew the main flow oil filter cover (the engine oil will flow back into the oil sump from the oil filter housing).
4. Unscrew the oil drain plug.
5. Allow the engine oil to drain off for 15 minutes.
6. Turn the engine once through 360 degrees by the vibration damper.
7. Allow the engine oil to drain off for 15 minutes.
8. Retighten the primary flow oil filter.
9. Pour in the specified engine oil quantity for the engine type in question (with filter change).
10. Drive the vehicle for a distance of about 1,000 km. Increasing the distance will produce significantly better measuring results.
11. Drain off the engine oil as described in steps 1 to 8, collecting it in a suitable receptacle.

12. Weight the **amount of drained engine oil**. (Engine oil at room temperature has a density of approx. 0.86 g/cm^3)

For the calculation of oil consumption, the **Record on oil consumption measurement** in Enclosure 12.0 must be used.

$$\text{Engine oil consumption} = \frac{\text{Oil quantity added } (cm^3) \text{ - } \textbf{engine oil quantity drained off} \text{ (g): } 0.86\ g/cm^3}{\text{mileage reading when draining - mileage reading when adding engine oil}}$$

Example:

Volume of oil added at mileage reading 44,800: 4,000 cm^3

Weight of oil added at mileage reading 45,900: 2.700 g

$$\text{Engine oil consumption} = \frac{4.000\ cm^3 - 2.700\ g: 0.86\ g/cm^3}{45{,}900\ km - 44{,}800\ km} = 0.78\ cm^3/km$$

$$0.78\ cm^3/km = 0.78\ l/1{,}000\ km$$

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Enclosure 11 to SI 11 07 96 (138), edition 02/2019

Caution!

> Because of the design of the oil sump, this procedure for engine oil consumption measurement may be used *only on the S 85 with one oil drain plug (= manufacturing period: start of series production until March 2007)*.

Many customer complaints about oil consumption are caused by incorrect measuring procedures.

Engine oil consumption measurement should be carried out after 7,500 km at the earliest, as it is only then that the running-in process of the vehicle is completed to a large extent and the oil consumption has stabilised.

The oil consumption that may arise with a particular engine can be determined by the customer only from the oil quantity he or she tops up with. As soon as the oil level falls below the maximum mark on the dipstick, engine oil is topped up without paying attention to some basic rules, such as the vehicle must be standing on level ground, a certain period of time must be left to allow the oil to flow back to the sump, etc. In such cases, the available container sizes (e.g. 1-litre can) make it easy to top up above the MAX mark. Excess oil can cause engine damage and is consumed more quickly due to the effects of splash.

For this reason, our advice is to let the oil level drop to the minimum mark and only then to top up the required oil quantity.

The distance between the two marks is approximately 1.0 - 1.5 litres.

The specified procedure for checking the engine oil level is given in the respective Owner's Handbook.

The service delegates will only deal with claims made under warranty if exact measurements by weighing are available (see below).

Important information concerning S85:

Design configuration of the oil sump:

The oil sump is divided into two sections. It is divided into a front and a rear oil sump. A pump transfers the oil in the front sump to the rear (main) sump. If the oil level is above the maximum, the oil level is above the elevation that separates the front and rear sump. In such cases, the excess oil will overflow back into the front sump.

Oil drain plug(s):

S85, manufacturing period: start of series production until March 2007:

- One oil drain plug on rear (main) sump

S85, manufacturing period: start of series production from April 2007:

- One oil drain plug on rear (main) sump
- A second oil drain plug on the front sump (accessible after removing the reinforcement plate)

Fluctuations in oil level due to chemical and physical causes:

Depending on vehicle state

- Engine cold/hot
- Urban driving, cross-country driving, motorway driving

the oil level will rise due to fuel entrainment and drop due to loss through condensation.

The main factor is the proportion of fuel in the oil. The proportion of fuel in the oil will rise above all during low-rev trips in urban traffic with the associated high levels of injection. Under extreme conditions, the quantity of oil can rise by 15% or 2 litres due to fuel entrainment.

When changing from frequent city driving to motorway driving, condensation is released (via the crankcase ventilation). Fuel in the engine oil is dissipated. The oil level drops again.

These chemical and physical causes result in relatively large fluctuations in the oil level. The customer interprets this situation as an apparently high oil consumption or as a fault in the measuring equipment.

Oil level display concept:

To prevent the driver being confused by a constantly fluctuating oil level, changes are only displayed if they exceed a certain threshold value.

Upwards:

- Changes less than +0.5 litres are not displayed

Downwards:

- As a rule: If the change is between -0.1 litres and -0.4 litres, the displayed value reduces gradually in steps of 0.1 litre
- If the change is greater than -0.4 litres, the display will reduce by the actual value

Overfilling:

The maximum value that can be displayed in the instrument cluster is +0.5 litre above maximum (when the oil level is called up, 1.5 litres are displayed, the bar is completely filled). This can cause problems of the overfilled quantity is greater. The diagnosis and information system tester is able to recognise overfilling of up to 3.5 litres above maximum.

Oil level sensor (QLT):

If an oil level sensor with status until November 2006 is fitted, the display may tend to jump.

Cause: The immersion pipe in the oil level sensor is not coated. Deposits of metal chippings can cause a short circuit.

Measure: Replacement of oil level sensor on vehicles with date of production until November 2006.

Dealing with problem:

The table below shows the actions needed for specific problems under given general conditions and their causes.

Problem	General conditions	Cause	Solution
Isolated or repeated downward jumps in the oil-level check ≥ 0.4 litres, possibly isolated upward jump of the oil-level check > 0.5 litres	No extreme variations in driving profile (no change between urban/motorway, race circuit)	For major jumps: short circuit in oil level sensor due to metallic particles (affected manufacturing period: start of series production until November 2006)	Replace oil level sensor. Note: Oil level sensors from November 2006 have a coated inner pipe that prevents a short circuit due to metallic chipping

Isolated or repeated downward jumps in the oil-level check ≥ 0.4 litres	Extremely variable driving profile (frequent urban traffic, then motorway)	Any fuel in the engine oil is dissipated	No action needed
Isolated or repeated downward jumps in the oil-level check by about 0.1 litres	Extremely variable driving profile (frequent urban traffic, then motorway)	Any fuel in the engine oil is dissipated.	No action needed
Isolated upward jump in the oil-level check ≥ 0.5 litres	Extreme driving profile: Permanent urban traffic, cold engine	Rising engine oil level due to fuel entering the engine oil	No action needed
Repeated jumps, both upwards and downwards, in the oil-level check	Wrong engine oil: SAE 10W-60 not used	Incorrect viscosity: Deviation from QLT map	Change oil
No change in display despite engine oil being topped up	Topping up quantity < 0.5 litre	Display concept	No action needed
Isolated upward jump in the oil-level check 0.5 litres (up to 0.9 litres)	Several top ups < 0.5 litres	Display concept	No measures needed, drain engine oil in case of overfilling (determine degree of overfilling with diagnosis and information system tester)
Display 1.5 litres	Engine oil previously changed or topped up	Overfilling	In the case of overfilling, drain engine oil (determine degree of overfilling with diagnosis and information system tester)
High engine oil consumption > 1 litre/1000 km	Use of approved oil types, correctly performed measurement, slowly dropping display, no extremely sporty driving style, no frequent full-load driving	Possible defect in engine	Engine oil consumption measurement as per SI 11 07 96 (138), Enclosure 11.0

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Weighing:

1. The engine must not leak any oil. Possible leaks must be rectified prior to determining the oil consumption.

   Note:

   Drain off the engine oil while the engine is at normal operating temperature. Read out the engine oil temperature, at least 95°C, with the diagnosis system.

2. Drive the vehicle at least 50 km in the medium to high load range to allow any fuel in the engine oil to be dissipated (by means of condensation).

3. Read out the oil level with the diagnosis system. It must be certain that there is no overfill situation. In the case of overfilling: Drain engine oil. Top up one litre less than the prescribed oil quantity.

   Notes:

   In an overfill situation, there will be up to one litre of oil in the front sump that cannot be drained off!

4. Allow the engine to run at idling speed for 5 minutes, during which the engine oil temperature must not drop below 90 °C.

   Note:

   Allowing the engine to idle causes a pump to transfer the oil in the front sump to the rear (main) sump. This ensures that there is no oil in the front sump.

5. Unscrew the primary flow oil filter drain plug.
6. Unscrew the oil drain plug.
7. Allow the engine oil to drain off for 15 minutes.
8. Turn the engine once through 360° by the vibration damper.
9. Allow the engine oil to drain off for 15 minutes.
10. Seal the primary flow oil filter drain plug.
11. Pour in the prescribed amount of oil for the relevant engine type. (Because the engine oil has been drained from the oil filter, the same quantity of oil must be added as if an oil filter change has taken place.) Oil filter renewal is not permitted!
12. Drive the vehicle for a distance of at least 1000 km. Increasing the mileage, clearly improves the measuring results.

- Immediately before the engine oil consumption measurement: Drive the vehicle at least 50 km in the medium to high load range to allow any fuel in the engine oil to be dissipated (by means of condensation).

- Read out the oil level with the diagnosis system. It must be certain that there is no overfill situation. In an overfill situation, there will be an undefined quantity (up to one litre) in the front sump that cannot be drained off!

  Because of this undefined quantity of oil in the front sump and the fact that the engine has been operated with too much oil (overfilling), *a correct engine oil consumption measurement is not possible.*

- To drain off engine oil: Perform the steps 4 to 9 described above.

- Weigh the oil quantity drained off.

  Engine oil has a density of about 0.86 g/ccm at room temperature.

- Oil consumption =

  Amount of oil added (ccm) - amount of oil drained off (g): 0.86 g/ccm

  Odometer reading at start - odometer reading when filling oil

- Example:

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Oil quantity filled at odometer reading of 44,800: 4,000 ccm

Oil quantity drained at odometer reading of 45,900: 2,700 g

Oil consumption =

4,000 ccm - 2700 g 0.86 g/ccm

45,900 km - 44,800 km

= 0.78l/1,000 km

Test certificate for engine oil consumption:

Please refer to Enclosure 12.0

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Enclosure 11 to SI 11 07 96 (138), edition 02/2019

Caution!

> Because of the design of the oil sump, this procedure for engine oil consumption measurement may be used *only on the S 85 with two oil drain plugs (= manufacturing period: start of series production from April 2007)*.

Many customer complaints about engine oil consumption are caused by incorrect measuring procedures.

Engine oil consumption measurement should be carried out after 7,500 km at the earliest, as it is only then that the running-in process of the vehicle is completed to a large extent and the oil consumption has stabilised.

The oil consumption that may arise with a particular engine can be determined by the customer only from the oil quantity he or she tops up with. As soon as the oil level falls below the maximum mark on the dipstick, engine oil is topped up without paying attention to some basic rules, such as the vehicle must be standing on level ground, a certain period of time must be left to allow the oil to flow back to the sump, etc. In such cases, the available container sizes (e.g. 1-litre can) make it easy to top up to above the maximum mark. Excess oil can cause engine damage and is consumed more quickly due to the effects of splash.

For this reason, our advice is to let the oil level drop to the minimum mark and only then to top up the required oil quantity.

The distance between the two marks is approximately 1.0 - 1.5 litres.

The specified procedure for checking the engine oil level is given in the respective Owner's Handbook.

The service delegates will only deal with claims made under warranty if exact measurements by weighing are available (see below).

Important information concerning S85:

Design configuration of the oil sump:

The oil sump is divided into two sections. It is divided into a front and a rear oil sump. A pump transfers the oil in the front sump to the rear (main) sump. If the oil level is above the maximum, the oil level is above the elevation that separates the front and rear sump. In such cases, the excess oil will overflow back into the front sump.

Oil drain plug(s):

S85, manufacturing period: start of series production until March 2007:

- One oil drain plug on rear (main) sump

S85, manufacturing period: start of series production from April 2007:

- One oil drain plug on rear (main) sump
- A second oil drain plug on the front sump (accessible after removing the reinforcement plate)

Fluctuations in oil level due to chemical and physical causes:

Depending on vehicle state

- Engine cold/hot

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- Urban driving, cross-country driving, motorway driving

the oil level will rise due to fuel entrainment and drop due to loss through condensation.

The main factor is the proportion of fuel in the oil. The proportion of fuel in the oil will rise above all during low-rev trips in urban traffic with the associated high levels of injection. Under extreme conditions, the quantity of oil can rise by 15% or 2 litres due to fuel entrainment.

When changing from frequent city driving to motorway driving, condensation is released (via the crankcase ventilation). Fuel in the engine oil is dissipated. The oil level drops again.

These chemical and physical causes result in relatively large fluctuations in the oil level. The customer interprets this situation as an apparently high oil consumption or as a fault in the measuring equipment.

Oil level display concept:

To prevent the driver being confused by a constantly fluctuating oil level, changes are only displayed if they exceed a certain threshold value.

Upwards:

- Changes less than +0.5 litres are not displayed

Downwards:

- As a rule: If the change is between -0.1 litres and -0.4 litres, the displayed value reduces gradually in steps of 0.1 litre
- If the change is greater than -0.4 litres, the display will reduce by the actual value

Overfilling:

The maximum value that can be displayed in the instrument cluster is +0.5 litre above maximum (when the oil level is called up, 1.5 litres are displayed, the bar is completely filled). This can cause problems of the overfilled quantity is greater. The diagnosis and information system tester is able to recognise overfilling of up to 3.5 litres above maximum.

Oil level sensor (QLT):

If an oil level sensor with status until November 2006 is fitted, the display may tend to jump.

Cause: The immersion pipe in the oil level sensor is not coated. Deposits of metal chippings can cause a short circuit.

Measure: Replacement of oil level sensor on vehicles with date of production until November 2006.

Dealing with problem:

The table below shows the actions needed for specific problems under given general conditions and their causes.

Problem	General conditions	Cause	Solution
Isolated or repeated downward jumps in the oil-level check ≥ 0.4 litres, possibly isolated upward	No extreme variations in driving profile (no change between urban/motorway, race circuit)	For major jumps: short circuit in oil level sensor due to metallic particles (affected manufacturing period: start of series	Replace oil level sensor. Note: Oil level sensors from November 2006 have a coated inner pipe that

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jump of the oil-level check > 0.5 litres		production until November 2006)	prevents a short circuit due to metallic chipping
Isolated or repeated downward jumps in the oil-level check ≥ 0.4 litres	Extremely variable driving profile (frequent urban traffic, then motorway)	Any fuel in the engine oil is dissipated	No action needed
Isolated or repeated downward jumps in oil level display by about 0.1 litre	Extremely variable driving profile (frequent urban traffic, then motorway)	Any fuel in the engine oil is dissipated.	No action needed
Isolated upward jumps in oil level display ≥ 0.5 litres	Extreme driving profile: Permanent urban traffic, cold engine	Rising engine oil level due to fuel entering the engine oil	No action needed
Repeated jumps, both upward and downward, in oil level display	Wrong engine oil: SAE 10W-60 not used	Incorrect viscosity: Deviation from QLT map	Change oil
No change in display despite engine oil being topped up	Topping up quantity < 0.5 litre	Display concept	No action needed
Isolated upward jump in oil level display > 0.5 litre (up to 0.9 litre)	Several top ups < 0.5 litres	Display concept	No measures needed, drain engine oil in case of overfilling (determine degree of overfilling with diagnosis and information system tester)
Display 1.5 litres	Engine oil previously changed or topped up	Overfilling	In the case of overfilling, drain engine oil (determine degree of overfilling with diagnosis and information system tester)
High engine oil consumption > 1 litre/1000 km	Use of approved oil types, correctly performed measurement, slowly dropping display, no extremely sporty driving style, no frequent full-load driving	Possible defect in engine	Engine oil consumption measurement as per SI 11 07 96 (138), Enclosure 11.0

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Weighing:

1. The engine must not leak any oil. Possible leaks must be rectified prior to determining the oil consumption.

   Note:

Drain off the engine oil while the engine is at normal operating temperature. Read out the engine oil temperature, at least 95°C, with the diagnosis system.

2. Drive the vehicle at least 50 km in the medium to high load range to allow any fuel in the engine oil to be dissipated (by means of condensation).
3. Allow the engine to run at idling speed for 5 minutes, during which the engine oil temperature must not drop below 90 °C.
4. Unscrew the primary flow oil filter drain plug.
5. Unscrew the oil drain plug on rear (main) sump.
6. Allow the engine oil to drain off for 15 minutes.
7. Remove reinforcement plate.
8. Unscrew the oil drain plug on the front sump.
9. Turn the engine once through 360° by the vibration damper.
10. Allow the engine oil to drain off for 15 minutes.
11. Seal the primary flow oil filter drain plug.
12. Pour in the prescribed amount of oil for the relevant engine type. (Because the engine oil has been drained from the oil filter, the same quantity of oil must be added as if an oil filter change has taken place.) Oil filter renewal is not permitted!
13. Drive the vehicle for a distance of at least 1000 km. Increasing the mileage, clearly improves the measuring results.

- Immediately before the engine oil consumption measurement: Drive the vehicle at least 50 km in the medium to high load range to allow any fuel in the engine oil to be dissipated (by means of condensation).
- To drain off engine oil: Perform the steps 3 to 10 described above.
- Weigh the oil quantity drained off.

  Engine oil has a density of about 0.86 g/ccm at room temperature.
- Oil consumption =

  Amount of oil added (ccm) - amount of oil drained off (g): 0.86 g/ccm

  Odometer reading at start - odometer reading when filling oil
- Example:

  Oil quantity filled at odometer reading of 44,800: 4,000 ccm

  Oil quantity drained at odometer reading of 45,900: 2,700 g

  Oil consumption = *4,000 ccm - 2700 g 0.86 g/ccm*

  45,900 km - 44,800 km

  = 0.78l/1,000 km

Test certificate for engine oil consumption:

Please refer to Enclosure 12.0

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Enclosure 12 to SI 11 07 96 (138), edition 02/2019

Vehicle data: _____

BMW Group (type): _____

Chassis number: _____

Note:

Document 11.0 Engine oil consumption measurement must be observed for the record on oil consumption measurement.

Amount of Engine oil quantity	**= _____(cm³)**	**Odometer reading (1): _____km**

Weigh the amount of drained engine oil	= _____g	; oil density = 0.86 g/cm³
Quantity of engine oil drained off	= Mass / density of engine oil drained	= _____(g)/0.86 (g/cm³)

Result:		
Quantity of engine oil drained off	**= _____(cm³)**	**Odometer reading (2): _____km**

Calculating engine oil consumption =	**Quantity of engine oil added –**	**= _____cm³ -**
	Quantity of engine oil drained off	**_____cm³**

Result:	
Engine oil consumption	**= _____ (cm³)**

Calculating the distance travelled =	**Odometer reading (2) - Odometer reading (1)**	**= _____km - _____km**

Result:	**= _____ km**
Distance travelled	

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Engine oil consumption (in l)	= Engine oil consumption (in cm^3)/1000 = _____l
Secondary variables x	= 1000 km / mileage = 1000 km/ _____km = _____
Engine oil consumption according to weighing	= (engine oil consumption * x) = (_____l * _____)
Result:	
Engine oil consumption according to weighing	**= _____l/1000 km**

Engine oil consumption according to weighing: _____ l/1000 km

Engine oil brand: _____

Oil grade: _____

Viscosity: _____

Cause of damage: _____

_____ _____

Dealer address Signature

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11 00 ... Overview of consumables (Electronic Parts Catalogue)

1.0 Sealing compound for **injection**.

	Repair instructions(engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	S55, S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.2	S55, S65, S85	Loctite 193140 liquid sealing compound	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.7	W20	Dow Corning liquid sealing compound	07 58 0 397 777	Sealing between crankcase upper and lower halves Sealing of oil sump

2.0 Sealing compound for **application**.

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N12, N14, N16, N18 N20, N26 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57T, N62, N62TU, N63, N63O1 N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85	Drei Bond 1209 liquid sealing compound	07 58 9 062 376	For sealing junction points on crankcase
2.2	N12, N13, N14, N16, N18, N20, N26, N40, N42,N43, N45, N46, N51, N52, N53, N54, N55	Loctite 5970 liquid sealing	83 19 0 404 517	Sealing between

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	W10, W11, W16,	compound		crankcase upper and lower sections.
2.2	N47top, N47D1, N47C1 N57D1 N57S1, B32 ,B36 ,B37 ,B38 ,B42 ,B46 ,B47 ,B48 ,B57 ,B58	Loctite 5970 liquid sealing compound	83 19 0 404 517	Timing case cover sealing, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid sealing compound	07 58 9 067 732	Sealing between the seal plug and crankcase
2.4	N12, N13, N14, N16, N18 W16	Loctite 121078 liquid sealing compound	83 19 2 223 765	Sealing between cover sleeve and crankcase

3.0 **Cleaning agent.**

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
3.1	N12, N13, N14, N18, N20, N26, N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63 Hybrid, N63O1, N63O2 N73, N74 B37, B38 B47, B48, B58	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine
3.2	M47, M47T1 M47T2, M57 M57T1, M57T2 N47 K/U/O/T 0/1 N47C	Universal cleaner	83 19 2 360 981	Clean intake pipe.
3.3	All	Brake cleaner	83 19 2 365 214	Clean.

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4.0 Lubricant for **application**

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N12, N13, N18, N20, N26, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N63O0, N63O1, N63O2, N73 S55, S63T0 B38, B48, B58	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High-temperature assembly paste	83 23 0 309 003	For greasing the thread on the exhaust turbocharger.
4.3	N12, N13, N14, N16, N18 N20, N26, N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63O0, N63O1, N63O2 N73, N73H, N74. S63T1, S65, S85. B38, B48, B58	High temperature paste	83 19 2 158 851 83 19 2 158 852	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1 N63O0, N63O1, N63O2 S63, S63T0	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger. For greasing the central bolt on the VANOS gear.
4.5	M47, M47TU, M47T2 M57, M57TU, M57T2 N47, N47O1 N47C1, N47T N47D1 N57 N57D1	High-temperature grease (UrethynE2).	83 23 0 441 070	For greasing the injectors or injector shafts. Solenoid valve and piezo injector.
4.6	N47T0, N47T1 N57T0, N57T1, N57S1 B47T0,	Assembly paste	83 29 9 407 778	For lubricating the O-rings of the pressure pipes. Multistage turbocharging assembly.

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4.7	W20	Assembly paste, grease	No longer greased.	For greasing the torsion splined shaft.
4.8	N63O1, N63O2	Assembly paste, grease	83 23 9 407 778	For greasing the central bolt on the crankshaft.
4.9	W20	Assembly paste, grease	83 23 9 407 778	Grease O-ring on alternator.

5.0 lubricant for **filling**

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
5.1	M47, M57	Exhaust turbocharger additive	83 19 2 362 168	For filling the exhaust turbocharger after the renewal.
5.2	B32, B36, B37, B38, B42, B46, B47, B48, B58	Exhaust turbocharger additive, petrol MSP	83 19 2 457 276	For filling the exhaust turbocharger after the renewal.

6.0 Lubricants to loosen locked **screw connections.**

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
6.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, N57S1 W16, W17, B37, B47, B57	Brunox lubricating grease	83 23 0 418 567	For releasing the glow elements.
6.2	E89 F10, F11.	Brunox lubricating grease	83 23 0 418 567	For releasing and tightening the screw connection of the rubber mounts.

7.0 **Leak detection spray and contact spray**

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
7.1	Petrol: N13, N20, N26, N54, N55 B38, B48, B58	Leak detection spray	83 19 9 407 861	Check charge air path for tightness. Example: leakage on charge air hose or charge air cooler.

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	Diesel fuel: M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, B37, B47			
7.2	S55	Contact spray	81 22 9 400 208	For cleaning and protecting of electrical plug connections.

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Enclosure 1 to SI 13 06 96 (139), edition 02/2019

Fuels are mainly produced from crude oil using chemical/physical procedures. To a small extent, petrol is also made from coal or plants.

In the refinery, the crude oil undergoes different processes, where it is split up into different components. Fuels with the desired properties are then mixed from these components .

The fuel properties are influenced through suitable supplements (additives), thus ensuring trouble-free engine operation with optimum energy efficiency.

Although petrols have different property value world-wide, they are nevertheless all suitable for the operation of BMW Group engines when complying with certain limit values.

- *Petrol* is the collective term for hydrocarbons of different structures and production methods
- *Regular-grade fuel* is petrol with a knock resistance RON 91.0/MON 82.5
- *Premium grade fuel E10* is petrol with a knock-resistance level of RON 95
- *Premium grade fuel* is a mixture with highly knock-resistant portions and thus has a higher knock resistance than regular grade fuel (RON 95/MON 85). In addition, "Super Plus" fuels are also available (RON 98/MON 88)
- *Unleaded fuel* does not contain any metalliferous antiknock additives, such as e. g. lead tetraethyl or lead tetramethyl.

  Unleaded fuel is offered as regular-grade, premium-grade and premium grade plus fuel according to European standard 228.

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Enclosure 2 to SI 13 06 96 (139), edition 02/2019

Fuels that can be used for petrol engines are mixtures of ring and chain-like hydrocarbons, with typical boiling points of between 30°C and 200°C. They are offered world-wide in different qualities.

Properties and specifications for leaded fuels are specified in DIN 51 600, for unleaded fuels in European standard 228.

For use in BMW Group vehicles, it is permissible to admix fuel components containing oxygen up to the limit values specified in European standard 228 (maximum methanol 3 %, maximum ethanol 5 %).

No changes result from the introduction of the new E10 fuels. E10 is a classification used for petrols with up to ten percent ethanol whose introduction is planned by German legislation as part of the implementation of the new EU Fuels Quality Directive 2009/30 (FQD).

The fuels with a biogenic portion can then lead to a further reduction in CO2 emissions without requiring an upgrade in the vehicle.

E10 fuels can be used in all BMW Group vehicle models of all series without ill effects. However, regardless of the ethanol content, the minimum required octane number as specified in the operating instructions must be observed since some older BMW Group vehicles require Super Plus RON 98 due to its higher knock resistance (see table below).

Properties and specifications for E10 fuels are defined in the E DIN 51 626-1.

The following BMW Group vehicle models for which the operating instructions explicitly specifies 98 octane fuel must continue to be refuelled with Super Plus (E DIN 51626-1, issue date April 2010):

Year of manufacture	Models	Type code
1960-1964	700s, 700cs	310, 311
1968-1977	2500, 2600, 2800, 2.8L, 3.0L, 3.0si, 3.3L, 3.3Li	329, 357, 358, 370, 371, 378, 383, 384, 389, 390
1968-1975	2800cs, 2.5cs, 3.0cs, 3.0csi, 3.0csl	359, 363, 364, 380
1966-1975	2000ti, 2002ti, 2002tii, 2002turbo	332, 360, 361, 369, 377
1962-1974	1600GT, 1600ti, 1800ti, 1800tsia	321, 323, 326, 338, 341
1972-1981	518 (92 KW), 520, 525, 528, 520i, 525i, 528i, M5 535i	373-375, 379, 382, 391, 394, 395, 401-403, 410, 415, 419
1965-1970	2000cs (88 KW), 2000tiux	315, 337
1975-1983	315, 318i, 320i,323i	388, 405, 416-418, 437
1978-1983	316	385
1976-1983	320	404
1977-1986	728, 730, 728i, 733i, 735i (145/160 KW), 745i	397-399, 412-414, 432, 444
1976-1989	625cs, 628csi, 630cs, 633csi, 635csi (160 KW)	392, 393, 406-409, 411, 424, 425, 446, 467
1978-1984	M 635csi (210 KW)	434
1978-1980	M1	301
1981-1987	518, 518i, 520i, 525e (92/95 KW), 525i, 528i, M535i (141/160 KW)	420-423, 430, 435, 436, 442, 450, 451
1982-1994	318i (77 KW), 320i, 325e (95 KW), M3	302, 303, 305, 427-429, 433, 459
1982-1987	316	426, 500
1982-1987	320i (95 KW)	452, 453, 477, 502

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1982-1987	325i (126 KW)	448, 449, 454
1952-1969	Dixie, Goggo, 309, 501 to 507, 602, 3200, Alpina B10	300, 302, 303, 305, 307, 316, 320, 327, 328, 330, 331, 333-335, 345-351

To ensure the required operating characteristics in all environmental and driving conditions, high demands are placed on fuels. To meet these requirements, a variety of data must be specified and used to compare the quality.

Knock resistance:

The knock resistance as a quality feature for petrol is the prerequisite for a controlled combustion process and thus crucial for the compression configuration, the efficiency and the engine performance.

The octane number is used as a measure. The higher the number, the more knock resistant the fuel. To determine the octane number, two different procedures are used internationally:

The RON (research octane number) and the MON (motor octane number).

The difference between the two method is in the mixture preheating, the engine speeds and the modified ignition timing setting.

Density

The density is determined by the fuel components. Because volume changes with temperature, density is measured at 15°C in accordance with the standard. Because of the different compositions, there are different values for mid-grade and regular-grade fuel.

Boiling curve and vapour pressure

Petrols must be free-flowing. The boiling curve and the vapour pressure values are used for evaluation purposes. Petrols do not have a boiling point but a boiling range, since they consist of a mixture of different hydrocarbon components.

The boiling range (boiling curve) and thus the vapour pressure influence e. g.:

- Formation of fuel vapour lock
- Starting response
- Evaporation loss
- Transient response and drivability
- Engine oil dilution
- Residue-free combustion

The boiling curve is different for summer and winter-grade fuels. European standard 228 specifies the amount to be evaporated at 70°C, 100°C and 150°C as well as the final boiling point. The vapour measurement is another tool used to make statements on the volatility properties of the fuel and is also specified in the standards.

Calorific value

The calorific value is the measurement for the energy content of the fuel. Engine output is relative to the calorific value of the combustible fuel-air mixture.

Purity, combustion residues

Fuels must be free from dirt contamination. Pumps, air vents and lines must not clog up or wear. Residues in the differentiated intake system and in the combustion chamber affect the operating sequence in the engine. The waste steam residue in the fuel provides on the degree of dirt contamination.

Sulphur content

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All fuels must have the lowest sulphur values possible. As a result, less sulphurous acid or sulphuric acid is formed in the combustion residues, which would lead to corrosion and pollutant emission of sulphur compounds in engines that are not at operating temperature.

Fuel additives, additives

To meet the listed requirements, the fuel companies mix additives to their fuels, including colours for identification purposes among other things.

It is up to the fuel companies, which colours they use to identify the fuels.

The selection, use and metering of the additive requires comprehensive tests in order to co-ordinate influences and interconnections.

No extra supplements are required in BMW Group vehicles in addition to the additives admixed by the fuel manufacturer.

Fuels with lead substitute

Use of unleaded fuel with lead substitutes added by the manufacturer is approved. *Subsequent* admixing of lead substitutes in unleaded fuels is *not approved* .

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Enclosure 3 to SI 13 06 96 (139), edition 02/2019

Leaded fuel:

Properties	Requirements	Test specifications
Knock resistance	Min. 98.0 RON	ISO 5164
	Min. 88.0 MON	ISO 5163
Density at 15 °C	0.730 - 0.780 g/ml	ISO 3675/ASTM D 4052
Lead content	max. 0.15 g/l	European standard 237

Unleaded petrols: Extract from DIN 51 607/EN 228 - version August 1989

Properties	Requirements	Test specifications
Knock resistance		
- normal	min. 91.0 ROZ*min. 82.5 MON*	ISO 5164ISO 5163
- Mid-grad fuel	min. 95.0 ROZ*min. 85.0 MON*	ISO 5164ISO 5163
- Premium grade fuel	min. 98.0 ROZ*min. 88.0 MON*	ISO 5164ISO 5163
Density at 15 °C	0.725 - 0.780 g/ml	ISO 3675/ASTM D 4052
Lead content	max. 0.013 g/l	European standard 237

* Manufacturer and/or supplier are obligated to provide a research octane number of 0.5 and a motor octane number of 0.7. The provision values are the result of ISO 4259 under the preconditions of the separation analysis in the CRF engine.

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Enclosure 4 to SI 13 06 96 (139), edition 02/2019

A special cleaning fluid is needed to clean the fuel injector in the ultrasonic sound device.

Trade name	*Order number*	*Container size*
SPX special cleaner	83 30 0 491 350	10 litre

Company	**Tel.: 0841 / 9 65 00 - 70 or 71 (domestic)**
Cartool GmbH	Tel.: +841 / 9 65 00 - 80 or 81 (from outside Germany)
Straußenlettenstr. 15	Fax: +841 / 9 65 00 - 90
D-85053 Ingolstadt, Germany	E-Mail: info@cartool.de

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Enclosure 5 to SI 13 06 96 (139), edition 02/2019

The most important prerequisite for an economic and trouble-free operation of the diesel engine is a clean and good quality of the diesel fuel.

Diesel fuel is a mixture of hydrocarbons that are derived by boiling at 180 ° to 380 °C and distillation, generally from crude oil, less commonly from plants.

Diesel fuels that are readily available on the free market are adjusted for the requirements of fast running diesel engines.

BMW diesel engines require fuels in compliance with EN 590 with a minimum cetane number of 51. The use of heating fuels, marine fuels or biodiesel fuels is prohibited. *The use of larger parts of fuels such as "biodiesel" or "rapeseed methyl ester" will result in leaks that can cause considerable subsequent damage. Exception: M47, M51, M57 with SA201 ”RME Version”.

The following criteria are important to determine the quality of diesel fuels:

Ease of ignition:

The cetane number (CZ) indicates the diesel fuel's ease of ignition. The larger this number is, the more easily the fuel will ignite. The ease of ignition is the property of the fuel that effects the self-ignition in the diesel engine. Sufficient ease of ignition is the basic prerequisite for a normal controlled and no-knock combustion process. The cetane number is specified in a test engine in compliance with ISO 5165. Due to the shorter combustion process, fast running diesel engines require diesel fuels with high cetane numbers.

Low temperature performance

Diesel fuels emit paraffin at low temperatures. In the field, the fuel is adjusted to the season. For example, the standard BMW fuel heating unit provides a temperature resistance up to approximately -22°C during the coldest time of winter. Operation of vehicles that were fuelled with fuel during the summer in the wintertime can lead to vehicle failure. When driving from warm regions to a cold mountain region (fuel tank range up to 1,000 km!), the cold resistant diesel fuel should be added to the tank prior to the end of the trip.

Sulphur content

The lubricity of this diesel fuel is reduced during the desulpherising process at the refinery. This is compensated by adding so called lubricity additives so that the lubricity is ensured for all brands of diesel fuels.

Purity

Due to the exact dimensional accuracy in the high-pressure fuel system, purity is a prerequisite for the function and service life of the diesel engine. The water content to prevent corrosion may not exceed 200 mg/kg. The ash content is specified with 0.01% to prevent above-average coking of nozzles and combustion deposits. The residue is also specified according to the standard.

Standard test procedures have been implemented to indicate the requirements for the diesel fuel. They are used to define the most important quality criteria and minimum requirements. For example, EN 590 applies in the European Union. Its specifications include that the diesel fuel consists of hydrocarbons and can be improved with hydrocarbon soluble additives.

* EN 590 permits the addition of a maximum of 7% biodiesel (fatty acid methyl ester content).

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Enclosure 6 to SI 13 06 96 (139), edition 02/2019

Extract from draft EN 590 from February, 2000

Properties	Requirements	Test specifications DIN
Density at 15 °C	0.820 - 0.845 g/ml	EN ISO 3675: 1998 EN ISO 12185: 1996
Sulphur content	max. 0.035 %	EN ISO 14596: 1998 EN ISO 8754: 1995EN 24260: 1994
Water content acc. to Karl Fischer	max. 200 ppm	prEN ISO 12937: 1996ASTM D 1744
Ease of ignition:		
Cetane number (test engine)	min. 51	EN ISO 5165: 1998

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Enclosure 7 to SI 13 06 96 (139), edition 02/2019

Summer and winter diesel fuels precipitate paraffins at corresponding temperatures below zero and become viscous. The resulting paraffin crystals obstruct the filter.

In order to improve this cold behaviour, the manufacturer adds flow improvers to the diesel fuel depending on the season. In conjunction with the standard fuel filter heater, this ensures trouble-free operation.

The subsequent addition of flow improvers as well as the addition of petrol from direct injection diesel engines is absolutely harmful to the injection pump / high-pressure pump and therefore no longer permitted!

Note: The fuel filter heater, which has been fitted as standard in all BMW Group diesel vehicles since mid-1985 and can be retrofitted to older vehicles, effectively prevents the particularly fine filter pores (3 - 5 µm) from clogging during driving.

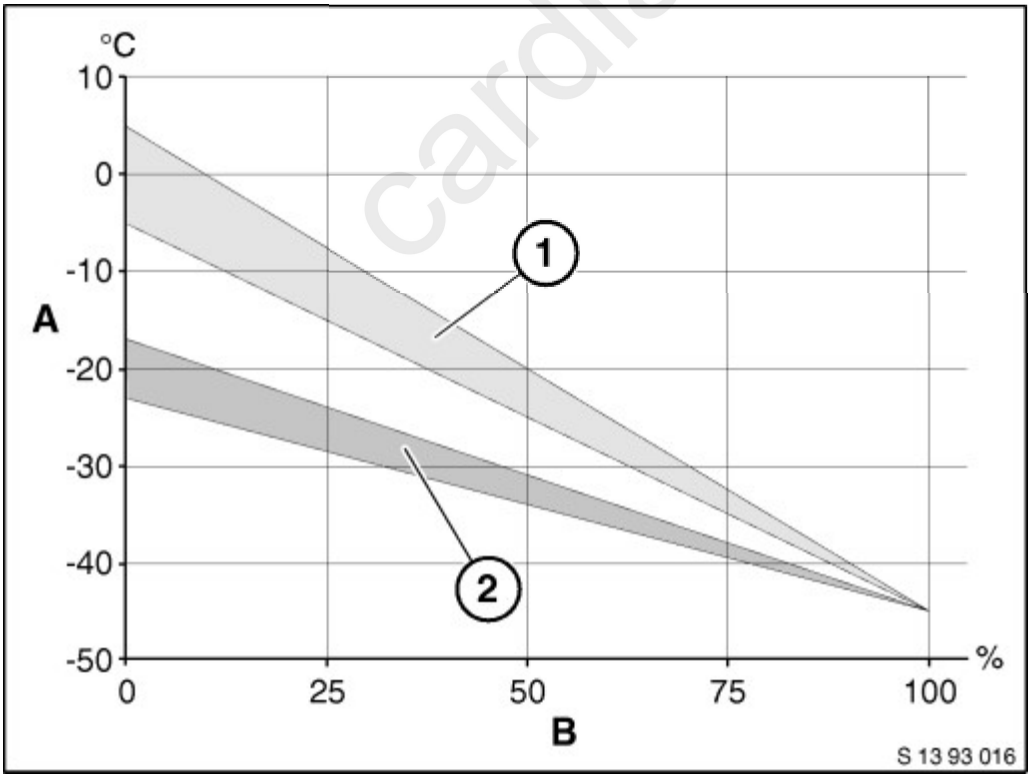
The temperature-dependent self-regulating behaviour of the PTC heating elements prevents excessive loads on the electrical household.

7.1 Flow improvement measures for BMW Group swirl-chamber diesel engines (not valid for direct injection diesel engines):

In exceptional cases, the addition of petroleum is permissible. Depending on the mixing ratio (0-100%) the pour point can be lowered to a temperature of about -45°C.

The following diagram shows the influence of the petroleum portion on the limit value of the filterability (CFPP=Cold Filter Plugging Point) of summer and winter diesel fuel.

Influence of petroleum on the (CFPP) of summer/winter diesel fuel



A = CFPP (limit value of the filterability) [°C] **1 = CFPP range of summer diesel engines**

B = petroleum portion [%] 2 = CFPP range of winter-grade diesel engines

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Note: The petroleum must be added before the filtration limit is reached, even if the temperature of the fuel system is at least 8°C above the cloud point (summer fuel: +8°C, winter fuel: 0°C). The addition is ineffective if paraffin precipitation has already taken place. In this case, only the heating of the fuel system can help, for example, by heating the vehicle in a warm room or, in most cases, by replacing the fuel filter cartridge.

For safety reasons (explosion hazard), the method used so far (only for swirl chamber engines!) of adding up to 30% regular-grade fuel to diesel fuel in order to ensure the flowability of the fuel may only be used if petroleum is not available. Special reference must be made to the safety risk! In this case, a higher combustion noise and driving behaviour disturbances must be accepted due to the petrol components. Driving with petrol additive (only with swirl chamber engines!) must be limited to the duration necessary due to temperature.

The use of flow improvers previously approved by the BMW Group is no longer permitted for the following reasons:

- Improved additives for winter-grade diesel fuels down to -20°C in the winter season
- Risk of overaddition with negative effects on cold properties

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Enclosure 8 to SI 13 06 96 (139), edition 02/2019

Cleaning agent for the degradation of fuel combustion residues in mechanically and electronically controlled diesel injection systems (BMW swirl chamber engines):

Trade name	*BMW part number*	*Container size*
BMW diesel rinsing	81 22 9 407 528	

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Enclosure 9 to SI 13 06 96 (139), edition 02/2019

For BMW swirl chamber engines (M21, M41, M51)

A special cleaning fluid is needed to clean the injector nozzles in the ultrasonic sound device.

Trade name	*Order number*	*Container size*
SPX special cleaner	83 30 0 491 350	10 litre

Company	**Tel.: 0841 / 9 65 00 - 70 or 71 (domestic)**
Cartool GmbH	Tel.: +841 / 9 65 00 - 80 or 81 (from outside Germany)
Straußenlettenstr. 15	Fax: +841 / 9 65 00 - 90
D-85053 Ingolstadt, Germany	E-Mail: info@cartool.de

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Enclosure 10 to SI 13 06 96 (139), edition 02/2019

For the safe storage, disposal and conversion of fuels, the authorities issue "regulations for combustible fluids".

For the purpose of this regulation, combustible fluids are substances with a flash point, which, at 35°C, are neither solid nor in paste form, and have a vapour pressure of 3 kg/cm or less at 50°C and belong to one of the following groups:

Group A:

Fluids that have a flashpoint not exceeding 200°C and do not have properties of group B with regard to water-solubility.

Danger classification I:	**Fluids with a flashpoint up to 21°C**
Danger classification II:	Fluids with a flashpoint 21 – 53°C
Danger classification III:	Fluids with a flashpoint 55 – 100°C

Petrols are part of group A/I. Kerosene and white spirit are part of group A/II. Diesel fuel is part of group A/III.

Group B:

Fluids with a flashpoint of below 21°C, which dissolve in water at 15°C at any ratio or whose combustible liquid elements dissolve in water at 15°C at any ratio.

This includes alcohols.

Specific regulations apply to each danger classification. They can be viewed or requested from the authorities responsible.

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Enclosure 1 to SI 13 06 96 (139), edition 02/2019

Product for the interior preservation of fuel systems of combustion engines. DESOLITE K is an antifreeze and corrosion inhibitor added to fuel (diesel or petrol) in order to preserve tanks, pipes, pumps, nozzles, carburettors, combustion chambers, inlet and outlet paths.

Trade name	*Order number*	*Container size*
Desolite K	81 22 2 414 883	250 ml

The combustion chamber, valve and injector cleaner is a lead-free surfactant cleaner for normal and premium grade fuel engines. Cleaning of engine combustion chambers, especially in countries with poor fuel quality, which results in coking of the combustion chamber (for example, China and other Asian markets).

Trade name	*Order number*	*Order number, China*	*Container size*
Combustion chamber cleaning agent	83 19 0 413 030	83 19 2 411 417	550 ml

To improve the fuel quality of petrol. Prevents and removes deposits on valves and injectors. Reduces fuel consumption, exhaust emissions and extends engine service life. The only additive technology officially approved by BMW.

Trade name	*Order number* **BMW**	*Order number* **MINI**	*Container size*
Petrol additive	83 19 2 408 560	83 19 2 408 562	100 ml

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Enclosure 2 to SI 13 06 96 (139), edition 02/2019

Product for the interior preservation of fuel systems of combustion engines. DESOLITE K is an antifreeze and corrosion inhibitor added to fuel (diesel or petrol) in order to preserve tanks, pipes, pumps, air vents, carburettors, combustion chambers, inlet and outlet paths.

Trade name	*Order number*	*Container size*
Desolite K	81 22 2 414 883	250 ml

To improve the fuel quality of diesel. Prevents and removes deposits on valves and injectors. Reduces fuel consumption, exhaust emissions and extends engine service life. Contains a cetane number booster in addition to the proven diesel additive.

Trade name	*Order number*	*Container size*
Diesel additive with cetane number booster	83 19 2 414 456	100 ml

To improve the fuel quality of diesel. Prevents and removes deposits on valves and injectors. Reduces fuel consumption, exhaust emissions and extends engine service life. No flow improver. The only additive technology officially approved by BMW.

Trade name	*Order number* **BMW**	*Order number* **MINI**	*Container size*
Diesel additive	83 19 2 296 922	83 19 2 350 550	100 ml

Diesel particulate filter additive for MINI. Prevents the filter from clogging and becoming ineffective. Enables complete and rapid burn off of soot particles.

Trade name	*Order number*	*Container size*
Eolys additive	83 19 2 208 040	1100 ml

Product for chemical emission control / nitrogen oxide reduction. AdBlue® is a synthetically produced SCR urea solution which reduces the emission of toxic nitrogen oxides from diesel engines with SCR exhaust re-treatment. Patented cap on the 1.89 l bottle for clean and drip-free filling by the end customer.

Trade name	*Order number*	*Container size*
Diesel Exhaust Fluid AdBlue®	83 19 0 441 139	1890 ml
	83 19 2 295 606	10 l
	83 19 2 357 295	210 l

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Enclosure 1 to SI 17 01 96 (140), edition 02/2019

Pure water is unsuitable as a coolant not just because of the lack of antifreeze properties. Good functioning of the cooling system is only guaranteed once a suitable antifreeze and corrosion inhibitor, or antifreeze for short, has been added.

The cooling systems of BMW vehicles must only be filled with the anti-freeze and corrosion inhibitors approved for the purpose. The filling and maintenance instructions to be found in the Repair Instructions and operating instructions must be observed.

Antifreeze agents must meet the following requirements:

- They must guarantee operability of the cooling system in winter (anti-freezing protection by lowering the freezing point) and in summer (prevent boiling and boiling over of the coolant).
- They must protect metal parts that come into contact with the coolant (grey cast iron, steel, aluminium alloy, brass, copper and solder) against corrosion and cavitation.
- They must be neutral with respect to rubber parts and plastic parts in the coolant circuit.
- They must guarantee the consistency of the above-mentioned quality criteria.

To create these coolant properties, the antifreeze and corrosion inhibitors must be mixed to the correct ratio with water.

Prescribed mixture for coolant:

50 % antifreeze for antifreeze protection up to -40 °C

The original coolant mixture for the initial filling at the factory has this antifreeze-to-water ratio.

If the proportion of antifreeze is less than 40 % to -29 °C (i.e. the water content is higher than 60 %), not only the degree of protection against freezing, but also corrosion protection is reduced. When the water content is too high, this can lead to premature excess temperature in very hot weather or hot climates and as a consequence lead to coolant being ejected out of the system and damage to the engine through excess temperature.

This means that it is essential that an antifreeze and corrosion inhibitor is added even in the tropics.

Too high a concentration, more than 55 % down to -47°C, leads to deterioration of the cooling properties (heat transfer) and protection against freezing-up is modified in the opposite direction, i.e. it also deteriorates.

The amounts of screenwash required for protection against freezing are stated (percentage values) on the containers.

Minimum requirements for water quality:

- Appearance: colourless, clear
- Sediment, without suspended matter
- pH value: 6.5-8.0
- Total hardness, max.: 20° dH (German hardness grade) or in new unit of measurement:
- Total hardness, max.: 3.6 mmol Ca^{2+}/ltr.
- Chloride content: max. 100 mg/l
- Sulphate content: max. 100 mg/l

Tap water with drinking water quality usually fulfils these requirements. Local water utilities can provide information about the quality of the water they supply. If necessary, the water must be treated (e.g. softened) or distilled water must be used.

The quality of regenerated sea water (as found in the Gulf states) is inadequate!

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Enclosure 2 to SI 17 01 96 (140), edition 02/2019

Change interval, coolant change and check

Regular testing of the coolant composition as part of inspections I and II. Due to decreasing corrosion protective effect the change interval of 4 years (3 years for M-power vehicles) has to be maintained. Check the coolant antifreeze concentration before the start of the cold season. It is also necessary to check its composition after having topped up coolant. When adjusting and checking the concentration, a areometer spindle is required (antifreeze tester). Mixing the approved substances with each other is allowed.

Technical progress has made it possible that coolant changes are not required for the vehicles specified below:

- All CBS vehicles (including M vehicles) as of production date 9/2003
- Service Interval Indicator vehicles:
    - All Service Interval Indicator vehicles with petrol engines (including M vehicles) as of production date 03/2003
    - E85 from market introduction
    - All Service Interval Indicator vehicles with diesel engine as of production date 09/2003
    - RR4, RR5, RR6 and all other new model start-ups

Disposal

For the disposal of the coolant, the safety data sheets of the manufacturers for antifreeze and corrosion inhibitors or the legal regulations of the individual countries must be observed.

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Enclosure 3 of SI 17 01 96 (140), 04/2019

Following coolants are used in vehicles of the BMW Group

Coolant	Characteristic: Colour	Use in the service
BMW antifreeze and corrosion inhibitorG30	magenta	
BMW antifreeze and corrosion inhibitorG48	blue	
BMW antifreeze and corrosion inhibitor HT-12	magenta	
BMW antifreeze and corrosion inhibitor HT-12	green	
i3 Coolant	blue	

Coolant use

Vehicle	BMW antifreeze and corrosion inhibitorG30	BMW antifreeze and corrosion inhibitorG48	BMW antifreeze and corrosion inhibitor HT-12 (magenta)	BMW antifreeze and corrosion inhibitor HT-12 (green)	i3 Coolant
MINI R55, R56; diesel engine W16	X				
F15, F16, F26, production to 30.06.2018		X			
G01, G02, G05, G07, production until 30.06.2018		X			
F06, F12, F34, F36, F85, F86, F90, production until 31.07.2018		X			
G11, G12, G14, G15, G30, G31, G32, production until 31.07.2018		X			
G29, production until 30.11.2018		X			
F20, F21, F22, F23, F30, F31, F32, F33, F35, F39, F45, F46, F48, F80, F82, F83, F87, Production until 31.12.2018		X			
G20, production until 31.12.2018		X			
I01 (coolant circuit for the drive components), I12, I15, production until 31.12.2018		X			

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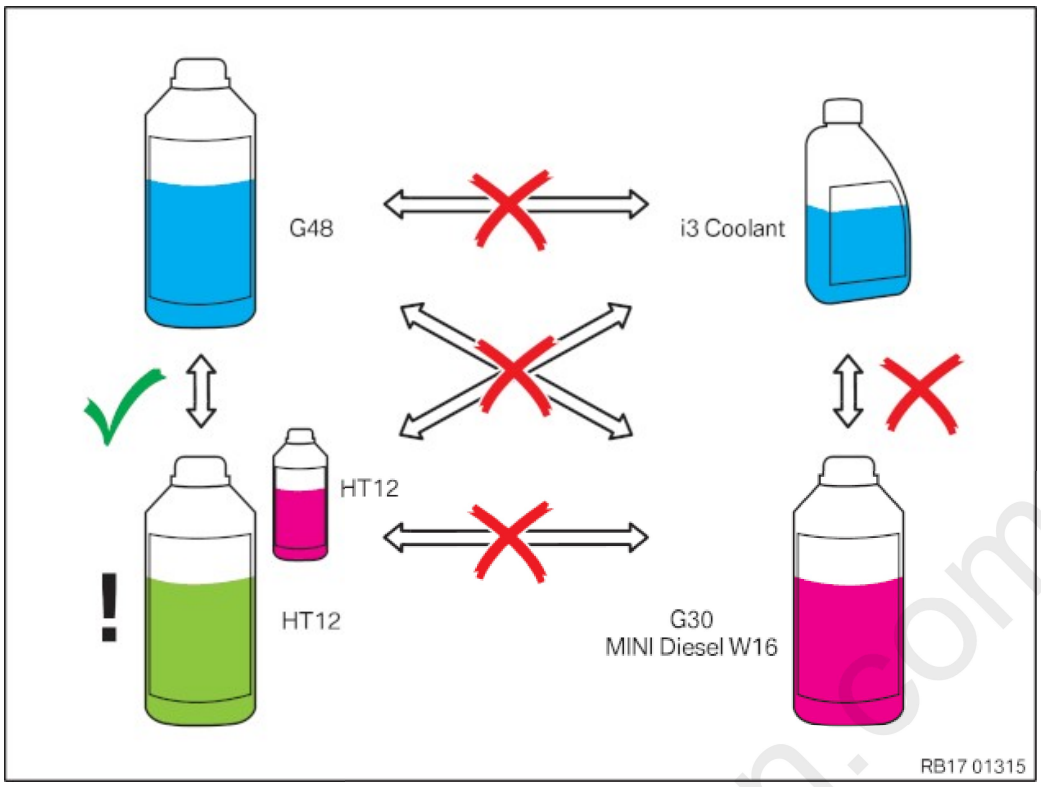
RR04, RR5, RR6, RR11, RR12, RR31, production until 31.12.2018		X			
F49, F52, production until 31.01.2019		X			
G08, G38, production until 31.01.2019		X			
F15, F16, F26, production from 01.07.2018			X (1)	X (1)	
G01, G02, G05, G07, production from 01.07.2018			X (1)	X (1)	
F06, F12, F34, F36, F85, F86, F90, production from 01.08.2018			X (1)	X (1)	
G11, G12, G14, G15, G30, G31, G32, production from 01.08.2018			X (1)	X (1)	
G29, production from 01.12.2018			X (1)	X (1)	
F20, F21, F22, F23, F30, F31, F32, F33, F35, F39, F45, F46, F48, F80, F82, F83, F87, Production from 01.01.2019			X (1)	X (1)	
G20, production from 01.01.2019			X (1)	X (1)	
I01 (coolant circuit for the drive components), I12, I15, production from 01.01.2019			X (1)	X (1)	
RR04, RR5, RR6, RR11, RR12, RR31, production from 01.01.2019			X (1)	X (1)	
F49, F52, production from 01.02.2019			X (1)	X (1)	
G08, G38, production from 01.02.2019			X (1)	X (1)	
F40, F44, F97, F98, starting with SOP			X (1)	X (1)	
G21, G28, starting with SOP			X (1)	X (1)	
i01 heater circuit					X
Other vehicles of the BMW, BMWi, MINI and Rolls-Royce models		X			

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More information

Note:

In principle, a vehicle has to be filled with the coolant that it was delivered with ex-works.



Risk of damage!

Coolants must not be mixed with one another arbitrarily.

The coolant may gel and that may lead to engine damage if mixed.

Following table shows the safe miscibility of the coolants from a technical point of view:

	BMW antifreeze and corrosion inhibitor HT-12 (green)	BMW antifreeze and corrosion inhibitor HT-12 (magenta)	BMW antifreeze and corrosion inhibitorG30	BMW antifreeze and corrosion inhibitorG48	i3 Coolant
BMW antifreeze and corrosion inhibitor HT-12 (green)	X	X		X	
BMW antifreeze and corrosion inhibitor HT-12 (magenta)	X	X		X	
BMW antifreeze and corrosion inhibitorG30			X		
BMW antifreeze and corrosion inhibitorG48	X	X		X	
i3 Coolant					X

Enclosure 4 to SI 17 01 96 (140), edition 02/2019

With the protection of the environment in mind, BMW has been filling all of its vehicles with nitrite- and amino-free antifreeze and corrosion inhibitors since mid-1986 as standard practice.

The use of antifreeze and corrosion inhibitors that contain nitrites and amines is no longer permissible.

Note:

> For an overview about the use of coolant, see technically suitable antifreeze and corrosion inhibitors.

The mixture ratio with water is 1:1. This provides antifreeze protection down to -40°C.

The BMW antifreeze and corrosion inhibitor G48 is blue in colour.

Trade name	***BMW part number DEU***	***BMW part number worldwide (except for DEU, JPN, CHN, AUS, FIN, NOR, SWE, DNK, FRO)***	***BMW part number JPN***	***BMW part number AUS***	***BMW part number CHN***	***BMW part number FIN, NOR, SWE, DNK, FRO***	***Container size***
BMW antifreeze and corrosion inhibitor	83 19 2 211 191	83 51 2 355 290	83 19 2 211 194	83 19 2 211 913	83 19 2 211 195	83 19 2 211 914	1.5-litre can
BMW antifreeze and corrosion inhibitor	83 19 2 304 068	83 51 2 355 291					60-litre barrel
BMW antifreeze and corrosion inhibitor	83 19 2 304 069	83 51 2 355 293					205-litre barrel

Trade name	***Manufacturer/Supplier***
AD Original AD 48	AD Parts, S.L.
AlpineC48	Mitan Mineralöl GmbH
AWM G11	Tosol-Sintez
Aral Antifreeze Extra	Aral AG
AVIA Antifreeze APN	AVIA Mineralöl AG
BMW Antifreeze	BMW AG
Radiocool NF	Castrol International

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MAINTAIN FRICOFIN	Fuchs Europe Schmierstoffe GmbH
Engmans Super Antifreeze and Coolant	Unico Manufacturing
GLYSANTIN® G48®	BASF series introduction
Kuttenkeuler Antifreeze ANF KK48	Kuttenkeuler GmbH
Antifreeze HD G11 K	Lukoil
Glycostar ST48	Kuttenkeuler GmbH
Zerex G48®	Valvoline

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Enclosure 5 to SI 17 01 96 (140), edition 02/2019

BMW antifreeze and corrosion inhibitor HT-12 was introduced for the first time starting 03/2018 exclusively as part of Technical Campaigns for selected BMW vehicles.

Starting 07/2018, a few series will be initially filled with the BMW antifreeze and corrosion inhibitor HT-12 ex works.

BMW antifreeze and corrosion inhibitor HT-12 is available in **green** colour as well as in **magenta** colour. **Green**BMW antifreeze and corrosion inhibitor HT-12 is used in the factories for initial filling. The BMW antifreeze and corrosion inhibitor HT-12 for the service department in the Retailer Organisation was **magenta in colour** for a short time. This **magenta-coloured** BMW antifreeze and corrosion inhibitor HT-12 is now eliminated.

Starting 11/2018, **green** BMW antifreeze and corrosion inhibitor HT-12 will be available to the service department in the Retailer Organisation.

Note:

For an overview about the use of coolant, see technically suitable antifreeze and corrosion inhibitors.

The mixture ratio with water is 1:1. This provides antifreeze protection down to -40°C.

Trade name	*BMW global part number*	*Container size*	*Colour*	*Note*
BMW antifreeze and corrosion inhibitor HT-12	83 19 2 458 358	5-litre canister	magenta	- omitted -
BMW antifreeze and corrosion inhibitor HT-12	83 19 2 466 484	5-litre canister	green	- New -

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Enclosure 6 of SI 64 09 96 (154), 02/2019

Lifetime coolant i3 was used for the first time from 09/2013 onwards in the BMW i01 **exclusively for the heater circuit**.

Risk of mixing up

The silicate free coolant i3 is dyed blue.

Do not use coolant i3 for the cooling circuits of the electrical machine or the range extender!

Do not use coolant for cooling circuits of the electrical machine or the range extender in the heater circuit!

Do not use other coolants, on account of the risk of flocculation and the associated clogging of the heat exchanger!

Note:

For an overview about the use of coolant, see technically suitable antifreeze and corrosion inhibitors.

Coolant i3 must not be used for all equipment specifications.

Mixture ratio with water is 1:1. This provides antifreeze protection down to -40 °C.

Trade name	***BMW part number***	***Container size***
Coolant i3	83 51 2 355 296	1000 ml

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Enclosure 7 to SI 17 01 96 (140), edition 02/2019

Caution!

The lifetime coolant Glysantin G30-91 is absolutely necessary for the MINI R56 diesel engine W16. Other coolant additives cause engine damage.

Glysantin G30-91 may not be used in the context of a Technical Campaign for BMW vehicles.

Risk of mixing up

The silicate-free coolant Glysantin G30-91 is identified by a magenta-coloured label.

The BMW antifreeze and corrosion inhibitor G30-91 is magenta in colour.

Note:

For an overview about the use of coolant, see technically suitable antifreeze and corrosion inhibitors.

The mixture ratio with water is 1:1. This provides antifreeze protection down to -40°C.

Trade name	***BMW part number DEU***	***BMW part number worldwide (except for DEU, JPN, CHN, AUS, FIN, NOR, SWE, DNK, FRO)***	***Container size***
BMW antifreeze and corrosion inhibitor G30-91	83 19 2 211 662	83 51 2 355 294	1.5-litre can
BMW antifreeze and corrosion inhibitor G30-91	83 19 2 304 076	83 51 2 355 295	60-litre barrel

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Enclosure 8 to SI 17 01 96 (140), edition 07.1999

Coolant additives that are, for example, supposed to provide additional corrosion protection or seal against minor leakage are rejected by BMW.

Due to the poor heat transfer from the cylinder head to the coolant *there can be heat accumulation and hot spots*, which in turn can lead to *cylinder head gaskets blowing out or the cylinder head tearing*.

We will have to reject warranty claims for any consequences and impacts.

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Enclosure 1 to SI 21 02 96 (141), edition 06/2006

Trade name	*BMW part number*	*Container size*
BMW DOT 4 low viscosity brake fluid	83 13 0 139 895	0.25-litre can
BMW DOT 4 low viscosity brake fluid	83 13 0 139 896	0.5-litre can
BMW DOT 4 low viscosity brake fluid	83 13 0 139 897	1.0-litre can
BMW DOT 4 low viscosity brake fluid	83 13 0 139 898	5.0-litre can
BMW DOT 4 low viscosity brake fluid	83 13 0 139 899	30.0-litre canister
BMW DOT 4 low viscosity brake fluid	83 13 0 139 900	60.0-litre barrel

Note:

Please refer to group 34 for detailed information on brake fluids.

Please refer to SI 34 03 96 (150)

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Enclosure 2 to SI 21 02 96 (141), edition 06/2006

Trade name	*BMW part number*	*Container size*
Pentosin CHF11S	81 22 9 407 758	1-litre can

(*) all SMG variants

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Enclosure 3 to SI 21 02 96 (141), edition 06/2018

Brake cylinder paste

For repair work on the clutch master or slave cylinder

Coat cylinder bore and grooved collar slightly.

Trade name	*BMW part number*	*Container size*
ATE brake cylinder paste	83 19 9 407 854	180 g tube
Syntheso Glep 1 lubricating grease	83 23 9 407 778	100 g tube

Grease in the clutch region

For greasing

- the spline grooves and the shaft extension of the transmission input shaft,
- the release lever (on the contact surfaces of the ball pin, release unit and piston rod of the clutch slave cylinder),

the grease listed below must be used according to the repair instructions.

Trade name	*BMW part number*	*Container size*
Grease MI-Setral-43 N	83 23 2 152 082	40g tube

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Enclosure 1 to SI 23 02 96 (142), edition 02/2019

Due to the variety of gearbox designs combined with widely fluctuating loads, temperatures and speeds, the manual gearbox oil must meet the following requirements:

- Sufficient compressive strength of the lubricant film in order to prevent gear tooth damage.
- No foaming
- No corrosion of the various metals
- No sludge formation
- No separation of additives at the operating temperature
- Noise reduction
- Prevention of blistering, hardening and contraction of the manual gearbox gaskets.

The manual gearbox oil obtains those properties by means of:

- High-pressure additives
- Corrosion inhibitors
- Oxidation inhibitors (inhibitors that restrict or prevent chemical processes)
- Anti-foaming agents.

Note:

Before opening the container, ”mix” the transmission oil to distribute the additives evenly through the oil.

Oil additives

BMW manual transmissions are designed in such a way that there is no need to use any supplementary oil additives.

Supplementary oil additives and liability for any kind of consequential loss or damage arising from the use of supplementary oil additives remain unacceptable by the factory.

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Enclosure 5 to SI 23 02 96 (142), edition 02/2019

(with yellow label)

Note on transmission designation, for example B manual gearbox, etc.:,

Note:

The yellow label with the lettering "MTF-LT-1" is located close to the oil filler plug.

The green label with the lettering "MTF-LT-2" is located close to the oil filler plug.

The blue label with the lettering "MTF-LT-3" is located close to the oil filler plug.

MTF-LT-1 is replaced by MTF-LT-2 and is also suitable for MTF-LT-1 specification transmissions.

These transmissions require no oil change for their entire service life.

After a repair on the transmission, the specified lifetime oil should be used.

SOP = Start of Production

Transmission designation:		Transmission type:	MTF-LT--1	MTF-LT--2	MTF-LT--3	MTF-LT--5
B	5-speed transmission		Replaced by MTF-LT-2			
C	5-speed transmission					
F	5-speed transmission					
D	6-speed transmission	GS6-26..	Replaced by MTF-LT-2			
G	6-speed transmission	GS6-53..	Replaced by MTF-LT-2	SOP until 03/07	from 03/07	
H	6-speed transmission	GS6-37..	Replaced by MTF-LT-2	SOP until 03/07	from 03/07	
I	6-speed transmission	GS6-17..			SOP	
K	6-speed transmission	GS6-45BZ/DZ				SOP

Transmission oil for BMW Motorsport manual gearbox:

Transmission designation:		Transmission type:	MTF-LT--1	MTF-LT--2	MTF-LT--3	MTF-LT--4
G	6-speed transmission	GS6-53..	Replaced by MTF-LT-2			
J	7-speed SMG transmission	GS7-47..	Replaced by MTF-LT-2			

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7-gear dual clutch gearbox GS7-36..

Trade name	**BMW part number Rest of the world**	**BMW part number China**
Manual gearbox oil MTF-LT-1	superseded by MTF-LT-2	superseded by MTF-LT-2
Manual gearbox oil MTF-LT-2	83 22 2 339 219	83 22 2 365 990
Manual gearbox oil MTF-LT-3	83 22 2 339 221	83 22 2 148 565
Manual gearbox oil MTF-LT-4	83 22 2 339 223	83 22 2 365 991
Manual gearbox oil MTF-LT-5	83 22 2 156 969	83 22 2 156 969

For smaller container sizes, see Electronic Parts Catalogue.

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Enclosure 7 of SI 23 02 96 (142), issue 02/2019;

Note:

This gearbox requires no oil change for the entire running time of the gearbox.

After a repair on the manual gearbox, the specified lifetime oil should be used.

Transmission oil produced after year of manufacture 09/2006 may also be required after having replaced the transmission.

The sticker on the gearbox is decisive.

Caution! The adhesive labels will be omitted from mid-2009.

The manual gearbox oil ”MTF-LT--4” is marked by means of a yellow sticker.

Oils must not be mixed with one another.

Transmission oil	**MTF2**	**MTF3**	**MTF-LT--4**
	BMW part number:	BMW part number:	BMW part number:
Rest of the world	2 344 589	2 455 210	2 339 223
China	2 365 990		2 365 991

Transmission	**Transmission oil**
GS5-52 BG	MTF-LT--4
GS5-65 BH	MTF2
GS6-85 BG/DG	MTF2
GS6-55 BG	MTF-LT--4
GS6-53 BG/DG	MTF 2/ MTF-LT-4
GS6-58BG/DG	MTF 2/ MTF 3 * **(observe transmission axle number)**
GS6-59BG/DG	MTF 2/ MTF 3 * **(observe transmission axle number)**
GS6-60DA GS6X60DA/BA (AISIN)	MTF 2/ MTF 3 * **(observe transmission axle number)**

***Depending on the transmission axle number, the transmission must be filled with either MTF-2 or MTF-LT-3!**

Select the prescribed transmission oil according to the BMW part number (transmission axle number) from the following table!

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AISIN transmission	MTF2	MTF3
GS6-60 DA (transmission axle number)	8608542, 8635919, 8655890, 8671140, 8621899, 9643457, 8655893, 8671143	8672170, 9494199, 8672173
GS6X60DA (transmission axle number)	7638383, 8635915, 8655891, 8671141, 8621898, 8643459, 8655894, 8671144	8672171, 9494200, 8672174
GS6X60BA (transmission axle number)	7638382, 8635914, 8655892, 8671142, 8643458, 8655895, 8671145	8672172, 9494203, 8672175

GETRAG transmission	MTF2	MTF3
GS6-58BG/DG (transmission axle number)	7638371,7638373, 640714, 8687636, 8687637, 8687638, 687640, 8687708, 8687709, 8687710, 687712, 8617531, 8617532, 8617533, 8617534, 8687646 8687647, 8687648, 8687650, 8689428, 8689429, 8689432	8671580, 8671635, 8671637, 8671641, 8482132, 8482133, 8482134, 8482135
GS6-58DG (transmission axle number)	8687639, 8687712, 8617535, 8617536, 8687649, 8689431	8671586, 8671639, 8689381, 8482136, 8482137, 8482138
GS6--59BG	7638596, 7638597, 8617540	8671647, 8482142
GS6--59DG	7638378, 7638379, 8687641, 8617537, 8617538, 8687651	8671643, 8685380, 8689379, 8689382, 8482139, 8482140, 8482141
GS6-59Control unit	7640047, 7640048, 8687642, 8687643, 8617542, 8617543, 8687652, 8687653	8671600, 8671602, 8482144, 84802145

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Enclosure 3 to SI 23 02 96 (142), edition 02/2019

(with orange sticker)

Note:

The orange sticker marked ”ATF-Oil!”, is in the vicinity of the oil filler plug.

BMW transmission fluid

Trade name	**BMW part number Rest of the world**	**BMW part number China**	*Container size*
BMW ATF D2	81 22 9 400 272	83 12 0 434 447	12x1 litre

Approved automatic transmission fluids (ATF) for manual gearboxes

Trade name	*Manufacturer/Supplier*
AGIP ATF II D	AGIP PETROLI SPA, ROM/I
AGIP ATF D 309	AGIP PETROLI SPA, ROM/I
AUTOL TRANSMISSION FLUID ATF-D	AGIP SCHMIERTECHNIK, WÜRZBURG/D
ARAL TRANSMISSION FLUID ATF 22	ARAL AG, BOCHUM/D
AVIA FLUID ATF 86	AVIA MINERALÖL AG, MUNICH/D
BLASOL 229	BLASER SWISSLUBE, HASLE-RÜEGSAU/CH
FRONTOL UNIVERSAL ATF 100	BP OIL DEUTSCHLAND, HAMBURG/D
AUTRAN MBX	BP OIL INTERNATIONAL, LONDON/GB
MOTOREX ATF SUPER D-22656	BUCHER+CIE AG, LANGENTHAL/CH
CIDISOL HYDRAULIC FLUID DEXRON IID	C.J. DIEDERICHS SÖHNE, WUPPERTAL/D
PAMATIC FLUID 289	CALPAM GMBH, ASCHAFFENBURG/D
CALTEX ATF-HDA	CALTEX PETROLEUM CORP., LONDON/GB
CASTROL TQ-D (22765)	CASTROL LTD, SWINDON/GB
CASTROL TQ-D (21289)	CASTROL LTD, SWINDON/GB
CASTROL ATF 21293	CASTROL LTD, SWINDON/GB
CEPSA ATF-70	CEPSA, MADRID/E
ATF 289	DE OLIEBRON B.V., ZWIJNDRECHT/NL
DEA FLUID 4011	DEA MINERALÖL AG, HAMBURG/D
DEAMATIC	DEA MINERALÖL AG, HAMBURG/D

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MAC ATF D-21666	DEUTSCHE SHELL AG, HAMBURG/D
UNIMATIC	DUCKHAMS OIL, BROMLEY/GB
TRANSANTAR DF2	ELF LUBRIFIANTS, PARIS/F
ELFMATIC G2 22329	ELF LUBRIFIANTS, PARIS/F
HUILE RENAULT DIESEL STARMATIC	ELF LUBRIFIANTS, PARIS/F
ANTAR 22329	ELF LUBRIFIANTS, PARIS/F
ELLMO AUTOMATIC FLUID 22233	ELLER-MONTAN-COMP., DUISBURG/D
TRANSMISIONES AUTOMATICAS D2	ERTOIL SA, MADRID/E
ESSO ATF D (21065)	ESSO AG, HAMBURG/D
ESSO ATF D (21611)	ESSO AG, HAMBURG/D
FINAMATIC II-D	FINA EUROPE SA, BRUSSELS/B
SILKTRAN MP-ATF	FUCHS LUBRICANTS (UK), DERBY/GB
YORK LT 785	GINOUVES GEORGES SA, LA FARLEDE/F
ATF 2	GULF OIL LTD, CHELTENHAM/GB
KENDALL ATF DEXRON IID	HANDEL-MIJ NOVIOL B.V., NIJMEGEN/NL
HOMBERG TRANSMISSION FLUID D	HOMBERG GMBH+CO KG, WUPPERTAL/D
IGOL ATF 420	IGOL FRANCE, PARIS/F
INA-ATF SUPER	INA D.D. RAFINERIJA ZAGREB/HR
TRANSMISSION FLUID DX	ITALIANA PETROLI, GENOVA/I
SELECTOL FLUID TRANS.FL. IID 23	KÄPPLER K., STUTTGART/D
DEUTZ OEL ATF-D	KLÖCKNER ENERGIEHANDEL GMBH, COLOGNE/D
ATF DEXRON IID	KROON OIL BV, ALMELO/NL
Q8 AUTO 14 (II D-21883)	KUWAIT PETROLEUM, HOOGVLIET/NL
Q8 AUTO 14 (II D-21677)	KUWAIT PETROLEUM, HOOGVLIET/NL
LEPRINXOL FLUID CN	LEPRINCE+SIVEKE GMBH, HERFORD/D
MEGOL ATF IID	LIQUI MOLY / MEGUIN, ULM/D
INTER OIL INTER MATIC ATF D2	MAURAN SA, ODARS/F
PENNASOL FLUID TRANSMISSION FLUID TYPE PCN	MIN.ÖL.RAFFIN. DOLLBERGEN, UETZE/D

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MOBIL ATF 220 D21412/D22187	MOBIL OIL, WEDEL/D
MOBIL ATF 220 D20104/D21685	MOBIL OIL, WEDEL/D
CARRIER ATF	MOL HUNGARIAN OIL, KOMARON/H
LIQUIMATIC DII	MORRIS LUBRICANTS, SHREWSBURY/GB
TASSILIA	NAFTEC, ALGIER/DZ
NANHAI ATF (D2)	NANHAI SUPERIOR LUB-OIL, CHINA
GALAX MATIC DAC	NIS-RAFINERIJA NAFTE BEOGRAD/YU
ATF T 4011	OEST G. MIN.ÖLWERK, FREUDENSTADT/D
OMV ATF D II (D22427)	OMV-AG, SCHWECHAT/A
OPTIMOL ATF T 4011	OPTIMOL ÖLWERKE, HAMBURG/D
UNIVERSAL ATF-D	OSWALD KLUTH, BARGFELD-STEGEN/D
MULTIPURPOSE TRANSM. FLUID IID	PAKELO MOTOR OIL, SAN BONIFACIO/I
PANOLIN ATF MULTI 21996	PANOLIN AG, MADETSWIL/CH
AERO-LINE ATF-D	PRINZ-SCHULTE, FRECHEN/D
AERO-LINE ATF-2	PRINZ-SCHULTE, FRECHEN/D
REPSOL MATIC ATF	REPSOL DISTRIBUCION SA, MADRID/E
GULF ATF DII D-22233	S.A.E.L., ALCOBENDAS/E
WINTERSHALL ATF D	SCHMIERSTOFFRAFFINERIE SALZBERGEN/D
ASEOL ATF DB UNIVERSAL	SHELL ASEOL AG, BERN/CH
SHELL DONAX TA (D-21666S)	SHELL INTERNATIONAL, LONDON/GB
SHELL ATF 9226	Shell International Petroleum Company Ltd
MADIT AUTOMATIC	SLOVNAFT JS CO, BRATISLAVA/SK
DEXRON 2 D	SONOL ISRAEL LTD, HAIFA/IL
SOPRAL 164	SOPROGRASA SA, MADRID/E
TECNOL TECMATIC D2	STL TECNOL, ESCALQUENS/F
SUNAMATIC 149	SUN OIL COMPANY, AARTSELAAR/B
SUNAMATIC 153	SUN OIL COMPANY, AARTSELAAR/B
TAMOIL ATF II D	TAMOIL LUBES, GENEVA/CH
TEXAMATIC 4291	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 4011	TEXACO SERVICES LTD, BRUSSELS/B

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TEXAMATIC 4261	TEXACO SERVICES LTD, BRUSSELS/B
TOTAL FLUIDE IID	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE ATX	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE ATD	TOTAL SOUTH AFRICA, JOHANNESBURG/ZA
TURBO UNIV. ATF MERCON 4011	TURBOTANK BÖSCHE+BÖDEKER, BREMEN/D
UFALUB ATF	UFANEFTECHIM REFINERY, UFA/RUS
UNIL MATIC CN T 4011	UNIL DEUTSCHLAND GMBH, BREMEN/D
VALVOLINE MULTI-PURPOSE ATF	VALVOLINE INC., LEXINGTON/USA
VALVOLINE ATF TYPE D	VALVOLINE INTERNAT., DORDRECHT/NL
MOVARA ATF TRANSMISSION FLUID DIID	VEBA OEL AG, GELSENKIRCHEN/D
VEEDOL ATF-M (22764)	VEEDOL INTERNATIONAL, SWINDON/GB
YACCO ATF D	YACCO SA, ST PIERRE-LES-ELBEUF/F
DIVINOL FLUID 666	ZELLER+GMELIN GMBH&CO, EISLINGEN/D

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Enclosure 4 of SI 23 02 96 (142), issue 08/2018

(with green label)

Note:

The green label with "Special Oil!" written on it is located near the oil filler plug.

Trade name	*BMW part number*	*Container size*
Manual transmission fluid	81 22 9 407 305	20-litre canister

Transmission oil (4-gear manual transmission)

Trade name	*BMW part number*	*Container size*
MTF1	81 22 2 339 384	1-litre canister

Additionally, all mineral-oil-based transmission oils in viscosity grade SAE 80 may be used in accordance with the specification MIL-L-2105 or API-GL-4.

Note:

To reduce cold shift forces in low outside temperatures, the following oils may be used for the transmission during the cold seasons:

- Mineral-oil-based single-grade HD engine oils SAE40, SAE30, SAE20
- In countries with particularly low outside temperatures, ATF oils (see enclosure 4.0) may also be used.

The disadvantage of this is that increased transmission rattling and/or idling rattling may occur at higher temperatures.

Attention!

The use of synthetic engine oils or multi-grade oils is not permitted under any circumstances, as these contain friction coefficient reducers that can impair the function of the synchronising assembly.

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Enclosure 7 to SI 23 02 96 (142), edition 02/2019

Note:

This gearbox requires no oil change for the entire running time of the gearbox.

Following repairs to the manual transmission, only use the specified lifetime oil.

Oils must not be mixed with one another!

Transmission oil:	MTF2	MTF3
BMW part number:	2 344 589	2 455 210

Caution!

Failure to comply with this requirement will result in damage to the transmission!

The following transmissions must be filled with either MTF 2 or MTF 3 transmission oil.

Select the prescribed transmission oil according to the BMW part number (transmission axle number) from the following table!

AISIN transmission	MTF2	MTF3
GS6-60 DA (transmission axle numbers)	8608542, 8635919, 8655890, 8671140, 8621899, 9643457, 8655893, 8671143	8672170, 9494199, 8672173
GS6X60DA (transmission axle numbers)	7638383, 8635915, 8655891, 8671141, 8621898, 8643459, 8655894, 8671144	8672171, 9494200, 8672174
GS6X60BA (transmission axle numbers)	7638382, 8635914, 8655892, 8671142, 8643458, 8655895, 8671145	8672172, 9494203, 8672175

GETRAG transmission	MTF2	MTF3
GS6-58BG/DG (transmission axle numbers)	8635910, 8635918, 8687713, 8687715, 8644447, 8644449, 8689433, 8689435	8671580, 8671635, 8671637, 8671641, 8482132, 8482133, 8482134, 8482135
GS6-58DG (transmission axle numbers)	8635911, 8687714, 8644448, 8689434	8671586,8671639, 8689381, 8482136, 8482137, 8482138
GS6-59BG (transmission axle numbers)	8644452	8671647, 8482142, 8482143
GS6-59DG (transmission axle numbers)	8635912, 8635913, 8635916, 8644450, 8644451	8671643, 8685380, 8689379, 8689382, 8482139, 8482140, 8482141
GS6-59SG (transmission axle numbers)		8671600, 8671602, 8482144, 8482145

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Enclosure 1 to SI 28 01 08 (001), edition 02/2019

Note:

The green label labelled "Lifetime Fill" is located in the area of the oil filler plug.

BMW transmission fluid

For vehicles up to December 2015 (except F87)

Trade name	*BMW part number*	*Container size*
Twin-clutch gearbox oil BMW DCTF-1	83 22 2 148 578	1-litre can
Twin-clutch gearbox oil BMW DCTF-1	83 22 2 148 579	20-litre can

BMW transmission oil **only** for the US market:

Trade name	*BMW part number*	*Container size*
Twin-clutch gearbox oil BMW DCTF-1	83 22 0 440 214	1-litre can
Twin-clutch gearbox oil BMW DCTF-1	83 22 2 147 477	20-litre can

For F87 and for all vehicles from January 2016:

Trade name	*BMW part number*	*Container size*
BMW DCTF-1+ double-clutch gearbox oil	83 22 2 446 673	1-litre can

Note:

Vehicle up to December 2015 can also be filled with BMW DCTF-1+!

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Enclosure 2 to SI 21 02 96 (141), edition 06/2006

Trade name	*BMW part number*	*Container size*
Pentosin CHF11S	81 22 9 407 758	1-litre can

(*) all SMG variants

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Enclosure 1 to SI 24 05 96 (143), edition 02/2019

The automatic transmission fluid (ATF) was specially developed for automatic transmissions. It requires additives that are particularly carefully coordinated, a high viscosity index and a pour point of below -40°C.

Moreover, the friction behaviour of the automatic transmission fluid in the multidisc clutches at the most diverse operating condition is particularly important as well as

- Wear protection
- Oil film tear resistant
- Adhesive strength
- Oxidation resistance
- Corrosion protection
- Sludge prevention
- Temperature-induced viscosity changes
- and compatibility with the sealant

Note:

Before opening the container, ”mix” the transmission oil to distribute the additives evenly through the oil.

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Enclosure 2 to SI 24 05 96 (143), edition 02/2019

The automatic transmissions are designed such that oil additives are not necessary and must not be admixed under any circumstances. BMW will not accept any liability for subsequent damage.

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Enclosure 3 of SI 24 05 96 (143), issue 11.03; update 05/2015

Note:

The following automatic transmission fluid types can also be used for transmissions A4S 310R (THM-R1), A4S 270R (THM-R1w) with **black** type plate.

BMW automatic transmission fluids (ATF) available from part sales

Trade name	*BMW part number* **China**	*BMW part number* **Rest of the world**	*Container size*
BMW ATF D2	83 12 0 434 447	81 22 9 400 272	12x1 litre

Approved automatic transmission fluids (ATF)

Trade name	*Manufacturer/Supplier*
ADDINOL ATF D III	ADDINOL MINERLÖL GMBH, KRUMPA/D
AGIP ATF II D	AGIP PETROLI SPA, ROM/I
AGIP DEXRON III	AGIP PETROLI SPA, ROM/I
AGIP ATF D 309	AGIP PETROLI SPA, ROM/I
AUTOL TRANSMISSION FLUID ATF III D	AGIP SCHMIERTECHNIK, WÜRZBURG/D
AUTOL TRANSMISSION FLUID ATF-D	AGIP SCHMIERTECHNIK, WÜRZBURG/D
ARAL TRANSMISSION FLUID ATF 55 F-30589	ARAL AG, BOCHUM/D
ARAL TRANSMISSION FLUID ATF 22	ARAL AG, BOCHUM/D
AVIA FLUID ATF 86	AVIA MINERALÖL AG, MUNICH/D
BLASOL 229	BLASER SWISSLUBE, HASLE-RÜEGSAU/CH
FRONTOL UNIVERSAL ATF 100	BP OIL DEUTSCHLAND, HAMBURG/D
AUTRAN MBX	BP OIL INTERNATIONAL, LONDON/GB
MOTOREX ATF SUPER D-22656	BUCHER+CIE AG, LANGENTHAL/CH
MOTOREX ATF DEXRON III MC	BUCHER+CIE AG, LANGENTHAL/CH
CIDISOL HYDRAULIC FLUID DEXRON IID	C.J. DIEDERICHS SÖHNE, WUPPERTAL/D
PAMATIC FLUID 289	CALPAM GMBH, ASCHAFFENBURG/D
CALPAMATIC FLUID III F	CALPAM GMBH, ASCHAFFENBURG/D
CALTEX ATF-HDA	CALTEX PETROLEUM CORP., LONDON/GB
CASTROL TQ-D (22765)	CASTROL LTD, SWINDON/GB
CASTROL TRANSMAX Z	CASTROL LTD, SWINDON/GB
CASTROL TQ-D (21289)	CASTROL LTD, SWINDON/GB
CASTROL ATF 21293	CASTROL LTD, SWINDON/GB

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CASTROL TQ DEXRON III F-30520	CASTROL LTD, SWINDON/GB
CEPSA ATF-70	CEPSA, MADRID/E
ATF DMM	DE OLIEBRON B.V., ZWIJNDRECHT/NL
ATF 289	DE OLIEBRON B.V., ZWIJNDRECHT/NL
DEA FLUID 3003	DEA MINERALÖL AG, HAMBURG/D
DEA FLUID 4011	DEA MINERALÖL AG, HAMBURG/D
DEAMATIC	DEA MINERALÖL AG, HAMBURG/D
MAC ATF D-21666	DEUTSCHE SHELL AG, HAMBURG/D
UNIMATIC	DUCKHAMS OIL, BROMLEY/GB
TRANSANTAR DF2	ELF LUBRIFIANTS, PARIS/F
ELFMATIC G3	ELF LUBRIFIANTS, PARIS/F
TRANSANTAR DF3	ELF LUBRIFIANTS, PARIS/F
ELFMATIC G2 22329	ELF LUBRIFIANTS, PARIS/F
HUILE RENAULT DIESEL STARMATIC	ELF LUBRIFIANTS, PARIS/F
ANTAR 22329	ELF LUBRIFIANTS, PARIS/F
ELLMO AUTOMATIC FLUID 22233	ELLER-MONTAN-COMP., DUISBURG/D
TRANSMISIONES AUTOMATICAS D2	ERTOIL SA, MADRID/E
ESSO ATF D (21065)	ESSO AG, HAMBURG/D
ESSO ATF D (21611)	ESSO AG, HAMBURG/D
ESSO ATF F-30320	ESSO AG, HAMBURG/D
FINAMATIC II-D	FINA EUROPE SA, BRUSSELS/B
SILKTRAN MP-ATF	FUCHS LUBRICANTS (UK), DERBY/GB
TITAN ATF 4000	FUCHS MINERALÖLWERKE, MANNHEIM/D
YORK LT 785	GINOUVES GEORGES SA, LA FARLEDE/F
ATF 2	GULF OIL LTD, CHELTENHAM/GB
KENDALL ATF DEXRON IID	HANDEL-MIJ NOVIOL B.V., NIJMEGEN/NL
HOMBERG TRANSMISSION FLUID D	HOMBERG GMBH+CO KG, WUPPERTAL/D
IGOL ATF 420	IGOL FRANCE, PARIS/F
INA-ATF SUPER	INA D.D. RAFINERIJA ZAGREB/YU
TRANSMISSION FLUID DX	ITALIANA PETROLI, GENOVA/I

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SELECTOL FLUID TRANS.FL. IID 23	KÄPPLER K., STUTTGART/D
DEUTZ OEL ATF-D	KLÖCKNER ENERGIEHANDEL GMBH, COLOGNE/D
ATF DEXRON IID	KROON OIL BV, ALMELO/NL
ALMIROL ATF	KROON OIL BV, ALMELO/NL
Q8 AUTO 15	KUWAIT PETROLEUM, HOOGVLIET/NL
Q8 AUTO 14 (II D-21883)	KUWAIT PETROLEUM, HOOGVLIET/NL
Q8 AUTO 14 (II D-21677)	KUWAIT PETROLEUM, HOOGVLIET/NL
LEPRINXOL FLUID CN	LEPRINCE+SIVEKE GMBH, HERFORD/D
MEGOL ATF IID	LIQUI MOLY / MEGUIN, ULM/D
INTER OIL INTER MATIC ATF D2	MAURAN SA, ODARS/F
PENNASOL FLUID TRANSMISSION FLUID TYPE PCN	MIN.ÖL.RAFFIN. DOLLBERGEN, UETZE/D
MOBIL ATF 220 D21412/D22187	MOBIL OIL, WEDEL/D
MOBIL ATF 220 D20104/D21685	MOBIL OIL, WEDEL/D
CARRIER ATF	MOL HUNGARIAN OIL, KOMARON/H
LIQUIMATIC DII	MORRIS LUBRICANTS, SHREWSBURY/GB
TASSILIA	NAFTEC, ALGIER/DZ
NANHAI ATF (D2)	NANHAI SUPERIOR LUB-OIL, CHINA
GALAX MATIC DAC	NIS-RAFINERIJA NAFTE BEOGRAD/YU
ATF T 4011	OEST G. MIN.ÖLWERK, FREUDENSTADT/D
OMV ATF D II (D22427)	OMV-AG, SCHWECHAT/A
OMV ATF III (F-30580)	OMV-AG, SCHWECHAT/A
OPTIMOL ATF T 4011	OPTIMOL ÖLWERKE, HAMBURG/D
UNIVERSAL ATF-D	OSWALD KLUTH, BARGFELD-STEGEN/D
MULTIPURPOSE TRANSM. FLUID IID	PAKELO MOTOR OIL, SAN BONIFACIO/I
PANOLIN ATF MULTI 21996	PANOLIN AG, MADETSWIL/CH
AERO-LINE ATF-D	PRINZ-SCHULTE, FRECHEN/D
AERO-LINE ATF-2	PRINZ-SCHULTE, FRECHEN/D
REPSOL MATIC ATF	REPSOL DISTRIBUCION SA, MADRID/E
GULF ATF DII D-22233	S.A.E.L., ALCOBENDAS/E

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WINTERSHALL ATF D	SCHMIERSTOFFRAFFINERIE SALZBERGEN/D
ASEOL ATF DB UNIVERSAL	SHELL ASEOL AG, BERN/CH
SHELL DONAX TA (D-21666S)	SHELL INTERNATIONAL, LONDON/GB
SHELL ATF 9226	Shell International Petroleum Company Ltd
MADIT AUTOMATIC	SLOVNAFT JS CO, BRATISLAVA/SLO
DEXRON 2 D	SONOL ISRAEL LTD, HAIFA/IL
SOPRAL 164	SOPROGRASA SA, MADRID/E
TECNOL TECMATIC D2	STL TECNOL, ESCALQUENS/F
SUNAMATIC 149	SUN OIL COMPANY, AARTSELAAR/B
SUNAMATIC 153	SUN OIL COMPANY, AARTSELAAR/B
TRANSWAY DX III (F-30373)	SVENSKA STATOIL AB, NYNÄSHAMM/S
TAMOIL ATF II D	TAMOIL LUBES, GENEVA/CH
ATF MERCON / DEXRON III	TEXACO LUBRICANTS COMP., BEACON/USA
TEXAMATIC 4291	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 4011	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 4261	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 7080	TEXACO SERVICES LTD, BRUSSELS/B
TOTAL FLUIDE AT 42	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE IID	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE ATX	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE ATD	TOTAL SOUTH AFRICA, JOHANNESBURG/ZA
TURBO UNIV. ATF MERCON 4011	TURBOTANK BÖSCHE+BÖDEKER, BREMEN/D
UFALUB ATF	UFANEFTECHIM REFINERY, UFA/RUS
UNIL MATIC CN T 4011	UNIL DEUTSCHLAND GMBH, BREMEN/D
VALVOLINE MULTI-PURPOSE ATF	VALVOLINE INC., LEXINGTON/USA
VALVOLINE ATF TYPE D	VALVOLINE INTERNAT., DORDRECHT/NL
MOVARA ATF TRANSMISSION FLUID DIID	VEBA OEL AG, GELSENKIRCHEN/D
VEEDOL ATF-M (22764)	VEEDOL INTERNATIONAL, SWINDON/GB
VEEDOL UNITRANS Z	VEEDOL INTERNATIONAL, SWINDON/GB
VEEDOL ATF DEXRON III F-30521	VEEDOL INTERNATIONAL, SWINDON/GB
YACCO ATF D	YACCO SA, ST PIERRE-LES-ELBEUF/F

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DIVINOL FLUID 666	ZELLER+GMELIN GMBH&CO, EISLINGEN/D
ZF ECOFLUID ”A”	ZF FRIEDRICHSHAFEN AG/D

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Enclosure 4 of SI 24 05 96 (143), issue 02/2005, update 05/2015

Note:

Differentiate between the following with A5S 310Z automatic transmissions:

- Automatic transmissions with oil filling for change intervals. Identifying feature - **black** type plate on the transmission housing. This transmission requires regular oil changes, see BMW Inspection Sheet.
- Automatic transmissions with life-time oil filling. Identifying feature - **green** type plate on the transmission housing and green sealing cap on the oil filler opening. This transmission type does not require oil changes throughout the entire operating time. Use the approved life-time oil following potential repairs on the transmission or transmission oil cooler only.

Attention!

Life-time oil must be used in suitable transmission types (green type plate) only and it must not be mixed or confused with other automatic transmission fluid because this may lead to transmission failure.

Life-time oil for transmission types with **green** type plate:

Trade name	*BMW part number*	*Container size*
ATF4	83 22 2 344 206	1 litre container
ATF 4	83 22 9 407 807	20 litre container

Automatic transmission fluid for transmissions with **black** type plate:

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW ATF D2	83 12 0 434 447	81 22 9 400 272	12x1 litre

Approved automatic transmission fluids (ATF)

Trade name	*Manufacturer/Supplier*
ADDINOL ATF D III	ADDINOL MINERALÖL GMBH, KRUMPA/D
AGIP DEXRON III	AGIP PETROLI SPA, ROM/I
AUTOL TRANSMISSION FLUID ATF III D	AGIP SCHMIERTECHNIK, WÜRZBURG/D
ARAL TRANSMISSION FLUID ATF 55 F-30589	ARAL AG, BOCHUM/D
MOTOREX ATF DEXRON III MC	BUCHER+CIE AG, LANGENTHAL/CH
CALPAMATIC FLUID III F	CALPAM GMBH, ASCHAFFENBURG/D
CASTROL TQ DEXRON III F-30520	CASTROL LTD, SWINDON/GB
CASTROL TRANSMAX Z	CASTROL LTD, SWINDON/GB
ATF DMM	DE OLIEBRON B.V., ZWIJNDRECHT/NL
DEAFLUID 3003	DEA MINERALÖL AG, HAMBURG/D
TRANSANTAR DF3	ELF LUBRIFIANTS, PARIS/F
ELFMATIC G3	ELF LUBRIFIANTS, PARIS/F

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ESSO ATF D (21065)	ESSO AG, HAMBURG/D
ESSO ATF F-30320	ESSO AG, HAMBURG/D
TITAN ATF 4000	FUCHS MINERALÖLWERKE, MANNHEIM/D
ALMIROL ATF	KROON OIL BV, ALMELO/NL
Q8 AUTO 15	KUWAIT PETROLEUM, HOOGVLIET/NL
OMV ATF III (F-30580)	OMV AG, SCHWECHAT/A
PANOLIN ATF DEXRON III	PANOLIN AG, MADETSWIL/CH
TRANSWAY DX III (F-30373)	SVENSKA STATOIL AB, NYNÄSHAMM/S
ATF MERCON / DEXRON III	TEXACO LUBRICANTS COMP., BEACON/USA
TEXAMATIC 7080	TEXACO SERVICES LTD, BRUSSELS/B
TOTAL FLUIDE AT 42	TOTAL RAFFINAGE DISTR., PARIS/F
VEEDOL ATF DEXRON III F-30521	VEEDOL INTERNATIONAL, SWINDON/GB
VEEDOL UNITRANS Z	VEEDOL INTERNATIONAL, SWINDON/GB
ZF ECOFLUID ”A”	ZF FRIEDRICHSHAFEN AG/D

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Enclosure 5 to SI 24 05 96 (143) En, edition 09.98

Note:

The automatic transmissions A5S 325Z are provided with lifetime lubrication. No oil change is required for the entire service life of these transmissions.

If repairs have to be made to the transmission or transmission oil cooler, use only the approved lifetime lube oil.
Attention!

Lifetime lube oil must not be mixed with or replaced by other ATF oils as this results in transmission malfunction.

Lifetime lube oil:

Tradename	***BMW Part Number***	***Container size***
Esso LT 71 141	83 22 9 407 807	20-litre canister

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Enclosure 6 to SI 24 05 96 (143) En, edition 09.98

Note:

The automatic transmissions A5S 440Z are provided with lifetime lubrication. No oil change is required for the entire service life of these transmissions.

If repairs have to be made to the transmission or transmission oil cooler, use only the approved lifetime lube oil.
Attention!

Lifetime lube oil must not be mixed with or replaced by other ATF oils as this results in transmission malfunction.

Lifetime lube oil:

Tradename	***BMW Part Number***	***Container size***
Esso LT 71 141	83 22 9 407 807	20-litre canister

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Enclosure 7 to SI 24 05 96 (143), issue 09/1998;, update 06/2014

Note:

The automatic transmissions A5S 560Z are provided with a life-time oil filling. These transmissions require no oil change for their entire operating time.

Only the approved lifetime fluid must be used after repairs on the transmission or transmission oil cooler.

Important!

The lifetime oil may not be mixed with other types of automatic transmission fluids as this will cause transmission failure. Likewise, the lifetime oils specified below may not be mixed with each other.

Lifetime oil for transmissions with conventional converter lockup clutch: identifying feature - **black** type plate on transmission housing

Trade name	*BMW part number*	*Container size*
Shell LA 2634*	83 22 9 407 765	5-litre canister

*Can be substituted by the lifetime oil Esso LT 71 141 specified below.

Note:

If the oil is no longer available, a complete oil change with the new lifetime oil must be performed.

Lifetime oil for transmissions with regulated converter lockup clutch: identifying feature - **green** type plate on transmission housing

Trade name	*BMW part number*	*Container size*
Esso LT 71 141	83 22 9 407 807	20-litre canister

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Enclosure 11 to SI 24 05 96 (143), edition 02/2019

Note:

The automatic transmissions have a life-time oil filling. These transmissions require no oil change for their entire service life.

The approved lifetime fluid must be used after repair work on the gearbox or transmission oil cooler.

Caution!

The lifetime oil must not be mixed with or replaced by other types of automatic transmission fluid as this will cause transmission failure.

Lifetime oil:

Trade name	***BMW part number***	***Container size***
Shell M-1375.4	83 22 0 142 516	20 litres

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Enclosure 14 to SI 24 05 96 (143), edition 02/2019

Note:

The automatic transmissions have a life-time oil filling. These transmissions require no oil change for their entire service life.

The approved lifetime fluid must be used after repair work on the gearbox or transmission oil cooler.

Caution!

The lifetime oil must not be mixed with or replaced by other types of automatic transmission fluid as this will cause transmission failure.

Trade name	*BMW part number*	*Container size*
ATF-3+	83 22 2 289 720	1 litre

The lifetime fluids ATF-3 and ATF-3+ can be mixed with each other.

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Enclosure 8 of SI 24 05 96 (143), issue 08/2018

Note:

Distinction between automatic transmissions A4S 310R and A4S 270R:

- Automatic transmissions with oil filling for change intervals. Identifying feature - **black** type plate on the transmission housing. A regular oil change is specified for these transmissions, see BMW Inspection Sheet.
- Automatic transmissions with life-time oil filling. Identifying feature - **green** type plate on the transmission housing. No oil change is required for these transmissions throughout the entire running time. After repairs to the transmission or transmission oil cooler: Use approved automatic transmission fluids.

Automatic transmission fluid for transmissions with **black** type plate:

All automatic transmission fluids, see Enclosure 3.0 and all automatic transmission fluids with the specification Dexron III.

Trade name	*BMW part number*	*Container size*
Dexron IIIautomatic transmission fluid	83 22 9407 858	1-litre can

Note:

The specification "Dexron III" is listed on the oil container, or the manufacturer/supplier must be asked.

Automatic transmission fluid for transmissions with **green** type plate:

Trade name	*BMW part number*	*Container size*
Dexron IIIautomatic transmission fluid	83 22 9407 858	1-litre can

Trade name	*BMW part number*	*Container size*
Automatic transmission fluid ETL 7045E	83 22 0 403 248	20 litres

Attention!

Changeover of transmissions from Dexron III to ETL 7045E, 09/01.

The lifetime oils Dexron III and ETL 7045E can be mixed.

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Enclosure 9 to SI 24 05 96 (143), edition 07/2008

Note:

These transmissions require no oil change for their entire service life.Identifier: **green** type plate on transmission housing.Only use the approved automatic transmission fluid after any repairs on the transmission or transmission oil cooler.

For information on the approved automatic transmission fluid, see label on the transmission oil sump.

Location of transmission code: on the transmission type plate, behind the transmission number.

Trade name	***BMW part number***	***Container size***
ETL 7045	Replaced by ETL 7045 E	
ETL 7045 E	83 22 0 403 248	20 litres
ETL 7045 E may be mixed/topped up with Dexron III.		
ETL 8072 B	Replaced by **Dexron VI** (old part no. 83 22 403 249)	
ETL 8072 B may be mixed/topped up with Dexron VI.		
Dexron VI	83 22 0 397 114	4 litre

Use of transmission oils ETL 7045 E, Dexron VI

Model year 1999

Model series	Engine	Transmission code	Trade name
E46	M52B28	SW	ETL 7045 E
E39	M57D30	WN	ETL 7045 E
E46 / E39	M52B25	SX	ETL 7045 E
E39	M57D30	SI	ETL 7045 E

Model year 2000

Model series	Engine	Transmission code	Trade name
E46 / E39	M52B28	VO	ETL 7045 E
E46	M57D30	VT	ETL 7045 E
E46	M52B25	VP	ETL 7045 E
E46 /E39	M52B24	VM	ETL 7045 E
E46	M52B20	VN	ETL 7045 E
E46	M43B19	VU	ETL 7045 E

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Model year 2001

Model series	Engine	Transmission code	Trade name
E46/16	M57	VY	ETL 7045 E
E46/16	M54B25	VW	Dexron VI
E46/16	M54B30	VX	Dexron VI
E46	M43	WH	ETL 7045 E
E46	M54	WE	Dexron VI
E39	M54B25	YG	Dexron VI
E36/7	M54B25	WE	Dexron VI
E39	M54B30	YH	Dexron VI
E36/7	M54B30	WD	Dexron VI
E46	M57	WG	ETL 7045 E
E39	M57D25	YJ	ETL 7045 E
E39	M57D30	YJ	ETL 7045 E
E39	M52B24CKD	YK	Dexron VI
E46	M52B24CKD	WJ	Dexron VI
E46	M47D20	WB	ETL 7045 E
E36/7	M54B22	WF	Dexron VI
E53	M54B30	TZ	Dexron VI

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Model year 2002

Model series	Engine	Transmission code	Trade name
E46	M43B19	XH	ETL 7045 E
E46	N42B18	XJ	ETL 7045 E
E46	N42B20	XK	ETL 7045 E
E39	M52B24CKD	YL	Dexron VI
E46	M52B24CKD	WV	Dexron VI
E46	M47D20VP	WW	ETL 7045 E
E46	M47D20TÜ	WX	ETL 7045 E
E46	M57D30	WZ	ETL 7045 E
E39	M57D30	YM	ETL 7045 E
E39	M57D25	YM	ETL 7045 E

Z3	M54B25	WT	Dexron VI
Z3	M54B30	WU	Dexron VI
Z3	M54B22	XL	Dexron VI
E46/16	M54B30	XC	Dexron VI
E4616	M54B25	XA	Dexron VI
E46/16	M57D30	XD	ETL 7045 E
E53	M57D30	XF	ETL 7045 E
E53	M54B30	XE	Dexron VI

Model year 2003

Model series	Engine	Transmission code	Trade name
E46	N42B18	XN	ETL 7045 E
E46	N42B20	XO	ETL 7045 E
E39/E46	M52B24CKD	XB	Dexron VI
E46	M47TÜ	XR	ETL 7045 E
E46 starting with March 03	M47TÜ UL	XR	ETL 7045 E
E46	M57D30	WZ	ETL 7045 E
E46	M57D30TÜ	XS	ETL 7045 E
E46	M54B25 US	ZT	Dexron VI
E46 starting with March, 03	M54B30 US	ZU	Dexron VI
E39	M57D25	ZN	ETL 7045 E
E39	M57D30	YP	ETL 7045 E
E46/16	M54B25	XV	Dexron VI
E46/16 starting with March 03	M54B25	ZS	Dexron VI
E46/16	M54B30	XX	Dexron VI
E46/16 starting with March 03	M54B30	XQ	Dexron VI
E46/16	M57D30	XD	ETL 7045 E
E46/16 starting with March 03	M57D30 TÜ	XY	ETL 7045 E
E53	M57D30	XW	ETL 7045 E
E53	M54B30	XU	Dexron VI

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Model year 2004

Model series	Engine	Transmission code	Trade name
E46	N42B18	XN	ETL 7045 E
E46	N46B18	YO	ETL 7045 E
E46	N42B20	X0	ETL 7045 E
E46	N46B20	YR	ETL 7045 E
E46 to 12/2003	M52B24 CKD	XB	Dexron VI
E46 from 12/2003	M52B24 CKD	ZV	Dexron VI
E46	M54B25	ZV	Dexron VI
E46	M54B30 US	ZW	Dexron VI
E46	M54B30 US Sport	ZW	Dexron VI
E46	M47 TÜ UL	YU	ETL 7045 E
E46	M47 TÜ	YU	ETL 7045 E
E46	M57D30TÜ	YV	ETL 7045 E
E46/16	M54B25	YW	Dexron VI
E46/16	M54B30	YX	Dexron VI
E46/16	M57D30TÜ	YY	ETL 7045 E
E39	M57D25	ZO	ETL 7045 E
E39	M57D30	ZM	ETL 7045 E
E53	M54B30	YZ	Dexron VI
E83	M54B25	YW	Dexron VI
E83	M54B30	YX	Dexron VI
E83	M57D30TÜ	YY	ETL 7045 E

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Model year 2005

Model series	Engine	Transmission code	Trade name
E46	N46B18	YN	ETL 7045 E
E46	N46B20	YR	ETL 7045 E
E46	M54B24 CKD	ZV	Dexron VI
E46	M54B22	NE	Dexron VI
E46	M54B25	ZV	Dexron VI
E46	M54B30 US	ZW	Dexron VI
E46	M54B30 US Sport	ZW	Dexron VI
E46	M47TÜ UL	YU	ETL 7045 E
E46	M47TÜ	YU	ETL 7045 E
E46	M57D30TÜ	YV	ETL 7045 E
E46	M57D30TÜ	MR	ETL 7045 E
E46/16	M54B25	YW	Dexron VI
E46/16	M54B30	YX	Dexron VI
E46/16	M57D30TÜ	YY	ETL 7045 E
E46/16	M57D30TÜ	MS	ETL 7045 E
E83	M54B25	YW	Dexron VI
E83	M54B30	YX	Dexron VI
E83	M57D30TÜ	YY	ETL 7045 E
E83	M57D30TÜ	MS	ETL 7045 E
E53	M54B30	YZ	Dexron VI

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Enclosure 13 to SI 24 05 96 (143), issue 08/2008

Note:

These transmissions require no oil change for their entire service life.Identifier: **green** type plate on transmission housing.Only use the approved automatic transmission fluid after any repairs on the transmission or transmission oil cooler.

For information on the approved automatic transmission fluid, see label on the transmission oil sump.

Location of transmission code: on the transmission type plate, behind the transmission number.

Trade name	*BMW part number*	*Container size*
Dexron VI automatic transmission fluid	83 22 0 397 114	4 litre
Dexron VI automatic transmission fluid	83 22 2 167 718	1 litre

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Enclosure 15 to SI 24 05 96 (143), issue 09/2010

Note:

This transmission requires no oil change for the entire service life of the transmission. Identifying sign: **Green**type plate on the transmission housing. Use exclusively the approved automatic transmission fluid after any repairs on the transmission or transmission oil cooler.

For information on the approved automatic transmission fluid, see label on the transmission oil sump.

Location of transmission code: on the transmission type plate, behind the transmission number.

Trade name	*BMW Part Number*	*Container size*
Dexron VI automatic transmission fluid	83 22 0 397 114	4 litre
Dexron VI automatic transmission fluid	83 22 0 432 807	1 litre

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Enclosure 10 of SI 24 05 96 (143), issue 08/2018

Note:

Only the automatic transmission fluid specified below may be used for the transmission A5S 300J.

Trade name	*BMW part number*	*Manufacturer/Supplier*
ATF Dexron III	83 22 9 407 858	1-litre can

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Enclosure 12 to SI 24 05 96 (143), issue 02/2005; update 06/2015

Note:

These automatic transmissions require an oil change according to the service instructions.

After a repair on the transmission, the specified transmission oil should be used.

GACVT16Z (CVT)

Trade name	BMW part number	Container size
Esso EZL-799A	83 22 0 429 154	20 litres

GA6F21WA (AISIN)

USA only:

Trade name	BMW part number	Container size
ATF JWS-3309	83 22 2 220 438	1 litre
ATF JWS-3309	83 22 2 220 440	20 litres

Worldwide except USA:

Trade name	BMW part number	Container size
ATF JWS-3309	83 22 7 542 290	1 litre

GA6F21FT/ GA6F21AW/ GA8F22AW (AISIN)

Trade name	BMW part number	Container size
ATF6	83 22 2 355 601	20 litres
ATF6	83 22 2 355 599	1 litre

GA8G45 (AISIN)

Trade name	BMW part number	Container size
ATF 7	83 22 2 413 477	1 litre

Update: 01/2019

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Enclosure 16 to SI 24 01 96 (146), issue 07/2014

I12

Trade name	*Gearbox:*	*BMW part number*	*Container size*
ATF 6	GE2I12AW	83 22 2 305 599	1000 ml

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Enclosure 1 to SI 25 01 96 (144) En, edition Dec. 1, 1996

Use the lubricants listed below for all work on external gearshift components of manual and automatic transmissions (ball sockets, bearing bushes, shift linkages etc.), as described in the relevant Repair Instructions:

Greasing:

Tradename	*Manufacturer/Supplier*
Klüber Polylub GLY 801	Klüber

Assembling:

Tradename	*BMW Part Number*
Gleitmittel-Circolight	83 19 9 407 771

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Enclosure 1 to SI 26 03 96 (145), edition 02/2019

To grease the flexible disc centring or the centring pin of the gearbox output flange as well as the keyway of the propeller shaft sliding piece, the following grease must be used.

Trade name	**BMW part number**	*Manufacturer/Supplier*
Optimol Olistamoly 2 L584LO	83 19 0 447 919	Optimol Ölwerke

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Enclosure 2 to SI 26 03 96 (145), edition 02/2019

Use the following grease to grease the hub gearing of the propeller shaft on the rear axle drive/input flange.

Trade name	*BMW part number*	*Container size*
Castrol Optitemp HT LF1	83 23 0 417 754	50g tube

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Enclosure 1 of SI 27 01 96 (146), 08/2018

The following transfer box and electrical transmission oils are used in vehicles of the BMW Group

Transfer box and electrical transmission oil	Use in the service
BMW ATF D2	Enclosure 17 of SI 24 05 96 (143)
BMW ATF D3	Enclosure 18 of SI 24 05 96 (143)
BMW DTF 1	Enclosure 4 of SI 27 01 96 (146)
BMW Synthetics OSP	Enclosure 7 of SI 33 01 96 (149)
BMWi TF (CLN-4S)	Enclosure 6 of SI 27 01 96 (146)
Rear axle differential oil SAF-XO	Enclosure 7 of SI 33 01 96 (149)
Hypoid Axle Oil G1 (BOT448)	Enclosure 12 of SI 33 01 96 (149)
Manual gearbox oil MTF-LT-2	Enclosure 9 of SI 23 02 96 (142)

Use of transfer box and electrical transmission oils

Vehicle	E30 325ix, E34 325ix	E46	E53 (without X-drive) Transfer box: NV 125, LWX 500	F39, F40, F44, F45, F46, F48, F49, F54, F60, R60, R61	I12 and I15 with electrical transmissions: GE2I12GK	E82 e; M12, I01, I01 REX, F45 PHEV, F49 PHEV, F60 PHEV with the electrical transmissions: GE1B100H, GE1E84H, GE1B130H, GE1B131H, GE1F45GK	All other vehicles with transfer box : ATC 13/300/350/400/450/500/700/35L/45L
BMW ATF D2	X						
BMW ATF D3			X				
BMW DTF 1							X
BMW Synthetics OSP				X			
BMWi TF (CLN-4S)					X		
Rear axle differential oil SAF-XO				X			
Hypoid Axle Oil G1 (BOT448)						X	
Manual gearbox oil MTF-LT-2		X					

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Enclosure 17 of SI 24 05 96 (143), issue 11.03; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW ATF D2	83 12 0 434 447	81 22 9 400 272	12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

Approved automatic transmission fluids (ATF)

Trade name	*Manufacturer/Supplier*
ADDINOL ATF D III	ADDINOL MINERLÖL GMBH, KRUMPA/D
AGIP ATF II D	AGIP PETROLI SPA, ROM/I
AGIP DEXRON III	AGIP PETROLI SPA, ROM/I
AGIP ATF D 309	AGIP PETROLI SPA, ROM/I
AUTOL TRANSMISSION FLUID ATF III D	AGIP SCHMIERTECHNIK, WÜRZBURG/D
AUTOL TRANSMISSION FLUID ATF-D	AGIP SCHMIERTECHNIK, WÜRZBURG/D
ARAL TRANSMISSION FLUID ATF 55 F-30589	ARAL AG, BOCHUM/D
ARAL TRANSMISSION FLUID ATF 22	ARAL AG, BOCHUM/D
AVIA FLUID ATF 86	AVIA MINERALÖL AG, MUNICH/D
BLASOL 229	BLASER SWISSLUBE, HASLE-RÜEGSAU/CH
FRONTOL UNIVERSAL ATF 100	BP OIL DEUTSCHLAND, HAMBURG/D
AUTRAN MBX	BP OIL INTERNATIONAL, LONDON/GB
MOTOREX ATF SUPER D-22656	BUCHER+CIE AG, LANGENTHAL/CH
MOTOREX ATF DEXRON III MC	BUCHER+CIE AG, LANGENTHAL/CH
CIDISOL HYDRAULIC FLUID DEXRON IID	C.J. DIEDERICHS SÖHNE, WUPPERTAL/D
PAMATIC FLUID 289	CALPAM GMBH, ASCHAFFENBURG/D
CALPAMATIC FLUID III F	CALPAM GMBH, ASCHAFFENBURG/D
CALTEX ATF-HDA	CALTEX PETROLEUM CORP., LONDON/GB

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CASTROL TQ-D (22765)	CASTROL LTD, SWINDON/GB
CASTROL TRANSMAX Z	CASTROL LTD, SWINDON/GB
CASTROL TQ-D (21289)	CASTROL LTD, SWINDON/GB
CASTROL ATF 21293	CASTROL LTD, SWINDON/GB
CASTROL TQ DEXRON III F-30520	CASTROL LTD, SWINDON/GB
CEPSA ATF-70	CEPSA, MADRID/E
ATF DMM	DE OLIEBRON B.V., ZWIJNDRECHT/NL
ATF 289	DE OLIEBRON B.V., ZWIJNDRECHT/NL
DEA FLUID 3003	DEA MINERALÖL AG, HAMBURG/D
DEA FLUID 4011	DEA MINERALÖL AG, HAMBURG/D
DEAMATIC	DEA MINERALÖL AG, HAMBURG/D
MAC ATF D-21666	DEUTSCHE SHELL AG, HAMBURG/D
UNIMATIC	DUCKHAMS OIL, BROMLEY/GB
TRANSANTAR DF2	ELF LUBRIFIANTS, PARIS/F
ELFMATIC G3	ELF LUBRIFIANTS, PARIS/F
TRANSANTAR DF3	ELF LUBRIFIANTS, PARIS/F
ELFMATIC G2 22329	ELF LUBRIFIANTS, PARIS/F
HUILE RENAULT DIESEL STARMATIC	ELF LUBRIFIANTS, PARIS/F
ANTAR 22329	ELF LUBRIFIANTS, PARIS/F
ELLMO AUTOMATIC FLUID 22233	ELLER-MONTAN-COMP., DUISBURG/D
TRANSMISIONES AUTOMATICAS D2	ERTOIL SA, MADRID/E
ESSO ATF D (21065)	ESSO AG, HAMBURG/D
ESSO ATF D (21611)	ESSO AG, HAMBURG/D
ESSO ATF F-30320	ESSO AG, HAMBURG/D
FINAMATIC II-D	FINA EUROPE SA, BRUSSELS/B
SILKTRAN MP-ATF	FUCHS LUBRICANTS (UK), DERBY/GB
TITAN ATF 4000	FUCHS MINERALÖLWERKE, MANNHEIM/D
YORK LT 785	GINOUVES GEORGES SA, LA FARLEDE/F
ATF 2	GULF OIL LTD, CHELTENHAM/GB
KENDALL ATF DEXRON IID	HANDEL-MIJ NOVIOL B.V., NIJMEGEN/NL
HOMBERG TRANSMISSION FLUID D	HOMBERG GMBH+CO KG, WUPPERTAL/D

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IGOL ATF 420	IGOL FRANCE, PARIS/F
INA-ATF SUPER	INA D.D. RAFINERIJA ZAGREB/YU
TRANSMISSION FLUID DX	ITALIANA PETROLI, GENOVA/I
SELECTOL FLUID TRANS.FL. IID 23	KÄPPLER K., STUTTGART/D
DEUTZ OEL ATF-D	KLÖCKNER ENERGIEHANDEL GMBH, COLOGNE/D
ATF DEXRON IID	KROON OIL BV, ALMELO/NL
ALMIROL ATF	KROON OIL BV, ALMELO/NL
Q8 AUTO 15	KUWAIT PETROLEUM, HOOGVLIET/NL
Q8 AUTO 14 (II D-21883)	KUWAIT PETROLEUM, HOOGVLIET/NL
Q8 AUTO 14 (II D-21677)	KUWAIT PETROLEUM, HOOGVLIET/NL
LEPRINXOL FLUID CN	LEPRINCE+SIVEKE GMBH, HERFORD/D
MEGOL ATF IID	LIQUI MOLY / MEGUIN, ULM/D
INTER OIL INTER MATIC ATF D2	MAURAN SA, ODARS/F
PENNASOL FLUID TRANSMISSION FLUID TYPE PCN	MIN.ÖL.RAFFIN. DOLLBERGEN, UETZE/D
MOBIL ATF 220 D21412/D22187	MOBIL OIL, WEDEL/D
MOBIL ATF 220 D20104/D21685	MOBIL OIL, WEDEL/D
CARRIER ATF	MOL HUNGARIAN OIL, KOMARON/H
LIQUIMATIC DII	MORRIS LUBRICANTS, SHREWSBURY/GB
TASSILIA	NAFTEC, ALGIER/DZ
NANHAI ATF (D2)	NANHAI SUPERIOR LUB-OIL, CHINA
GALAX MATIC DAC	NIS-RAFINERIJA NAFTE BEOGRAD/YU
ATF T 4011	OEST G. MIN.ÖLWERK, FREUDENSTADT/D
OMV ATF D II (D22427)	OMV-AG, SCHWECHAT/A
OMV ATF III (F-30580)	OMV-AG, SCHWECHAT/A
OPTIMOL ATF T 4011	OPTIMOL ÖLWERKE, HAMBURG/D
UNIVERSAL ATF-D	OSWALD KLUTH, BARGFELD-STEGEN/D
MULTIPURPOSE TRANSM. FLUID IID	PAKELO MOTOR OIL, SAN BONIFACIO/I
PANOLIN ATF MULTI 21996	PANOLIN AG, MADETSWIL/CH
AERO-LINE ATF-D	PRINZ-SCHULTE, FRECHEN/D
AERO-LINE ATF-2	PRINZ-SCHULTE, FRECHEN/D

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REPSOL MATIC ATF	REPSOL DISTRIBUCION SA, MADRID/E
GULF ATF DII D-22233	S.A.E.L., ALCOBENDAS/E
WINTERSHALL ATF D	SCHMIERSTOFFRAFFINERIE SALZBERGEN/D
ASEOL ATF DB UNIVERSAL	SHELL ASEOL AG, BERN/CH
SHELL DONAX TA (D-21666S)	SHELL INTERNATIONAL, LONDON/GB
SHELL ATF 9226	Shell International Petroleum Company Ltd
MADIT AUTOMATIC	SLOVNAFT JS CO, BRATISLAVA/SLO
DEXRON 2 D	SONOL ISRAEL LTD, HAIFA/IL
SOPRAL 164	SOPROGRASA SA, MADRID/E
TECNOL TECMATIC D2	STL TECNOL, ESCALQUENS/F
SUNAMATIC 149	SUN OIL COMPANY, AARTSELAAR/B
SUNAMATIC 153	SUN OIL COMPANY, AARTSELAAR/B
TRANSWAY DX III (F-30373)	SVENSKA STATOIL AB, NYNÄSHAMM/S
TAMOIL ATF II D	TAMOIL LUBES, GENEVA/CH
ATF MERCON / DEXRON III	TEXACO LUBRICANTS COMP., BEACON/USA
TEXAMATIC 4291	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 4011	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 4261	TEXACO SERVICES LTD, BRUSSELS/B
TEXAMATIC 7080	TEXACO SERVICES LTD, BRUSSELS/B
TOTAL FLUIDE AT 42	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE IID	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE ATX	TOTAL RAFFINAGE DISTR., PARIS/F
TOTAL FLUIDE ATD	TOTAL SOUTH AFRICA, JOHANNESBURG/ZA
TURBO UNIV. ATF MERCON 4011	TURBOTANK BÖSCHE+BÖDEKER, BREMEN/D
UFALUB ATF	UFANEFTECHIM REFINERY, UFA/RUS
UNIL MATIC CN T 4011	UNIL DEUTSCHLAND GMBH, BREMEN/D
VALVOLINE MULTI-PURPOSE ATF	VALVOLINE INC., LEXINGTON/USA
VALVOLINE ATF TYPE D	VALVOLINE INTERNAT., DORDRECHT/NL
MOVARA ATF TRANSMISSION FLUID DIID	VEBA OEL AG, GELSENKIRCHEN/D
VEEDOL ATF-M (22764)	VEEDOL INTERNATIONAL, SWINDON/GB

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VEEDOL UNITRANS Z	VEEDOL INTERNATIONAL, SWINDON/GB
VEEDOL ATF DEXRON III F-30521	VEEDOL INTERNATIONAL, SWINDON/GB
YACCO ATF D	YACCO SA, ST PIERRE-LES-ELBEUF/F
DIVINOL FLUID 666	ZELLER+GMELIN GMBH&CO, EISLINGEN/D
ZF ECOFLUID ”A”	ZF FRIEDRICHSHAFEN AG/D

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Enclosure 18 of SI 24 05 96 (143), issue 08/2018

Trade name	*BMW part number*	*Manufacturer/Supplier*
BMW ATF D 3	83 22 9 407 858	1-litre can

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 4 of SI 27 01 96 (146), issue 10/2009, update 08/2018

Trade name	*BMW part number*	*Container size*
BMWDTF1	83 22 2 409 710	1-litre can

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 7 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 2 365 987	1000 ml
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 9 407 768	60-litre barrel
BMW Synthetik OSP / rear axle differential oil SAF-XO	83 22 2 148 570		12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 6 of SI 27 01 96 (146), issue 09/2013; update 08/2018

Trade name	BMW part number	Container size
BMW i TF (CLN-4S)	83 22 2 365 760	1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 7 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 2 365 987	1000 ml
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 9 407 768	60-litre barrel
BMW Synthetik OSP / rear axle differential oil SAF-XO	83 22 2 148 570		12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 12 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	BMW part number	Container size
Hypoid Axle Oil G1 (BOT448)	83 22 2 295 532	3 x 500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 9 of SI 23 02 96 (142), issue 08/2018

Trade name	*BMW part number*	*Container size*
Manual gearbox oil MTF LT-2	83 22 2 339 219	1-litre canister
Manual gearbox oil MTF LT-2	83 22 0 309 031	5-litre canister

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 1 of SI 31 02 96 (147), 08/2018

The following front axle transmission oils are used in vehicles of the BMW Group

Front axle transmission oil	Use in the service
BMW Synthetics OSP	Enclosure 7 of SI 33 01 96 (149)
Rear axle differential oil SAF-XO	Enclosure 7 of SI 33 01 96 (149)
Hypoid Axle Oil G1 (BOT448)	Enclosure 12 of SI 33 01 96 (149)
Hypoid Axle Oil G2	Enclosure 8 of SI 31 02 96 (147)

Use of front axle transmission oils

Vehicle	E53, E83 (without N46)	All other vehicles
BMW Synthetics OSP	X	
Rear axle differential oil SAF-XO	X	
Hypoid Axle Oil G1 (BOT448)	X	
Hypoid Axle Oil G2		X

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Enclosure 2 of SI 31 02 96 (147), issue 01.12.1996

High-temperature multipurpose grease consists of a lithium complex soap in a mineral oil raffinate in combination with select additive combinations. The soap is contained in the oil with a very fine distribution and virtually serves as a structure.

This lubricating grease has the following quality features:

- Thermally very durable and operatively stable

  At operating temperatures of minus 30° C to plus 150° C in continuous operation as well as high load, the structure and consistency must be maintained over a long service life.

- Oxydation-resistant

  To prevent oxidation at high operating temperature, lubricating grease contains effective inhibitors (inhibitors that limit or prevent chemical processes).

- Water-resistant and corrosion-preventing

  The high-temperature multipurpose greases are resistant against water. At the same time, the greased components are optimally protected by corrosion inhibitors against corrosive effects.

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Enclosure 3 of SI 31 02 96 (147), issue 08/2018

Taper roller bearing

High-temperature multipurpose grease is used to grease the taper roller bearing.

Grease filling in the wheel hub 50 g and in the wheel hub protective cap 20 g per wheel.

Trade name	*BMW part number*	*Container size*
UNIREX N3	83 19 2 160 349	400 ml

The wheel hub protective caps must always be replaced and glued into the wheel hubs during installation with the following adhesive.

Trade name	*BMW part number*	*Container size*
Loctite No. 638	81 22 9 407 420	50 ml tube

Angular-contact ball bearing unit

Bearing unit lubricated for life, cannot be dismantled, no re-greasing possible.

Grooved ball bearing (rear axle) E12, E21, E23, E24 up to mod. 5.82

Trade name	*BMW part number*	*Container size*
UNIREX N3	83 19 2 160 349	400 ml

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Enclosure 4 to SI 31 02 96 (147), edition 02/2019

Trade name	*BMW part number*	*Container size*
Installation aid (Circo Light)	83 19 2 405 829	250 ml

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Enclosure 7 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 2 365 987	1000 ml
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 9 407 768	60-litre barrel
BMW Synthetik OSP / rear axle differential oil SAF-XO	83 22 2 148 570		12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 7 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 2 365 987	1000 ml
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 9 407 768	60-litre barrel
BMW Synthetik OSP / rear axle differential oil SAF-XO	83 22 2 148 570		12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 12 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	BMW part number	Container size
Hypoid Axle Oil G1 (BOT448)	83 22 2 295 532	3 x 500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 8 of SI 31 02 96 (147), issue 01.12.1996 / update 08/2018

Trade name	*BMW part number*	*Container size*
Hypoid Axle Oil G2	83 22 2 413 511	500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 1 to SI 32 03 96 (148) En, edition Dec. 1, 1996

The ZF Gemmer steering gear is lubricated for life and therefore maintenance-free.

If repairs are carried out, the steering gear must be refilled with one of the following oils:

Tradename	*Manufacturer*
ARAL Getriebeöl Hyp. 90	ARAL
BP Mehrzweck-Getriebeöl 90	BP
ESSO Getriebeöl GX D 90	ESSO
FUCHS Renogear Hypoid 90	FUCHS
Castrol Hypoy B 90	Castrol
Shell Spirax MB 90	Shell
TEXACO Multigear EP 90	TEXACO
VALVOLINE X - 18 MD 90	VALVOLINE

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Enclosure 2 to SI 32 03 96 (148), edition 02/2019

Note:

The oil reservoirs for hydraulic fluid are marked on the rim of the reservoir to show which type of oil grade can be used. ATF oil or Pentosin CHF oil

Only for topping up hydraulic steering

Trade name	*BMW part number*	*Container size*	*Oil colour*
BMW automatic transmission fluid D II	81 22 9 400 272	1-litre can	red

Trade name	*BMW part number*	*Container size*	*Oil colour*
Pentosin CHF 11S [1)]	83 29 0 429 576	1-litre can	green

[1)] Vehicles with AFS or with ARS are filled as standard with Pentosin CHF 11S.

The ZF rack-and-pinion steering has lifetime lubrication and is thus maintenance-free. In case of repair, the affected steering components must be lubricated with the following grease:

Trade name	*BMW part number*	*Container size*
Lubricating grease FB-1	83 23 2 208 093	100 g tube

RR1, RR2 and RR3 models are filled with Texaco Cold Climate.

Trade name	*BMW part number*	*Container size*
Texaco Cold Climate		

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Enclosure 3 to SI 32 03 96 (148), edition 02/2019

Only the automatic transmission fluids listed in section 5 may be used to ensure trouble-free functioning of the hydraulic steering and the vane pump.

These automatic transmission fluids are clear homogeneous liquids without mineral oil insoluble substances, they contain only additives that do not fail even after longer immobility periods.

The additives are mineral oil soluble compounds that improve the pressure absorption capability, the viscosity/temperature dependence, the friction and wear resistance, the foam prevention and the compatibility with the sealants.

In the case of brief hydraulic noises after starting at low outside temperatures, we recommend replacing the red automatic transmission fluid with the green CHF oil in accordance with Section 4.0.

A filter change is not necessary. For vehicles of the model range (E23) which are still equipped with paper filters from the series launch, a filter change should only be carried out if necessary.

It is not necessary to do an oil change regularly. However, after repair work (assembly or line change) it is recommended to change the oil.

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Enclosure 4 to SI 32 03 96 (148), edition 02/2005

The oils for BMW models with power steering and a brake-power-boosting H 31 unit are identical with the oils for power steering gears without H 31 unit.

The following exceptions apply:

- All models with recirculating self-levelling suspension, AHK (active rear-axle kinematics) or EH lock and common oil reservoir in the engine compartment (see Group 37)
- E32/M60 and E34/M60

Models for countries with low outside temperatures (Finland, Norway, Sweden and Canada).

These models are filled with Pentosin CHF 11S.

If repairs are carried out on these models or the oil level needs to be topped up, the hydraulic fluid Pentosin CHF 11S can be ordered from the BMW Parts Service:

Trade name	***BMW part number***	***Container size***
Pentosin CHF 11S	81 22 9 407 758	1-litre can

CHF and ATF oils must not be mixed. The oil types are indeed compatible, but if there is more of the one type in the steering gear than the other, this adversely affects the properties of the other oil. it is permissible to mix Pentosin CHF 4548 with CHF 7.1 - *exce p t on the E32 with recirculating self-levelling suspension*!

Therefore, the hydraulic system for steering and brake-power assistance must be drained as completely as possible when changing from one type of oil to the other.

All oil reservoirs will in future be marked with the oil type used - ATF or CHF 11.

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Enclosure 5 to SI 32 03 96 (148), edition 02/2019

Trade name	*BMW part number*	*Container size*
Copper paste	81 22 9 400 794	100 g tube

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Enclosure 6 to SI 32 03 96 (148), edition 02/2019

See main group 31 enclosure 4.0 Lubricant for rubber mount installation

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Enclosure 1 of SI 33 01 96 (149), 08/2018

The following rear axle differential oils are used in vehicles of the BMW Group

Final drive oil	Use in the service
BMW HOK oil	Enclosure 6 of SI 33 01 96 (149)
BMW Synthetics OSP	Enclosure 7 of SI 33 01 96 (149)
Rear axle differential oil MSP/A	Enclosure 8 of SI 33 01 96 (149)
Rear axle differential oil SAF-Carbon Mod	Enclosure 9 of SI 33 01 96 (149)
Rear axle differential oil SAF-XJ Booster	Enclosure 10 of SI 33 01 96 (149)
Rear axle differential oil SAF-XO	Enclosure 7 of SI 33 01 96 (149)
Hypoid Axle Oil G1 (BOT448)	Enclosure 12 of SI 33 01 96 (149)
Hypoid Axle Oil G3 (Fuchs Titan EG 4218)	Enclosure 13 to SI 33 01 96 (149)
Hypoid Axle Oil G4	Enclosure 14 of SI 33 01 96 (149)
Manual gearbox oil MTF 1	Enclosure 8 of SI 23 02 96 (142)

Use of rear axle differential oils

Vehicle	E70 (with QMVH) , F15 (with QMVH) , F16 (with QMVH) , E71, F85, F86	E82 M, E90 M, E92 M, E93 M	E34 M5, E36 Z3 with SA209, E36 Z3 M, E36 with SA209, E36 M3, E39 M5, E46 M3, E60 M5, E61 M5, E63 M6, E64 M6, E85 M, E86 M	F06 M6, F10 M5, F12 M6, F13 M6, F2x (with M Performance differential lock), F3x (with M Performance differential lock), F80, F82, F83, F87	E26 M1	F90, F97, F98, G01 (with SA2T4), G02 (with SA2T4), G05 (with SA2T4), G07 (with SA2T4), G14 (with SA2T4), G15 (with SA2T4), G20 (with SA2T4), G21 (with SA2T4), G29 (with SA2T4), G30 (with SA2T4)	F39, F40, F44, F45, F46, F48, F49, F54, F60	All other vehicles
BMW HOK oil							Hang-on clutch (HOC)	
BMW Synthetics	Basic transmission,							up to 07/2011

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OSP	centre							
Rear axle differential oil MSP/A			X	X				
Rear axle differential oil SAF-Carbon Mod	Variable ratio transmission left/right							
Rear axle differential oil SAF-XJ Booster		X						
Rear axle differential oil SAF-XO	Basic transmission, centre							up to 07/2011
Hypoid Axle Oil G1 (BOT448)								From 07/2011
Hypoid Axle Oil G3 (Fuchs Titan EG 4218)								From 07/2011
Hypoid Axle Oil G4						X		
Manual gearbox oil MTF 1					X			

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Enclosure 2 of SI 33 01 96 (149), issue 09.1998

The joints of the output shaft are greased for life and are maintenance-free. In the event of repair, the necessary amount of joint grease is enclosed in the "gaiter repair kit".

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Enclosure 3 of SI 33 01 96 (149), issue 10.2000

See HG 31 Enclosure 2.0 Grease for wheel bearing

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Enclosure 4 to SI 33 01 96 (149), edition 02/2019

See main group 31 enclosure 4.0 Lubricant for rubber mount installation

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Enclosure 5 to SI 33 01 96 (149), edition 02/2019

The following grease should be used for greasing the contact surfaces of the flange nut to the bearing inner ring and to the insert nut, and for greasing the face of the drive flange.

The Drei Bond glue is to be used for the threads of the flange nut.

Trade name	*BMW part number*	*Container size*
Castrol Optitemp HAT LF1	83 23 0 417 754	50g tube
Drei Bond adhesive, type 1385	83 19 0 417 376	50g tube

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Enclosure 6 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*Container size*
BMW HOC oil	83 22 2 413 513	850 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 7 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 2 365 987	1000 ml
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 9 407 768	60-litre barrel
BMW Synthetik OSP / rear axle differential oil SAF-XO	83 22 2 148 570		12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 8 of SI 33 01 96 (149), issue 06/2006, update 08/2018

Trade name	*BMW part number*	*Container size*
BMW rear axle differential oil MSP/A	83 22 2 365 988	1 litres

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

Rear axle differential oils approved by name

Trade name	*Manufacturer/Supplier*
Castrol SAF-XJ	Castrol
Castrol Syntrax Limited Slip 75W-140	Castrol
MOTUL HYPO SYNT LS	Motul
Mobil transmission oil VS 500	Mobil
Aral transmission oil BS-LSX	Aral
BP Energear SHX-ZR	BP
Avia Hypoid 75W--140 LSX	AVIA
Agip HLZ	Agip
FINA PONTONIC MLK	Fina
Shell transmission oil ZLS-BMW	Shell
Wintershall gear fluid BMS Plus	Schmierstoffraffinerie Salzbergen GmbH
Westfalen Fugo BMS	Westfalen AG

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Enclosure 9 of SI 33 01 96 (149), issue 09/2008; update 02/2017

Trade name	*BMW part number* **China**	*BMW part number* **Rest of the world**	*Container size*
BMW rear axle differential oil SAF-Carbon Mod	83 12 0 446 012	83 12 0 445 832	3 x 500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 10 of SI 33 01 96 (149), issue 06/2006, update 08/2018

Trade name	*BMW part number* China	*BMW part number* Rest of the world	*Container size*
BMW rear axle differential oil SAF-XJ Booster	83 21 2 155 243	83 22 2 282 583	3x500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 7 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	*BMW part number*	*BMW part number*	*Container size*
	China	**Rest of the world**	
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 2 365 987	1000 ml
BMW Synthetik OSP / rear axle differential oil SAF-XO		83 22 9 407 768	60-litre barrel
BMW Synthetik OSP / rear axle differential oil SAF-XO	83 22 2 148 570		12x1 litre

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 12 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	BMW part number	Container size
Hypoid Axle Oil G1 (BOT448)	83 22 2 295 532	3 x 500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 13 to SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	BMW part number	BMW part number	Container size
	China	Rest of the world	
Hypoid Axle Oil G3 (Fuchs Titan EG 4218)	83 22 2 459 097	83 22 2 413 512	3 x 500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

The oil service intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 14 of SI 33 01 96 (149), issue 08/2008; update 08/2018

Trade name	BMW part number	Container size
Hypoid Axle Oil G4	83 22 2 447 362	3 x 500 ml

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 8 of SI 23 02 96 (142), issue 08/2018

Trade name	*BMW part number*	*Container size*
Manual gearbox oil MTF 1	81 22 2 339 384	1-litre canister

Note:

The above oils satisfy the demands required of lifetime oils.

Oil change intervals are given in the vehicle-specific inspection sheets.

Before opening the container, ”mix” the oil to distribute the additives evenly through the oil.

Oil additives

All transmissions are designed in such a way that there is absolutely no need to use oil additives. BMW is totally against the use of such additives. We will also accept no liability for any consequences resulting from the use of additives.

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Enclosure 1 to SI 34 03 96 (150), edition 02/2019

Glycol-based brake fluids used in BMW Group brake systems must fulfil the following requirements among other things:

- High boiling point
- Great low-temperature resistance
- Low compressibility
- Corrosion protection of all metallic parts within the brake system
- Adequate lubrication properties
- Compatibility with all rubber parts/elastomers used in the brake system

These requirements are fulfilled by the brake fluids, quality DOT 4 approved by the BMW Group.

Silicone-based brake fluid is more compressible and, due to the inability to absorb moisture, can already lead to the formation of fuel vapour lock at more than 100°C or icing up at very low temperatures. Due to these findings from long-term driving tests conducted by the BMW Group, it is *not approved* .

Glycol-based brake fluid absorbs moisture - hygroscopicity - over the components used (expansion tank, brake hoses etc.) from the atmosphere. Because of the water absorption, the initial boiling point of the brake fluid drops and as a result the active safety of the entire system. At extreme loads of the brake system, for example, quickly driving downhill, fuel vapour lock can develop in the brake fluid due to the thermal load. In the worst case, this means a total failure of the entire brake system! Therefore, make sure to always observe the brake fluid change intervals!

The fuel vapour locks inevitably first occur in the areas of the brake caliper that are exposed to high thermal stress and exposed with regard to heat dissipation, so that changing the expansion tank content alone is ineffective.

Of course, when changing the brake fluid, the brake fluid in the clutch system should also be changed by draining or bleeding via the *clutch slave cylinder*.

To help with an economical exchange of the entire fluids contained in the brake system, the filling and bleeder units tested and approved by the BMW Group are available to you, which can be obtained via the BMW Group Parts.

The units offered there always separate the brake fluid from the compressed air part through a diaphragm, so that no air humidity can be absorbed. The change should take place via the expansion tank of the tandem brake master cylinder. Attention must be paid that each vent valve of the individual wheel brake cylinders or brake caliper remains open until clear and bubble-free brake fluid emerges. Never pour this brake fluid back into the unit!

Particular attention must also be paid to the storage of the brake fluid. The ageing process already starts upon exposure to the atmosphere, in other words immediately after opening the new container.

In order to keep the boiling point of stored brake fluids as high as possible over a long period of time, the following must be observed:

- Keep all containers tightly closed
- Choose small container sizes to ensure it is used up quickly
- Avoid refilling into other collecting vessels

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Enclosure 2 to SI 34 03 96 (150), edition 02/2019

Due to its constitution, brake fluid can be easily confused with mineral oil products.

Attention: Never fill or store brake fluid in drink bottles. Danger of poisoning and possibly danger to life!

After skin has come into contact with brake fluid, immediately wash affected areas with water and soap. If eyes are also affected, rinse them with lots of clear water. If accidentally ingested, induce vomiting and immediately visit the nearest hospital.

If brake fluid comes into contact with a painted surface, it must be immediately rinsed with water, since it attacks the paint. Never rub in. Brake fluid must not come into contact with grease or oil. Clean hands from grease and oil prior to handling brake fluid. Furthermore, make sure that grease cannot get into the brake system.

Used brake fluid must not be disposed of in the rubbish, mixed with used oil, or disposed of in the sewer. It falls under the law for the disposal of hazardous waste and must be disposed of separately from other used oils at the nearest hazardous waste collection centre.

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Enclosure 3 to SI 34 03 96 (150), edition 02/2019

Use:

All vehicles with Dynamic Stability Control (DSC) *without* a pre-charge pump must be filled with new brake fluid *DOT 4 with low viscosity*.

All other vehicles can be filled with the new brake fluid DOT 4 with low viscosity; it is possible to mix DOT 4 and DOT 4 with low viscosity.

Identification of container:

Brake fluid **DOT 4 with low viscosity** , container size 0.25 - 5.0 litre: **Cap colour black**

Trade name	***BMW part number***	***Container size***
BMW brake fluid DOT 4 with low viscosity	83 13 0 443 023	0,25-litre can
BMW brake fluid DOT 4 with low viscosity	83 13 0 443 024	0,50-litre can
BMW brake fluid DOT 4 with low viscosity	83 13 0 443 026	1,0-litre can
BMW brake fluid DOT 4 with low viscosity	83 13 0 443 027	5,0-litre canister
BMW brake fluid DOT 4 with low viscosity	83 13 0 443 028	30.0-litre barrel
BMW brake fluid DOT 4 with low viscosity	83 13 0 443 029	60.0-litre barrel

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Enclosure 4 to SI 34 03 96 (150), edition 02/2019

Vehicles	*Change interval*
Up to model year 1990	Annually
As of model year 1990 (except 750i E32)	every 2 years
BMW i: I01	every 2 years
Changeover brake fluid (except US version) As of model year 03/2011: R55, R56, R57, R60 E81, E82, E87, E88 E90, E91, E92, E93 E84, E89 As of model year 04/2011: E70, E71, E72 As of model year 07/2011: F12, F13 F20, F21 As of model year 09/2011: RR4 F01, F02, F03, F04 F07 F10, F11 As of model year 10/2011: F25 As of model year 11/2011: F30, F31	1. Change after 3 years, then every 2 years
all new series launches as of 2012	3 years, then every 2 years
US models as of production 07/2013 (except E7x, E8x and E9x)	1. Change after 3 years, then every 2 years
750iE32	Annually
BMW high-security vehicles E23	Semi-annually

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BMW high-security vehicles E32, E38, E67, F03	Annually
Special vehicles for authorities	Annually
Vehicles with difficult conditions of use	Annually
Rolls-Royce up to 2012	every 2 years
Rolls-Royce starting from 2012	1. Change after 3 years, then every 2 years

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Enclosure 5 to SI 34 03 96 (150), edition 02/2019

5.1 Brake cylinder paste

To install and preserve wheel brake cylinders, cylinder barrels, pistons and sleeves, the parts are clean prior to assembly and then treated with a thin coating of ATE brake cylinder paste.

Trade name	*BMW part number*	*Container size*
ATE brake cylinder paste	83 19 9 407 854	180 g tube
Syntheso Glep 1 lubricating grease	83 23 9 407 778	100 g tube

5.2 Brake pad paste

For usage, see Repair Instructions, Group 34

Trade name	*BMW part number Rest of the world*	*BMW part number China*	*Container size*
Brake block paste	83 19 2 158 851	83 19 2 180 000	3 gr. bag
Brake block paste	83 19 2 158 852	83 19 2 179 999	100 gr. bag
Brake block paste	83 23 0 140 233		5 g bag, TU*

TU = Trade Unit.

Note:

Lubrication instructions in the repair instructions and on the information sheet supplied with the set of brake pads must be observed.

5.3 Brake cleaner

Trade name	*BMW part number*	*Container size*
BMW brake cleaner	83 19 2 365 214	500 ml spray can
BMW brake cleaner	83 19 2 365 215	20-litre canister

5.4 Corrosion inhibitor for ABS pulse sensor

To avoid fretting corrosion between ABS pulse sensor and bore hole in the wheel suspension parts, the ABS pulse sensor and the bore hole are cleaned and treated prior to assembly with a thin coating of corrosion inhibitor.

Trade name	*BMW part number*	*Container size*
Staburags NBU 12/K	83 23 9 407 810	100 g tube

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Enclosure 1 to SI 35 01 96 (151), edition 02/2019

To grease all foot control bearings, only the following products must be used:

Trade name	*Manufacturer/Supplier*
Renocal FN 745	Fuchs
Glissando VW 745	DEA
Special grease by BMW	Esso

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Enclosure 1 to SI 36 01 96 (152), edition 02/2019

It is used for mounting passenger car tyres and for limiting the fitting pressure of the tyre bead on the rim flange during initial mounting.

Trade name	*BMW part number*	*Container size*
BMW tyre mounting spray for Pax system	83 19 2 156 562	400 ML
BMW tyre-fitting paste	81 22 0 433 046	3.5 kg bucket

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Enclosure 2 to SI 36 01 96 (152), edition 02/2019

To avoid contact corrosion between the wheel rim and wheel centring, the following grease must be applied to the centring collar of the wheel hub.

Brake block paste

Attention: Coating the contact surface of the disc wheel is not permitted as this inadmissibly impairs the friction behaviour of the wheel contact faces!

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Enclosure 1 to SI 37 01 96 (153), edition 02/2019

CHF hydraulic oils have a favourable viscosity curve and enable trouble-free operation of the self-levelling suspension control even at very low temperatures without lasting effects in the upper temperature range. The pour points are below -60°C.

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Enclosure 2 to SI 37 01 96 (153), edition 02/2019

The following hydraulic fluids must be used to top up the hydraulic system.

All vehicles **up to 9.91**

Trade name	*BMW part number*
Pentosin CHF 7.1	No longer available after 10/2011

Note:

Pentosin CHF 7.1 and CHF 11S may not be mixed because mixing will lead to problems in the hydraulic system due to precipitation (non-soluble precipitation in form of flakes).

Re-oiling the hydraulic system changing from Pentosin CHF 7.1 to CHF 11S and vice versa is not permitted because this will also result in failure of the hydraulic system.

Recommendation: Replacing the parts to which Pentosin CHF 7.1 has been applied.

All Vehicles **from 9.91**

Trade name	*BMW part number*	*Container size*
Pentosin CHF 11S	81 22 9 407 758	1-litre can
Pentosin CHF 11S	81 22 9 407 759	20-litre canister

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Enclosure 1 to SI 27 01 96 (146), edition 02/2019

Trade name	*BMW part number*	*Container size*
Hydraulic fluid for convertible top / lids Aral Vitamol ZHM	54 34 0 394 395	250 ml

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Enclosure 2 to SI 27 01 96 (146), edition 03/2019

Trade name	*BMW part number*	*Container size*
Klueberplex REP 41 - 151	83 19 2 460 509	Tube, 90 g

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Enclosure 1 to SI 64 09 96 (154), edition 02/2019

In order to fulfil the environmental compatibility requirements of BMW products and to reduce the ozone pollution of the earth's atmosphere caused by refrigerants needed for heating and air conditioning systems, from April 1991 on and starting with the model E32/M30 and the optional equipment IHKA, only the chlorine-free refrigerant R134a (tetrafluorethane) is used.

This product has been used since September 1992 in all models. The refrigerant used so far, called Frigen R12, is omitted.

The refrigerant used in the vehicle and the capacity are specified on the type plate in the engine compartment.

The boiling point of the R134a is -26.2°C. The refrigerant R134a is non-combustible and does not form an explosive mixture in combination with air.

It is odourless and non-corrosive. However, it is very hygroscopic, i. e. it readily combines with water.

Safety regulations:

The safety regulations as specified for the refrigerant Frigen R12 in point 2.0 apply.

Trade name	*BMW part number*	*Container size*
Refrigerant R134a	83 19 9 408 386	12 kg steel cylinder

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Enclosure 2 to SI 64 09 96 (154), edition 02/2019

Especially for the refrigerant R134a (tetrafluorethane), a PAG refrigerant oil (polyalkylene glycol) had to be selected which ensures the lubrication of the compressor.

This oil may not be mixed with the refrigerant oil Sanden SP-A2!

This refrigerant oil is very hygroscopic and must only be exposed to air humidity for a very short period.

Trade name	*BMW part number*	*Container size*
Refrigerant oil 1	81 22 9 407 724	250 ml tin can

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Enclosure 3 to SI 64 09 96 (154), edition 02/2019

To comply with EU Directive 2006/40/EC, refrigerant R1234yf (Tetrafluoropropene) has been introduced as a significantly more environmentally-friendly alternative to R134a (Tetrafluorethane).

This refrigerant will be introduced in the BMW i 01 from September 2013 onwards in certain countries. R134a will continue to be used in other vehicles/countries.

The type plate in the engine compartment indicates which refrigerant has been used.

Both refrigerants have comparable themodynamic properties. The boiling point of R1234yf is -29°C (R134a: -26°C).

R1234yf is odourless, non-corrosive and inflammable at high temperatures.

It is extremely hygroscopic, i.e. it readily combines with water.

Safety regulations:

Avoid contact with the liquid refrigerant to prevent signs of frostbite. Particularly protect the eyes with safety goggles. If an accident occurs, contact a physician immediately.

R1234yf is heavier than air, therefore do not discharge refrigerant in closed spaces. There is a risk of asphyxiation in pits. Do not store or heat refrigerant cylinder above 45 ° C.

Welding is not permitted on a filled system or in the surrounding area. An explosion hazard is presented by the possible excess pressure that could occur from heating. Furthermore, R1234yf decomposes at high temperatures and exposure to flames. The products of decomposition (hydrofluoric acids) are poisonous and harmful to health.

Observe the safety regulations stipulated on the safety data sheet (available on the Aftersales Assistance Portal)!

Note in case of contaminated refrigerant R1234yf:

If the A/C service station for R1234yf identifies contaminated refrigerant in the refrigerant circuit of the vehicle before evacuation, then a special procedure to draw off and dispose of this refrigerant must be followed.

Observe notes on drawing off, evacuating and filling the heating and air conditioning system!

Trade name	*BMW part number*	*Container size*
Refrigerant R1234yf	83 19 2 354 790	12 kg steel cylinder with 5 kg load

Enclosure 4 to SI 64 09 96 (154), edition 02/2019

A refrigerant oil that lubricates the electric A/C compressor and has a high isolation resistance is especially needed for vehicles with an electric A/C compressor.

This refrigerant oil will be first introduced from 09/2013 in the BMW i 01 on a country-specific basis **and will be used with refrigerants R134a and R1234yf**.

Caution!

I01, I12 with production date up to 08/2014:

In national-market versions with R134a the type plate shows **incorrect refrigerant oil**!

Always use Sanden SP-A2

Existing refrigerant oils must not be mixed with the new refrigerant oil!

When filling the refrigerant circuit with R134a, always ensure you use the correct, vehicle-specific refrigerant oil type!

To avoid mixing the different refrigerant oil types, flush the hoses of the A/C service station after every drawing off/filling procedure!

In the event of a sudden discharge of refrigerant or if the refrigerant circuit has been opened, observe the notes for opening and exchanging parts in the refrigerant circuit.

The amount of refrigerant oil is extremely important for the entire heating and air conditioning system. Part of this refrigerant oil (approx. 25 % depending on the amount of refrigerant) mixes with the refrigerant and constantly circulates through the circuit. This refrigerant oil lubricates the moving parts of the circuit such as the expansion valve and the air conditioning compressor.

Check the respective system capacity on the label on the air conditioning compressor when refilling.

When replacing the air conditioning compressor, never forget to adjust the amount of refrigerant oil!

This refrigerant oil is very hygroscopic and must only be exposed to air humidity for as short a time a possible.

Observe notes on refrigerant and refrigerant oil from 09/2013.

Trade name	*BMW part number*	*Container size*
Sanden SP-A2	83 22 2 339 920	250 ml

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Enclosure 6 of SI 64 09 96 (154), 02/2019

Lifetime coolant i3 was used for the first time from 09/2013 onwards in the BMW i01 **exclusively for the heater circuit**.

Risk of mixing up

The silicate free coolant i3 is dyed blue.

Do not use coolant i3 for the cooling circuits of the electrical machine or the range extender!

Do not use coolant for cooling circuits of the electrical machine or the range extender in the heater circuit!

Do not use other coolants, on account of the risk of flocculation and the associated clogging of the heat exchanger!

Note:

For an overview about the use of coolant, see technically suitable antifreeze and corrosion inhibitors.

Coolant i3 must not be used for all equipment specifications.

Mixture ratio with water is 1:1. This provides antifreeze protection down to -40 °C.

Trade name	***BMW part number***	***Container size***
Coolant i3	83 51 2 355 296	1000 ml

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Enclosure 1 to SI 97 01 96 (155), edition 02/2019

The prerequisite for the long-term quality of our vehicles is provided through long-standing and comprehensive studies and tests, the design, the materials used and the production processes in our advanced production facilities.

In spite of the increased use of galvanised panels, the quality features, the visual appearance as well as the value retention can additionally be influenced in a positive way over many years through expert care and maintenance.

The corrosion protection and care products offered through the “BMW Parts and Accessories” have been tested in the BMW Laboratories, they meet the latest technological developments and thus provide the very best while still being economical.

We recommend that you thoroughly clean the engine, engine compartment, vehicle underbody, axles and assembly at least twice a year in particular before and after the period where de-icing salt is applied to the roads and then carry out vehicle paintwork preservation or after-treatment.

When cleaning engine and engine compartment, the cleaned parts should afterwards be sprayed with engine preservation.

Checking the body including the vehicle underbody is part of each inspection.

Depending on the condition, the underbody’s preservation should be partially repaired or completely sprayed with underbody protection (wax), taking care *not* to spray rotating parts such as propeller shaft, drive shafts, disc wheels, brake discs and exhaust systems.

The ventilation and vent holes or grilles in the body must not be closed during this process.

New vehicles stored outside should not be dewaxed until shortly before the handover to the customer. In this way you avoid the consequences of paint damaging deposits of surface rust, chemical dust, soot containing oil, precipitation containing sulphur dioxide (acid rain) on the horizontal surfaces to a large extent. Bird and insect secretions as well as tree resins can also cause paint damage in the form of stains, blisters and etching of the top coat.

The protection removal should *only* be carried out on the outer skin. Preservatives on the engine or in the engine compartment, in the A-pillars (hinge area) are intended and prevent corrosion.

Already dewaxed vehicles should be washed every 2 weeks. Parked vehicle should never be covered with plastic or other covers, since this can cause paint damage through condensation in combination with plastics plasticiser diffusion and scratches.

Enclosure 2 to SI 97 01 96 (155), edition 02/2019

Cavity preservation no longer has to be reapplied regularly starting from model 1981. The particular area must be preserved again only during body repair.

Only the product approved by BMW may be used to maintain the 6-year warranty against rust damage. It protects cavities in a highly effective manner and permanently against corrosion and, due to the high penetration and water displacement capability, reaches even inaccessible angles and folds.

Trade name	*BMW part number*	*Container size*
Cavity sealant spray	83 42 2 457 337	400 ml, spray can
Cavity preservation	83 42 0 428 348	1000 ml, can

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Enclosure 3 to SI 97 01 96 (155), edition 02/2019

To maintain the six-year warranty against rust damage.

Specially selected waxes and additives provide an elastic, temperature-resistant, anthracite-coloured corrosion protection film. The maximum film thickness must be 30 µm. By repeating the spraying procedure accordingly, the material application can be changed as desired and the drip-off losses remain low. The material is given a colour indicator for identification purposes.

Application:

Clean underside of vehicle from grease, oil and dirt. Mask rotating part and parts that are not to be treated such as gearbox drive shaft, brake discs, brake hoses, springs etc..

During body repair, the particular area must be protected again. The same applies if a corresponding touch up of the underbody protection becomes necessary during maintenance.

Trade name	***BMW part number***	***Container size***
Underbody protection, black starter kit	83 19 2 219 790	Set
Underbody protection spray, black	51 91 0 427 674	500 ml, spray can
Underbody protection, black	83 19 2 317 997	1000 ml, can

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Enclosure 4 to SI 97 01 96 (155), edition 02/2019

Trade name	*BMW part number*	*Container size*
Seam sealing (sealant D1)	83 42 2 409 985	310 ml, cartridge
Seam sealing, spreadable (sealant D2)	83 42 2 409 986	310 ml, cartridge
Cavity foam	83 42 9 410 694	400 ml, spray can

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