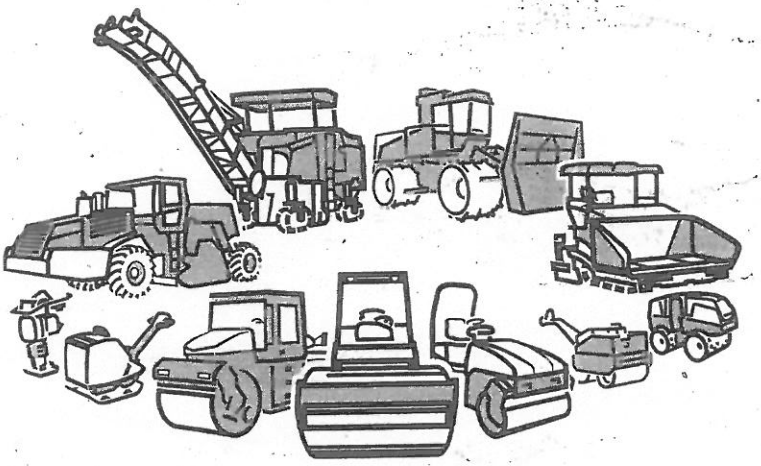
BOMAG
FAYAT GROUP

Operating Instruction
Maintenance Instruction

Original Operating Instructions

BW 219 DH-5



S/N 101 586 33 1024>

Single drum roller

008 200 99 EN

Table of contents

Table of contents

1 Introduction

1.1 Foreword

BOMAG manufactures machines for earth, asphalt and refuse compaction, stabilizers/ recyclers as well as planers and pavers.

BOMAG's vast experience in connection with state-of-the-art production and testing methods, such as lifetime tests of all important components and highest quality demands guarantee maximum reliability of your machine.

These operating and maintenance instructions are part of your machine.

They provide necessary information to operate your machine safely and properly.

They also contain information on required operating, maintenance and repair measures.

Carefully read the operating and maintenance instructions before taking your machine into operation.

Please observe the safety regulations strictly and follow all instructions to ensure safe operation.

If you are not yet acquainted with the controls and indicating elements on this machine, you should thoroughly read the corresponding chapter ↯ *Chapter 4 „Indicators and control elements" on page 69*.

The description of the individual operating steps including the notes on safety to be followed can be found in chapter "Operation" ↯ *Chapter 6 „Operation" on page 105*.

Before every start up, carry out all required visual inspections and function tests ↯ *Chapter 5 „Checks prior to start up" on page 89*.

Ensure the compliance with the specified operating, maintenance and repair measures to maintain the functional safety of your machine.

A description of all necessary maintenance work, maintenance intervals as well as information on fuels and lubricants can be found in the chapter "Maintenance" ↳ *Chapter 8 „Maintenance" on page 149.*

Do not service or repair your machine by yourself to avoid harming persons or damaging material or environment.

The machine must only be serviced and repaired by qualified and authorized personnel.

Contact our Customer Service to carry out the required maintenance work or necessary repairs.

In case of operating errors, inadequate maintenance or the use of unapproved fuels and lubricants all warranty claims will become null and void.

For your own personal safety you should only use original parts from BOMAG.

For your machine we offer service kits to make maintenance easier.

In the course of technical development we reserve the right for technical modifications without prior notification.

These operating and maintenance instructions are also available in other languages.

Apart from that, you can also order the spare parts catalogue against the serial number of your machine.

The above notes do not constitute an extension of the warranty and liability conditions specified in the general sales and delivery conditions of BOMAG GmbH.

We wish you successful work with your BOMAG machine.

1.2 Machine type plate and engine type plate

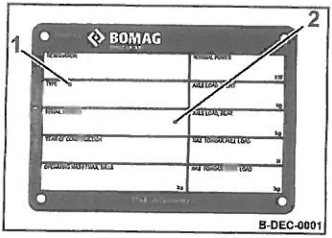


Fig. 1: Machine type plate (example)

Please enter here:	
Machine type (1):	
Serial number (2):	

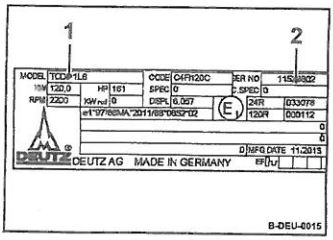


Fig. 2: Engine type plate (example)

Please enter here:	
Engine type (1):	
Engine number (2):	

2 Technical data

Dimensions

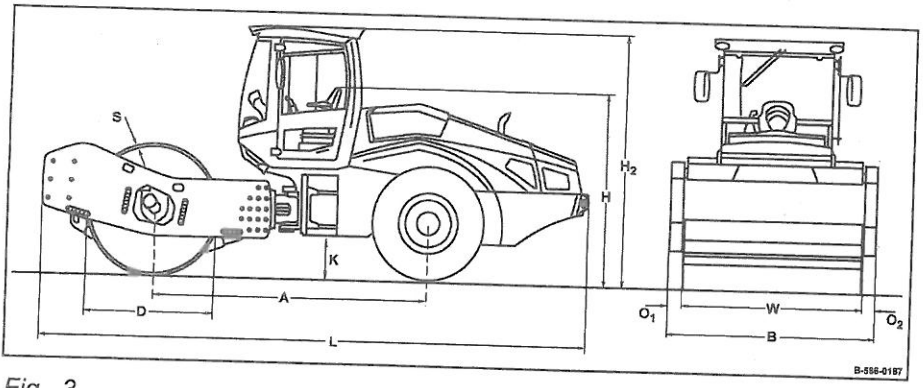


Fig. 3

A	B	D	H	H_2	K	L	$O_{1/2}$	S	W
3255	2300	1600	2295	3034	495	6500	85	40	2130
(128)	(91)	(63)	(90)	(119)	(19.5)	(256)	(3.3)	(1.6)	(84)

Dimensions in millimetres
(Dimensions in inch)

Weights		
Max. operating weight	22000	kg
	(48502)	(lbs)
Operating weight with ROPS cabin (CECE)	19400	kg
	(42770)	(lbs)
Axle load, drum (CECE)	12800	kg
	(28219)	(lbs)
Axle load, wheels (CECE)	6600	kg
	(14550)	(lbs)
Static linear load	60.1	kg/cm
	(337)	(pli)

Travel characteristics		
Travel speed	0 – 10 (0 – 6.2)	km/h (mph)
Max. gradability without/with vibration (soil dependent)	60/57	%

Drive		
Engine manufacturer	Deutz	
Type	TCD 6.1 L6	
Cooling	Fluid	
Number of cylinders	6	
Rated power ISO 3046	150	kW
Rated power SAE J 1995	202	hp
Rated speed	2300	min^{-1}

Electric system		
Voltage	12	V

Tyres		
Tyre size	23.1-26 12PR	
Air pressure, nominal value	1.4 (20)	bar (psi)

Brakes		
Service brake	hydrostatic	
Parking brake	hydro-mechanical	

Steering		
Type of steering	Oscill.-articul.	
Steering angle	+/- 35	°
Oscillation angle	+/- 12	°
Inner track radius	4120	mm
	(162)	(in)

Exciter system		
Drive system	hydrostatic	
Frequency (1/2)	26/31	Hz
	(1560/1860)	(vpm)
Amplitude (1/2)	2.10/1.20	mm
	(0,083/0,047)	(in)
Centrifugal force (1/2)	328/266	kN
	(73737/59799)	(lbf)

Filling capacities		
Fuel (diesel)	250	l
	(66)	(gal us)

2.1 Noise and vibration data

The following noise and vibration data were determined in accordance with the following guidelines under equipment specific conditions and by using harmonized standards:

- EU Machine Directive edition 2006/42/EU
- Noise Emission Directive 2000/14/EU, Noise Protection Directive 2003/10/EU
- Vibration Protection Directive 2002/44/EU

During operation these values may vary because of the prevailing operating conditions.

2.1.1 Noise data

Sound pressure level at the operator's stand	L_{pA} = 74 dB(A), determined acc. to ISO 11201 and EN 500.
Guaranteed sound power level	L_{WA} = 110 dB(A), determined acc. to ISO 3744 and EN 500

2.1.2 Vibration data

Vibration of the entire body (driver's seat)	The weighted effective acceleration value determined according to ISO 7096 is ≤ 0.5 m/s^2.
Hand-arm vibration	The weighted effective acceleration value determined according to EN 500/ISO 5349 is ≤ 2.5 m/s^2.

3 Concerning your safety

3.1 Basic prerequisites

3.1.1 General

This BOMAG machine has been built in compliance with the latest technical standard and complies with the applicable regulations and technical rules.

However, dangers for persons and property may arise from this machine, if:

- it is used for purposes other than the ones it is intended for,
- it is operated by untrained personnel,
- it is changed or converted in an unprofessional way,
- the safety instructions are not observed.

Each person involved in the operation, maintenance and repair of the machine must therefore read and comply with these safety regulations. If necessary, the operating company must obtain the relevant signatures as confirmation.

Furthermore, the following obviously also applies:

- applicable accident prevention instructions,
- generally accepted safety and road traffic regulations,
- country specific safety regulations.

It is the duty of the operator to be acquainted with the safety regulations and to apply these accordingly. This also applies for local regulations and regulations concerning different types of handling activities. Should the recommendations in these instructions be different from the regulations valid in your country, you must comply with the safety regulations valid in your country.

3.1.2 Explanation of signal words used:

DANGER!
Danger to life if failing to comply!
Sections marked accordingly indicate an extremely dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

WARNING!
Danger to life or danger of severe injuries if failing to comply!
Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

CAUTION!
Danger of injury if failing to comply!
Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

NOTICE!
Danger of material damage if failing to comply!
Sections marked accordingly indicate possible dangers for machines or components.

Sections marked accordingly indicate technical information or notes on using the machine or its components.

ENVIRONMENT!
Environmental damage if failing to comply!
Paragraphs marked accordingly indicate practices for safe and environment-friendly disposal of fuels and lubricants as well as replacement parts.

3.1.3 Personal protective equipment

Depending on the work to be carried out, personal protective equipment is required (to be provided by the operating company):

 Working clothes	Tight fitting working clothes with low tear-resistance, tight sleeves and without any projecting parts protect against being caught by moving components.
 Safety shoes	To protect against heavy falling parts and slipping on slippery ground.
 Protective gloves	To protect the hands against excoriation, punctures or deep injuries, against irritating and caustic substances as well as against burns.
 Safety goggles	To protect the eyes against airborne particles and squirting fluids.

	Face protection	To protect the face against airborne particles and squirting fluids.
	Hard hat	To protect the head against falling parts and to protect against injuries.
	Hearing protection	To protect hearing against excessive noise.
	Respiratory protection	To protect respiratory tracts against substances or particles.

3.1.4 Intended use

This machine must only be used for:

- Compaction work in earth construction and road bases.
- Compaction of bituminous material, e.g. road surface layers,

Intended use also includes compliance with the specified operating, maintenance and repair measures.

3.1.5 Improper use

Dangers may arise from the machine when it is used for purposes other than the one it is intended for.

Any danger caused by improper use is the sole responsibility of the operating company or driver/operator, the manufacturer cannot be made liable.

Examples for improper use are:

- work with vibration on hard concrete, cured bitumen layers or extremely frozen ground
- driving on unstable subbases or too small contact area (danger of tipping over)
- Using the machine for towing
- use to pull down walls or demolish buildings

transporting persons, except the machine driver, is prohibited.

starting and operation of the machine in explosive environments and in underground mining is prohibited.

3.2 Definition of responsible persons

3.2.1 Operating company

The operating company is the natural or juridical person who uses the machine or in who's name the machine is used.

The operating company must make sure that the machine is only used for the purpose it is intended for and in strict compliance with the safety regulations mentioned in these operating and maintenance instructions.

The operating company must determine and assess the danger in its company. It must then take appropriate action to ensure health and safety at work for its employees and point out any remaining dangers.

The operating company must determine whether there are special operational hazards such as a toxic atmosphere or limiting soil conditions. Such conditions require special, additional measures to remove or reduce the hazard.

The operating company must make sure that all users read and understand the information concerning safety.

The operating company is responsible for the planning and professional execution of regular safety inspections.

3.2.2 Expert / qualified person

An expert / qualified person is a person who, based on his/her professional education and experience, has profound knowledge in the field of construction equipment and the machine in question in particular.

This person is acquainted with the applicable governmental industrial safety regulations, accident prevention instructions, guidelines and generally acknowledged technical rules and regulations (standards, directives, technical rules of other member states of the European Union or other contractual states concerning the agreement about the European Economic Area) in as far as is necessary to be able to judge the safe condition of this machine.

3.2.3 Driver / operator

This machine must only be operated by trained, instructed persons entrusted by the operating company aged 18 or more.

Observe your local laws and regulations.

Rights, obligations and rules of conduct for driver or operator:

The driver or operator must:

- be instructed about his rights and obligations,
- wear protective equipment as appropriate for the application,
- have read and understood the operating instructions,
- have made himself familiar with the operation of the machine,
- be physically and psychologically able to drive and operate the machine.

Persons under the influence of alcohol, medication or drugs are not allowed to operate, service or repair the machine.

Maintenance and repair work requires specific knowledge and must therefore only be performed by trained specialists.

3.3 Fundamentals for safe operation

3.3.1 Remaining dangers, remaining risks

Despite careful work and compliance with standards and regulations it cannot be ruled out that further dangers may arise when working with and handling the machine.

Both the machine as well as all other system components comply with the currently valid safety regulations. Nevertheless, remaining risks cannot be ruled out completely, even when using the machine for the purpose it is intended for and following all information given in the operating instructions.

A remaining risk can also not be excluded beyond the actual danger zone of the machine. Persons remaining in this area must pay particular attention to the machine, so that they can react immediately in case of a possible malfunction, an incident or failure etc.

All persons remaining in the area of the machine must be informed about the dangers that arise from the operation of the machine.

3.3.2 Regular safety inspections

Have the machine inspected by an expert / qualified person as required for the conditions the machine is working under, but at least once every year.

3.3.3 Modifications and alterations to the machine

Unauthorized changes to the machine are prohibited for safety reasons.

Original parts and accessories have been specially designed for this machine.

We wish to make explicitly clear that we have not tested or approved any parts or accessories not supplied by us.

The installation and/or use of such products may have an adverse effect on the active and/or passive safety.

3.3.4 Damage, defects, misuse of safety devices

Machines which are not safe to operate or in traffic must be immediately taken out of service and shall not be used, until these deficiencies have been properly rectified.

Safety installations and switches must neither be removed nor must they be made ineffective.

3.3.5 Roll Over Protective Structure (ROPS)

On machines with cab the ROPS is an integral part of the cab.

The frame of the machine must not be warped, bent or cracked in the area of the ROPS fastening.

The ROPS must not show any rust, damage, hairline cracks or open fractures.

The real machine weight must never exceed the testing weight for the ROPS.

No accessories may be welded or bolted on and no additional holes must be drilled without the consent of the manufacturer, since this will impair the strength of the unit.

The ROPS must therefore also not be straightened or repaired if it is damaged.

A defect ROPS must generally be replaced with an original spare part in close coordination with the manufacturer.

3.4 Handling fuels and lubricants

3.4.1 Preliminary remarks

The operating company must ensure that all professional users have read and follow the corresponding safety data sheets for the individual fuels and lubricants.

Safety data sheets provide valuable information about the following characteristics:

- name of substance
- possible dangers
- composition / information on constituents
- first-aid measures
- fire fighting measures
- measures in case of accidental release
- handling and storage
- limitation and monitoring of exposure / personal protective equipment
- physical and chemical properties
- stability and reactivity
- toxicological data
- environmental data
- notes on waste disposal
- information on transport
- legislation
- other data

3.4.2 Safety regulations and environmental protection regulations for handling diesel fuel

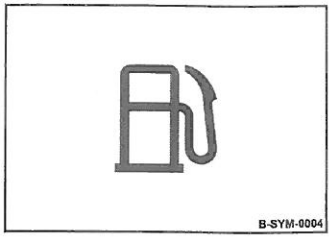


Fig. 4

WARNING!

Danger of burning by ignited diesel fuel!

- Do not allow diesel fuel to come into contact with hot components.
- Smoking and open fire is prohibited!
- Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!

Health hazard caused by contact with diesel fuel!

- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any fuel fumes.
- Avoid contact.

CAUTION!

Danger of slipping on spilled diesel fuel!

- Immediately bind spilled diesel fuel with an oil-binding agent.

ENVIRONMENT!
Diesel fuel is an environmentally hazardous substance!
- Always keep diesel fuel in proper containers.
- Immediately bind spilled diesel fuel with an oil-binding agent and dispose of properly.
- Dispose of diesel fuel and fuel filters according to regulations.

3.4.3 Safety regulations and environmental protection regulations for handling AdBlue®/DEF

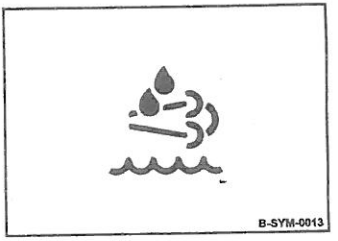


Fig. 5

CAUTION!
Health hazard caused by ammonia vapours!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale ammonia vapours.
- Avoid contact and consumption.

AdBlue®/DEF has not been classified as environmentally harmful.

3.4.4 Safety regulations and environmental protection regulations for handling oil

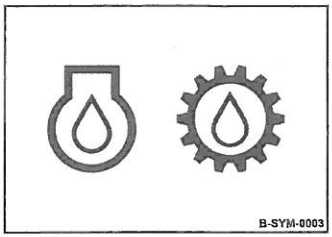


Fig. 6

WARNING!
Danger of burning by ignited oil!
- Do not allow oil to come into contact with hot components.
- Smoking and open fire is prohibited!
- Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!
Health hazard caused by contact with oil!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any oil vapours.
- Avoid contact.

CAUTION!
Danger of slipping on spilled oil!
- Immediately bind spilled oil with an oil-binding agent.

ENVIRONMENT!
Oil is an environmentally hazardous substance!
- Always keep oil in proper containers.

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- Immediately bind spilled oil with an oil-binding agent.
- Dispose of oil and oil filter according to regulations.

3.4.5 Safety regulations and environmental protection regulations for handling hydraulic oil

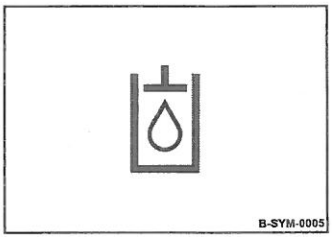

Fig. 7

WARNING!
Danger of injury caused by escaping pressure fluid!
- Always depressurize the hydraulic system before starting work in the hydraulic system.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Should pressure fluid penetrate the skin, immediate medical help is required.

WARNING!
Danger of burning by ignited hydraulic oil!
- Do not allow hydraulic oil to come into contact with hot components.
- Smoking and open fire is prohibited!
- Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!
Health hazard caused by contact with hydraulic oil!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any oil vapours.
- Avoid contact.

CAUTION!
Danger of slipping on spilled oil!
- Immediately bind spilled oil with an oil-binding agent.

ENVIRONMENT!
Oil is an environmentally hazardous substance!
- Always keep oil in proper containers.
- Immediately bind spilled oil with an oil-binding agent.
- Dispose of oil and oil filter according to regulations.

4.6 Safety regulations and environmental protection regulations for handling coolants

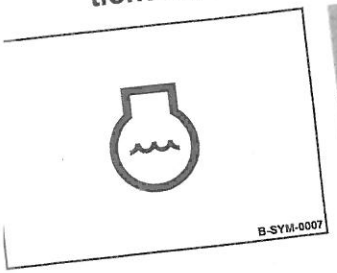

Fig. 8

WARNING!
Danger of scalding by hot fluid!
- Open the compensation tank only when the engine is cold.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

CAUTION!
Health hazard caused by contact with coolant and coolant additives!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any fumes.
- Avoid contact.

CAUTION!
Danger of slipping on spilled coolant!
- Immediately bind spilled coolant with an oil-binding agent.

ENVIRONMENT!
Coolant is an environmentally hazardous substance!
- Always keep coolant and coolant additives in proper containers.

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- Immediately bind spilled coolant with an oil-binding agent and dispose of it according to regulations.
- Dispose of coolant according to regulations.

3.4.7 Safety regulations and environmental protection regulations for handling battery acid

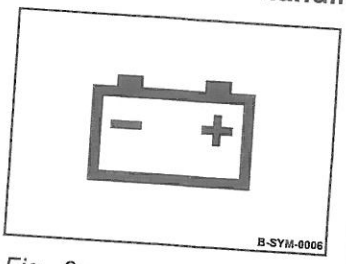


Fig. 9:

WARNING!
Danger of cauterization with acid!
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).
- Do not allow clothes, skin or eyes to come into contact with acid.
- Rinse off spilled battery acid immediately with lots of water.

Rinse acid off clothes, skin or eyes immediately with lots of clean water.

Immediately call for medical advice in case of cauterization.

WARNING!
Danger of injury caused by exploding gas mixture!
- Remove the plugs before starting to recharge the battery.
- Ensure adequate ventilation.
- Smoking and open fire is prohibited!
- Do not lay any tools or other metal objects on the battery.
- Do not wear jewellery (watch, bracelets, etc.) when working on the battery.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

ENVIRONMENT!
Battery acid is an environmentally hazardous substance!
– Dispose of battery and battery acid according to regulations.

3.5 Load/transport the machine

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradability of the machine.

Make sure that persons are not endangered by the machine tipping or sliding off. The instructing person must stand within the view of the operator, but outside the danger area.

Secure the machine with the articulation lock after driving it on the transport vehicle or before loading it with a crane.

Do not use damaged or in any other way impaired lashing points.

Always use appropriate lifting and lashing means on the lifting and lashing points.

Use lifting and lashing gear only in the prescribed direction of load application.

Lifting tackle must not be damaged by machine components.

Secure the machine on the transport vehicle against rolling, slipping and turning over.

Loads must only be attached and hoisted by an expert / capable person.

Use only lifting gear and lifting tackle with sufficient load bearing capacity for the weight to be loaded.

Fasten the lifting gear only at the specified lifting points.

Danger to the life of persons if they step or stand under a suspended load.

When lifting the machine avoid uncontrolled movements of the load. If necessary hold the load with guide ropes.

After the transport loosen the articulation lock again, as otherwise the machine would not be steerable.

3.6 Start-up procedure

3.6.1 Prior to starting up

Use only machines which are serviced at regular intervals.

Become acquainted with the equipment, the indicators and control elements, the working principle of the machine and the working area.

Use your personal protective equipment (hard hat, safety boots, if necessary also goggles and ear protection).

Do not take any loose objects with you or fasten them to the machine.

Before mounting the machine check whether:

- persons or obstructions are beside or under the machine,
- the machine is free of oily and combustible materials,
- all access steps, grips and platforms are free of obstacles, grease, oils, fuel, dirt, snow and ice,
- all safety elements are in place,
- all maintenance flaps and doors are closed and locked.

Use only the intended access steps and grips to mount the machine.

Before start up, carry out all required visual inspections and function tests.

If the following tests reveal damages or other faults, the machine must not be operated, until these deficiencies have been corrected.

Do not operate the machine with defective indicators and control elements.

3.6.2 Starting the engine

The machine must only be started and operated from the driver's seat.

Before starting and moving the machine, make sure that there is nobody in the danger zone.

To start, set all control levers to "neutral position".

Do not use any starting aids like start pilot or ether.

The machine must not be operated with damaged, missing or non-functional safety installations.

After starting check all display instruments.

Do not inhale exhaust fumes, because they contain toxic substances, which could cause damage to health, unconsciousness or even death.

For operation in closed or partly closed rooms ensure adequate ventilation.

3.6.3 Starting the engine with jump leads

Connect positive with positive and negative with negative (ground cable) – always connect the ground strap last and disconnect it first! A wrong connection will cause severe damage in the electric system.

Do not start the engine by shorting the electric terminals on the starter motor, because the machine may start to drive immediately.

3.7 Driving the machine; working operation

3.7.1 Persons in the danger area

Before taking up work, also after breaks, you should always convince yourself that the danger zone is free of persons or obstructions, especially when driving in reverse.

Give warning signals, if necessary. Stop work immediately if persons remain in the danger zone, despite the warning.

Do not step or stand in the articulation area of the machine when the engine is running.

3.7.2 Driving the machine

Always wear the seat belt when driving.

Do not drive on bases with insufficient load bearing capacity.

Do not drive on ice and snow.

If the machine has touched high-voltage power lines:

- do not leave the driver's stand,
- warn others from coming close to or touching the machine,
- if possible, drive the machine out of the danger zone,
- have the power switched off.

Operate the machine only from the driver's stand.

Keep the cabin doors closed.

Do not adjust the driver's seat while driving.

Do not climb onto or off the machine while the machine is driving.

Do not use the machine to transport persons.

In case of unusual noises and development of smoke perform trouble shooting to determine the cause and have the fault corrected.

Match the speed to the working conditions.

Do not make extreme steering movements when driving with high speed, danger of tipping over!

Always give way to loaded transport vehicles.

Switch the lights on if visibility is poor.

Always keep a safe distance to excavation pit borders, embankments and edges.

Refrain from any work that could adversely affect the stability of the machine.

Always keep a sufficient distance when passing through subways, under bridges, tunnels, electric power lines etc.

3.7.3 Driving up and down slopes

Do not drive on gradients or slopes exceeding the maximum gradeability of the machine
↳ *Chapter 2 „Technical data" on page 15.*

Drive extremely carefully on gradients and always directly up or down the slope.

Soil conditions and weather influences impair the gradeability of the machine.

Wet and loose soil considerably reduces traction of the machine on inclinations and slopes. Increased danger of accident!

3.7.4 Cross-slope

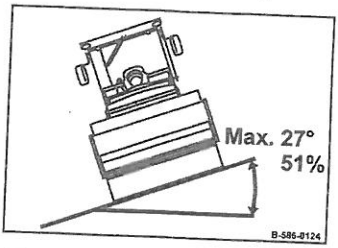


Fig. 10: Maximum cross-slope

The tipping angle was measured statically on level, hard ground with the machine stopped and without steering.

The max. permissible inclination of the machine may be limited by the max. permissible slanted position of the engine.

The specified angle must not be exceeded.

With loose soil, acceleration/deceleration, running vibration, steering or attached accessories the tipping angle may be considerably lower.

Driving across slopes should therefore be strictly avoided, because of the high risk of tipping over and the related risk of severe or even fatal accidents.

3.7.5 Working with vibration

When compacting with vibration you must always check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power). If necessary stop compacting with vibration.

Do not activate the vibration on hard (frozen, concrete) ground. Components may get damaged.

3.7.6 Parking the machine

Park the machine on horizontal, level, firm ground.

Before leaving the machine:

- shift all control levers to "Neutral position", "Off" or "0",
- apply the parking brake,

- shut down the engine, pull off the ignition key,
- pull off the main battery switch,
- secure the machine against unauthorized use.

Do not jump off the machine, but use hand grips and access steps.

Mark machines, which could be in the way, with a clearly visible sign.

When parking on ascents or descents use appropriate means to secure the machine against rolling.

3.8 Refuelling

Do not inhale any fuel fumes.

Refuel only with the engine shut down.

Do not refuel in closed rooms.

No open fire, do not smoke.

Static charges may be generated in the fuel as it passes through the filling system. The discharge of these charges in the presence of combustible vapours can cause fire or an explosion.

Ultra-low sulphur diesel fuel poses a higher risk of combustion caused by the static charging than diesel fuel with a higher sulphur content.

You should therefore always make sure that the filling system is properly grounded and that there is equipotential bonding to the machine. If necessary use a connecting cable between filling system and vehicle ground.

Monitor the entire refuelling process.

Do not spill any fuel. Collect leaking fuel, do not let it seep into the ground.

Wipe off spilled fuel. Keep dirt and water away from the fuel.

A leaking fuel tank can cause an explosion. Ensure tight fit of the fuel tank cover, if necessary replace immediately.

3.9 Topping up AdBlue®/DEF

If AdBlue®/DEF heats up to a temperature in excess of 50 °C (122 °F) over a longer period of time, e.g. caused by direct insolation, AdBlue®/DEF may disintegrate. This results in ammonia vapours.

If you open the AdBlue®/DEF tank lid at high temperatures, ammonia vapours may escape.

Ammonia vapours have a pungent smell and irritate, above all, skin, mucous membranes and eyes. This can cause burning sensations in eyes, nose and throat and also cause coughing and watering eyes.

Do not inhale escaping ammonia vapours.

3.10 Emergency procedures

3.10.1 Actuating the emergency stop switch

In events of emergency and in case of danger actuate the emergency stop switch immediately.

The machine is braked immediately, the engine is shut down.

Restart the machine only after the danger that caused the actuation of the emergency stop switch has been eliminated.

In case of frequent use the wear on the multi-discs brakes will be very high, you should therefore never use the emergency stop switch as a service brake.

3.10.2 Disconnecting the battery

In events of emergency, e.g. in case of a cable fire, disconnect the battery from the vehicle network.

Pull out the main battery switch or lift off the battery pole to do so.

3.10.3 Towing the machine

Tow the machine only in a case of emergency or to avoid an accident.

Before releasing the parking brake apply suitable measures to secure the machine against unintended rolling.

Use a tractor vehicle with sufficient traction and braking power for the unbraked towed load.

If no tow bar is used, towing is only permitted uphill.

Before starting towing operations make sure that the fastening means are able to withstand the load and are fastened at the points provided for this purpose.

Before removing the towing facility apply appropriate measures to secure the machine against unintended rolling.

3.11 Maintenance work

3.11.1 Preliminary remarks

Adhere to the specified operating, maintenance and repair measures.

The machine must only be serviced by qualified personnel authorised by the operating company.

Keep unauthorised persons away from the machine.

Perform maintenance work only with the engine shut down.

Make sure that the engine cannot be accidentally started during maintenance work.

3.11.2 Work on hydraulic lines

Relieve hydraulic pressures before working on hydraulic lines. Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury. Immediately call for medical advice when injured by hydraulic oil.

Do not step in front of or behind the machine when performing adjustment work in the hydraulic system.

Do not change the setting of pressure relief valves.

Drain the hydraulic oil at operating temperature – danger of scalding!

Any hydraulic oil must be collected and disposed of in an environmentally friendly way.

Always collect and dispose of hydraulic oils separately.

Do not start the engine after draining the hydraulic oil. Once all work is completed (with the system still depressurized!) check all connections and fittings for leaks.

Hydraulic hoses must be visually inspected at regular intervals.

Do not mix up hoses by mistake.

Only genuine BOMAG replacement hydraulic hoses ensure that the correct hose type (pressure range) is used at the right location.

3.11.3 Working on the engine

Do not work on the fuel system while the engine is running - danger to life due to high pressures!

Wait until the engine has stopped, then wait approx. another 15 minutes.

Keep out of the danger zone during the initial test run.

In case of leaks return to the workshop immediately.

Drain the engine oil at operating temperature – danger of scalding!

Wipe off spilled oil, collect leaking oil and dispose of it in an environmentally friendly way.

Store used filters and other oil contaminated materials in a separate, specially marked container and dispose of them in an environmentally friendly way.

The settings for idle speed and highest speed must not be changed, since this would affect the exhaust gas values and cause damage to engine and power train.

Engine and exhaust system work at high temperatures. Keep combustible materials away and do not touch any hot surfaces.

Check and change coolant only when the engine is cold. Collect coolant and dispose of it in an environmentally friendly way.

3.11.4 Exhaust gas aftertreatment system, regeneration at standstill

During regeneration at standstill the exhaust gas reaches very high temperatures and the exhaust gas quantity increases - fire hazard!

When performing regeneration at standstill park the machine outdoors at a safe distance from any combustible or explosive materials.

Components of the exhaust gas aftertreatment system get very hot.

Do not touch hot components or exhaust gases.

Should there be an endangerment caused by high exhaust gas temperatures and quantities, the operator needs to suppress the regeneration at standstill.

3.11.5 Maintenance work on electric components and battery

Before starting to work on electric parts of the machine disconnect the battery and cover it with insulating material.

Do not use fuses with higher ampere ratings and do not bridge fuses.

When working on the battery, smoking or open fire is prohibited!

Do not lay any tools or other metal objects on the battery.

Do not wear jewellery (watch, bracelets, etc.) when working on the battery.

The connection cables of the battery must not touch or rub against machine parts.

3.11.6 Working on the air conditioning

Faults on the air conditioning should only be remedied by authorized service personnel.

Do not perform welding work in the vicinity of the air conditioning. Danger of explosion!

Do not release refrigerant into the atmosphere, but dispose of it in line with environmental regulations.

3.11.7 Working on wheels and tyres

Explosion-like bursting of tyres or parts of tyres and rims can cause most severe or even fatal injuries.

Do not drive with damaged wheels or tyres.

Install the tyres only if you are sufficiently experienced and with the right tools at hand. If necessary have the tyres assembled in a qualified workshop.

Always ensure the correct tyre pressure and do not exceed the specified maximum pressure.

When checking the tyre pressure stand in the extended path of the tyre track. Use an at least 6 meter air hose, so that you can keep a safe distance to the tyre.

Always consider the heavy weight of a wheel during disassembly and assembly. Use a crane or forklift truck equipped with suitable claws or a belt-type hoisting device.

3.11.8 Cleaning work

Do not perform cleaning work while the motor is running.

Allow the engine to cool down before starting cleaning work on engine and exhaust system.

Never use gasoline or other easily inflammable substances for cleaning.

When cleaning with a high pressure cleaner, do not subject electrical parts and insulation material to the direct jet of water, or cover them beforehand.

Do not guide the water jet into the exhaust pipe and into the air filter.

3.11.9 After maintenance work

Reassemble all guards and protective devices.

Close all maintenance flaps and maintenance doors again.

3.12 Repair

Identify a defective machine with a warning sign.

Only operate the machine after it has been repaired.

Repairs must only be performed by an expert/ qualified person.

When replacing safety relevant components, only original spare parts must be used.

Signage

Keep stickers and signage in good and legible condition and comply with their meaning.

Replace damaged and illegible stickers or signage immediately.

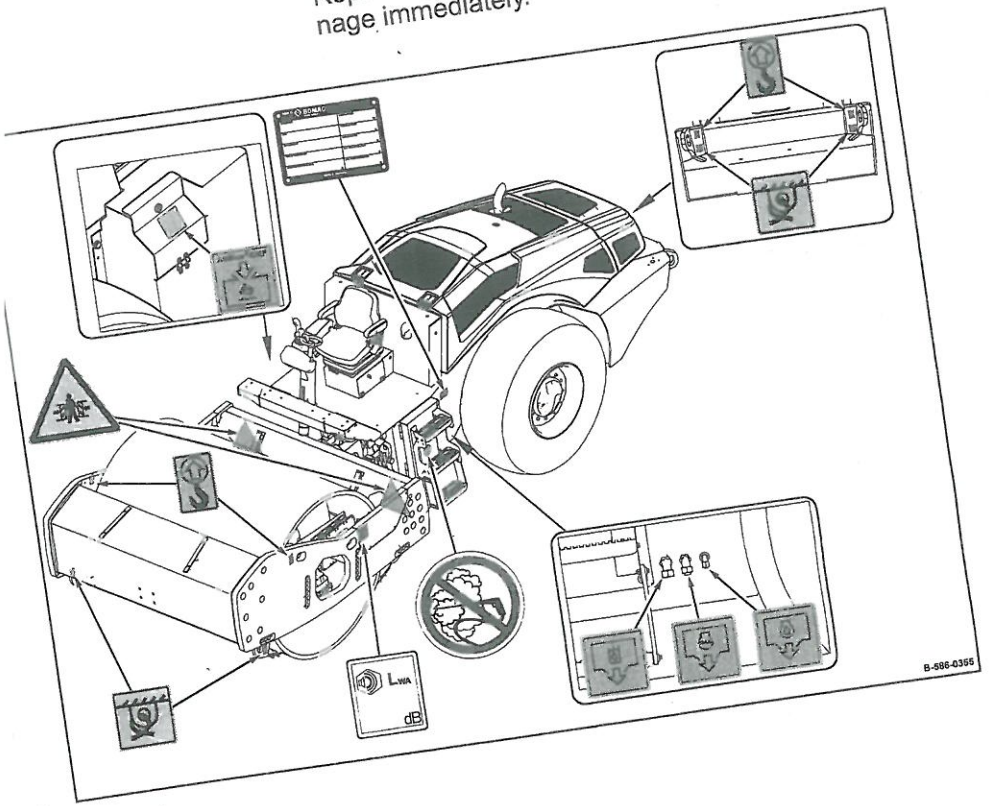


Fig. 11

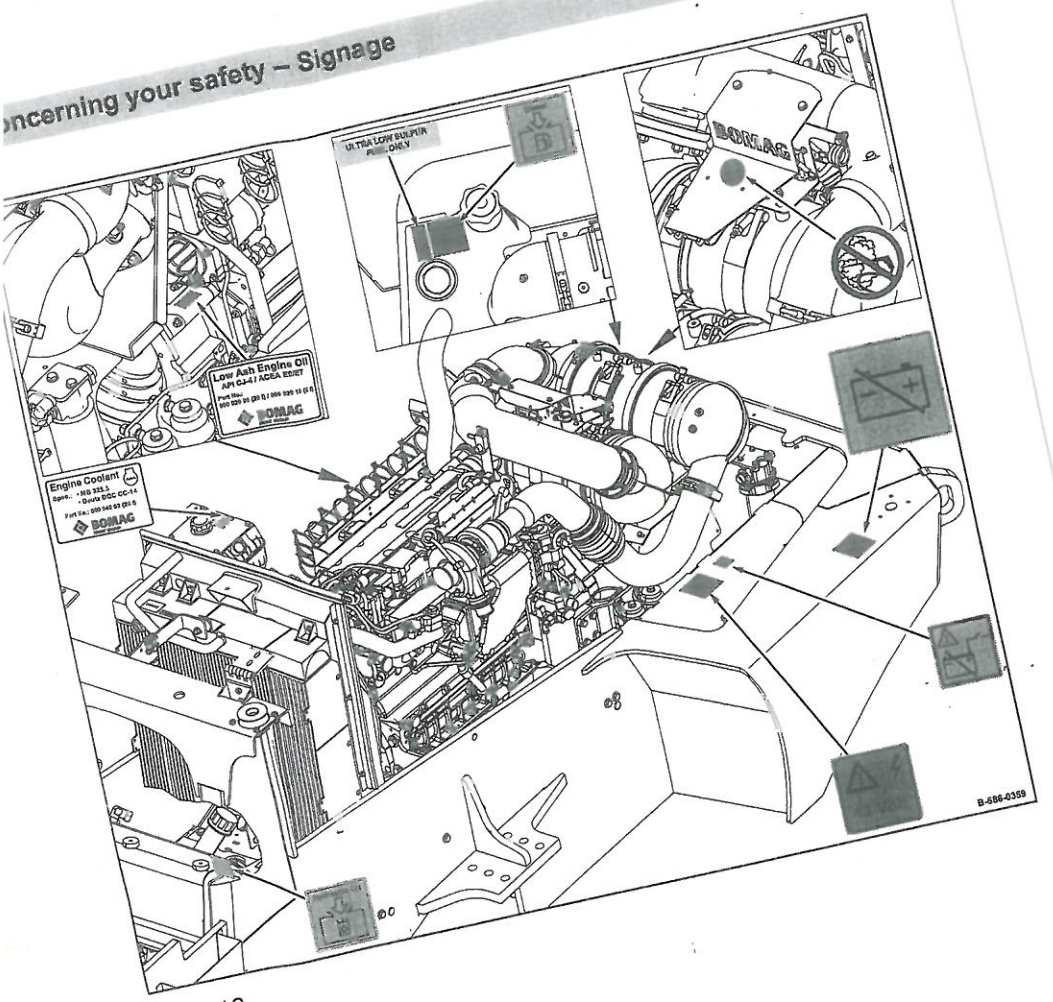

ULTRA LOW SULPHUR
FUEL ONLY
BOMAG
Low Ash Engine Oil
API CJ-4 / ACEA E6/E7
BOMAG
Engine Coolant
BOMAG
B-686-0359

Fig. 12

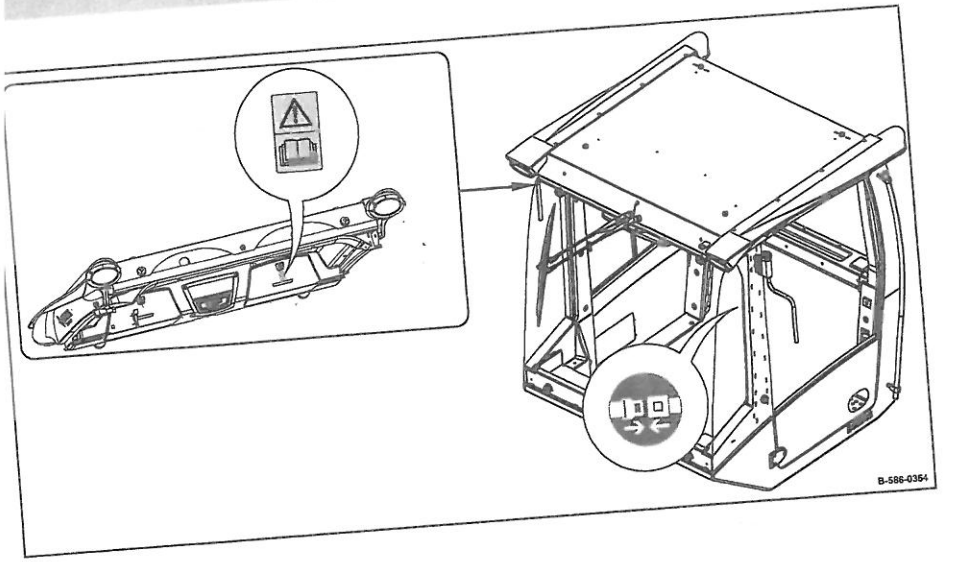
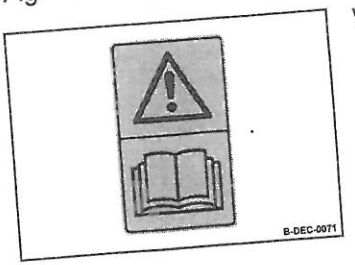


Fig. 13

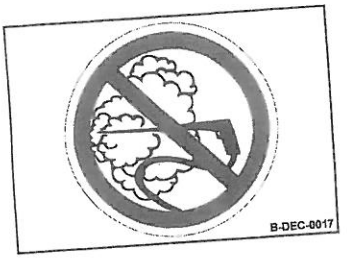
Warning sticker - Danger of crushing

Fig. 14



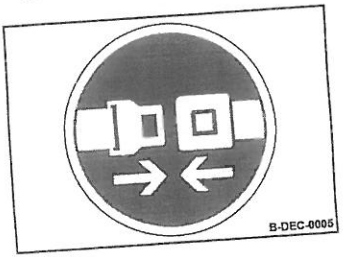
Warning sticker - Follow operating instructions

Fig. 15



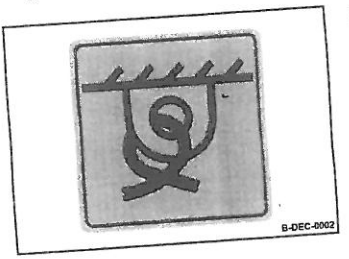
Prohibition sticker - High pressure cleaning

Fig. 16



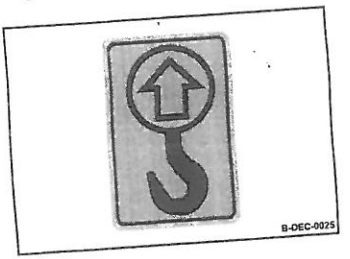
Instruction sticker - Always wear your seat belt

Fig. 17



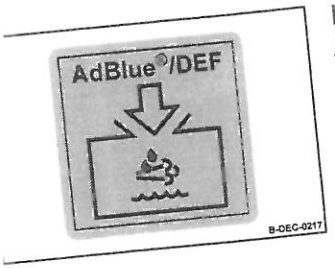
Information sticker - Lashing point

Fig. 18



Information sticker - Lifting point

Fig. 19

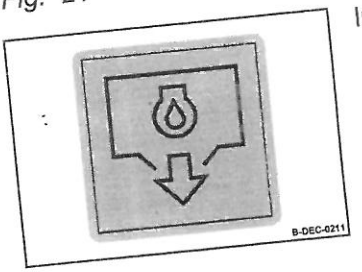


Information sticker - Filler opening for AdBlue®/DEF

Fig. 20

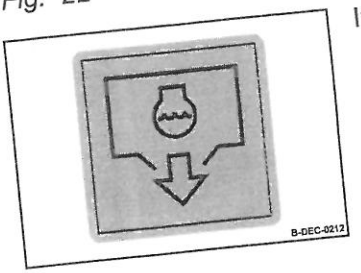
Information sticker - Minimum topping up quantity AdBlue®/DEF

Fig. 21



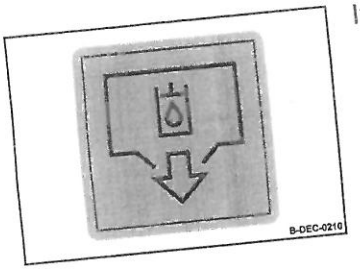
Information sticker - Engine oil drain

Fig. 22



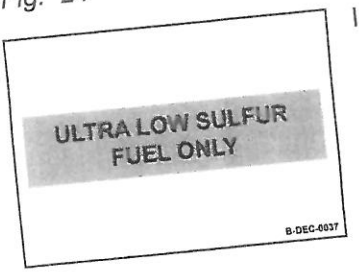
Information sticker - Coolant drain

Fig. 23



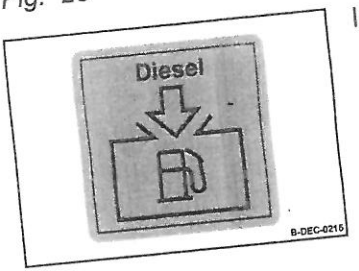
Information sticker - Hydraulic oil drain

Fig. 24



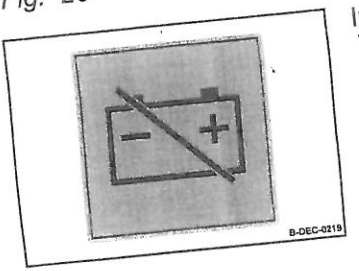
Information sticker - Ultra-low sulphur fuel

Fig. 25



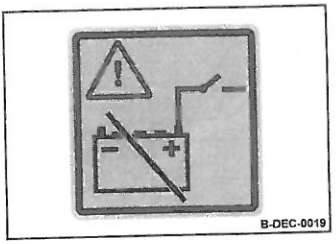
Information sticker - Filler opening for diesel

Fig. 26



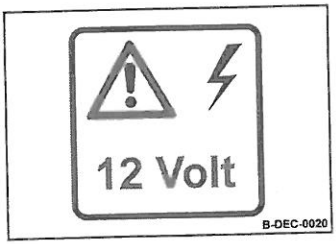
Information sticker - Disconnecting the battery

Fig. 27



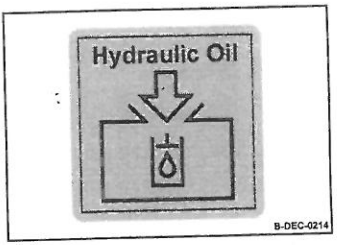
Information sticker - Main battery switch plus side

Fig. 28



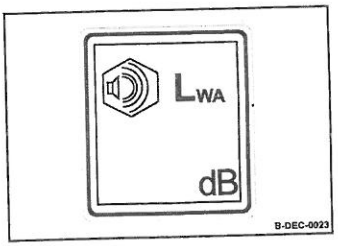
Information sticker - Vehicle voltage 12 V

Fig. 29



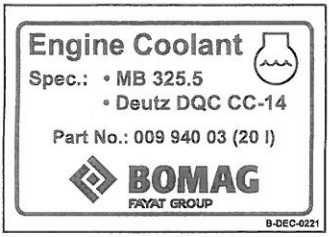
Information sticker - Filler opening for hydraulic oil

Fig. 30



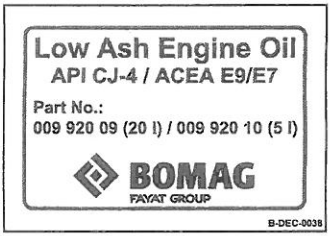
Information sticker - Guaranteed sound capacity level

Fig. 31



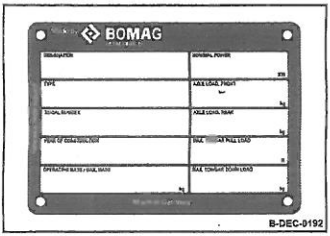
Information sticker - Coolant

Fig. 32



Information sticker - Low ash engine oil

Fig. 33



Machine type plate (example)

Fig. 34

4.1 Driver's stand

4.1.1 Instrument cluster

Overview

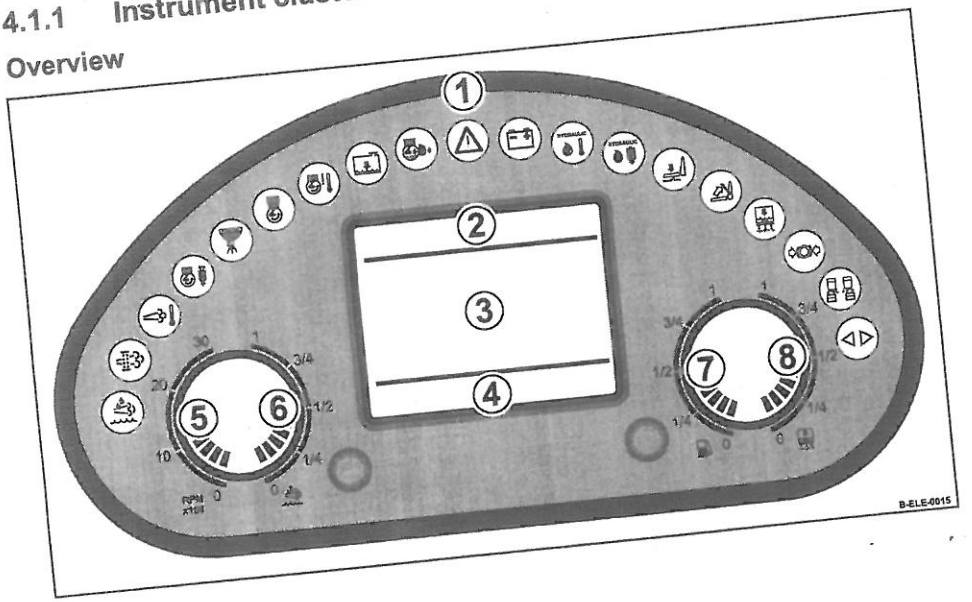


Fig. 35

1 Control and warning lamps
2 INFO 3 display field
3 INFO 2 display field
4 INFO 1 display field
5 Engine rpm-meter
6 AdBlue®/DEF level gauge
7 Fuel level gauge
8 not used

Control and warning lamps

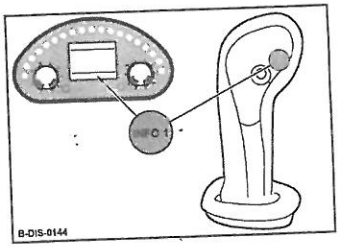
	Designation	Note
	Warning lamp AdBlue®/DEF	Lights up if the AdBlue®/DEF filling level is low, if the AdBlue®/DEF quality is insufficient or if there is a fault in the exhaust gas after-treatment system. Flashes in case of an extremely low AdBlue®/DEF filling level. Fill up AdBlue®/DEF or have the exhaust gas after-treatment system checked immediately.
	Regeneration warning lamp	Flashes when regeneration at standstill is required. ■ Carry out regeneration at standstill *Chapter 8.8.1 „Running regeneration at standstill" on page 185.* Lights up during regeneration at standstill. If regeneration at standstill is not performed, the soot load in the DPF will increase. The engine power is reduced. The DPF is overloaded. ■ Regeneration at standstill must be triggered by authorized Service Personnel, or regeneration of the DPF is no longer possible.
	Exhaust gas temperature warning lamp	Lights in case of an increased exhaust gas temperature during regeneration at standstill.
	Air filter warning lamp	Lights up if the air filter is blocked. Clean or replace the air filter.
	Water in fuel warning lamp	Lights up when the water content in the fuel pre-cleaner reaches the sensor contacts, the warning buzzer sounds. Clean the water separator.

Indicators and control elements – Driver's stand

	Designation	Note
	Pre-heating control lamp	Lights up during pre-heating.
	Coolant temperature warning lamp	Lights up when the engine overheats. The engine power is reduced after a short while. Run the engine with idle speed or, if necessary, shut it down and clean the radiator. If necessary, repair the engine.
	Coolant level warning lamp	Lights up if the coolant level is too low. The engine is shut down after a short while. Check coolant level, check cooling system for leaks, repair if necessary.
	Engine oil pressure warning lamp	Lights up if the engine oil pressure is too low. The engine is shut down after a short while. Check the engine oil level; if necessary, repair the engine.
	Central warning lamp	Flashes in case of system faults, warnings and for information.
	Charge control lamp	Lights up if the battery is not being charged. Check the V-belt drive, if necessary repair the generator.
	Hydraulic oil temperature warning lamp	Lights up if the hydraulic oil temperature is too high. The engine power is reduced after a short while. Run the engine with idle speed or shut it down if necessary and clean the radiator.
	Hydraulic oil filter warning lamp	Lights up, if the hydraulic oil filter is blocked. Warning buzzer sounds. The engine is shut down after 2 minutes. Check the hydraulic system and replace the hydraulic oil filter.

	Designation	Note
	Driver's seat warning lamp	Lights up when the driver's seat is not occupied. If the machine is travelling, the warning buzzer will sound and the machine is decelerated after 3 seconds. To continue driving, occupy the driver's seat and shift the travel lever again to the desired travel direction through the parking brake position.
	Parking brake warning lamp	Lights up when the parking brake is applied.
	Indicator control light	

INFO 1 display field

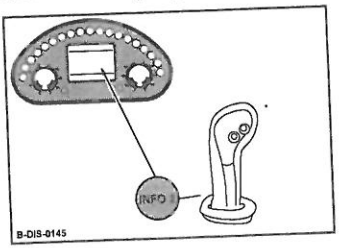


Each actuation of the button switches between:

- Operating hours
- Coolant temperature
- Battery voltage
- Vibration frequency *(optional equipment)*

Fig. 36

INFO 2 display field



Each actuation of the button switches between:

- Travel speed
- ECONOMIZER *(optional equipment)*
- E_{VIB} value *(optional equipment)*
- Travel speed and E_{VIB} value *(optional equipment)*

Fig. 37

INFO 3 display field

	Designation	Note
	Immobilizer control lamp	Lights up when the electronic immobilizer is active.
	ECOSTOP control lamp	Lights up after the engine has been shut down by the ECOSTOP function.

4.1.2 Operating console

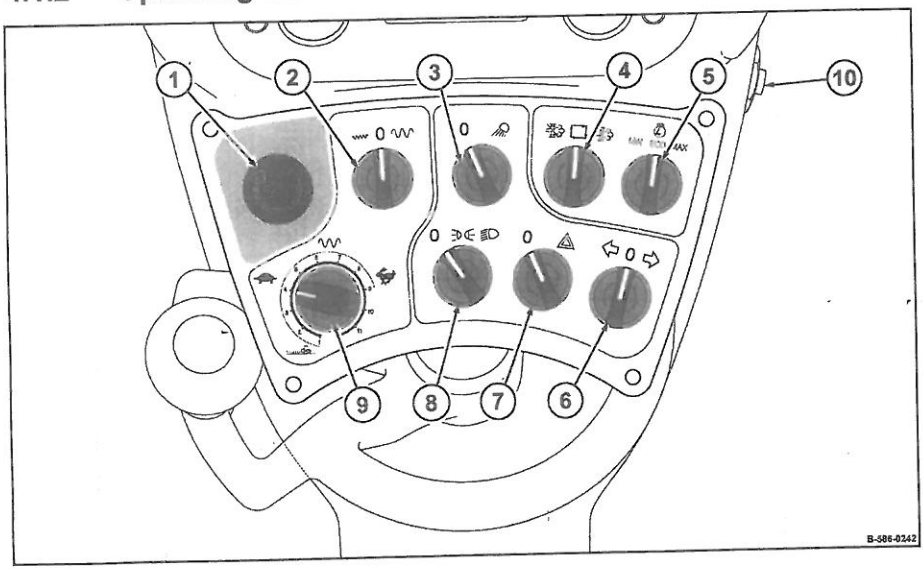


Fig. 38

1 Emergency stop switch
2 Rotary switch for amplitude pre-selection
3 Rotary switch for working lights *(optional equipment)*
4 Rotary button for regeneration
5 Rotary switch for engine speed
6 Rotary switch for direction indicators *(optional equipment)*
7 Rotary switch for hazard light system *(optional equipment)*

8 Rotary switch for lighting *(optional equipment)*
9 Rotary switch for travel ranges
10 Starter switch

4.1.2.1 Emergency stop switch

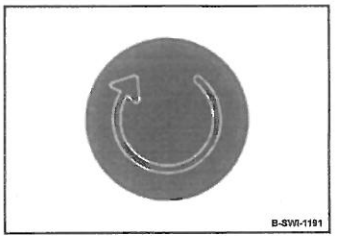
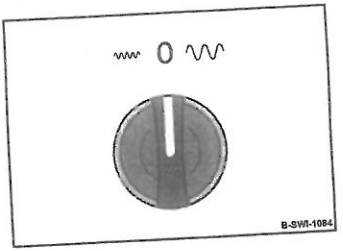


Fig. 39

press	In events of emergency and in case of danger actuate the emergency stop switch immediately by pressing it fully down. It automatically locks in end position. The machine will be braked immediately. The engine is shut down.
switch off/ unlock	Turn the Emergency Stop switch clockwise and let it go.

NOTICE!
In case of frequent use the wear on the multi-discs brakes will be very high.
– Do not use the emergency stop switch as service brake!

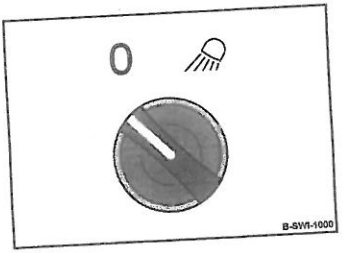
4.1.2.2 Rotary switch for amplitude pre-selection



Position "Left"	low amplitude, high frequency
Position "Middle"	Vibration off
Position "Right"	high amplitude, low frequency

Fig. 40

4.1.2.3 Rotary switch for working lights

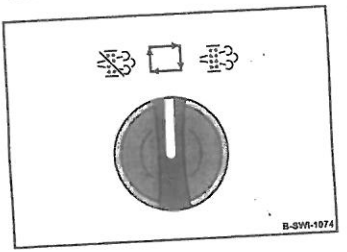


Position "Left"	Working lights off
Position "Right"	Working lights on

Optional equipment

Fig. 41

4.1.2.4 Rotary button for regeneration



actuate to the left	To abort regeneration at standstill
actuate to the right	To activate regeneration at standstill

The button is only active when the regeneration warning lamp is flashing or is on.

Description of regeneration at standstill: ↳ Chapter 8.8.1 „Running regeneration at standstill" on page 185.

Fig. 42

4.1.2.5 Rotary switch for engine speed

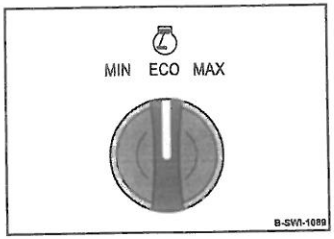


Fig. 43

Position "Left"	Idle speed position (MIN)
Position "Middle"	ECO -mode The engine speed automatically adapts to the power requirements. This enables economical operation.
Position "Right"	Full load position (MAX)

4.1.2.6 Rotary switch for direction indicators

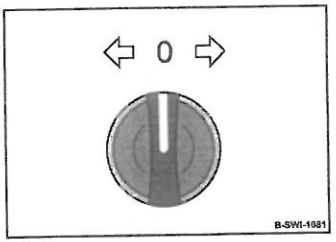


Fig. 44

Position "Middle"	Direction indicators off
Position "left or right"	Front and rear direction indicators on the corresponding side are flashing

Optional equipment

4.1.2.7 Rotary switch for hazard light system

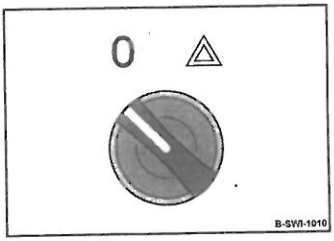


Fig. 45

Position "Left"	Hazard light system off
Position "Right"	Hazard light system on

Optional equipment

4.1.2.8 Rotary switch for lighting

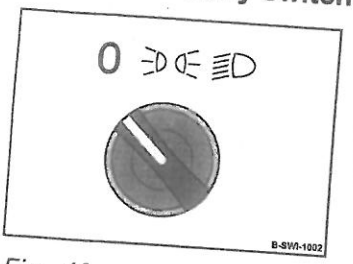


Fig. 46

Position "Left"	Light off
Position "Middle"	Side light on
Position "Right"	Travel light on

Optional equipment

4.1.2.9 Rotary switch for travel ranges

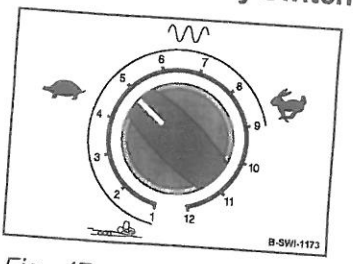


Fig. 47

Travel range "1"	lowest travel speed
Travel range "12"	maximum travel speed

Vibration is automatically switched off at travel speed range1 and from travel speed range 10.

4.1.2.10 Starter switch

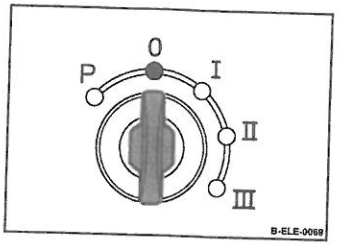


Fig. 48

Position "P"/"0"	Switch the ignition off Ignition key can be removed
Position "I"/"II"	Ignition on All control and warning lights light up for a moment (test function). At low temperatures the pre-heating control light lights up.
Position "III"	Turn further against spring pressure, the engine starts Turn the ignition key back to position "I" when the engine starts.

The starter switch is designed with a re-start lock. The ignition key must first be turned back to position "0" before a new starting attempt can be made.

4.1.3 Travel lever

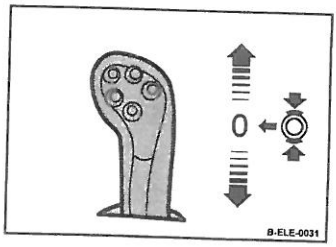


Fig. 49

Shift forward	Forward travel
Pull back	Backward travel
Position "Middle"	Service brake position
Position "middle right"	Parking brake position

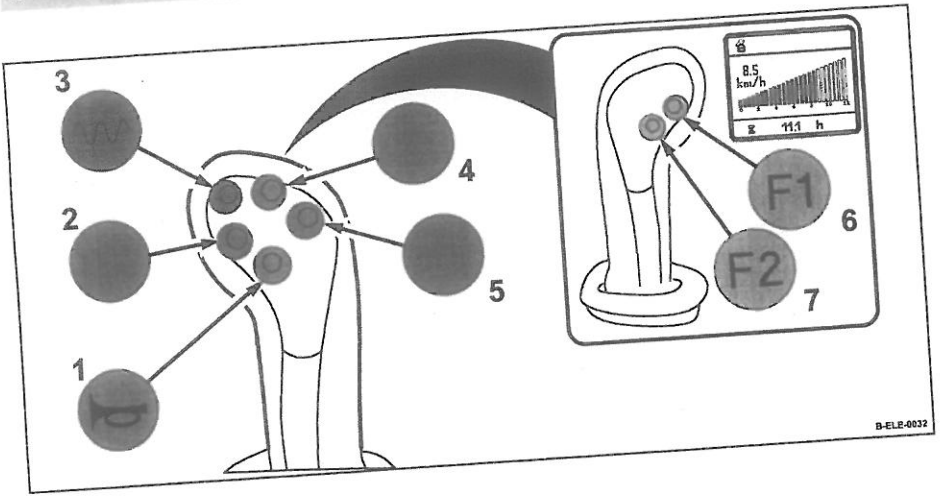


Fig. 50

Pos.	Designation	Note
1	Warning horn	
2	not used	
3	Vibration	Vibration on/off
4	not used	
5	not used	
6	Function key *[F1]*	Switch over the INFO 1 display field
7	Function key *[F2]*	Switch over the INFO 2 display field

4.2 Cabin

4.2.1 Control console cabin

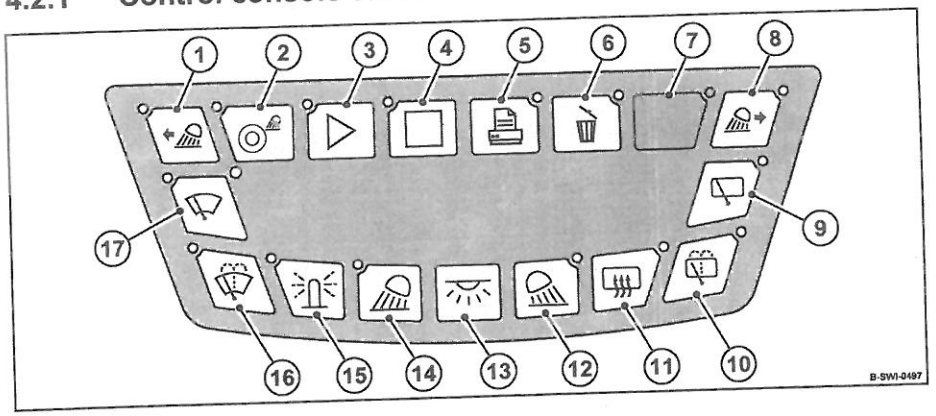


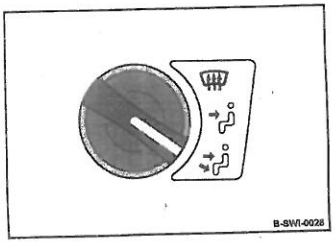
Fig. 51

Pos.	Designation	Note
1	not used	
2	not used	
3	Start measurement	*only for Terrameter with printer* LED lights up: Measurement possible. LED flashing: Measurement active.
4	Stop measurement	*only for Terrameter with printer* LED lights up: E_{VIB}-value has not increased by more than 10% since the last pass.
5	Print measuring report	*only for Terrameter with printer* LED lights up: The measuring report can be printed out.
6	Delete measurement	*only for Terrameter with printer*
7	not used	

Pos.	Designation	Note
8	not used	
9	Rear windscreen wiper	Interval/on/off
10	Washer nozzles for rear windscreen	
11	Rear windscreen heating	The rear windscreen heating is switched off after three minutes.
12	Rear working lights	
13	Cabin light	
14	Front working lights	
15	Flashing beacon	
16	Washer nozzles for front windscreen	
17	Front windscreen wiper	Interval/on/off

4.2.2 Heating / air conditioning

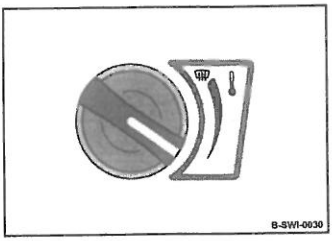
4.2.2.1 Rotary switch for air distribution



Position "Top"	Air flow to windscreen
Position "Middle"	Air flow to body
Position "Bottom"	Air flow to body and footwell

Fig. 52

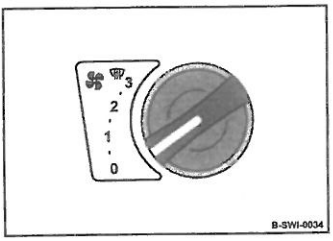
4.2.2.2 Rotary switch for cabin temperature



Position "Top"	max. temperature
Position "Bottom"	min. temperature

Fig. 53

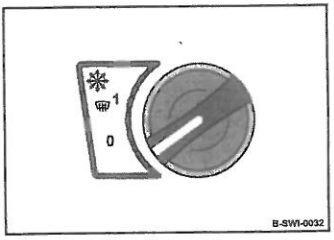
4.2.2.3 Rotary switch for fan



Position "0"	Fan off
Position "1" to "3"	Fan stages of different strengths

Fig. 54

4.2.2.4 Rotary switch for air conditioning system



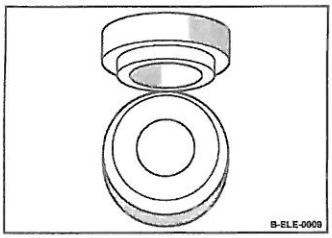
Position "Top"	Air conditioning on
Position "Bottom"	Air conditioning off

Fig. 55

Optional equipment

The air conditioning system only works when the engine is running and the fan is switched on.

4.2.3 12 V DIN socket



Permanent current, loadable up to 20 A.

Fig. 56

4.2.4 Monitor for reversing camera

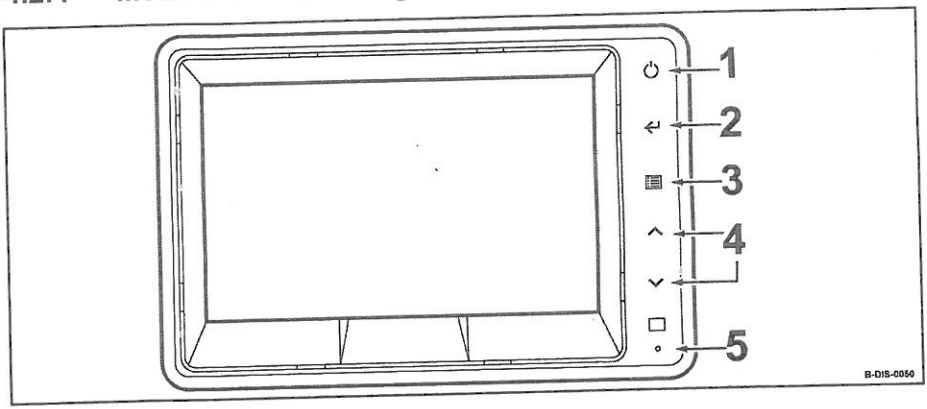


Fig. 57

Pos.	Designation	Note
1	Button on/off	
2	Push button for camera selection	Within menus to confirm the selection.
3	Push button for menu selection	Press briefly (approx. 0.5 s), to change to the "DISPLAY MENU". Press long (approx. 2 s), to change to the "MAIN MENU".
4	Push button arrow up and push button arrow down	Change the selection in a menu.
5	Light sensor	

Optional equipment

Clean the screen only with a soft, possibly damp cloth.

» *Continued on the next page*

Clean the ventilation slots on the monitor occasionally with a cloth or a brush.

4.2.5 Fire extinguisher

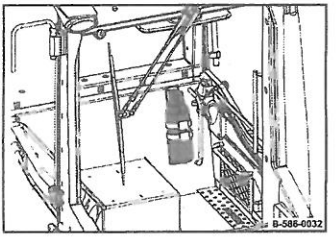


Fig. 58

Optional equipment

NOTICE!

Components may get damaged!

– When retrofitting a fire extinguisher, install it only in this position.

4.3 Engine compartment

4.3.1 Main battery switch

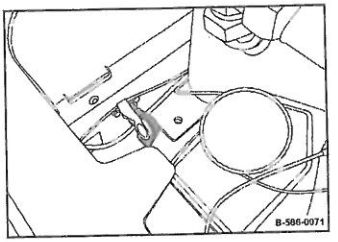
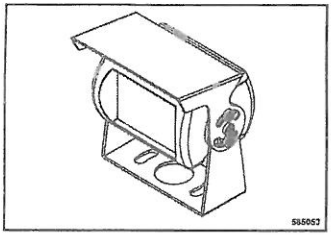


Fig. 59

Position "On"	Main battery switch locked Normal position, operation
turn counter-clockwise	Main battery switch can be pulled off Isolates the batteries from the on-board electrics in case of cable fire and fire in the engine compartment as well as protection against unauthorized use.

4.4 Outside of machine

4.4.1 Reversing camera



With the monitor connected it enables the driver to check the working range behind the machine without direct vision.

Optional equipment

Fig. 60

5.2 Visual inspections and function tests

1. Check hydraulic oil tank and lines for condition and leaks.
2. Check fuel tank and lines for condition and leaks.
3. Check AdBlue®/DEF-tank and lines for condition and leaks.
4. Check cooling system for contamination, damage and leaks.
5. Check bolted connections for tight fit.
6. Check engine and exhaust system for leaks.
7. Check belt drive for damage.
8. Check machine for contamination and damage.
9. Check function of steering.
10. Check function of brakes.
11. Check emergency stop function.
12. Check function of backup alarm system.
13. Check function of seat contact switch.

5.3 Checking the engine oil level

NOTICE!
Danger of engine damage!
- If the engine is warm, shut it down and check the oil level after five minutes. With a cold engine the oil level can be checked immediately.
- Use only oil of the permitted specification ↬ *Chapter 8.3.1 „Engine oil" on page 155.*

During the DPF-regeneration process part of the fuel may mix with the engine oil. This increases the amount of engine oil in the engine.

NOTICE!
Danger of engine damage!
- If the engine oil level is higher than the "MAX"-mark, the engine oil must be changed immediately.

Protective equipment:
- Working clothes
- Protective gloves

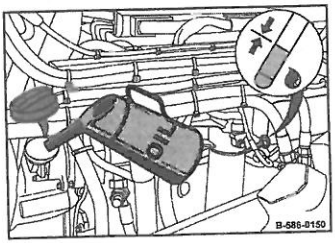


Fig. 61

1. Pull the dipstick out, wipe it off with a lint-free, clean cloth and reinsert it until it bottoms.
2. Pull the dipstick out again.
3. The oil level must always be between the "MIN"- and "MAX"-marks. If the oil level is too low, top up oil to the "MAX" mark immediately.

5.1 Notes on safety

If the following tests reveal damages or other defects, the machine must not be operated, until these deficiencies have been corrected.

Do not operate the machine with defective indicators and control elements.

Safety installations and switches must neither be removed nor must they be made ineffective.

Do not change any fixed settings.

WARNING!
Health hazard caused by fuels and lubricants!
- Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 „Handling fuels and lubricants“ on page 32.*

WARNING!
Danger of injury caused by rotating parts!
- Before starting work on the machine make sure that the engine can not be started.

CAUTION!
Danger of being injured by the engine hood dropping down!
- Always secure an opened engine hood.

Park the machine in secured condition
Chapter 6.8 „Parking the machine in secured condition“ on page 126.

Open and secure the engine hood ↳ *Chapter 8.2.1 „Open and secure the engine hood“ on page 152.*

Close the engine hood again after work is completed.

5.4 Checking the fuel level, topping up fuel

5.4.1 Checking the fuel level

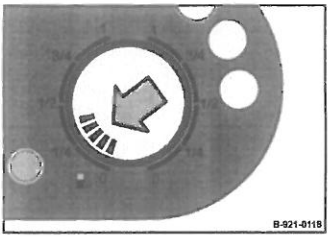


Fig. 62

1. Check the fuel level on the fuel gauge.
2. Refuel if required, shut the engine down to do so.

5.4.2 Refuelling

NOTICE!

Danger of engine damage!

- Never run the fuel tank empty, as otherwise the fuel system needs to be bled.
- Monitor the entire refuelling process.
- Contaminated fuel can cause malfunction or even damage of the engine. If necessary, fill in fuel through a screen filter.
- Use only fuel of the permitted specification ↳ *Chapter 8.3.2 „Fuel“ on page 157.*

Protective equipment:
- Working clothes
- Protective gloves

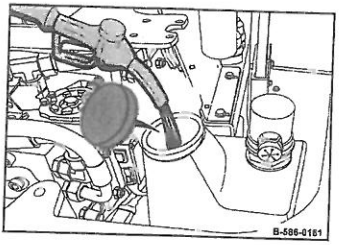


Fig. 63

1. Clean the area around the filler opening.
2. Fill in fuel.

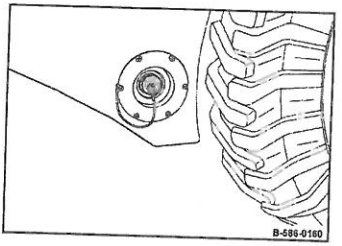


Fig. 64

3. Alternatively fill the machine with the quick refuelling system .

5.5 Checking the AdBlue®/DEF level, topping up

5.5.1 Checking the AdBlue®/DEF level

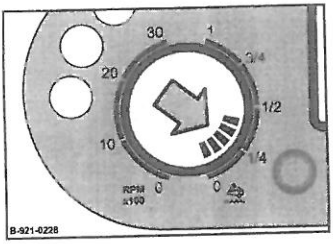


Fig. 65

1. Check the filling level on the AdBlue®/DEF level gauge.
2. Top up if required, after shutting down the engine first.

Fig. 66

A filling level, which is too low, is indicated by the AdBlue®/DEF warning light.

If the AdBlue®/DEF level is not topped up in time, the engine power will be reduced.

5.5.2 Topping up AdBlue®/DEF

Protective equipment:
- Working clothes
- Protective gloves

NOTICE!

Filling the AdBlue®/DEF tank with cleaning agent or other operating media or fuels, mixing in additives or diluting AdBlue®/DEF will damage the exhaust gas aftertreatment system.

- Use only AdBlue®/DEF of the permitted specification ↳ *Chapter 8.3.3 „AdBlue®/DEF“ on page 158.*
- In case of incorrect filling inform our service immediately.
- If AdBlue®/DEF comes into contact with spray painted or aluminium surfaces while refilling, you should rinse off the affected areas immediately with lots of water.

NOTICE!
Minimum topping up quantity:
- 10 l (2.65 gal us)
- Fill up, if less than 10 l free tank volume is available.

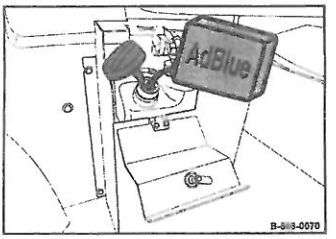


Fig. 67

1. Clean the area around the filler opening.
2. Unscrew the cap and fill in AdBlue®/DEF.
3. Close the cap.

5.6 Checking the hydraulic oil level

NOTICE!
Components may get damaged!
- Check the hydraulic oil level at room temperature (approx. 20 °C (68 °F)).
- If, during the daily inspection of the oil level the hydraulic oil level is found to have dropped, check all lines, hoses and components for leaks.
- Use only oil of the permitted specification ↳ *Chapter 8.3.5 „Hydraulic oil" on page 164.*

Protective equipment:
- Working clothes
- Protective gloves

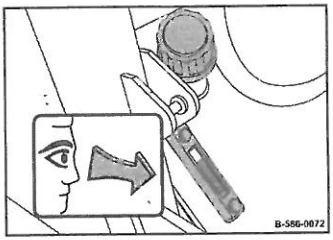


Fig. 68

1. Check the oil level in the inspection glass.

Normal level	approx. 3 cm (1.2 in) below the top edge of the inspection glass
Minimum level	Middle of inspection glass

2. For topping up, clean the area around the filler opening.
3. Unscrew the cap and fill in hydraulic oil.
4. Close the cap.

5.7 Checking the coolant level

NOTICE!
Danger of engine damage!
- If, during the daily inspection the coolant level is found to have dropped, check all lines, hoses and engine for leaks.
- Do not use radiator sealant to seal leaks.
- Use only coolant of the permitted specification ⇳ *Chapter 8.3.4 „Coolant" on page 161*.

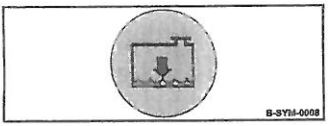


Fig. 69

The coolant level warning light informs about a coolant level which is too low.

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

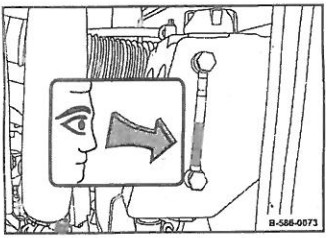


Fig. 70

1. Check the coolant level in the compensation tank.

WARNING!
Danger of scalding by hot fluid!
- Open the compensation tank only when the engine is cold.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

2. For topping up, clean the area around the filler opening.

3. Unscrew the cap and fill in coolant up to the "MAX" mark.
4. Close the cap.

5.8 Checking wheels and tyres

WARNING!
Danger of being injured by bursting tyres!

- Wear your personal protective equipment (safety shoes, gloves, goggles, hard hat).
- When checking the tyre pressure stand in the extended path of the tyre track.
- Use an air hose with a length of min. 6 meters.
- Never exceed the permitted maximum pressure.

The tire pressure can be adapted to the operating conditions within the specified limits.

A reduced tire pressure improves the traction especially on sandy soils.

Higher tires pressures improve the driving stability of the machine.

The total height of the machine can also be influenced by changing the tire pressure.

Protective equipment:

- Safety shoes
- Protective gloves
- Safety goggles
- Hard hat

Fig. 71

1. Move the machine until the tire inflation valve (1) is in top position.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
3. Check the tyres for cuts, bulges, damaged rims, missing wheel studs or nuts.
4. Have damaged wheels or tyres replaced immediately.
5. Unscrew the valve caps and check the front and rear tire pressure, correct if necessary.

   Ensure equal pressure in all tires.

   Tire pressure, nominal value ↳ *Chapter 2 „Technical data“ on page 15*

6. Screw the valve caps back on again.

6.1 Setting up the work place

1. Park the machine in secured condition
↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*

6.1.1 Adjusting the driver's seat

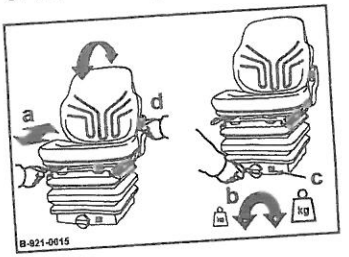


Fig. 72

a Length adjustment
b Weight adjustment
c Display of weight adjustment
d Backrest inclination

1. To adjust the inclination of the backrest operate lever (d) and tilt the backrest forward or back.
2. To adjust the seat in longitudinal direction disengage lever (a) and push the seat forward or back.
3. To adapt to the weight of the operator read the weight indication in the window (c) and, if necessary, turn lever (b) until the correct driver's weight has been adjusted.

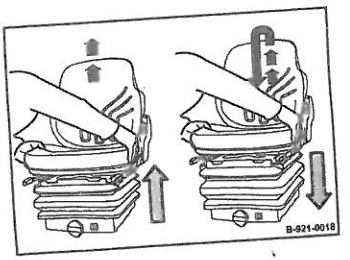


Fig. 73

4. To adjust the seat height lift up the seat, until it locks at the appropriate height.

When lifting the seat completely it will sink down to lowest position.

6.1.2 Swivelling the driver's seat

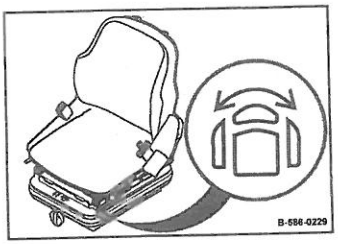


Fig. 74

1. Pull the lever and swivel the driver's seat to the desired position.

Optional equipment

6.1.3 Adjust the steering wheel

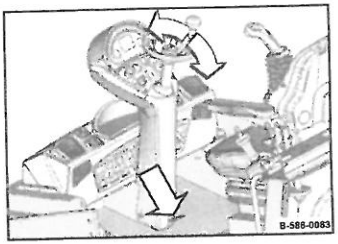


Fig. 75

1. To adjust the inclination kick the pedal down, move the steering wheel to the desired position and release the pedal.

Optional equipment

6.2 Electronic immobilizer

Optional equipment

Before starting the engine the anti-theft protection* must be disarmed by entering a code.

With the electronic immobilizer armed, the light emitting diode (a) flashes slowly.

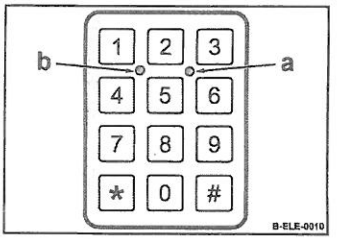


Fig. 76

1. Slowly enter the six-digit user code.
   ⇨ When entering the code, the light emitting diode (6) lights up with every digit.
2. Press the diamond button.
   ⇨ The electronic immobilizer is now disarmed and the engine can be started within the next 15 minutes.

6.3 Starting the engine

Prerequisites:

- Main battery switch switched on
- Emergency stop switch unlocked
- Travel lever in position "Middle right" (parking brake closed)

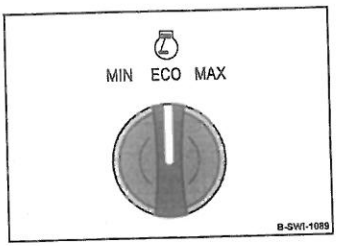


Fig. 77

1. Turn the rotary switch for engine speed to position "Middle" (ECO-mode).

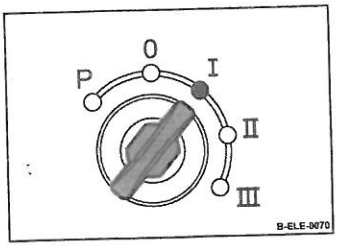


Fig. 78

2. Turn the ignition key to position "I".
   ⇨ All control and warning lights in the instrument cluster light up for a moment.

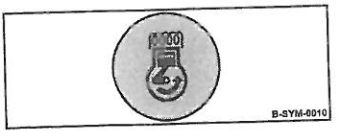


Fig. 79

3. If the preheating control light lights up, wait until it goes out before you start the engine.

The starter switch is designed with a re-start lock. The ignition key must first be turned back to position "0" before a new starting attempt can be made.

NOTICE!
Components may get damaged!
- Run the starting process for maximum 20 seconds without interruption and pause for a minute between starting attempts.
- If the engine has not started after two attempts, determine the cause.

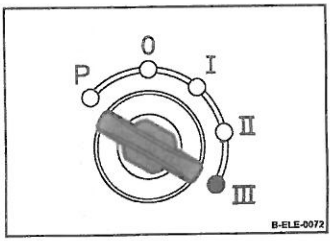


Fig. 80

4. Turn the ignition key through position "II" to position "III".
   ⇨ The starter cranks the engine.

NOTICE!
Danger of engine damage!
- Warm up engine for a short while before starting work. Do not operate the engine immediately under full load.

NOTICE!
Low exhaust gas temperatures result in increased soot loads in the DPF!
- Short engine running times, low engine loads or excessively long engine idle times should be avoided.

6.4 Travel operation

6.4.1 Preliminary remarks and safety notes

Driving up and down slopes

DANGER!
Danger to life caused by the machine turning over!
- Never drive across a slope.
- Always drive straight up or down a slope.

Do not drive on gradients exceeding the maximum gradeability of the machine ↳ *Chapter 2 „Technical data" on page 15.*

Soil conditions and weather influences impair the gradeability of the machine.

Wet and loose soil considerably reduces traction of the machine on inclinations and slopes. Increased danger of accident!

Leaving the seat while travelling

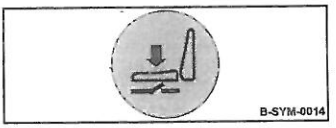


Fig. 81

If the operator leaves his seat while travelling, the driver's seat warning light lights up.

The warning buzzer sounds.

After approx. 3 seconds, the machine brakes to a standstill.

Before being able to drive again, the travel lever must first be shifted to the right into the parking brake position.

6.4.2 Driving the machine

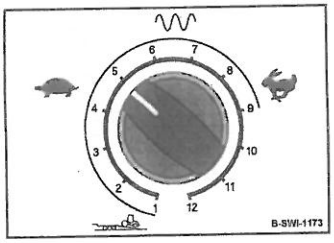


Fig. 82

1. Fasten your seat belt.
2. Pre-select the desired travel range.

> *The travel range can also be switched over while driving.*

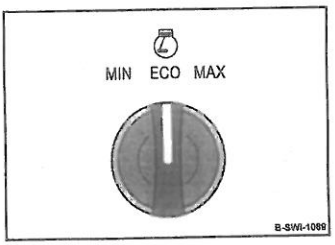


Fig. 83

3. Turn the rotary switch for engine speed to position "Middle" (ECO-mode).

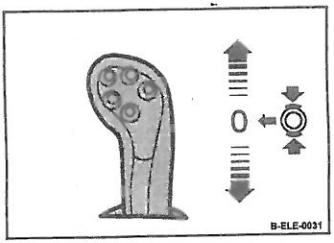


Fig. 84

4. Disengage the travel lever to the left out of parking brake position and move it slowly to the desired travel direction.
   ⇨ The further the travel lever is moved to forward or backward the faster the machine will travel.
5. Set the travel lever to "Middle" position to stop the machine.
   ⇨ The machine decelerates to a standstill.
6. Always apply the parking brake to stop on inclinations or slopes.

6.4.3 Applying the parking brake

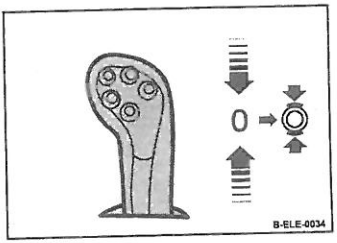


Fig. 85

1. Shift the travel lever to "Middle" position.
   ⇨ The machine decelerates to a standstill.
2. Engage the travel lever to the right (parking brake position).
   ⇨ The parking brake warning lamp lights up.

6.5 Working with vibration

6.5.1 Preliminary remarks and safety notes

NOTICE!
Possible damage to neighbouring buildings!
- When compacting with vibration you must always check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power).
- If necessary stop compacting with vibration.

NOTICE!
Components may get damaged!
- Do not activate the vibration on hard (frozen, concrete) ground.

Vibration at standstill causes transverse marks

- Switch the vibration on only after shifting the travel lever to the desired travel direction.
- Switch the vibration off before stopping the machine.

6.5.2 Switching the vibration on and off

Vibration is automatically switched off at travel speed range1 and from travel speed range 10.

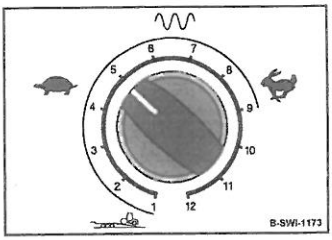


Fig. 86

1. Turn the rotary switch for travel speed ranges to the desired position.

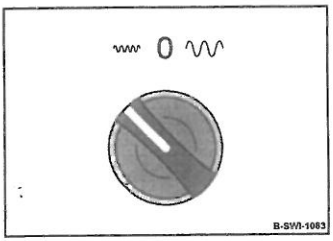


Fig. 87

2. Preselect the desired amplitude with the rotary switch for amplitude pre-selection.

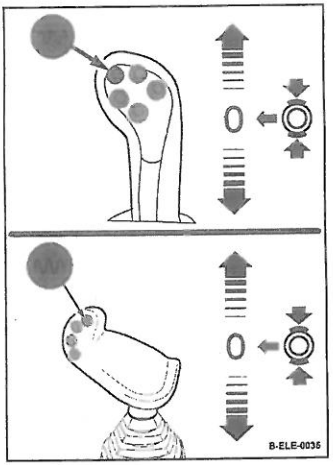


Fig. 88

3. Shift the travel lever slowly to the desired travel direction.
4. Press the vibration push button on the travel lever.

   ⇨ Vibration is switched on.
5. Perform passes in forward and reverse direction on the same track, until the E_{Vib} value no longer increases compared to the previous pass.
6. Press the vibration push button on the travel lever once again to switch off vibration.

   ⇨ Vibration is switched off.

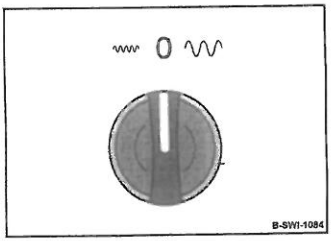


Fig. 89

7. After the end of work turn the rotary switch for amplitude pre-selection back to position "0".

6.6 ECONOMIZER

Optional equipment

The ECONOMIZER continuously informs the driver about the compaction status of the layer being compacted and enables the detection and targeted post-compaction of local weak spots.

The acceleration sensor on the drum measures the reaction of the road subbase.

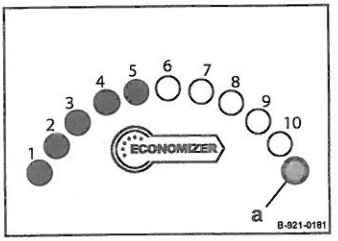


Fig. 90: INFO-2 display field in instrument cluster

- With the vibration switched on, the measuring value for the soil stiffness is shown on a scale (1 - 10).
- If the display value does not increase any further, no further compaction can be achieved with this machine. The maximum display value (10) is not always reached.
- If the drum is in jump operation, the display (a) flashes.

In order to achieve the desired soil stiffness, one must always perform a suitable reference measurement before compaction is started.

The reference measurement is used to determine which display value of the ECONOMIZER corresponds with the measuring value for soil stiffness.

6.7 Terrameter

6.7.1 Terrameter display

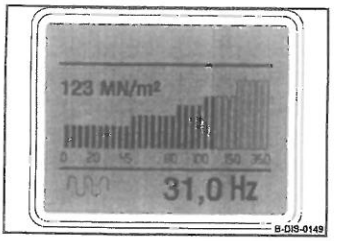


Fig. 91

With the permanent display of the compaction value (E_{VIB} value) weak spots can be detected during compaction work and unnecessary passes avoided.

Optional equipment

1. Press push button INFO 2 on the travel lever to select the display for the E_{VIB} value.

   ⇨ When working with vibration, the actual E_{VIB} value will now be displayed during the compaction pass.

6.7.2 Terrameter with printer

Preliminary remarks

Optional equipment

In case of a Terrameter with printer, the compaction values (E_{VIB} values) can be saved, compared with each other and printed out.

The (E_{VIB} values) recorded during different passes can only be compared, if the recording of measuring values took place with the same amplitude, frequency and travel speed and on exactly the same track.

A change in travel speed would affect the measuring result, because e.g. with a slow travel speed per pass the energy introduced into the ground is higher and in the comparison of all passes a higher E_{VIB} value would be displayed.

Measuring values must only be compared for passes performed in the same direction.

Since the transducer unit is mounted on the left hand side of the drum, it is necessary to arrange the tracks so that track 1 is processed first, followed by further tracks offset to the left.

The maximum track length is 150 m (492 ft).

If the vibration is switched off or the travel lever is returned to neutral position, the measurement is automatically stopped and the measuring report is printed out in form of a line diagram.

The following text describes a measuring pass in forward travel. Measuring passes in backward travel must be performed accordingly.

Measuring pass with Terrameter

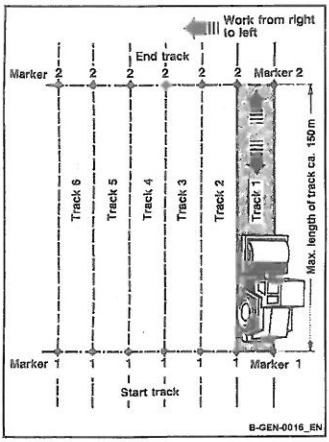


Fig. 92

1. Mark the track to be compacted.

Fig. 93

2. Select display of E_{Vib} values.
   ⇨ When working with vibration, the actual E_{VIB} value will now be displayed. .

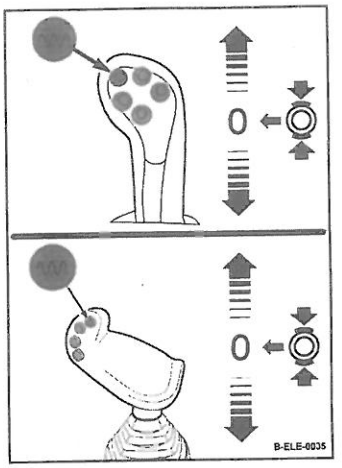


Fig. 94

3. Shift the travel lever to the desired travel direction.
4. Press the vibration push button on the travel lever.

   ⇨ Vibration is switched on.

> *Before reaching mark 1 the nominal exciter shaft speed must have been reached and a valid E_{VIB} value should be displayed.*

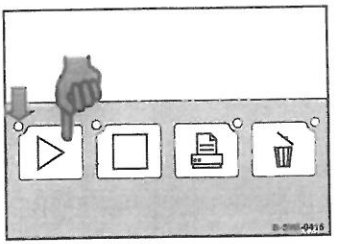


Fig. 95

5. When reaching mark 1 press push button "Start measurement" to start the measuring pass.

   ⇨ The LED will flash during the measuring pass.

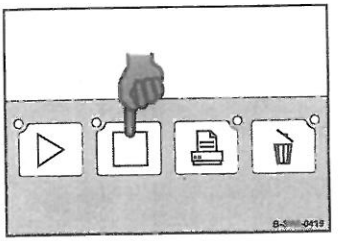


Fig. 96

6. When reaching mark 2 press push button "Stop measurement" to stop the measuring pass.

   ⇨ The first forward pass is finished.
7. Return to mark 1.

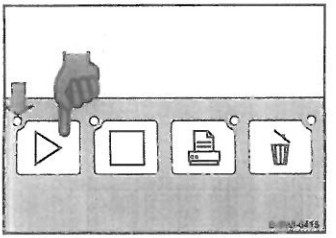


Fig. 97

8. For the second pass press push button "Start measurement" to start the measuring pass when reaching mark 1.

   ⇨ The measuring pass will be continued.

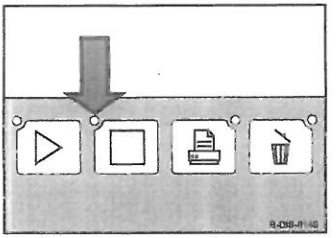


Fig. 98

9. Keep repeating these passes, until there is no considerable increase in the E_{VIB} value.

   ⇨ The LED above the "Stop measurement" button lights up, if the E_{VIB} value does not increase more than 10% in comparison to the previous pass.

10. Change to the next track and repeat this whole process of recording measuring values.

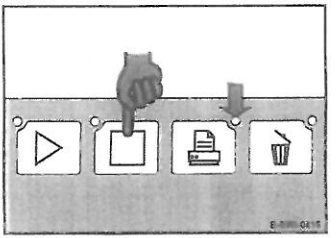


Fig. 99

11. Press the "Stop measurement" button to end a measuring pass.

    ⇨ The LED of the printer icon lights up and indicates, that the measuring report can be printed.

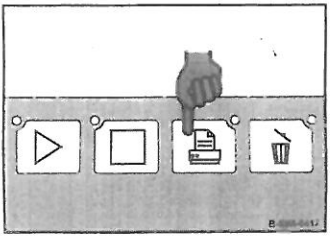
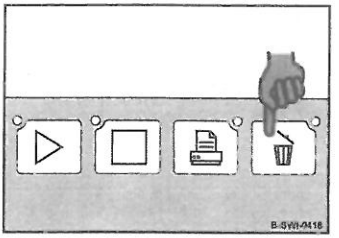


Fig. 100

12. Press the "Print measuring report" button to print out a measuring pass.

    ⇨

    – *short actuation: Line diagram*
    – *long actuation (> 5 s): Bar chart*



13. Operate the "Delete measurement" button to delete all saved data.

Fig. 101

6.7.3 Line graph (E_{VIB})

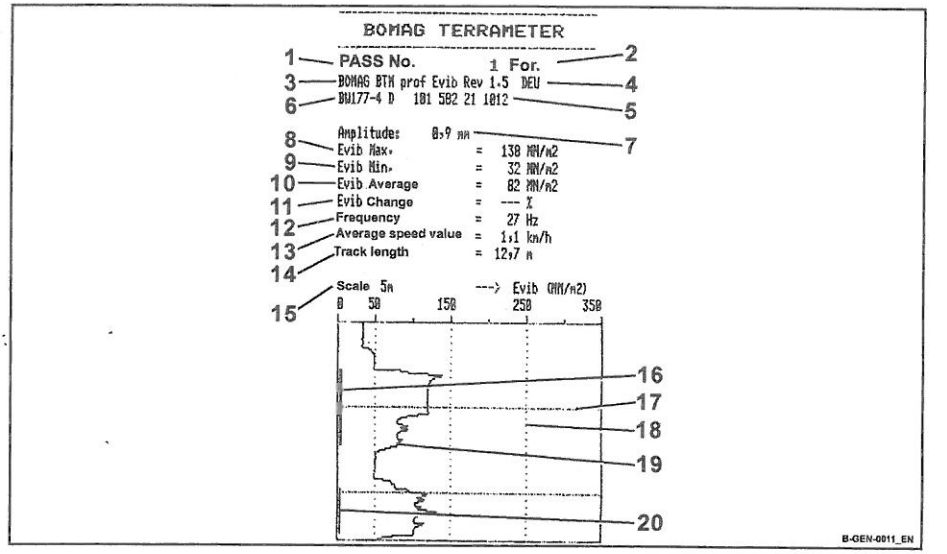


Fig. 102

Pos.	Designation	Note
1	Pass	Total number of measured passes on this track.
2	Travel direction	
3	Software status of the measuring equipment	

Pos.	Designation	Note
4	set language	Please contact our Customer Service if you want to change the language.
5	Serial number of machine	
6	Machine type	
7	Amplitude	Display of the vertical amplitude the machine has worked with on this track.
8	Maximum E_{VIB}-value	
9	Minimum E_{VIB}-value	
10	Mean E_{VIB}-value	
11	E_{VIB}-change	E_{VIB}-change in %. This always refers to the previous pass in the same travel direction.
12	Medium frequency	
13	Mean travel speed	
14	Track length	
15	Raster division in longitudinal direction	Division of the measuring track (track length) into fixed sections. Is graticule serves the purpose of pinpointing individual measuring values on the measuring curve.
16	Identification of jump operation (thick line)	Indicates excessive jumping of the drum on the marked track section. Select a smaller amplitude, if necessary!
17	Longitudinal raster line	
18	Measuring value raster line	

Pos.	Designation	Note
19	E_{VIB}-curve (in MN/m²)	Shows the E_{VIB}-value at any point of the rolled track. The raster line enables the location related assignment of the E_{VIB}-value and the location of a fault (excessive or insufficient compaction).
20	Identification of jump operation (thin line)	Indicates jumping of the drum on the marked track section (thin line).

The bar diagram differs from the line diagram only by the graphic representation of measuring values.

In the bar diagram the mean values of 5 m sections are shown as bars.

6.8 Parking the machine in secured condition

1. Drive the machine onto level and firm ground.

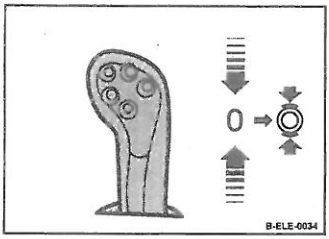


Fig. 103

2. To stop the machine return the travel lever to middle position and shift it to the right to lock (parking brake position).
   ⇨ The parking brake warning lamp lights up.

NOTICE!
Danger of engine damage!
– Do not shut down the engine all of a sudden from full load speed, but let it idle for about two minutes.

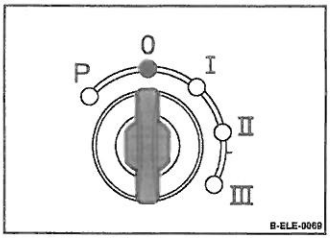


Fig. 104

3. Turn the ignition key to position "0" and pull it out.
4. Open and secure the engine hood
   ↳ *Chapter 8.2.1 „Open and secure the engine hood" on page 152.*

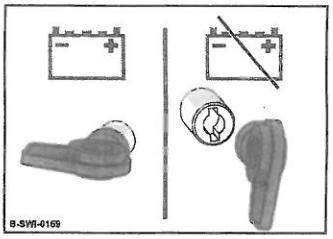


Fig. 105

5. Turn the main battery switch counter-clockwise and pull it out.
6. Close the engine hood and lock it if necessary.

6.9 Operating the heating / air conditioning system

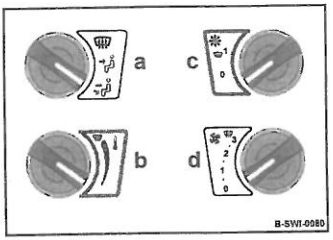


Fig. 106

a Adjust the air distribution
b Regulate the cabin temperature
c Air conditioning on/off
d Set the fan speed

NOTICE!

The function of the heating / air conditioning system may be affected!

- Always keep the air inlet slots on the cabin free of snow, foliage etc.
- Switch the air conditioning on every month for about ten minutes.

Heating the interior

1. Close all windows completely.
2. Adjust the desired air distribution.
3. Switch on the fan.
4. Regulate the cabin temperature.

Cooling the interior

1. Close all windows completely.
2. Adjust the desired air distribution.
3. Switch on the fan.
4. Switch the air conditioning on.
5. Regulate the cabin temperature.

Reducing the humidity

1. Direct the air distribution to the windscreen.
2. Switch the fan to stage "3".
3. Set the cabin temperature to "Max".
4. Switch the air conditioning on.

6.10 ECOSTOP

Optional equipment

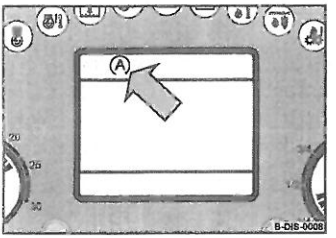


Fig. 107

In order to reduce the idle speed times of the machine, the engine is, under certain conditions, automatically shut down after an idle time of 10 minutes.

The INFO 3 display field shows the control light ECOSTOP.

Prerequisites for automatic shut-down of the engine:

- Travel lever in parking brake position
- Driver's seat not occupied
- Hydraulic oil temperature between 50 - 90 °C (122 - 194 °F) (as far as information is available)
- Coolant temperature between 60 - 90 °C (140 - 194 °F) (as far as information is available)
- Ambient temperature between 3 - 35 °C (37 - 95 °F) (as far as information is available)
- Engine idle speed
- Regeneration at standstill is not active (only on machines with exhaust gas aftertreatment system)

NOTICE!

The battery can become partly or fully discharged!

After the engine has been shut down, ignition and possibly other consuming devices (e.g. lighting) may still be switched on.

– If necessary, switch off consuming devices and ignition.

Starting the engine after ECOSTOP

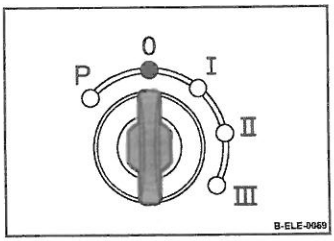


Fig. 108

1. Turn the ignition key to position "0".
2. Start the engine ↬ *Chapter 6.3 „Starting the engine" on page 109*.

6.11.4 Towing the machine

Tow the machine only in a case of emergency or to avoid an accident.

Towing distance max. 500 m (1600 ft), towing speed max. 1 km/h (55 ft/min).

Before towing make sure that:

- the tractor vehicle has sufficient traction and braking power for the unbraked towed load,
- fastening means are able to withstand the load and are fastened to the points provided for this purpose.

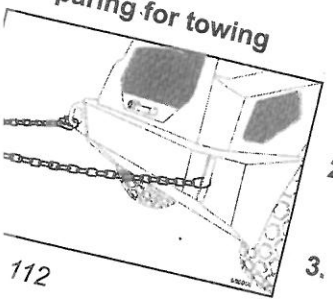
If no tow bar is used, towing is only permitted uphill.

Protective equipment:

- Working clothes
- Protective gloves

WARNING!
Danger of injury caused by uncontrolled machine movement!
– Always secure the machine against unintended rolling.

Preparing for towing



112

1. Fasten the towing device reliably to the towing points.
2. Open and secure the engine hood ↳ *Chapter 8.2.1 „Open and secure the engine hood“ on page 152.*
3. Allow the engine to cool down.

Access to the travel pumps

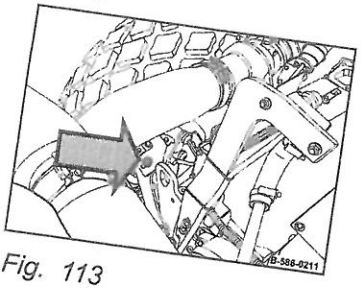


Fig. 113

4. Unscrew the screw on the upper exhaust pipe bracket.

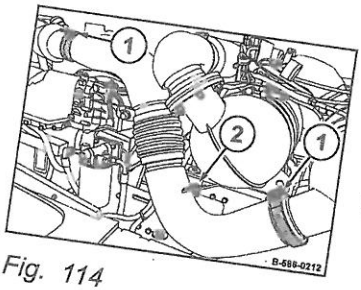


Fig. 114

5. Loosen both clamps (1) on the exhaust pipe.
6. Unscrew the screw (2) on the exhaust pipe bracket.
7. Take off the exhaust tube with the two seals.

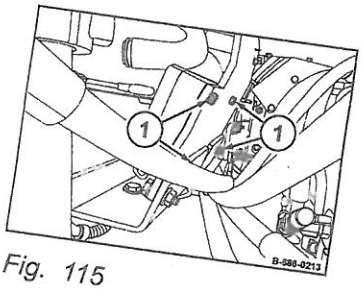


Fig. 115

8. Unscrew four screws (1) from the main fuse box and lay the main fuse box to the side.

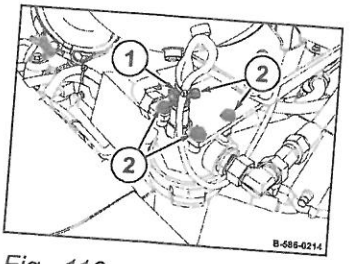


Fig. 116

9. Pull off plug (1).
10. Unscrew four screws (2) from the hydraulic oil filter and lay the hydraulic oil filter to the side.

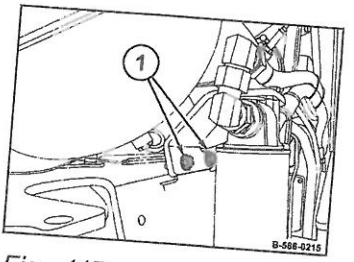


Fig. 117

11. Unscrew the two screws (1) from the engine oil filter mounting bracket and lay the engine oil filter with bracket to the side.

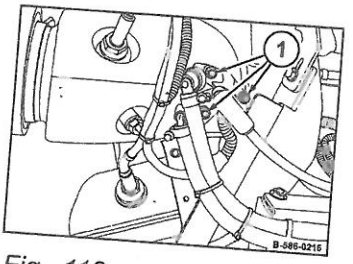


Fig. 118

12. Unscrew three screws (1) from the AdBlue®/DEF dosing unit.
13. Lay the AdBlue®/DEF dosing unit to the side.

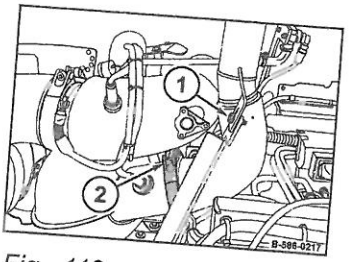


Fig. 119

14. Unscrew the screw (1) on the exhaust pipe bracket.
15. Loosen the clamp (2) on the exhaust pipe and take off the exhaust pipe.

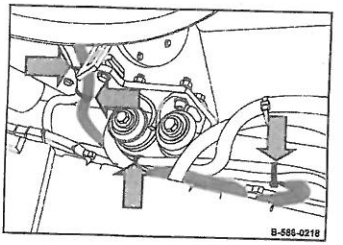


Fig. 120

16. Loosen the cable straps on the wiring loom.

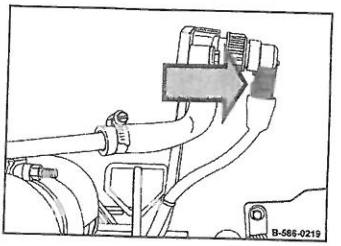


Fig. 121

17. Pull off the plug.

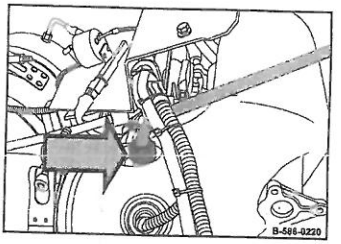


Fig. 122

18. Unscrew the pipe to the sensor and lay it to the side.

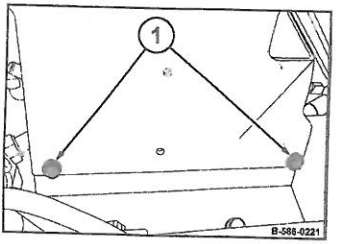


Fig. 123

19. Unscrew the two screws (1) from the left side of the cross-member.

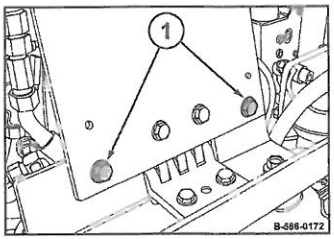


Fig. 124

20. Unscrew the two outer screws (1) from the right side of the cross-member.
21. Tilt the cross-member to the right.

Releasing the parking brake

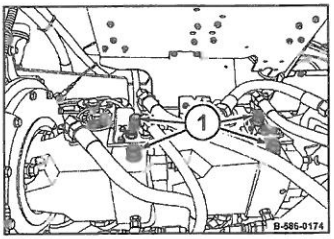


Fig. 125

22. Loosen the high pressure relief valves (1) on both travel pumps for approx. three turns in counter-clockwise direction to open a bypass.

Leakage!
– *Do not back the valves out for more than three turns!*

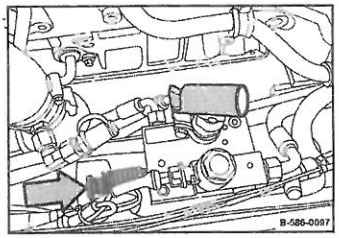


Fig. 126

23. Press the emergency operation button completely in.
24. Insert a suitable pump lever extension and operate the pump, until the brake is released.

⇨ The machine can now be towed.

6.11.5 After towing

WARNING!
Danger of injury caused by uncontrolled machine movement!
– Always secure the machine against unintended rolling.

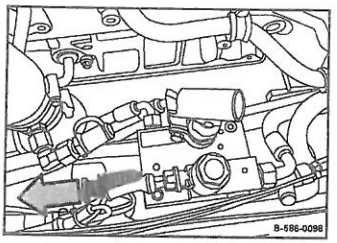


Fig. 127

1. If the engine cannot be started, pull the emergency operation button completely out after towing.

   After starting the engine the emergency operation button is pushed out by hydraulic pressure.

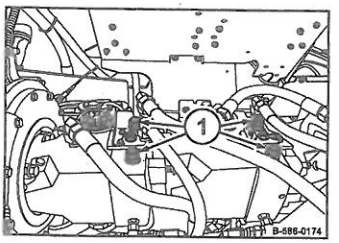


Fig. 128

2. Retighten the high pressure limiting valves (1) on both travel pumps again, tightening torque: 70 Nm (52 ft·lbf).
3. Return the cross-member to the installation position.

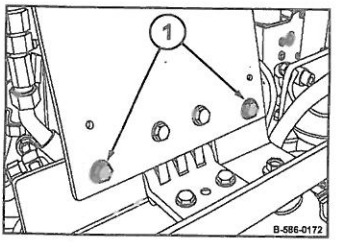


Fig. 129

4. Screw in and tighten the two outer screws (1) on the right side of the cross-member.

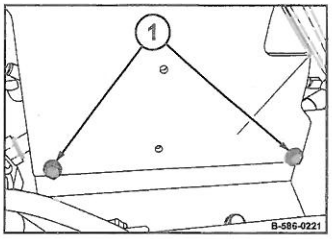


Fig. 130

5. Screw in and tighten the two screws (1) on the left side of the cross-member.

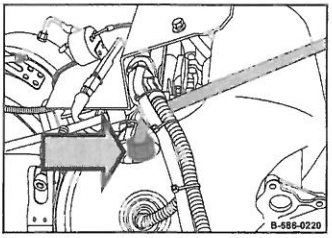


Fig. 131

6. Screw on the pipe to the sensor and tighten it.

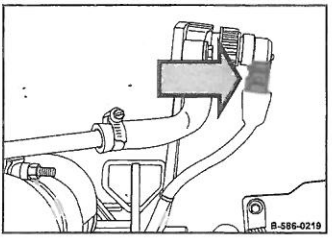


Fig. 132

7. Plug on the plug to the sensor.

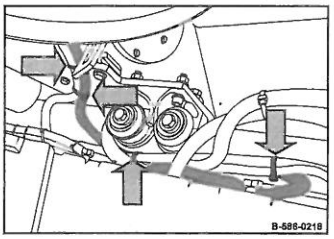


Fig. 133

8. Position the wiring loom and fasten with cable straps.

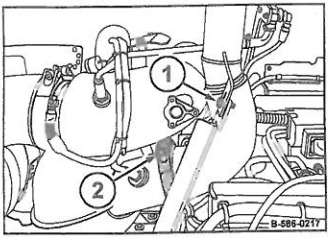


Fig. 134

9. Push on the exhaust end pipe.
10. Install and tighten clamp (2).
11. Install the bracket and tighten the screw (1).

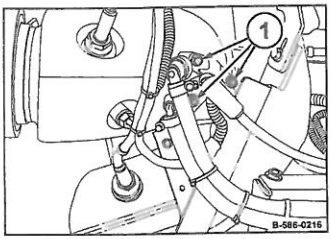


Fig. 135

12. Fasten the AdBlue®/DEF dosing unit and tighten the three screws (1).

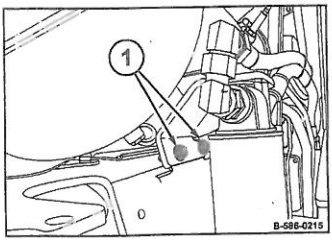


Fig. 136

13. Attach the engine oil filter bracket in installation position and tighten both screws (1).

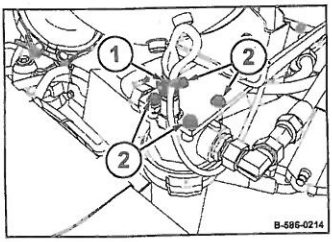


Fig. 137

14. Attach the hydraulic oil filter and tighten four screws (2).
15. Plug on the plug (1) to the sensor.

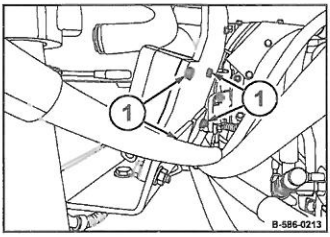


Fig. 138

16. Attach the main fuse box and tighten the four screws (1).

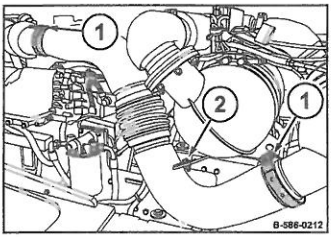


Fig. 139

17. Return the exhaust tube to the installation position.
18. Mount the two clamps (1) on the exhaust tube with seals and tighten.
19. Install the bracket and tighten the screw (2).

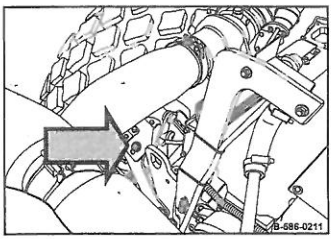


Fig. 140

20. Install the upper bracket and tighten the screw.

7.1 Prepare for transport

1. Close all doors, windows and flaps.
2. Remove all loose objects from the machine or from the operator's stand or fasten them reliably.

7.2 Loading the machine

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Make sure that any persons keep a safety distance of at least 2 metres while the machine is driven onto or down from the transport vehicle. The instructing person should not be inside the travel range of the machine.

Position of centre of gravity

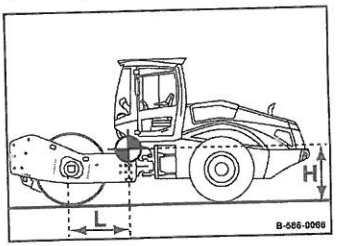


Fig. 141

Distance from middle of drum	Height
1050 ± 240 mm	1030 ± 60 mm
41.3 ± 9.4 in	40.6 ± 2.4 in

DANGER!
Danger to life caused by the machine slipping or turning over!
– Make sure that no persons are in the danger zone.

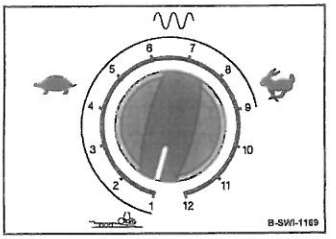


Fig. 142

1. Turn the rotary switch for travel range selection to position "Ramp".
2. Drive the machine carefully onto the transport vehicle.
3. Observe the centre of gravity.
4. Shut down the engine, pull off the ignition key.
5. Engage the articulation lock ↬ *Chapter 8.2.2.1 „Engaging the articulation lock" on page 153.*

7.3 Lashing the machine to the transport vehicle

Do not use damaged or in any other way impaired lashing points.

Always use appropriate lifting and lashing means on the lifting and lashing points.

Use lifting and lashing gear only in the prescribed direction of load application.

Lifting and lashing gear must not be damaged by machine components.

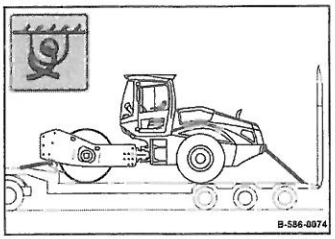


Fig. 143

1. Fasten the lashing tackle at the marked lashing points.
2. Lash the machine securely to the transport vehicle.

7.4 Loading by crane

Loads must only be attached and hoisted by an expert / qualified person.

Do not use damaged or in any other way impaired lashing points.

Use only lifting gear and lifting tackle with sufficient load bearing capacity for the weight to be loaded. Minimum load bearing capacity of lifting gear: see max. operating weight ↬ *Chapter 2 „Technical data" on page 15.*

Always use appropriate lifting and lashing means on the lifting and lashing points.

Use lifting and lashing gear only in the prescribed direction of load application.

Lifting and lashing gear must not be damaged by machine components.

When lifting the machine avoid uncontrolled movements of the load. If necessary, hold the load with guide ropes.

1. Shut down the engine.
2. Engage the articulation lock ↬ *Chapter 8.2.2.1 „Engaging the articulation lock" on page 153.*
3. Fasten the lashing tackle at the marked lifting points.
4. Adjust the length of the lifting tackle in such a way, that the crane hook is vertically above the centre of gravity of the machine.
5. Use a suitable cross-beam to prevent the machine from being damaged.

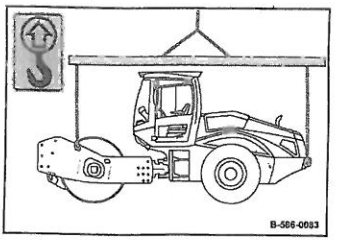


Fig. 144

DANGER!

Danger to life caused by suspended loads!

– Do not step or stand under suspended loads.

6. Lift the machine carefully and lower it again at the intended location.

7.5 After transport

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Make sure that any persons keep a safety distance of at least 2 metres while the machine is driven onto or down from the transport vehicle. The instructing person should not be inside the travel range of the machine.

1. Loosen the articulation lock ↬ *Chapter 8.2.2.2 „Disengaging the articulation lock“ on page 154.*
2. Turn the rotary switch for travel range selection to position “Ramp”.

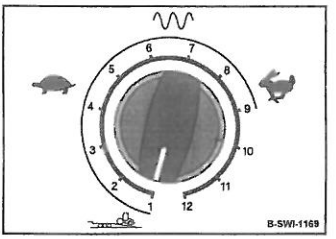


Fig. 145

3. **DANGER!**
   Danger to life caused by the machine slipping or turning over!
   – Make sure that no persons are in the danger zone.

   Drive the machine carefully off the transport vehicle.

8.1 Preliminary remarks and safety notes

DANGER!
Danger to life caused by an operationally unsafe machine!
- The machine must only be serviced by qualified and authorized personnel.
- Follow the safety regulations for maintenance work *Chapter 3.11 „Maintenance work" on page 55.*

WARNING!
Health hazard caused by fuels and lubricants!
- Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 „Handling fuels and lubricants" on page 32.*

CAUTION!
Danger of being injured by the engine hood dropping down!
- Always secure an opened engine hood.

Wear your personal protective equipment.

Do not touch hot components.

Park the machine on horizontal, level, firm ground.

Perform maintenance work only with the engine shut down.

Make sure that the engine cannot be accidentally started during maintenance work.

Thoroughly clean machine and engine before starting maintenance work.

Before mounting the machine, check whether all access steps, grips and platforms are free of obstacles, grease, oils, fuel, dirt, snow and ice.

Use only the intended access steps and grips to mount the machine.

For overhead maintenance work use the access steps and working platforms provided or other secure means.

Do not step on machine parts which are not intended for this purpose.

Always attach the articulation lock when working in the area of the articulated joint.

Do not leave any tools or other objects, that could cause damage, in or on the machine.

After all maintenance work is completed reinstall all guards and safety installations.

Close all maintenance flaps and doors after maintenance work has been completed.

The terms right/left are always in relation to the travel direction.

8.2 Preparations / concluding work

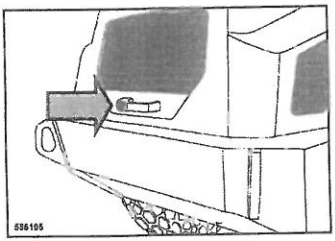
Certain maintenance tasks require preparations and concluding activities.

This includes e.g. opening and closing maintenance flaps and maintenance doors as well as securing certain components.

After this work close all maintenance flaps and doors again and return all components to their operating condition.

8.2.1 Open and secure the engine hood

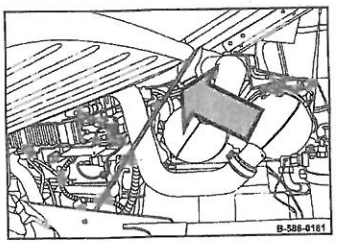
Open the engine hood



1. Unlock the lock.
2. Press the button.

Fig. 146

Bottom position



1. Pull the support out of the bracket and support the hood.

Fig. 147

Top position

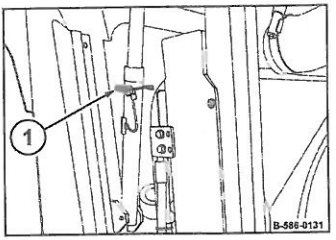


Fig. 148

1. Push the hood to top position.
2. Secure the locking bolt with the split pin (1).

8.2.2 Engaging / releasing the articulation lock

8.2.2.1 Engaging the articulation lock

WARNING!
Danger of crushing by the articulating machine!
– Do not step into the articulation area of the machine while the engine is running.

1. Move the steering to middle position and stop the machine.
2. Shut down the engine, pull off the ignition key.
3. Engage the articulation lock and secure the bolt with the spring pin.

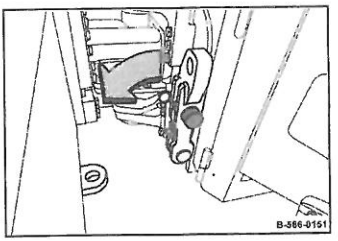


Fig. 149

8.2.2.2 Disengaging the articulation lock

WARNING!
Danger of crushing by the articulating machine!
– Do not step into the articulation area of the machine while the engine is running.

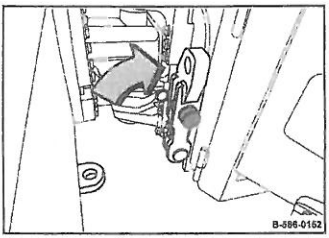


Fig. 150

1. Loosen the articulation lock again, fix it in its receptacle and lock the bolt with the spring plug.

8.3 Fuels and lubricants

8.3.1 Engine oil

8.3.1.1 Oil quality

Engine oils for use in DEUTZ engines are classified in DEUTZ Engine Oil Quality Classes (DQC).

The following engine oil specifications are permitted:

- Low-ash engine oils complying with DQC III-LA or DQC IV-LA.

Avoid mixing of engine oils.

The list of approved engine oils is also available on the Internet under the following address:

www.deutz.com	
de	SERVICE \ Maintenance \ Betriebsstoffe \ Öle \ DEUTZ Quality Class \ DQC Freigabeliste
en	SERVICE \ Maintenance \ Operating Liquids\ Oils \ DEUTZ Quality Class \ DQC Release List

8.3.1.2 Oil viscosity

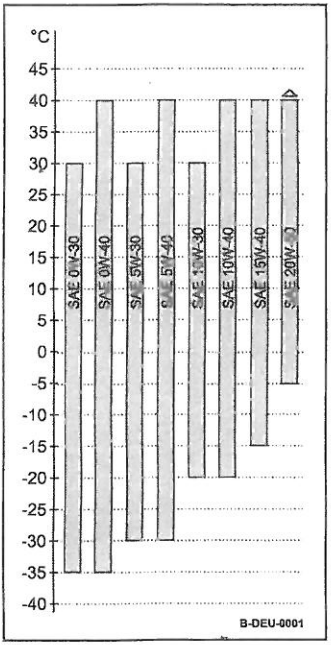


Fig. 151: Oil viscosity diagram

Since engine oil changes its viscosity with the temperature, the ambient temperature at the operating location of the engine is of utmost importance when choosing the viscosity class (SAE-class).

Only use multi-purpose oils.

The temperature indications of the SAE-class always refer to fresh oils. In travel operation engine oil ages because of soot and fuel residues. This adversely affects the properties of the engine oil, especially under low ambient temperatures.

Optimal operating conditions can be achieved by using the oil viscosity chart as a reference.

8.3.1.3 Oil change intervals

If the oil change intervals are not reached over a period of one year, the oil change should be performed at least 1 x per year, irrespective of the operating hours reached.

The oil change interval must be halved if at least one of the following conditions applies:

- Permanent ambient temperatures below -10 °C (14 °F)
- Engine oil temperatures below 60 °C (84 °F).

8.3.2 Fuel

8.3.2.1 Fuel quality

In order to fulfil the regulations of the exhaust gas legislation, diesel engines equipped with an exhaust gas aftertreatment system, must only be operated with sulphur-free diesel fuel.

The following fuel specifications are permitted:

- EN 590
- ASTM D975 Grade-No. 1-D S15 and 2-D S15

8.3.2.2 Winter fuel

For winter operation use only winter diesel fuel, to avoid clogging because of paraffin separation.

At very low temperatures disturbing paraffin separation can also be expected when using winter diesel fuel.

Diesel fuels suitable for temperatures down to -44 °C (-47 °F) are available for Arctic climates.

NOTICE!

Danger of engine damage!

– The admixture of petroleum and the addition of "flow enhancing additives" (fuel additives) is not permitted.

8.3.2.3 Storage

Even traces of zinc, lead and copper can cause deposits in the injection nozzles, especially in modern Common-Rail injection systems.

Zinc and lead coatings in refuelling systems and fuel lines are not permitted.

Copper containing materials (copper lines, brass items) should be avoided, because they can cause catalytic reactions in the fuel with subsequent depositing in the injection system.

8.3.3 AdBlue®/DEF

8.3.3.1 AdBlue®/DEF quality

AdBlue® is a non-inflammable, non-toxic, colour and odourless as well as water soluble fluid.

AdBlue® is alternatively also called "Urea" or "DEF" (Diesel Exhaust Fluid).

NOTICE!

Damage to the exhaust gas after-treatment system!

Filling the AdBlue®/DEF tank with cleaning agent or other operating media or fuels, mixing in additives or diluting AdBlue®/DEF will damage the exhaust gas aftertreatment system.

Use only AdBlue®/DEF as per DIN 70070/ISO 22241.

In case of incorrect filling you should contact a qualified expert workshop.

If AdBlue®/DEF comes into contact with spray painted or aluminium surfaces, you should rinse off the affected areas immediately with lots of water.

8.3.3.2 Low outside temperatures

AdBlue®/DEF freezes at a temperature of approx. -11 °C (12 °F). Winter operation is also guaranteed at temperatures below -11 °C (12 °F).

At low temperatures crystals may form on the wound hose between engine and exhaust silencer. Such crystallization does not impair the function of the exhaust gas aftertreatment. If necessary just remove the crystals with clear water.

8.3.3.3 Storage

Use only tanks made of the following material to store AdBlue®/DEF:

- Cr-Ni steels acc. to DIN EN 10 088-1/2/3
- Mo-Cr-Ni steels acc. to DIN EN 10 088-1/2/3
- Polypropylene
- Polyethylene

NOTICE!

Damage to the exhaust gas after-treatment system!

Containers made of the following materials are not suitable for storing AdBlue®/DEF, because components of these materials may dissolve and thus damage the exhaust gas after-treatment system:

- aluminium
- copper
- copper containing alloys
- non-alloyed steel
- galvanized steel

The service life of AdBlue®/DEF without any loss of quality is influenced by the storage conditions.

Exposure of stored containers to direct insolation and UV-radiation must be strictly avoided.

constant storage temperature	Minimum shelf life (months)
< 10 °C (50 °F)	36
< 25 °C (77 °F)	18
< 30 °C (86 °F)	12
< 35 °C (95 °F)	6
> 35 °C (95 °F)	Check the product before use

AdBlue®/DEF should remain in the tank for max. four months.

8.3.3.4 Cleanliness

NOTICE!

Damage to the exhaust gas aftertreatment system!

Contaminated AdBlue®/DEF, e.g. caused by other operating fluids, cleaning agents or dust leads to:

- increased emission values
- damage to catalytic converters
- engine damage
- malfunction of the exhaust gas aftertreatment system.

Always ensure strict cleanliness of the AdBlue®/DEF in order to avoid malfunction of the exhaust gas aftertreatment system.

If you pump AdBlue®/DEF out of the tank, e.g. in case of a repair, do not fill it back into the tank. Otherwise the cleanliness of the fluid can no longer be guaranteed.

8.3.4 Coolant

8.3.4.1 General

For fluid cooled engines the cooling fluid must be prepared by admixing a cooling system protection agent to the fresh water and should be checked within the specified maintenance intervals.

This prevents damage caused by corrosion, cavitation, freezing and overheating.

8.3.4.2 Water quality

The correct quality of water is highly important when preparing coolant. Clear and clean water within the boundaries of the following analysis values should generally be used.

Analysis values	
pH-value at 20 °C (68 °F)	6.5 - 8.5
Chlorine-ion content	max. 100 mg/l
Sulphate ion content	max. 100 mg/l
Water hardness (ion content of calcium and magnesium)	max. 3.56 mmol/l max. 356 mg/l (ppm)
Germ degree:	max. 20 °dH
English degree:	max. 25 °eH

Analysis values	
French degree:	max: 35.6 °fH
Bacteria, fungi, yeasts	not permitted

Information concerning the water quality can be obtained from the waterworks.

If the fresh water analysis values are unknown, these must be determined with the help of a water analysis.

If the values of the analysis deviate, the water must be treated accordingly:

pH-value too low	- Adding of caustic lye of soda or caustic potash solution.
Water hardness too high	- Mix with soft, distilled or fully demineralized water
Chlorides and/or sulphates too high	- Mix with distilled or fully demineralized water

NOTICE!
Danger of engine damage!
– Another analysis must be made after the fresh water has been prepared.

8.3.4.3 Cooling system protection agent

As a protection against frost, corrosion and boiling, anti-freeze agents must be used in any climatic conditions.

Coolant is prepared by adding an ethylene-glycol based anti-freeze agent with corrosion inhibiting properties to the cooling water.

We therefore highly recommend using our BOMAG cooling system protection agent.

If our cooling system protection agent is not available for any important reasons, you may, in exceptional cases, use products that have been approved by the engine manufacturer.

The list of approved lubrication oils is also available on the internet under the following link:

www.deutz.com	
de	SERVICE \ Maintenance \ Betriebsstoffe \ Kühlsystemschutz
en	SERVICE \ Maintenance \ Operating Liquids \ Coolant

Products of the same product group (see Deutz Technical Circular Cooling System Protection Agents) can be mixed with each other.

The BOMAG cooling system protection agent corresponds with product group C.

NOTICE!

Danger of engine damage!

- Do not mix different coolants and additives of any other kind.
- Before changing the product you must clean the entire cooling system.
- Consult our customer service if in doubt.
- The cooling system protection agent must be used all year round, to provide adequate corrosion protection.

The mixing ratio must not be below or exceed the following value:

Cooling system protection agent	Fresh water	Protection against cold down to
min. 35%	65%	-22 °C (-8 °F)
40%	60%	-28 °C (-18 °F)
45%	55%	-35 °C (-31 °F)
max. 50%	50%	-41 °C (-42 °F)

NOTICE!

Danger of engine damage!

- A proportion of more than 50% of cooling system protection agent results in reduced cooling power.
- The use of corrosion protection oils as cooling system protection agents is not permitted.

8.3.5 Hydraulic oil

8.3.5.1 Mineral oil based hydraulic oil

The hydraulic system is operated with hydraulic oil HV 46 (ISO) with a kinematic viscosity of 46 mm^2/s at 40 °C (104 °F) and 8 mm^2/s at 100 °C (212 °F).

When refilling or changing oil, use only hydraulic oil type HVLP according to DIN 51524, part 3, or hydraulic oil type HV according to ISO 6743/4.

The viscosity index must be at least 150 (observe information of manufacturer).

8.3.5.2 Bio-degradable hydraulic oil

The hydraulic system can also be operated with a synthetic ester based biodegradable hydraulic oil.

The biologically quickly degradable hydraulic oil Panolin HLP Synth.46 meets all demands of a mineral oil based hydraulic oil according to DIN 51524.

In hydraulic systems filled with Panolin HLP Synth.46 always use the same oil to top up.

When changing from mineral oil based hydraulic oil to an ester based biologically degradable hydraulic oil, you should consult the lubrication oil service of the oil manufacturer, or our customer service for details.

NOTICE!
Danger of damage to the hydraulic system!

- After the changeover check the hydraulic oil filters increasingly for contamination.
- Have regular oil analyses performed regarding the water content and mineral oil.
- Replace the hydraulic oil filter at the latest after 500 operating hours.

8.3.6 Gear oil SAE 75W-90

Use a fully synthetic gear oil in accordance with SAE 75W-90, API GL5 with a kinematic viscosity of at least 16 mm^2/s at 100 °C (212 °F).

8.4 List of fuels and lubricants

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
Engine oil	SAE 15W-40 Specification: ↳ *Chapter 8.3.1 „Engine oil" on page 155*		009 920 09 20 l	15.5 l (4.1 gal us)
	SAE 10W-40			
	SAE 10W-30			
	SAE 30	SAE 10W		
Fuel	Diesel	Winter diesel fuel		235 l (62 gal us)
	Specification: ↳ *Chapter 8.3.2 „Fuel" on page 157*			
AdBlue®/DEF	Specification: ↳ *Chapter 8.3.3 „AdBlue®/DEF" on page 158*			20 l (5.3 gal us)
Coolant	Mixture of water and anti-freeze agent Specification: ↳ *Chapter 8.3.4 „Coolant" on page 161*		009 940 03 20 l	26 l (6.9 gal us)
Hydraulic system	Hydraulic oil (ISO), HVLP 46 Specification: ↳ *Chapter 8.3.5.1 „Mineral oil based hydraulic oil" on page 164*		009 930 09 20 l	75 l (20 gal us)
	or ester based biodegradable hydraulic oil Specification: ↳ *Chapter 8.3.5.2 „Bio-degradable hydraulic oil" on page 165*			

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
Exciter housing	Gear oil SAE 75W-90 Specification: ↳ *Chapter 8.3.6 „Gear oil SAE 75W-90" on page 165*		009 925 05 20 l	1.6 l each (0.4 gal us)
Drum drive reduction gear	Gear oil SAE 80W-140 Specification: ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166*		009 925 07 20 l	5 l (1.3 gal us)
Drive axle	Gear oil SAE 80W-140 Specification: ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166*		009 925 07 20 l	12.5 l (3.3 gal us)
Axle reduction gear	Gear oil SAE 80W-140 Specification: ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166*		009 925 07 20 l	1.9 l (0.50 gal us)
Wheel hubs	Gear oil SAE 80W-140 Specification: ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166*		009 925 07 20 l	3.7 l each (0.98 gal us)
Tyres	Water + calcium chloride			295 l + 100 kg (80 gal us + 220 lbs)

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
	or water + magnesium chloride			308 l + 87 kg (81 gal us + 192 lbs)
Air conditioning	Refrigerant R134a			1500 g (3.3 lbs)

8.5 Running-in instructions

8.5.1 General

The following maintenance work must be performed when running in new machines or overhauled engines.

NOTICE!
Danger of engine damage!
– Up to approx. 250 operating hours check the engine oil level twice every day.

Depending on the load the engine is subjected to, the oil consumption will drop to the normal level after approx. 100 to 250 operating hours.

8.5.2 After 250 operating hours

1. Tighten all bolted connections on air intake, exhaust, oil sump and engine mounts.
2. Retighten the bolted connections on the machine.
3. Retighten the wheel nuts ↳ *Chapter 8.9.12 „Retightening the wheel nuts“ on page 216.*
4. Oil and filter change on diesel engine ↳ *Chapter 8.8.2 „Change engine oil and oil filter cartridge“ on page 189.*
5. Oil change in drive axle ↳ *Chapter 8.9.6 „Change the oil in the drive axle“ on page 208.*
6. Oil change, drum drive reduction gear ↳ *Chapter 8.9.7 „Change the oil in the drum drive reduction gear“ on page 209.*

7. Oil change in wheel hubs ↳ *Chapter 8.9.8 „Changing the oil in the wheel hubs" on page 211.*
8. Exciter unit oil change. ↳ *Chapter 8.9.9 „Change the oil in the exciter housing" on page 212*
9. Oil change, drum drive reduction gear ↳ *Chapter 8.9.10 „Change the oil in the drum drive reduction gear" on page 214.*

8.5.3 After 500 operating hours

1. Oil and filter change on diesel engine ↳ *Chapter 8.8.2 „Change engine oil and oil filter cartridge" on page 189.*
2. Exciter unit oil change. ↳ *Chapter 8.9.9 „Change the oil in the exciter housing" on page 212*
3. Oil change, drum drive reduction gear ↳ *Chapter 8.9.10 „Change the oil in the drum drive reduction gear" on page 214.*

8.5.4 After 1000 operating hours

1. Oil change in drive axle ↳ *Chapter 8.9.6 „Change the oil in the drive axle" on page 208.*
2. Oil change, drum drive reduction gear ↳ *Chapter 8.9.7 „Change the oil in the drum drive reduction gear" on page 209.*
3. Oil change in wheel hubs ↳ *Chapter 8.9.8 „Changing the oil in the wheel hubs" on page 211.*
4. Exciter unit oil change. ↳ *Chapter 8.9.9 „Change the oil in the exciter housing" on page 212*

5. Oil change, drum drive reduction gear
   ↳ *Chapter 8.9.10 „Change the oil in the drum drive reduction gear“ on page 214.*
6. Retighten the wheel nuts ↳ *Chapter 8.9.12 „Retightening the wheel nuts“ on page 216.*

8.6 Maintenance Table

8.7 Every 250 operating hours

8.7.1 Cleaning the radiator module

NOTICE!
Components may get damaged!
- Dirt on fan blades and oil coolers reduce the cooling effect. Dirt deposits in these areas are substantially supported by oil and fuel on these surfaces. For this reason you should always seal any oil or fuel leaks in the vicinity of the cooling fan or the radiator and clean the cooling fins after.
- Do not damage any cooling fins on the cooler core when cleaning.

Cleaning with compressed air

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine safely *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.
3. **CAUTION!**
   Danger of eye injuries caused by particles flying around!
   - Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

   Blow the radiator out with compressed air from the air discharge side.

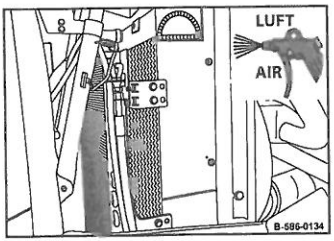


Fig. 152

4. Blow the radiator out with compressed air from the air supply side.

Cleaning with cold cleansing agent

NOTICE!
Electric components can be damaged by water entering into the system!
– Protect electrical equipment such as generator, regulator and starter against the direct water jet.

1. Spray engine and radiator with a suitable cleansing agent, e.g. cold cleansing agent, let it soak in for a while and spray it off with a strong water jet.
2. Warm up the engine for a while to avoid corrosion.

8.7.2 Checking, tensioning the V-belt for the generator system

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
2. Allow the engine to cool down.

8.7.2.1 Checking the condition of the V-belt

Protective equipment:
- Working clothes
- Protective gloves

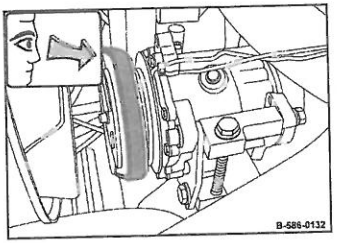


Fig. 153

1. Check the entire circumference of the belt for damage and cracks.
2. Replace a damaged or torn V-belt
↬ *Chapter 8.9.3 „Replacing the air conditioning compressor V-belts“ on page 204.*

8.7.2.2 Checking the V-belt tension

Protective equipment:
- Working clothes
- Protective gloves

Special tool:
- Belt tension tester

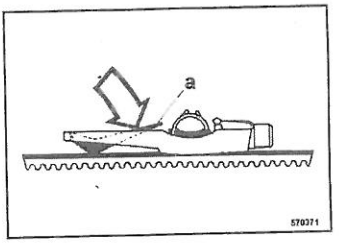


Fig. 154

1. Press the indicator arm (a) of the tester into the gap of the measuring scale.
2. Place the meter in the middle between the V-belt pulleys on the back of the belt.

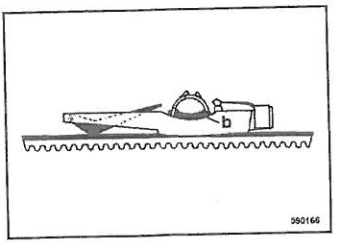


Fig. 155

3. Actuate the push button (b) evenly with a finger under a right angle to the belt, until the pressure spring disengages audibly and noticeably.
   ⇨ The indicator arm remains in the measured position.
4. Take the measuring unit carefully off, without moving the indicating arm.

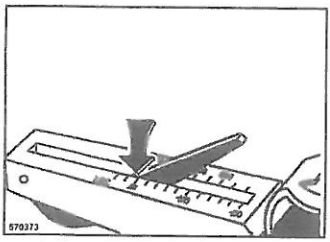


Fig. 156

5. Read the belt tension where the upper edge of the indicating arm intersects with the measuring scale.

Belt tension nominal value

during initial assembly (new belt)	400 N (90 lbf) (cold)
after a running-in time, in case of reassembly	300 N (67 lbf)

6. Tighten the belt, if necessary.

8.7.2.3 Tightening the V-belt

Protective equipment:
- Working clothes
- Protective gloves

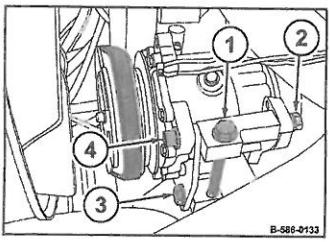


Fig. 157

1. Loosen the screws (2, 3, 4) on the air conditioning compressor.
2. Turn the tensioning screw (1) to tighten the V-belt to the specified value.
3. Tighten screws (2, 3, 4) again.

8.7.3 Checking the oil level in the drive axle

NOTICE!

Components may get damaged!

– Use only gear oil of the permitted specification ↬ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166.*

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition
↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Clean the area around the level inspection plug (1) and unscrew the plug.
   ⇨ The oil level must reach the bottom edge of the level bore.

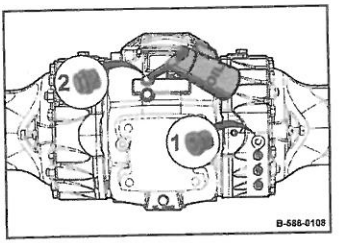


Fig. 158

> *A second inspection plug is located on the left front side of the drive axle.*

3. If necessary clean the area around the filler plug (2) and unscrew the filler plug.
4. Fill in oil through the filler bore, until it starts to run out through the level inspection bore.
5. After filling in oil wait until the oil has evenly distributed inside the axle.
6. Retighten level inspection and filler plugs.

8.7.4 Checking the oil level in the drive axle reduction gear

> **NOTICE!**
> **Components may get damaged!**
> – Use only gear oil of the permitted specification ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140“ on page 166.*

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Clean the area around the level inspection plug and unscrew the plug.
3. The oil level must reach the bottom edge of the bore, top up oil if necessary.
4. Turn the level inspection plug tightly back in.

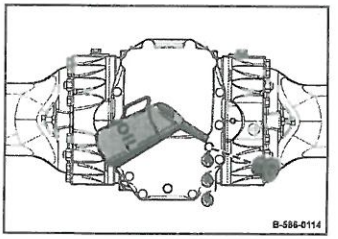


Fig. 159

8.7.5 Checking the oil level in the wheel hubs

NOTICE!
Components may get damaged!
– Use only gear oil of the permitted specification ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140“ on page 166.*

Protective equipment:
- Working clothes
- Protective gloves

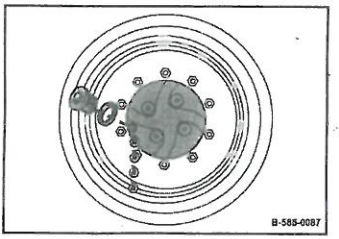


Fig. 160

1. Move the machine until the oil level inspection plug is in horizontal position.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
3. Clean the area around the level inspection plug and unscrew the plug.
4. The oil level must reach the bottom edge of the bore, top up oil if necessary.
5. Turn the level inspection plug tightly back in.

6. Change the oil in both wheel hubs.

8.7.6 Checking the oil level in the exciter housing

NOTICE!
Components may get damaged!
– Use only gear oil of the permitted specification ↬ *Chapter 8.3.6 „Gear oil SAE 75W-90" on page 165.*

Protective equipment:
- Working clothes
- Protective gloves

1. Before checking the oil level, run the machine warm with vibration for about 1/2 hour.
2. Move the drum, until the oil level inspection plug is in bottom position.
3. Park the machine in secured condition ↬ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
4. Clean the area around the level inspection plug and unscrew the plug.
   ⇨ The oil level must reach the bottom edge of the level bore.

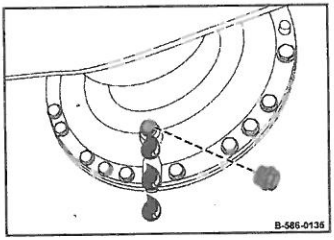


Fig. 161

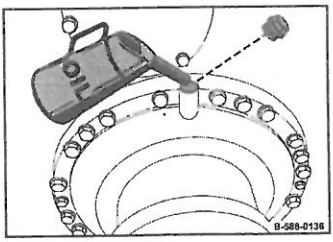


Fig. 162

5. Clean the area around the filler plug and unscrew the filler plug.
6. Fill in oil through the filler bore, until it starts to run out through the level inspection bore.
8. Retighten the filler and level inspection plugs.
9. Repeat this inspection on the other side.
10. If a loss of oil is found, perform trouble shooting, repair the drum if necessary.

8.7.7 Checking the oil level in the drum drive reduction gear

NOTICE!
Components may get damaged!
– Use only gear oil of the permitted specification ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166.*

Protective equipment:
- Working clothes
- Protective gloves

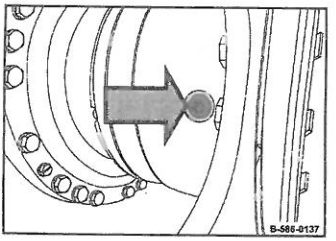


Fig. 163

1. There are 3 inspection plugs arranged around the circumference of the reduction gear, always offset to each other by 90°.

   Move the machine until one level inspection plug is in horizontal position and one inspection plug points vertically up.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
3. Clean the area around the horizontal level inspection plug and unscrew the plug.

   ⇨ The oil level must reach the bottom edge of the level bore.
4. If necessary clean the area around the upper level inspection plug and unscrew the plug.
5. Fill in oil through the opening of the upper level inspection plug, until it starts to run out through the horizontal inspection plug.
6. Retighten both inspection plugs again.

8.7.8 Changing the fresh air filter in the cabin

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↬ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Pull the fastening pins out of the left cover and remove the cover.

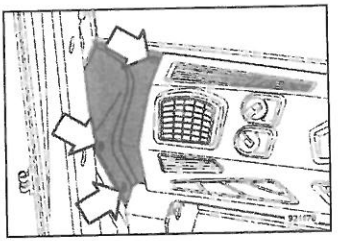


Fig. 164

3. Loosen the fastening screw.
4. Also remove the cover from the right hand side and loosen the fastening screw.

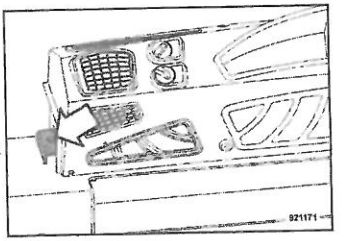


Fig. 165

5. Tilt the console towards the front screen and hold it.

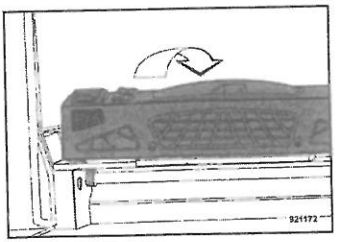
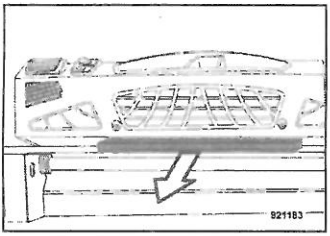


Fig. 166



6. Take out the filter.
7. Insert the new filter and fold the console down again.
8. Tighten the left and right fastening screws and reinstall the covers.

Fig. 167

8.7.9 Check the parking brake

This work must only be performed by authorized service personnel.

8.8 Every 500 operating hours

8.8.1 Running regeneration at standstill

Preliminary remarks

The combustion of diesel fuel produces soot particles, which are filtered out of the exhaust gas in the DPF.

These soot particles are deposited in the DPF and under normal conditions they are burned off to a great extent.

Short engine running times, low engine loads or long engine idle times lead to the formation of soot in the DPF.

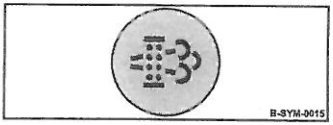


Fig. 168

This load is monitored by the engine control unit. If the load is too high,the regeneration warning light will flash and thus demand regeneration at standstill.

If regeneration at standstill is not carried out or is interrupted and the soot load continues to increase, the engine power will be reduced and the warning buzzer will sound.

If regeneration at standstill is still not carried out after the reduction of engine power, the soot load will continue to increase. The engine power is reduced further. The DPF is overloaded.

NOTICE!
DPF overload!
- In this case of a DPF overload, regeneration must be activated by authorized Service Personnel, or regeneration of the DPF is no longer possible.

Regeneration at standstill should be performed after approx. 500 operating hours.

If the regeneration warning light does not light up, regeneration at standstill can only be activated by authorized service personnel with the help of the engine diagnostics device.

Within the framework of regular maintenance, the regeneration at standstill is performed before the engine oil change.

Regeneration at standstill takes up to 40 minutes.

Keep the engine hood closed until the regeneration at standstill is finished and the exhaust gas temperature warning light has gone out.

Regeneration at standstill

Fig. 169

Prerequisites:

- Regeneration warning light flashing
- If the regeneration warning light is not flashing, you must connect the engine diagnostics device to be able to start regeneration at standstill.

1. **WARNING!**
   Danger of burning by ignited materials!
   – Keep a safe distance to combustible or explosive materials.

   Stop the machine in open terrain.

2. Engage the travel lever to the right (parking brake position).
   ⇨ The parking brake warning light lights up.

   When the travel lever is disengaged out of parking brake position to the left, regeneration at standstill will be aborted.

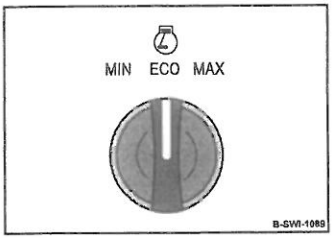


Fig. 170

3. Turn the rotary switch for engine speed to position "Middle" (ECO mode).

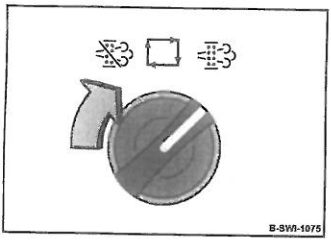


Fig. 171

4. Actuate the rotary button for regeneration to the right.

   ⇨ As soon as regeneration at standstill starts, the engine speed will increase.

   Regeneration at standstill runs automatically and takes up to 40 minutes.

Fig. 172

The regeneration warning light lights up.

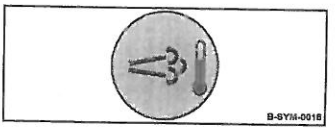


Fig. 173

The increased exhaust gas temperature is indicated by the exhaust gas temperature warning light.

After the regeneration at standstill has been completed, the regeneration warning light goes out.

After the exhaust gas temperature has dropped to its normal level, the exhaust gas temperature warning light will also go out.

8.8.2 Change engine oil and oil filter cartridge

Protective equipment:
- Working clothes
- Protective gloves

During the regeneration at standstill part of the fuel may mix with the engine oil.

You should therefore run a possibly necessary regeneration at standstill before changing the engine oil.

Perform this maintenance work at the latest after one year.

NOTICE!
Danger of engine damage!
- Change the oil only with the engine at operating temperature.
- Use only oil of the permitted specification ↳ *Chapter 8.3.1 „Engine oil" on page 155.*
- Filling quantity: ↳ *Chapter 8.4 „List of fuels and lubricants" on page 167*

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

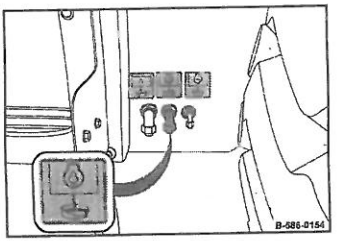


Fig. 174

2. Unscrew the oil drain plug and catch any oil running out.
3. Turn the drain plug tightly back in.

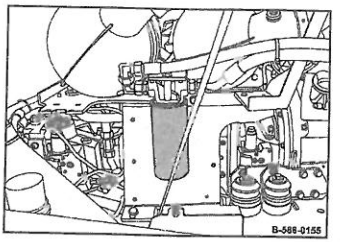


Fig. 175

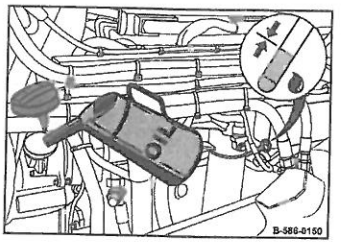


Fig. 176

4. Thoroughly clean the outside of the oil filter cartridge.
5. Unscrew the oil filter cartridge using an appropriate filter wrench.
6. Clean the sealing face on the filter carrier from any dirt.
7. Slightly oil the rubber seal on the new oil filter cartridge.
8. Spin the new oil filter cartridge on and tighten it hand-tight.
9. Fill in new engine oil.
10. After a short test run check the oil level on the dipstick; if necessary, top up to the top dipstick mark.
11. Check oil filter cartridge and drain plug for leaks.
12. Dispose of oil and oil filter cartridge environmentally.

8.8.3 Replacing the fuel filter, bleeding the fuel system

8.8.3.1 Preliminary remarks

NOTICE!

Danger of engine damage!

- Ensure strict cleanliness! Thoroughly clean the area around the fuel filters.
- Air in the fuel system causes irregular running of the engine, a drop in engine power, stalls the engine and makes starting impossible.
- After work on the fuel system bleed the system, perform a test run and check for leaks.
- Additional bleeding of the fuel system by a 5 minute test run in idle speed or low load is mandatory.

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*

8.8.3.2 Replacing the fuel filter

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Protective gloves

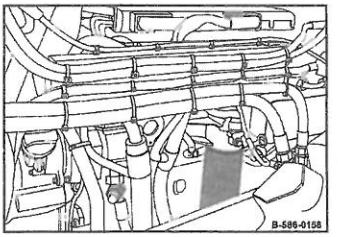


Fig. 177

1. Loosen and unscrew the fuel filter cartridge using an appropriate filter wrench.
2. Clean the sealing face on the filter carrier from any dirt.
3. Slightly oil the rubber seal on the new filter cartridge.
4. Turn the new filter cartridge on by hand, until the seal contacts.
5. Tighten the filter cartridge by another half turn.

8.8.3.3 Replacing the fuel pre-filter

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Protective gloves

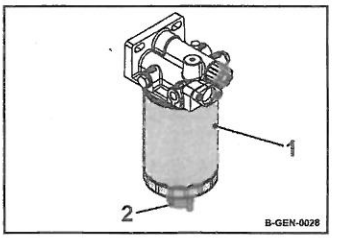


Fig. 178

1. Pull the plug off the sensor on the water separator.
2. Place a collecting vessel under the drain bore.
3. Unscrew the drain plug (2) and catch running out fuel.
4. Loosen and unscrew the fuel pre-filter (1) using a suitable filter wrench.
5. Slightly oil the rubber seal on the new fuel pre-filter element.
6. Spin on the new fuel pre-filter.
7. Turn the oil drain plug back in with a new seal ring.

8. Push the plug on to the sensor on the water separator.
9. Dispose of fuel and filter environmentally.

8.8.3.4 Bleeding the fuel system

Protective equipment:
- Working clothes
- Protective gloves

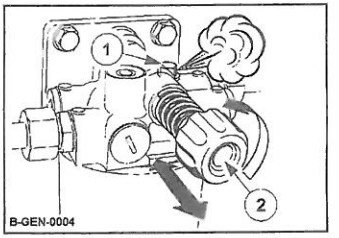


Fig. 179

1. Slacken the bleeding screw (1) on the fuel pre-filter for 2 to 3 turns.
2. Unlock the bayonet lock of the manual fuel pump (2) by pressing it down and turning it anti-clockwise.
3. Operate the hand pump manually, until fuel flows out of the slackened bleeding screw without air bubbles.
4. Then tighten the bleeding screw while pumping.
5. Lock the bayonet lock of the fuel hand pump by pressing it down and turning it clockwise.
6. Start the engine and run it 5 minutes with idle speed.
7. Check the filter cartridges for leaks.

8.8.4 Checking the anti-freeze concentration and the condition of the coolant

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.

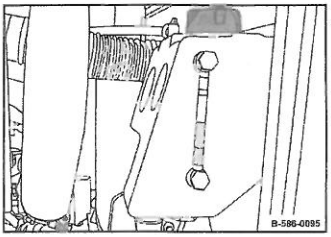


Fig. 180

3. Unscrew the radiator cap and check the anti-freeze concentration with a conventional tester.
4. Check the condition of the coolant.
5. Thoroughly flush the cooling system if the coolant is contaminated by corrosion residues or other suspended matter ↳ *Chapter 8.10.3 „Changing the coolant“ on page 222.*
6. Screw the cap back on again.

8.8.5 Checking the hydraulic lines

This work must only be performed by an expert / qualified person!

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
2. Check all hydraulic lines.

   Hydraulic hoses must be immediately replaced if:

   - the outer layer is damaged down to the inlay (e.g. chafing, cuts, cracks),
   - embrittlement of the outer layer or formation of cracks in the hose material,
   - the hose shows deformation in pressurized and depressurized condition, which do not comply with the genuine shape of the hydraulic hose (e.g. layer separation, formation of blisters, crushed spots, buckling),
   - leaks on hose, socket or fitting,
   - the hydraulic hose has separated from the fitting,
   - fittings are damaged or deformed, whereby the function and strength of the hose - fitting connection is impaired,
   - the fitting shows corrosion that impairs both function and strength,
   - incorrect installation (squeezing, shearing or chafing points),
   - paint covered hydraulic hoses (no detection of identifications or cracks),
   - shelf life and service life exceeded.
3. Replace damaged hydraulic hoses immediately, fasten these properly and avoid chafing.
4. Only operate the machine after it has been repaired.

8.8.6 Servicing the battery, checking the main battery isolation

8.8.6.1 Battery service

Maintenance free batteries also need care. Maintenance free only means that the fluid level does not need to be checked.

Every battery has a self-discharge, which may, if not checked occasionally, even cause damage to the battery as a result of exhaustive discharge.

Exhausted batteries (batteries with formation of sulphate on the plates) are not covered under warranty!

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Remove the battery and clean the battery compartment.
3. Clean the outside of the battery.
4. Clean battery poles and pole clamps and grease them with pole grease (Vaseline).
5. Install the battery and check the battery fastening.
6. On serviceable batteries check the acid level, if necessary top up to the filling mark with distilled water.

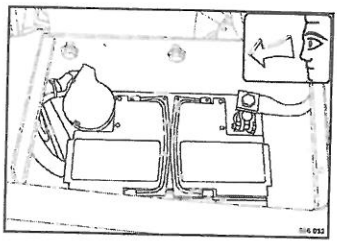


Fig. 181

8.8.6.2 Checking the main battery shutoff

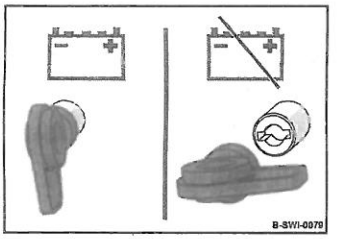


Fig. 182

1. Turn the main battery switch counter-clockwise and pull it out.
2. Check by turning the ignition key, whether the battery is disconnected from the electric system of the machine.

8.8.7 Servicing the air conditioning system

8.8.7.1 Cleaning the condenser

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine safely *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.

The air conditioning condenser is located in front of the radiator.

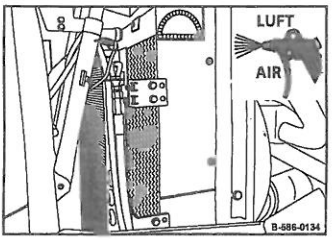


Fig. 183

3. **CAUTION!**
   Danger of eye injuries caused by particles flying around!
   – Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

   Clean the condenser fins with compressed air or water.

8.8.7.2 Air conditioning function test

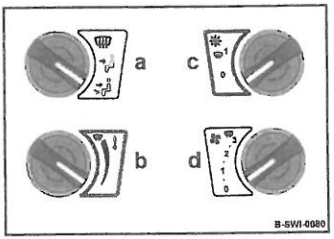


Fig. 184

a Adjust the air distribution
b Regulate the cabin temperature
c Air conditioning on/off
d Fan on/off

1. Start the engine.
2. Switch the fan to the highest stage.
3. Choose the lowest cabin temperature.
4. Switch the air conditioning on.
5. Direct the air flow into the cabin and check, that the flowing out air is considerably cooler.

   ⇨ If the outflowing air is considerably cooler, the air conditioning system is in good working order.

8.8.7.3 Checking the condition of the drier/collector unit

Have the drier/collector unit replaced by our customer service once every year before the operating season.

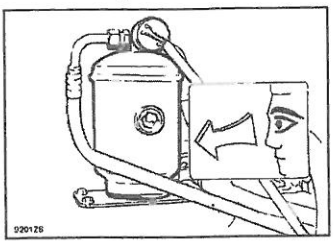


Fig. 185

1. Check the drier/collector unit for mechanical damage or rust.
2. In case of mechanical damage or rust have the drier/collector unit immediately replaced by our customer service.
3. Start the engine.
4. Switch the air conditioning on.

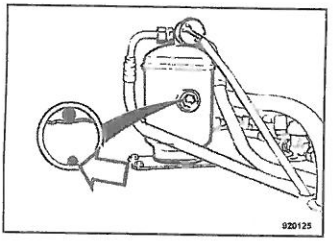


Fig. 186

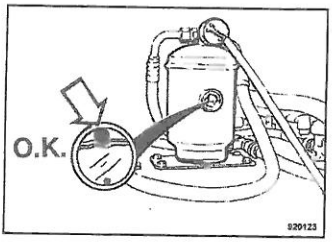


Fig. 187

5. Check the moisture indication pearl inside the inspection glass of the drier/collector unit.

orange	The degree of moisture in the drying agent is correct
colourless	Moisture level of drying agent too high

6. If the moisture level of the drying agent is too high, have the drier/collector unit replaced by our customer service.
7. Check the white floating ball inside the inspection glass of the drier/collector unit.

Ball floats right on top	The refrigerant level is correct
Ball floats at bottom	The refrigerant level is not correct

8. If the refrigerant level is too low, have the air conditioning system inspected by our customer service.

8.9 Every 1000 operating hours

8.9.1 Renewing the AdBlue®/DEF filter

Perform this maintenance work at the latest after three years.

NOTICE!
Components may get damaged!
- If AdBlue®/DEF comes into contact with spray painted or aluminium surfaces while refilling, you should rinse off the affected areas immediately with lots of water.

NOTICE!
Components may get damaged!
- Ensure strict cleanliness! Thoroughly clean the area around the filter housing.
- Take care that no dirt will enter into the filter housing.

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine safely *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down for at least five minutes.

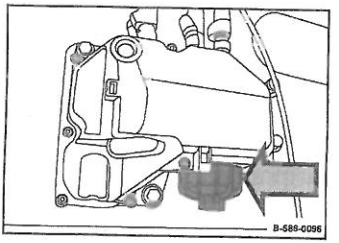


Fig. 188

3. Thoroughly clean the area around the filter housing.
4. Unscrew the filter cover.

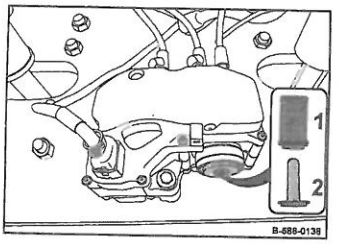


Fig. 189

5. Pull out filter carrier (2) together with filter element (1).
6. Attach the new filter element to the filter carrier and reinsert it into the filter housing.
7. Tighten the filter cover, tightening torque: 23 Nm (17 ft·lbf).
8. Dispose of the filter element in an environmentally friendly way.

8.9.2 Checking the ribbed V-belt

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
2. Allow the engine to cool down.
3. Remove the air conditioning compressor V-belt ↳ *Chapter 8.9.3 „Replacing the air conditioning compressor V-belts" on page 204.*

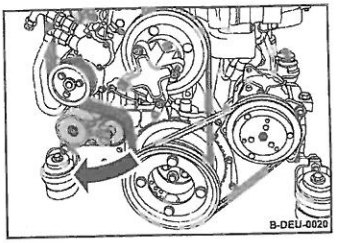


Fig. 190

4. Swing the idler pulley back and fixate it by inserting a locking pin into the fixing bore.
5. Take the ribbed V-belt first off the smallest pulley.
6. Check the condition of tensioning device and pulley (e.g. excessively worn bearings of tensioning device, idler pulley and reversing rollers as well as the profile wear on the pulleys).
7. Replace any damaged parts.

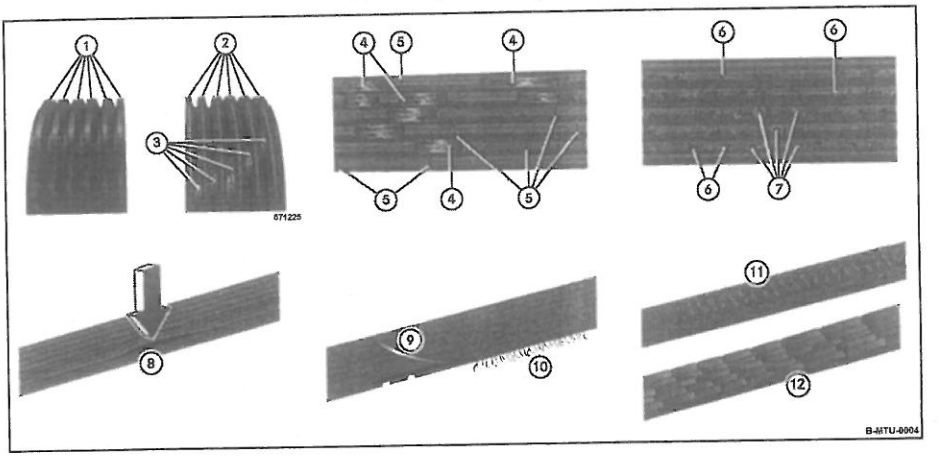


Fig. 191: Images showing damaged ribbed V-belts

1 New condition (for comparison): Trapezoidal shape ribs
2 Flank wear: Ribs wedge shaped
3 Tensile strand in base of belt visible
4 Broken out ribs
5 Transverse cracks in several ribs
6 Rubber bulbs in base of belt
7 Embedding of dirt or stones
8 Ribs loosened from base of belt
9 Tensile strand laterally ripped out

10 Fraying of outer tensile strands
11 Transverse cracks on back
12 Transverse cracks in several ribs

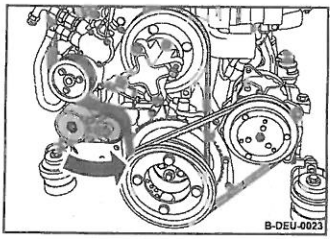


Fig. 192

8. Check the ribbed V-belts for damage by using the images with damaged belts.
9. Replace damaged ribbed V-belts.
10. Install the ribbed V-belt.
11. Pull the locking pin out of the fixing bore and slowly release the idler pulley.
12. Check the correct seat of the ribbed V-belt on the V-belt pulleys.
13. Install the air conditioning compressor V-belt ↳ *Chapter 8.9.3 „Replacing the air conditioning compressor V-belts“ on page 204.*

8.9.3 Replacing the air conditioning compressor V-belts

Perform this maintenance work at the latest after two years.

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.

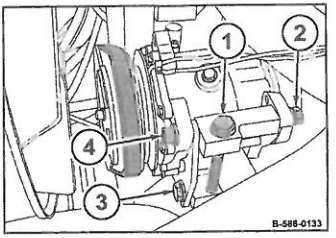


Fig. 193

3. Loosen the screws (2, 3, 4) on the air conditioning compressor.
4. Relieve the V-belt with the tensioning screw (1) and take it off.
5. Install the new V-belt for the air conditioning compressor.
6. Turn the tensioning screw (1) to tighten the V-belt to the specified value ↳ *Chapter 8.7.2.2 „Checking the V-belt tension“ on page 177.*
7. Tighten screws (2, 3, 4) again.

8.9.4 Checking the engine mounts

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.
3. Check air intake and exhaust manifold fastenings for tight fit.
4. Check sockets and clamps between air filter, exhaust turbocharger and charge air line as well as the engine oil lines for tight fit and leaks.
5. Check fastening screws on the engine oil sump and engine mounts for tight fit.
6. Check condition and tight fit of engine pillow blocks.

8.9.5 Replacing the hydraulic oil filter

Perform this maintenance work at the latest after one year.

NOTICE!
Components may get damaged!
- If the filter has to be changed together with the hydraulic oil, the filter must only be changed after the oil change and after the test run.
- Do not use the oil in the filter bowl again.
- Apart from the normal oil change intervals, the filter element must also be changed after major repairs in the hydraulic system.

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.
3. Unscrew filter bowl (4) and take it off with filter element (3).

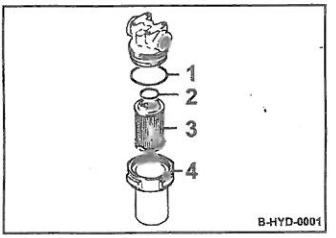


Fig. 194

NOTICE!

Negligence may cause destruction to the entire hydraulic system!

- Visible dirt may be an early sign for the failure of system components and indicate the possible failure of components.
- In this case determine the cause and replace or repair the defective components, if necessary.
- Do not clean or reuse the filter element.

4. Take out the old filter element and clean the filter bowl.
5. Clean the thread on the filter bowl.
6. Reassemble the filter bowl with a new filter element and new O-rings (1, 2).
7. After a short test run check the filter for leaks.
8. Dispose of oil and filter in an environmentally friendly way.

8.9.6 Change the oil in the drive axle

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140" on page 166.*
- Filling quantity: ↳ *Chapter 8.4 „List of fuels and lubricants" on page 167.*

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
2. Clean the area around the drain plug.

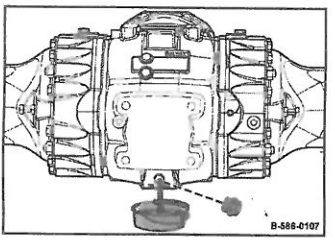


Fig. 195

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

3. Unscrew the drain plug and catch any oil running out.
4. Turn the drain plug tightly back in.

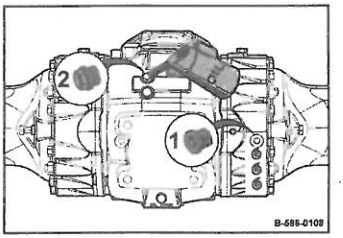


Fig. 196

5. Clean the area around the filler plug (2) and the level inspection plug (1).
6. Unscrew the oil level inspection plug.

> *A second inspection plug is located on the left front side of the drive axle.*

7. Unscrew the filler plug.
8. Fill in oil through the filler bore, until it starts to run out through the level inspection bore.
9. After filling in oil wait until the oil has evenly distributed inside the axle, if necessary fill in some more oil.
10. Retighten level inspection and filler plugs.
11. Dispose of oil in an environmentally friendly way.

8.9.7 Change the oil in the drum drive reduction gear

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↪ *Chapter 8.3.7 „Gear oil SAE 80W-140“ on page 166.*
- Filling quantity: ↪ *Chapter 8.4 „List of fuels and lubricants“ on page 167.*

> *Perform this maintenance work at the latest after one year.*

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition
↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*

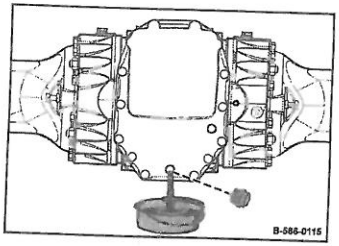


Fig. 197

2. Clean the area around drain plug and level inspection plug.

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

3. Unscrew the drain plug and catch any oil running out.
4. Turn the drain plug tightly back in.
5. Unscrew the oil level inspection plug.
6. Fill in oil through the inspection bore, until it starts to run out through the level inspection bore.
7. Turn the level inspection plug tightly back in.
8. Dispose of oil in an environmentally friendly way.

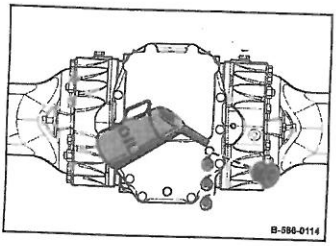


Fig. 198

8.9.8 Changing the oil in the wheel hubs

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↳ *Chapter 8.3.7 „Gear oil SAE 80W-140“ on page 166.*
- Filling quantity: ↳ *Chapter 8.4 „List of fuels and lubricants“ on page 167.*

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Protective gloves

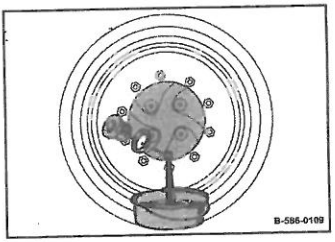


Fig. 199

1. Move the drum, until the oil level inspection plug is in bottom position.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
3. Clean the area around the oil level inspection plug.

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

4. Unscrew the level inspection plug and catch any oil running out.

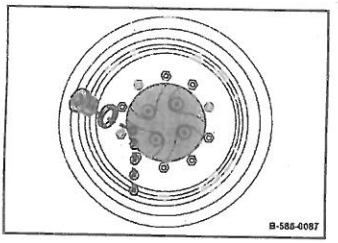


Fig. 200

5. Move the drive wheel, until the oil level inspection plug is in horizontal position.
6. Fill in oil through the inspection bore, until it starts to run out through the level inspection bore.
7. Turn the level inspection plug tightly back in.
8. Change the oil in both wheel hubs.
9. Dispose of oil in an environmentally friendly way.

8.9.9 Change the oil in the exciter housing

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↪ *Chapter 8.3.6 „Gear oil SAE 75W-90" on page 165.*
- Filling quantity: ↪ *Chapter 8.4 „List of fuels and lubricants" on page 167.*

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Protective gloves

1. Before changing the oil level run the machine warm for about 1/2 hour with vibration.
2. Move the drum, until the drain plug is in bottom position.
3. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
4. Clean the area around the drain plug.

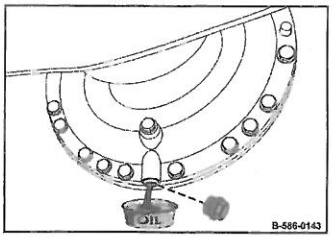


Fig. 201

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

5. Unscrew the drain plug and catch any oil running out.
6. Turn the drain plug tightly back in.
7. Clean the area around the oil level inspection plug.
8. Unscrew the oil level inspection plug.

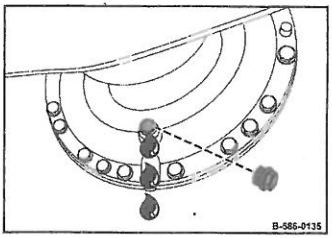


Fig. 202

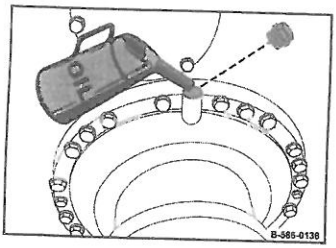


Fig. 203

9. Unscrew the oil filler plug and fill in new oil through the oil filler bore, until oil starts to drip out through the inspection bore.
10. Retighten the filler and level inspection plugs.
11. Change the oil on both sides.
12. Dispose of oil in an environmentally friendly way.

8.9.10 Change the oil in the drum drive reduction gear

NOTICE!

Components may get damaged!

- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↬ *Chapter 8.3.7 „Gear oil SAE 80W-140“ on page 166.*
- Filling quantity: ↬ *Chapter 8.4 „List of fuels and lubricants“ on page 167.*

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Protective gloves

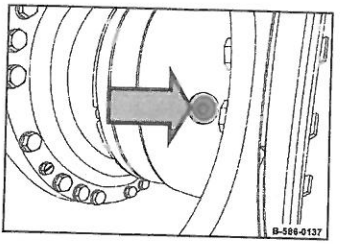


Fig. 204

1. There are three plugs arranged around the circumference of the reduction gear, always offset to each other by 90°.

   Move the machine so that one plug is in horizontal position and the two other plugs are facing vertically upwards and vertically downwards.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
3. Clean the area around the plugs.

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

4. Unscrew the drain plug and catch any oil running out.
5. Turn the drain plug tightly back in.
6. Unscrew the filler and oil level inspection plugs.
7. Fill in oil through the filler plug, until it starts to run out through the oil level inspection plug.
8. Retighten the filler and oil level inspection plugs.
9. Dispose of oil in an environmentally friendly way.

8.9.11 Retightening the fastening of the axle on the frame

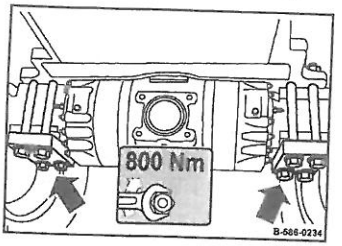


Fig. 205

1. Check all fastening nuts on axle mounting bolts for tight fit, retighten if necessary, tightening torque: 800 Nm (590 ft·lbf).

8.9.12 Retightening the wheel nuts

Protective equipment:
- Working clothes
- Protective gloves

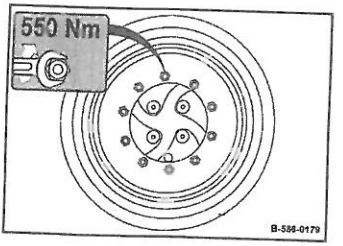


Fig. 206

1. Tighten the wheel nuts cross-wise, tightening torque: 550 Nm (405 ft·lbf).

8.9.13 Checking the ROPS

On machines with cabin the ROPS (roll over protection structure) is an integral part of the cabin.

All bolted connections must comply with the specifications and should be absolutely tight (observe the tightening torques).

Screw and nuts must not be damaged, bent or deformed.

Unusual movements and noises (vibrations) during operation are signs for damage or loosened fastening elements.

1. Inspect the cabin, especially the ROPS, for cracks, corrosion, damage and missing fastening parts.
2. Check the fastening screws for the cabin (ROPS) to the operator's stand for tight fit.
3. Check the rubber buffers of the operator's platform suspension for condition and tight fit.
4. Check the condition and fastening of the seat belts.

8.9.14 Checking the travel control

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition" on page 126.*

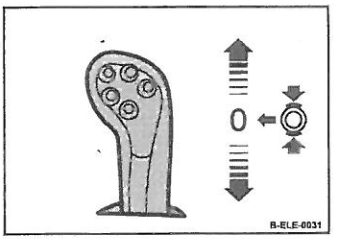


Fig. 207

2. Move the travel lever forward, backwards and to braking position. Thereby check for function, light movement, clearance and damage.
3. In case of malfunction perform trouble-shooting and replace the corresponding parts.
4. Only operate the machine after it has been repaired.

8.9.15 Cleaning the circulation air filter of the heating

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Loosen the locks and remove the cover.
3. Take out the filter.
4. Clean the filter, replace if necessary.
5. Insert the filter and reinstall the cover.

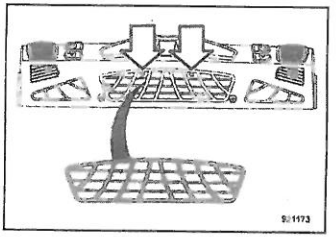


Fig. 208

8.10 Every 2000 operating hours

8.10.1 Adjusting the valve clearance

NOTICE!

Danger of engine damage!

We recommend to have this work carried out by trained personnel or our after sales service.

– Before checking the valve clearance let the engine cool down for at least 30 minutes. The engine oil temperature must be below 80 °C (176 °F).

Valve clearance adjustment angle:	
Intake valve	75° ±15°
Exhaust valve	120° ±15°

Valve	Cylinder					
overlapping	1	5	3	6	2	4
adjustment	6	2	4	1	5	3

Protective equipment:
- Working clothes
- Protective gloves

Special tool:
- Rotation angle disc

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
2. Allow the engine to cool down.
3. Remove the valve cover.
4. Turn the crankshaft with the cranking device until the valves are overlapping.

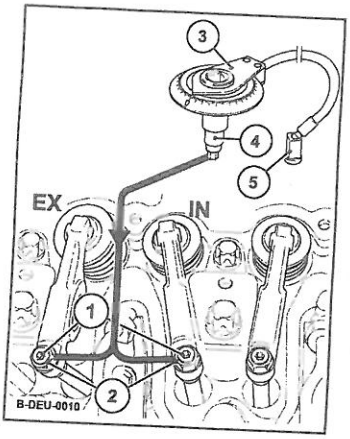


Fig. 209

1 Valve adjustment screw
2 Counter nut
3 Rotation angle disc
4 Socket
5 Magnet

5. Loosen counter nut (2).
7. Attach the rotation angle disc (3) and the spanner socket (4) to the valve clearance adjustment screw (1).
8. Fix the magnet (5) of the rotation angle disc.
9. Turn the rotation angle disc (3) clockwise against the stop (rocker arm no clearance) and set the scale to zero.
10. Turn the rotation angle disc (3) counter-clockwise, until the specified angle is reached.
11. Hold the rotation angle disc tight, so that it does not turn, and tighten counter nut (2), tightening torque: 20 Nm (15 ft·lbf).
12. Repeat this adjustment procedure on all other cylinders, after cranking the crank-shaft accordingly.
13. Install the cylinder head cover again with a new gasket.

    ⇨ Tightening torque: 9 Nm (7 ft·lbf)
14. After a short test run check the engine for leaks.

8.10.2 Changing the hydraulic oil

Perform this maintenance work at the latest after two years.

The hydraulic oil must also be changed after major repairs in the hydraulic system.

Always replace the hydraulic oil filter after each hydraulic oil change. Change the hydraulic oil filter only after the hydraulic oil change and after the test run.

Do not start the engine after draining off the hydraulic oil.

Do not use any detergents to clean the system.

Use only lint-free cleaning cloths for cleaning.

When changing from mineral oil based hydraulic oil to an ester based biologically degradable hydraulic oil, you should consult the lubrication oil service of the oil manufacturer, or our customer service for details.

NOTICE!

Risk of damage!

- Perform the oil change when the hydraulic oil is warm.
- Use only hydraulic oil of the permitted specification ↳ *Chapter 8.3.5 „Hydraulic oil" on page 164.*
- Filling quantity: ↳ *Chapter 8.4 „List of fuels and lubricants" on page 167.*

Protective equipment:

- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
2. Clean the area around hydraulic oil tank, filler opening and filler cap.
3. Remove the cover from the hydraulic oil tank.

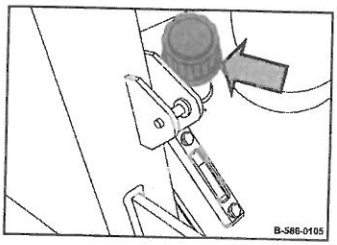


Fig. 210

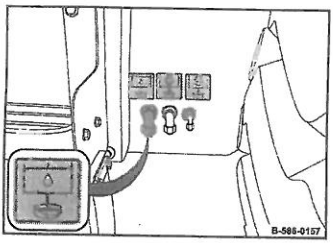


Fig. 211

4. Unscrew the plug.
5. Drain off and collect all hydraulic oil.
6. Turn the plug tightly back in.

> *We recommend to use our filling and filtering unit with fine filter to fill the system. This ensures finest filtration of the hydraulic oil, prolongs the lifetime of the hydraulic oil filter and protects the hydraulic system.*

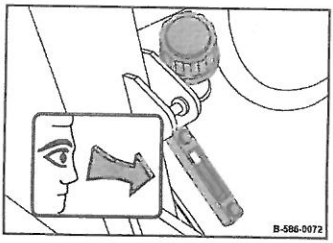


Fig. 212

7. Fill in new hydraulic oil.
8. Check the oil level in the inspection glass.
   ⇨ **Normal level:** approx. 3 cm (1.2 in) below the top edge of the inspection glass.

   Minimum level: Middle of inspection glass
9.

> *The breather filter for the hydraulic oil tank is integrated in the cap, you must therefore replace the complete cap.*

   Close the tank with a new cap.
10. Dispose of oil in an environmentally friendly way.

8.10.3 Changing the coolant

> *Perform this maintenance work at the latest after two years.*

Do not start the engine after draining off the coolant.

In case of lubrication oil entering into the cooling system or a suspicious turbidity caused by corrosion residues or other suspended matter, the coolant must be drained off and the complete cooling system needs to be cleaned.

Oil can damage the sealing materials used in the cooling system.

If oil has entered, you must add a cleansing agent in order to remove any residues from the system. Follow the instructions of the manufacturer! If in doubt, consult your Customer Service or the engine manufacturer.

When changing the coolant without any signs of contamination, cleaning of the cooling system is not necessary.

NOTICE!

Danger of engine damage!

- Use only coolant of the permitted specification ↳ *Chapter 8.3.4 „Coolant“ on page 161.*
- Do not mix different coolants and additives of any other kind.
- Filling quantity: ↳ *Chapter 8.4 „List of fuels and lubricants“ on page 167*

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.

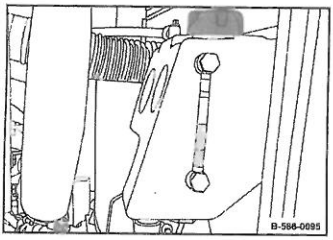


Fig. 213

3. Unscrew the lid from the compensation tank.

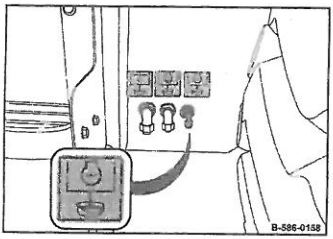


Fig. 214

4. Unscrew the plug.
5. Drain off and collect all fluid.
6. Turn the drain plug tightly back in.
7. Check the condition of the coolant.
8. Thoroughly flush the cooling system if the coolant is contaminated by corrosion residues or other suspended matter.
9. Remove the thermostat.
10. Fill in clean water.
11. Start the engine and run to operating temperature.
12. Allow the engine to cool down to approx. 50 °C (122 °F).
13. Drain all water off.
14. When using a cleansing agent repeat the flushing process twice with clear water.
15. Reinstall the thermostat.

NOTICE!
Danger of engine damage!
The anti-freeze concentration (additive) must be at least 35 Vol% and maximum 45 Vol%.

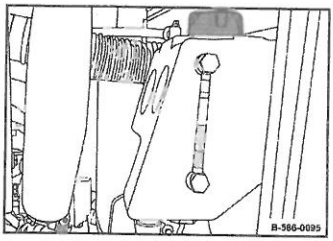


Fig. 215

16. Fill in coolant and tighten the locking cap on the compensation tank.

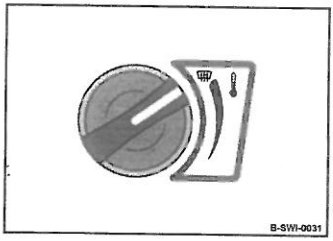


Fig. 216

17. Set maximum cabin temperature.

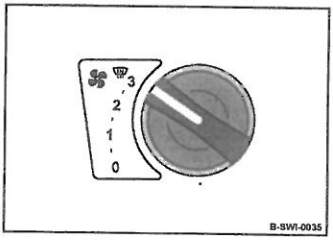


Fig. 217

18. Set maximum blowing range.
19. Start the engine ↳ *Chapter 6.3 „Starting the engine“ on page 109*.
20. Run the machine with idle speed until operating temperature has been reached and the thermostat opens.
21. As soon as the thermostat has opened, run the engine for approx. 1 minute at high speed.
22. Shut down the engine.
23. Allow the engine to cool down.

24. Check the coolant level again when the engine has cooled down, top up if necessary.
25. Dispose of the coolant in an environmentally friendly way.

8.10.4 Checking, cleaning the components of the exhaust gas aftertreatment system

This work must only be performed by authorized service personnel.

1. Check, clean the charge pressure sensor.
2. Check, clean the Venturi sensor and the exhaust gas recirculation system adapter plate underneath.
3. Check, clean the differential pressure sensor of the DPF

8.11 Every 4000 operating hours

8.11.1 Replace ribbed V-belt and idler pulley

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.
3. Remove the air conditioning compressor V-belt ↳ *Chapter 8.9.3 „Replacing the air conditioning compressor V-belts“ on page 204.*

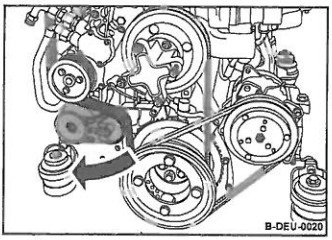


Fig. 218

4. Swing the idler pulley back and fixate it by inserting a locking pin into the fixing hole.
5. Take the ribbed V-belt off the smallest pulley first.
6. Unscrew fastening screw and take off the idler pulley.
7. Attach the new idler pulley and tighten the fastening screw; tightening torque of 80 Nm (59 ft·lbf).

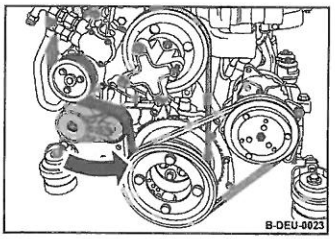


Fig. 219

8. Install the new ribbed V-belt.
9. Pull the locking pin out of the fixing hole and slowly release the idler pulley.
10. Check the correct seat of the ribbed V-belt on the V-belt pulleys.
11. Install the air conditioning compressor V-belt ↳ *Chapter 8.9.3 „Replacing the air conditioning compressor V-belts“ on page 204.*

8.12 As required

8.12.1 Air filter maintenance

NOTICE!

Danger of engine damage!

- Do not start the engine after having removed the air filter.
- If necessary, the air filter may be cleaned up to six times. After one year at the latest it must be replaced together with the safety element.
- Cleaning does not make sense if the air filter element is covered with a sooty deposit.
- Do not use gasoline or hot fluids to clean the filter element.
- After cleaning, the air filter must be inspected for damage using a torch.
- Do not continue to use a damaged air filter element. If in doubt use a new air filter.
- If the air filter is damaged, the safety element must be replaced as well.
- The safety element must not be cleaned.

We generally recommend to renew the air filter. A new filter element is far less expensive than a possible engine damage.

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

Fig. 220

1. Maintenance of the air filter is due when the air filter warning light lights up, but at the latest after one year.
2. Park the machine in secured condition ↬ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
3. Allow the engine to cool down.
4. Loosen both locking hooks on the housing cover and take the cover off.
5. Clean housing cover and dust discharge valve.

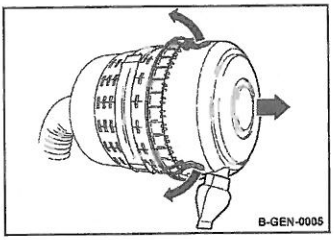


Fig. 221

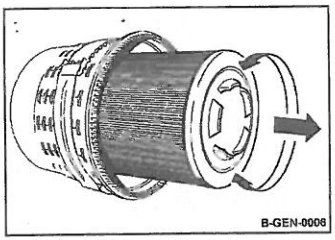


Fig. 222

6. Pull out the air filter with light turning movements.

CAUTION!
Danger of eye injuries caused by particles flying around!
- Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

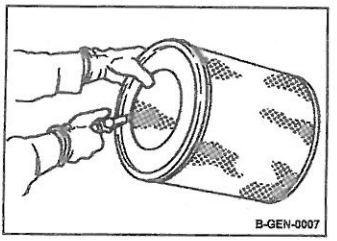


Fig. 223

7. Blow the air filter out with dry compressed air (max. 2.1 bar (30 psi)) from inside to outside by moving the gun up and down inside the element, until it is free of dust.

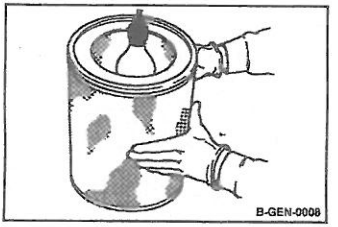


Fig. 224

8. Examine the air filter with a torch for cracks and holes in the paper bellows.
9. In case of damage replace the air filter and the safety element.

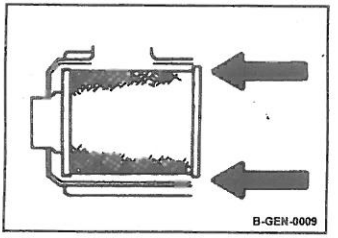


Fig. 225

10. Slide the air filter carefully into the housing.

NOTICE!
Danger of engine damage!
- The dust discharge valve must point vertically downwards.
- Make sure that the cover locks engage correctly.

11. Reassemble the housing cover.

8.12.1.1 Replacing the safety element

NOTICE!

Danger of engine damage!

The safety element must not be cleaned and should not be used again after it has been removed.

The safety element must be replaced:

- if the air filter is damaged.
- at the latest after one year.
- if the air filter warning light comes on again after the air filter has been cleaned.

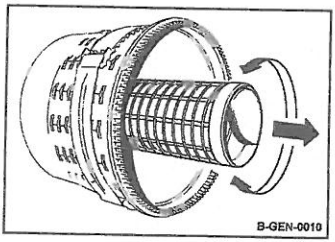


Fig. 226

1. Remove the housing cover and pull the air filter element off.
2. Pull the safety element out by turning it lightly.
3. Push in a new safety element.
4. Insert the air filter and reassemble the housing cover.

8.12.2 Checking, cleaning the water separator

The service intervals for the water separator depend on the water content in the fuel and can therefore not be determined precisely.

After taking the engine into operation you should check the filter bowl for signs of water and dirt initially every day, later as required.

If a too high quantity is drained off, the filter needs to be bled.

Protective equipment:
- Working clothes
- Protective gloves

Fig. 227

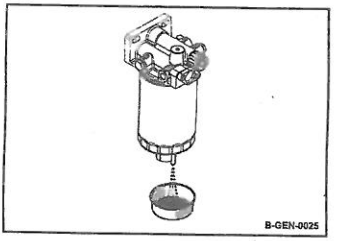


Fig. 228

1. If the "water in fuel" warning light lights up when starting or during operation, drain the water from the fuel pre-filter immediately.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition" on page 126.*
3. Slacken the drain plug for a few turns and collect leaking fluid.
4. Turn the drain plug tightly back in. Check for leaks, if necessary use a new seal ring.

   ⇨ Once the water separator is empty, the warning light for water in fuel must go out.

8.12.3 Retightening the padfoot shell

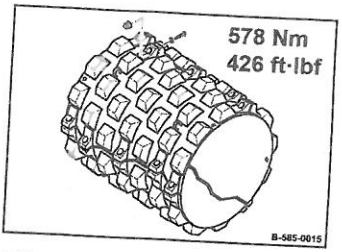


Fig. 229

After the installation of the padfoot shell, all fastening screws must be retightened.

1. Run an approx. two minute test drive with vibration.
2. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
3. Retighten all fastening screws.
4. After approx. 60 minutes work retighten all fastening screws again.

8.12.4 Adjust the scrapers

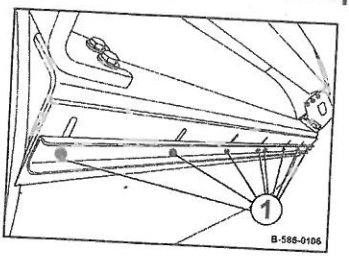


Fig. 230

1. Check adjustment and condition of front and rear scrapers, if necessary adjust or replace the scraper rubber.
2. In order to adjust the scrapers, slacken the fastening screws (1) in the slots and push the scraper towards the drum to contact.
3. Fasten the fastening screws again.

8.12.5 Cleaning the machine

Clean the machine thoroughly at least once a week.

If necessary, clean the machine daily for example when used on highly cohesive soils or cement.

Do not climb on the machine to clean it.

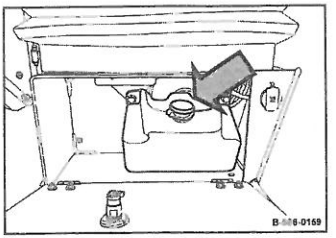
WARNING!
Danger of injury caused by falling off the platform!
– Always ensure safe standing.

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine in secured condition *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Allow the engine to cool down.
3. When cleaning with a high pressure cleaner, do not subject electrical parts and insulation material to the direct jet of water, or cover them beforehand.
4. If necessary, clean the windows using a telescopic rod.

8.12.6 Filling the windscreen washer tank

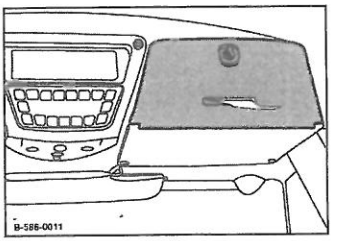


1. Open the flap under the driver's seat on the left hand side.
2. Check the fluid level in the provision container, top up if necessary.
3. If there is a risk of frost, you may also fill the provision container with an anti-freeze mixture.

Fig. 231

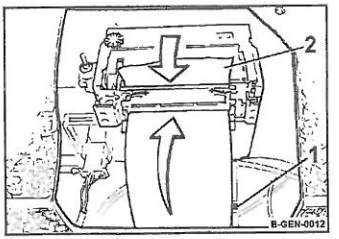
8.12.7 Replacing the paper roll in the printer

Use a new paper roll if a red stripe appears on the paper.



1. Open the cover.

Fig. 232



2. Remove shaft (1) with the rest of the paper roll (2).

Fig. 233

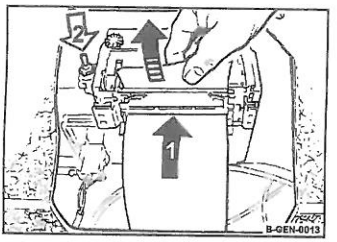


Fig. 234

3. Insert a new paper roll.
4. Feed the paper into the guide (1) on the printer.
5. Actuate the toggle switch (2) in direction of arrow, until the paper comes out of the slot with tear-off edge.
6. Close the cover↳ Fig. 232.

8.12.8 Replacing the printer ribbon in the printer

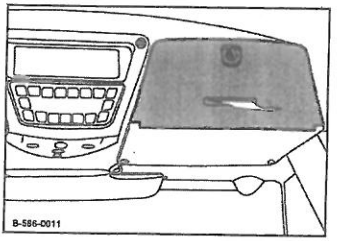


Fig. 235

1. Open the cover.

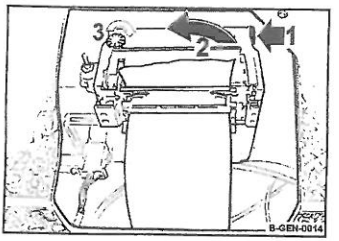


Fig. 236

2. Lift the tongue at point (1) and take the printer ribbon (2) out of the printer.
3. Insert the new printer ribbon into the printer, then press in the tongue (1) on the right.
4. Tension the printer ribbon by turning the rotary button (3) in direction of arrow.
5. Close the cover.

8.12.9 Drain the fuel tank sludge

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.8 „Parking the machine in secured condition“ on page 126.*
2. Unscrew the drain plug and drain off and catch approx. 5 litres of fuel.
3. Turn the drain plug tightly back in.
4. Dispose of fuel environmentally.

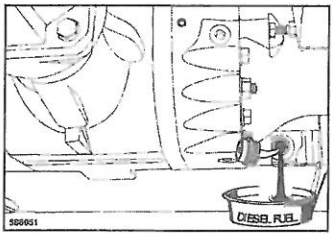


Fig. 237

8.12.10 Measures prior to extended shutdown period

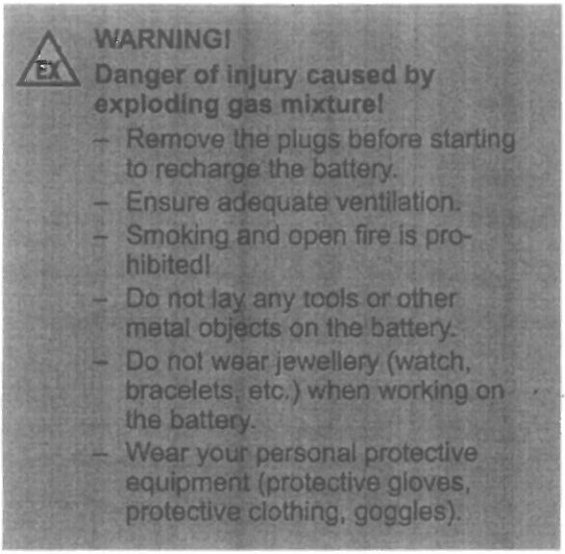
8.12.10.1 Measures before shutting down

If the machine is shut down for a longer period of time, e.g. winter season, the following work must be carried out:

1. Clean the machine thoroughly.
2. Clean the water separator.
3. Fill the fuel tank with diesel fuel, to prevent the formation of condensation water in the tank.
4. Change engine oil and oil filter if the oil has been changed more than 300 hours ago, or if the oil is older than 12 months.
5. After shutting down store the machine under cover in a dry and well ventilated room. The room temperature should thereby not drop below -10 °C (14 °F), to prevent freezing of the AdBlue®/DEF.
6. Check the anti-freeze concentration and the coolant level.

7. Completely fill the AdBlue®/DEF tank, to avoid crystallizing of AdBlue®/DEF.
8. Disconnect the ground strap from the battery (this avoids self-discharge caused by closed-circuit consuming devices).

8.12.10.2 Battery service during prolonged machine downtimes



Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Switch off all consuming devices (e.g. ignition, light).
2. Measure the open-circuit voltage of the battery at regular intervals (at least 1 x per month).

   ⇨ Reference values: 12.6 V = fully charged; 12.3 V = discharged to 50%.

3. Recharge the battery immediately after an open-circuit voltage of 12.25 V or less is reached. Do not perform boost charging.
   ⇨ The open-circuit voltage of the battery occurs approx. 10 hours after the last charging process or one hour after the last discharge.
4. Switch off the charging current before removing the charging clamps.
5. After each charging process allow the battery to rest for one hour before taking it into service.
6. For standstill periods of more than one month you should always disconnect the battery. Do not forget to perform regular open-circuit voltage measurements.

8.12.10.3 Measures before restarting

1. Replace the fuel filter.
2. Replace the air filter.
3. Change engine oil and oil filter.
4. For storage periods exceeding four months, empty the AdBlue®/DEF tank and fill it completely with new AdBlue®/DEF.
5. In case of storage periods exceeding four months you should renew the AdBlue®/DEF filter.
6. Check the coolant level.
7. Check the charge condition of the batteries, recharge if necessary. Check the battery fluid level before and after charging.
8. Connect the ground straps to the batteries.
9. Check the function of the electric system.

10. Check cables, hoses and lines for cracks and leaks.
11. Start the engine and run it for 15 to 30 minutes with idle speed.
12. While the engine is running keep an eye on the gauges for engine oil pressure and coolant temperature.
13. Check the oil levels.
14. Check the function of electric system, steering and brakes.
15. Clean the machine thoroughly.

9.1 Preliminary remarks

Malfunctions are frequently caused by incorrect operation of the machine or insufficient maintenance. Whenever a fault occurs you should therefore thoroughly read these instructions on correct operation and maintenance.

If you cannot locate the cause of a fault or rectify it yourself by following the trouble shooting chart, you should contact our customer service department.

9.2 Starting the engine with jump leads

NOTICE!

A wrong connection will cause severe damage in the electric system.

– Bridge the machine only with a 12 Volt auxiliary battery.

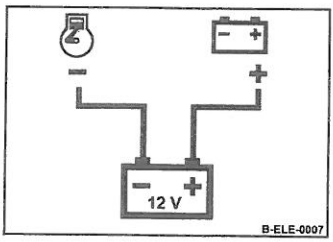


Fig. 238

1. Connect the plus pole of the external battery first with the plus pole of the vehicle battery using the first jump lead.
2. Then connect the second battery cable first to the minus pole of the current supplying auxiliary battery and then to engine or chassis ground, as far away from the battery as possible.
3. Start the engine ↪ *Chapter 6.3 „Starting the engine" on page 109.*

NOTICE!

Danger of damage to the electronic system!

If no powerful consuming device is switched on, voltage peaks may occur when separating the connecting cables between the batteries, which could damage electrical components.

4. Once the engine is running switch on a powerful consumer (working light, etc.).
5. After starting disconnect the negative poles first and the positive poles after.
6. Switch off the consumer.

9.3 Fuse assignment

9.3.1 Notes on safety

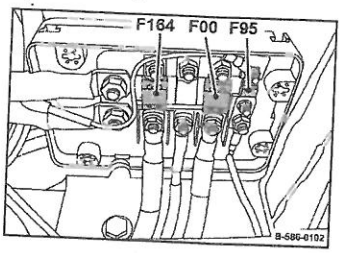
WARNING!
Danger of injury by fire in the machine!
– Do not use fuses with higher ampere ratings and do not bridge fuses.

9.3.2 Central electrics

Fuse	Amperage	Designation
F05	20 A	12-V socket
F07	10 A	Hazard light
F08	10 A	Direction indicators
F09	10 A	Parking and tail light, left
F10	10 A	Parking and tail light, right
F11	15 A	Head lights, front
F13	15 A	Starter switch
F19	15 A	Working head lights, front
F22	15 A	Working head lights, rear
F23	15 A	Warning horn
F24	10 A	Instrument cluster
F29	15 A	Compressor - air suspended seat, seat heating
F39	80 A	Main fuse for cabin
F40	30 A	Heating, air conditioning, fan
F67	15 A	Control (potential 30)
F68	15 A	Reserve (potential 30)
F84	10 A	Control (contact 54)

Fuse	Amperage	Designation
F91	5 A	Sensors
F103	15 A	Reserve (potential 15)
F122	10 A	Engine control
F124	25 A	Fuel pre-heating
F146	15 A	Control (potential 30)
F148	10 A	Control (potential 15)
F157	30 A	Starter
F169	5 A	Start current
F243	7.5 A	BOMAG TELEMATIC (potential 30)
F244	5 A	BOMAG TELEMATIC (potential 15)
F268	20 A	Fuel pump
FM1	1 A	Sensors
FM2	1 A	Sensors

9.3.3 Main fuses



The main fuse box is located in the engine compartment.

Fig. 239

Fuse	Amperage	Designation
F164	150 A	(B+) charge line
F00	125 A	Main fuse (potential 30)
F95	30 A	Engine control

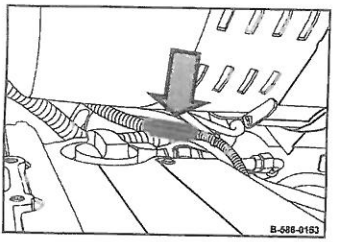


Fig. 240

Fuse	Amperage	Designation
F48	150 A	Preheating system

9.3.4 Exhaust gas after-treatment system

The fuse box for the exhaust gas aftertreatment system is located in the engine compartment under the battery cover.

Fuse	Amperage	Designation
F238	15 A	Exhaust gas recirculation
F250	30 A	SCR-control
F251	10 A	NO_x-Sensors *(NO_x: Nitric oxides)*
F310	5 A	Sensor for AdBlue©/DEF quality
F312	20 A	Spare
F313	20 A	Spare

9.3.5 Control console cabin

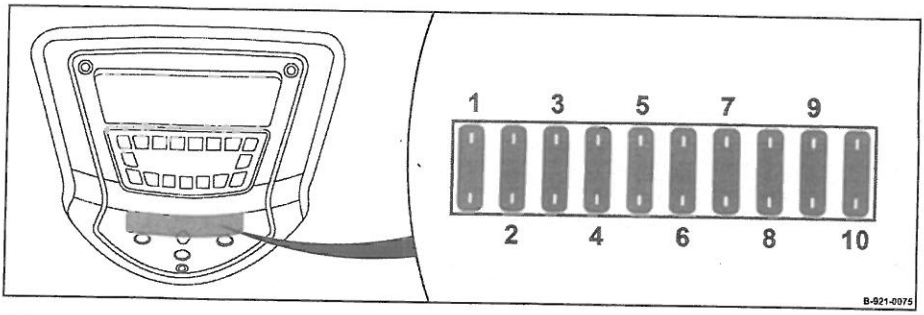


Fig. 241

Position	Fuse	Amperage	Designation
1	F17	5 A	Radio
2	F264	10 A	BCM
3	F271	10 A	BCM net
4	F150	5 A	GPS
5	F266	10 A	Radio/Tachograph
6	F143	20 A	Rear windscreen heating
7	F28	15 A	Rear windscreen wiper
8	F27	15 A	Front windscreen wiper
9	F279	15 A	Spare
10	F272	5 A	Control console cabin

9.4 Engine malfunctions

Fault	Possible cause	Remedy
Engine does not start or starts poorly	Fuel tank empty	Refuel, bleed the fuel system
	Temperature below starting limit	Check
	Cold starting device	Check, replace if necessary
	Engine oil with wrong SAE viscosity class	Changing the engine oil
	The fuel quality does not meet the requirements	Change the fuel
	Battery defective or not charged	Check
	Cable connection to starter loose or oxidized	Check cable connection
	Starter defective or pinion does not engage	Check starter
	Incorrect valve clearance	Check, adjust if necessary
	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Air in the fuel system	Bleeding the fuel system
	Compression pressure too low	Check
	Exhaust gas counter-pressure too high	Check
	Injection line leaking	Check
	High pressure pump defective	Check, replace if necessary
Engine does not start and central warning light is flashing	Engine electronics prevent starting	Check fault code, repair as necessary

Fault	Possible cause	Remedy
Engine starts but runs irregularly or misfires	V-belt/ribbed V-belt (fuel pump in belt drive)	Check if torn or loose
	Incorrect valve clearance	Check, adjust if necessary
	Compression pressure too low	Check
	Cold starting device	Check, replace if necessary
	Air in the fuel system	Bleeding the fuel system
	Fuel pre-filter soiled	Check, clean the water separator, replace the fuel pre-filter
	The fuel quality does not meet the requirements	Change the fuel
	Injector defective	Replace
	Injection line leaking	Check
	Engine wiring loom defective	Check, replace if necessary
Speed changes are possible and central warning light flashes	Engine electronics detected a system fault and activates a substitute speed	Check fault code, repair as necessary
The engine overheats, the coolant temperature warning light flashes	Ventilation line to the coolant compensation tank clogged	Clean
	Incorrect valve clearance	Check, adjust if necessary
	Injector defective	Replace
	Coolant radiator soiled	Clean
	Coolant pump defective (V-belt torn or loose)	Check if torn or loose
	Lack of coolant	Check the coolant level, refill if necessary
	Resistance in cooling system too high / flow rate too low	Check the cooling system

Troubleshooting – Engine malfunctions

Fault	Possible cause	Remedy
	Fan defective / V-belt torn or loose	Check fan / V-belt, replace if necessary
	Intercooler soiled	Clean
	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Throttle valve defective	Check, replace if necessary
	Coolant temperature sensor	Check, replace if necessary
	Coolant thermostat defective	Check, replace if necessary
	Coolant cover defective	Check, replace if necessary
Insufficient engine power	Engine oil level too high	Check, drain off if necessary
	Throttle valve defective	Check, replace if necessary
	Exhaust gas recirculation, actuator defective	Check, replace if necessary
	Fuel intake temperature too high	Check the system
	The fuel quality does not meet the requirements	Change the fuel
	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Fan defective / V-belt torn or loose	Check fan / V-belt, replace if necessary
	Charge air line leaking	Check
	Intercooler soiled	Clean
	Exhaust gas counter-pressure too high	Check, clean if necessary
	Injection line leaking	Check
	Injector defective	Replace
	Exhaust turbo charger defective	Replace

Fault	Possible cause	Remedy
Insufficient engine power and central warning light flashes	Engine electronics reduce the power	Check fault code, repair as necessary
Engine does not work with all cylinders	Injection line leaking	Check
	Injector defective	Check, replace if necessary
	Incorrect valve clearance	Check, adjust if necessary
	Compression pressure too low	Check
	Engine wiring loom defective	Check, replace if necessary
Engine has too low or no oil pressure	Engine oil level too low	Check, refill if necessary
	Engine oil with wrong SAE viscosity class	Changing the engine oil
	Lubrication oil pressure sensor defective	Check, replace if necessary
	Lubrication oil control valve jammed	Check, clean if necessary
	Lubrication oil suction pipe blocked	Check, clean if necessary
Engine has excessive lubrication oil consumption	Engine oil level too high	Check, drain off if necessary
	Crankcase ventilation	Check, replace if necessary
	Engine oil with wrong SAE viscosity class	Changing the engine oil
	Valve shaft seals defective	Check, replace if necessary
	Piston rings worn	Check, replace if necessary
	Exhaust turbo charger defective	Check, replace if necessary
Blue engine exhaust smoke	Engine oil level too high	Check, drain off if necessary
	Crankcase ventilation	Check, replace if necessary
	Engine oil with wrong SAE viscosity class	Changing the engine oil

Fault	Possible cause	Remedy
	Valve shaft seals defective	Check, replace if necessary
	Piston rings worn	Check, replace if necessary
	Exhaust turbo charger defective	Check, replace if necessary
White engine exhaust smoke	Coolant in exhaust gas	Check
	Condensation water	Warm up the engine to evaporate water residues
Black engine exhaust smoke	Diesel particulate filter (DPF) defective	Check, replace if necessary
Fault in the SCR-system (exhaust gas aftertreatment)	AdBlue®/DEF-tank empty/ level indicator shows full	Check filling level sensor
	SCR does not work	Check plug-in connections of cables on feed pump and injector.
		Check plugs and lines of feed pump, NO_x sensor and exhaust gas temperature sensor.
Frequent regeneration at standstill	Air filter clogged/exhaust turbocharger defective	Check, replace if necessary
	Incorrect valve clearance	Check, adjust if necessary
	Charge air line leaking	Check
	Injector defective	Replace
	Differential pressure flow meter defective	Replace
	NO_x sensor defective	Replace

10.1 Final shut-down of machine

If the machine can no longer be used and needs to be finally shut down you must carry out the following work and have the machine disassembled by an officially recognized specialist workshop.

WARNING!
Health hazard caused by fuels and lubricants!
- Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 „Handling fuels and lubricants“ on page 32.*

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

1. Remove the batteries and dispose of in compliance with legal regulations.
2. Empty the fuel tank.
3. Drain the hydraulic oil tank.
4. Empty the AdBlue®/DEF tank.
5. Drain coolant from cooling system and engine.
6. Drain off engine oil.
7. Drain off gear oil.

11 List of special tools

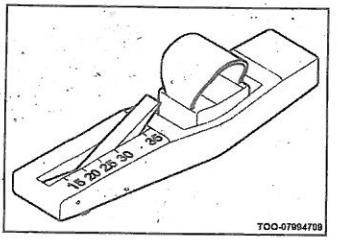


Fig.

Belt tension tester
BOMAG No. 079 947 09

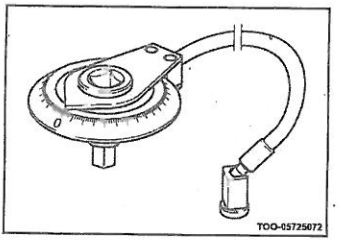


Fig.

Rotation angle disc
BOMAG 057 250 72