en **Operator's manual**

Wheel loader

L 576-1169

From serial number 40349

Document ID

ORIGINAL OPERATOR'S MANUAL

Order number: 11837099
Issued: 06-2016
Version: 02
Author: LBH / Technical Documentation Department

Product ID

Manufacturer: Liebherr-Werk Bischofshofen GmbH
Type: L 576
Type no.: 1169
From Serial no.: 40349

Conformity: CE

Contact

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Parking brake

Electrohydraulically actuated spring accumulator brake system on the transmission.

1.2.8 Steering

Type:
- Load sensing swash plate variable displacement pump with pressure cut-off and flow regulator.
- Central articulated joint with two dual-action steering cylinders with shock absorbers.

Emergency steering: Electrohydraulic emergency steering system

Description	Unit	Value
Angle of articulation to each side		40°

1.2.9 Working hydraulics

- Load sensing swash plate variable displacement pump with power regulator and flow regulator, pressure cut-off in control valve block.
- Hydraulic oil cooling with thermostatically controlled fan and oil cooler.
- Return filter in the hydraulic tank.
- Single-lever control, hydraulic servo system.

Lifting cycle:
- Lifting, neutral, lowering
- Float position using lockable control lever
- Automatic lift kick-out (this attachment is optional)

Tilting cycle:
- Tilt out, neutral, tilt in
- Automatic bucket return-to-dig function

Description	Unit	Value
Maximum flow	l/min	290
Maximum operating pressure for Z kinematics	bar	350 $^{\pm 5}$
Maximum operating pressure for industrial lift arms	bar	380$^{\pm 5}$

1.2.10 Lift arms

Lift arm versions:
- Z kinematics
- Industrial lift arms

Working cycle time at rated load with Z kinematics

Description	Unit	Value
Lifting	s	5.5

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	Designation	Unit	Value
	Breakout force (SAE)	kN	190
	Tipping load when straight	kg	17435
	Tipping load when articulated at 37°	kg	15250
	Tipping load when articulated at 40° (ISO 14397-1)	kg	14900
	Operating weight	kg	25490

Tab. 8: Complete machine with bucket (industrial lift arms)

A) Industrial lift arms with parallel movement including quick coupler
B) Earth bucket with short, straight base for quick coupler
C) Welded tooth holder with plug-in teeth
D) In practice, the bucket capacity can be around 10% greater than as calculated using the ISO 7546 standard. The bucket filling level depends on the type of material.

1.2.22 Attachment: Light material bucket

The values stated refer to the machine:

- In its standard version
- With 26.5R25 L3 tyres (For more information see: 1.2.17 Tyres, page 24)
- Including all lubricants
- With a full fuel tank
- With ROPS/FOPS cab and driver

Note
The tyres and working attachments affect the operating weight and tipping load.

▶ Note the information on the tyres and working attachment.

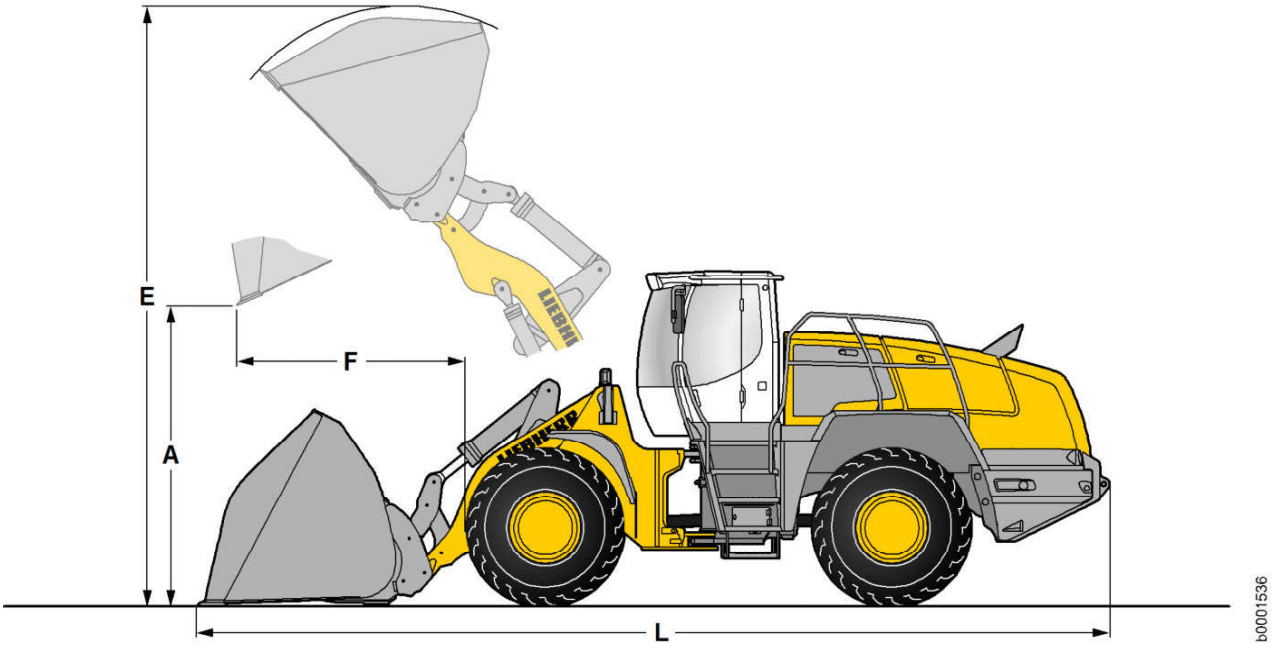

Fig. 7: Attachment: Light material bucket

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Safety belt decal

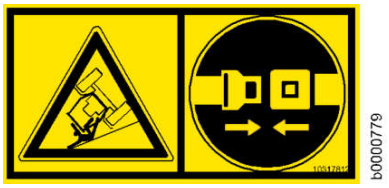

Fig. 26: Safety belt decal

Warns of the risk of accidents, possibly resulting in severe or even fatal injuries.

Meaning: **Fasten your safety belt before starting up the machine.**

Coolant decal

Fig. 27: Coolant decal

Warns of the risk of scalding and severe injuries caused by coolant escaping under pressure.

Meaning: **Do not open the cap on the filler neck until the engine has cooled down.**

Engine shutdown decal

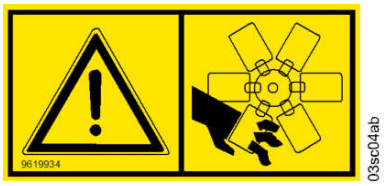

Fig. 28: Engine shutdown decal

Warns of the risk of accidents, possibly resulting in severe injuries.

Meaning: **Only open when the engine is shut down.**

Burn hazard decal

Fig. 29: Burn hazard decal

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4. Clearly establish the driver's responsibilities (also with respect to traffic regulations) and authorise him to refuse to carry out unsafe instructions from third parties.
5. Personnel undergoing training and instruction, or who are not yet fully qualified, may only be allowed to work on the machine under constant supervision by an experienced person.
6. Now and again, check that your personnel are working safely and are aware of possible dangers in observance of the **operating manual**.
7. Wear safe working clothes when working on the machine.
   Do not wear rings, wristwatches, ties, scarves, unbuttoned jackets, loose clothing or similar garments, as they can become caught in the machinery and cause injury.
   Certain tasks require safety goggles, safety boots, hard hats, gloves, reflective vests, ear protection etc.
8. Ask the site manager about any special safety regulations in force on the site.
9. Do not hold onto the steering column, the control panel or the control levers when getting on or off the machine.
   You might inadvertently trigger movements which could lead to accidents.
10. Never jump down from the machine. Use the steps, ladders and platforms provided for getting on and off.
11. Keep all handles, steps, rails, gangways, platforms and ladders free from oil, grease, mud snow and ice. This reduces the risk of slipping, tripping up or falling.
12. Familiarise yourself with the emergency exit through the right cab door and/or the rear window.
13. Unless there are other instructions, perform maintenance and repair work as follows:

    Procedure:
    - Park the machine on firm, level ground and lower the working attachment to the ground.
    - Move all control levers to neutral.
    - Turn off the engine and take out the ignition key.
14. Before all work on the hydraulic system, depressurise the hydraulic circuits and the hydraulic tank as described in the **operating manual**.
15. Lock the working hydraulics to prevent accidental actuation before leaving the driver's cab.
    Lock the working hydraulics in accordance with the instructions in the **operating manual**.
16. Secure all loose parts of the machine.
17. Never start up a machine without first making a thorough tour of inspection and checking if any warning signs are missing or illegible.
18. Observe all signs with warnings or safety instructions.
19. Special safety apparatus must be fitted to the machine for certain applications. If this is the case, only work with this apparatus fitted and in working order.
20. Do not make any modifications, extensions or conversions to the machine which may impair safety. This also applies to installing and adjusting safety equipment and safety valves, as well as to welding on load-bearing components.
21. Avoid standing near the engine while it is running. People who have a pacemaker must not stand next to the diesel engine while it is running (minimum distance 50 cm).
22. Do no touch live components when the engine is running!

2.4.2 Instructions on preventing crushing injuries and burns

1. Do not work under the attachment if it is not resting on the ground or supported.

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The following modifications to the machine can lead to the maximum total weight being exceeded:
– Using attachments that are too heavy
– Changing the working attachment
– Attachments or modifications to the machine

Never use a machine whose operator's cab protection system (ROPS, FOPS) has been damaged.

Damage to the operator's cab can be caused by the following operations and events:
– Welding, cutting or drilling holes
– Attaching brackets
– Deformation after an accident
– Falling objects

Structural modifications and any kind of repairs are prohibited.

Preventing injuries

The operator's cab roll-over protection system can only protect the driver if he or she is wearing a safety belt.

Any modifications to the interior of the cab, such as installing accessories, may not impair the operator's working space.

Objects carried in the cab may not project into the operator's working space. Loose objects must be stored securely.

2.4.18 Attachments and accessories

1. Attachments and accessories produced by third-party manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting may not be installed or fitted on the machine without prior written consent from LIEBHERR.
2. The appropriate technical documentation should be made available to LIEBHERR for this purpose.
3. When adding or converting equipment or tyres, the stability of the machine must be tested and ensured in accordance with **EN 474**.

2.4.19 Protection against vibrations

1. The vibrations to which mobile construction machines are subjected are mainly due to the way they are used.

   The following parameters in particular have a great effect:
   - Terrain conditions: bumps and potholes.
   - Operating methods: speed, steering, braking, use of the controls while driving and while working.
2. The amount of vibration largely depends on the driver, who determines the speed, gear ratio, working methods and distance covered.
   This means vibration can vary greatly on the same type of machine.
3. The driver’s overall exposure to body vibration can be reduced by following these recommendations:
   - Select a suitable machine, equipment and accessories for the job.
   - Use a machine equipped with a suitable seat (i.e. for earthworking machines, one which complies with EN ISO 7096).
   - Keep the seat in good repair and adjust the position and cushioning according to the height and weight of the driver.

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- ▶ Remove the spring clip **1**.
- ▶ Remove the pin **2**.
- ▶ Place the safety bar **4** in the holder **3**.
- ▶ Push in the pin **2** and secure it with the spring clip **1**.

If the pin **2** will not go in:

- ▶ Start the machine and use careful steering movements to bring the locking bar **4** into the correct position.
- ▶ Turn off the engine.
- ▶ Push in the pin **2** and secure it with the spring clip **1**.

Releasing the articulation lock

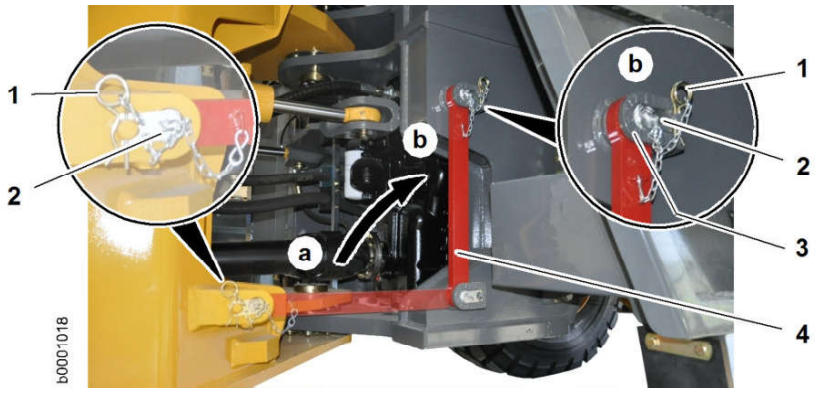

Fig. 61: Releasing the articulation lock

1	Spring clip	**4**	Locking bar
2	Pin	**a**	Articulation lock engaged
3	Bracket	**b**	Articulation lock released

- ▶ Remove the spring clip **1**.
- ▶ Remove the pin **2**.
- ▶ Place the safety bar **4** in the holder **3**.
- ▶ Push in the pin **2** and secure it with the spring clip **1**.

3.2.3 Cab access

Only get on and off the machine using the access aids.

Only enter and leave the driver's cab through the left cab door.

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Adjusting the seat surface inclination

Standard seat / comfort seat / premium seat

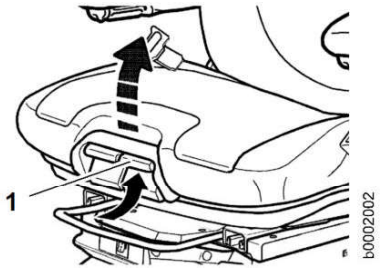

Fig. 79: Adjusting the seat surface inclination

1 *Seat surface inclination adjustment* lever

▶ Push up the lever **1**.

▶ Move the back rest to the angle required.

▶ Let go of the lever **1**.

Adjusting the driver's seat surface horizontally

Standard seat / comfort seat / premium seat

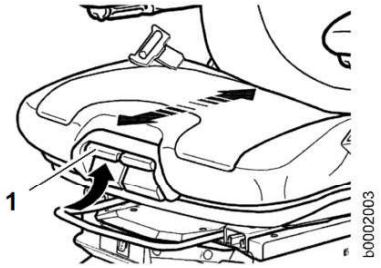

Fig. 80: Adjusting the driver's seat surface horizontally

1 *Horizontal seat surface adjustment* lever

▶ Push up the lever **1**.

▶ Adjust the surface of the driver's seat horizontally.

▶ Let go of the lever **1**.

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▶ Remove the master key.

▶ Switch on the ignition using the new ignition key.
▷ When the display **2** disappears the ignition key is programmed.

Note
Programme more ignition keys.

▶ Repeat the entire procedure.

Deleting programmed ignition keys

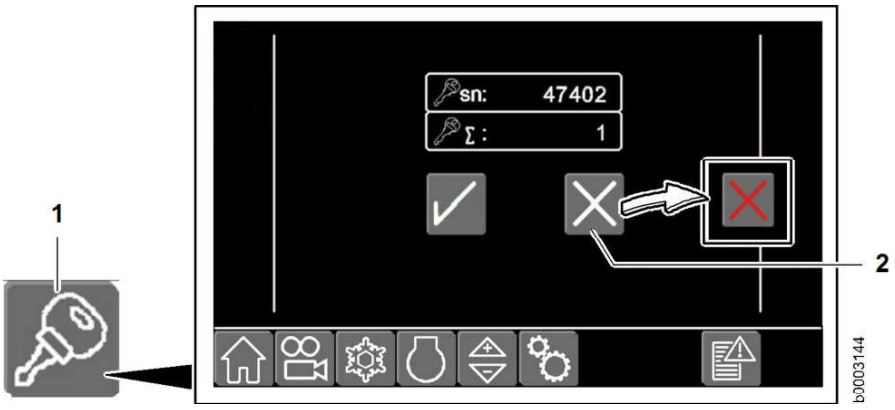

Fig. 97: Deleting programmed ignition keys

1 *Electronic immobiliser* button **2** *Delete ignition key* button

▶ Switch on the ignition with the master key.

▶ Call up the display screen using the button **1**.

▶ Press the button **2**.
▷ The button **2** appears in red.
▷ All the ignition keys are deleted.
▷ The master key remains programmed.

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3 Machine warning symbols
4 *Main menu* button
5 *Reversing camera full screen* button
8 *System settings* button
9 *Function settings* button
10 *Messages (service codes)* button

Machine status symbols [A)]	Designation
	Parking brake – The travel direction cannot be selected when the parking brake is activated.
	Neutral
	Forward travel direction
	Reverse travel direction
	Working hydraulics lockout
	Air filter contamination
	Joystick steering
	Preglow indicator light – Lights up when the ignition is ON and the temperature is below 5 °C.
	Flashing light
	High beam

Tab. 20: Machine status symbols

A) The indicator changes according to the situation. If more than one symbol has to be displayed, they alternate in 1 second intervals.

Diesel particle filter warning symbols	Designation
	High exhaust temperature – Lights up if the exhaust temperature exceeds 300 °C at the outlet of the exhaust pipe when the diesel particle filter is regenerating. (For more information see: 3.3.7 Regenerate the diesel particulate filter, page 174)

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– If the post warning time until the next service is reached, the indicator **4** changes from yellow to red. The negative value shows that the service is already overdue.
– Once the service is performed and confirmed by Liebherr customer service, the service notification in the main menu disappears.
– If a service is not performed and confirmed before the post-warning time expires, the system switches over automatically to the next service and the service notification in the main menu disappears. At the same time, the data memory in the on-board electronics saves a service code.

If you want to suppress the service notification in the main menu:
▶ Press the button **5**.
  ▷ The service code is saved in the data memory of the on-board electronics.
  ▷ The service notification symbol only appears again in the main menu when the next service is due.

Note
When suppressing service notifications in the main menu:
Disabling the service notification is not a service confirmation.

▶ Have Liebherr customer service perform the upcoming service.

Language setting

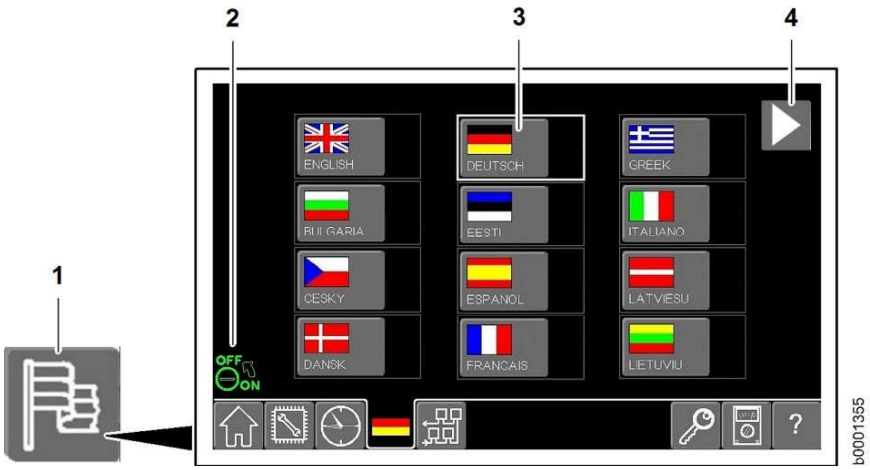

Fig. 120: Language setting

1	*Language setting* button	**3**	Language selection
2	Ignition OFF/ON symbol (flashes after language selection)	**4**	Further language selection

▶ Call up the display screen using the button **1**.

Note
To display the selected language:

▶ Switch the ignition off and on again.

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Messages (service codes)

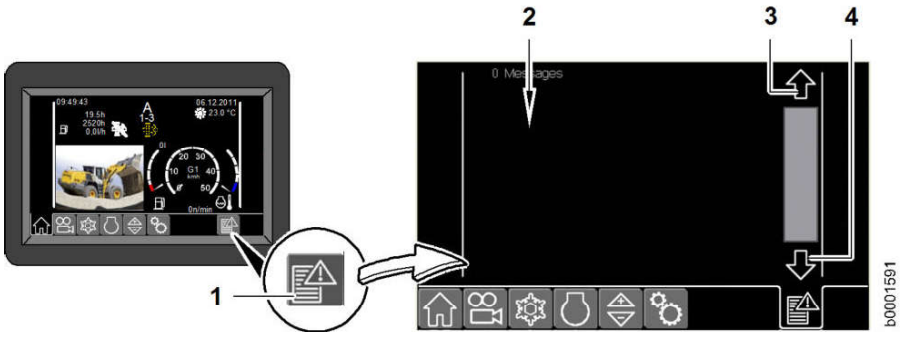

Fig. 135: Messages (service codes)

1	*Messages (service codes)* button	**3**	Previous screen
2	*Messages (service codes)* indicator	**4**	Next screen

▶ Call up the display screen using the button **1**.

If the button **1** is white, there are no current service codes.

If the button **1** is red, there are current service codes.

To display messages (service codes):
▶ Press the button **1**

Note
Acknowledge the messages (service codes).
When you acknowledge a message, the bar turns from red to white.

▶ Acknowledge the messages by pressing the text.

▶ Contact Liebherr customer service if necessary.

3.2.18 Control lever

Use the control lever to control the travel direction, “Kick-Down” function and movements of the working attachment.

The following options are available for activating a working attachment with independent hydraulic supply:
– Control lever with comfort control
– Control lever with button control

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To deactivate the additional hydraulic function:

▶ Let go of the lever **2**.
▷ The lever **2** automatically returns to the middle position.

Mini joystick

The mini-joystick is for activating a working attachment with its own hydraulic circuit (e.g. timber grabber).

The working attachment can be controlled with a high degree of sensitivity, i.e. the further the mini-joystick is pushed in a direction, the faster the motion of the working attachment.

WARNING
Incorrect operation of the working attachment can lead to injuries.

▶ Observe the manufacturer's operating manual.

▶ Familiarise yourself with the working attachment in a secure area.

Controlling the hydraulic working attachment

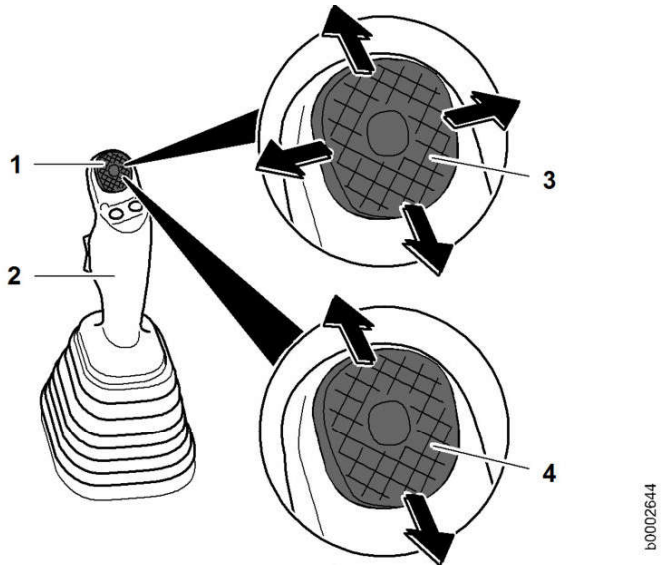

Fig. 145: Controlling the hydraulic working attachment

1	Mini joystick	**3**	Biaxial mini joystick
2	Control lever	**4**	Monoaxial mini joystick

▶ Grip the control lever **2** in your hand.

▶ Push the mini-joystick **1** in the desired direction.
▷ The hydraulic working attachment is controlled (for example, opening and closing a timber grabber).

Mini joystick function settings

The following functional settings can be selected:

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Adjusting the sun visor

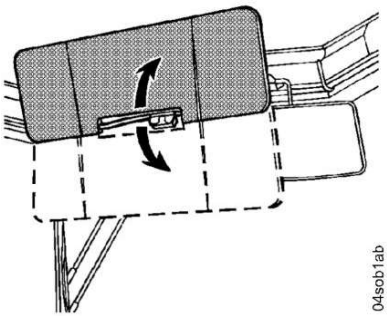

Fig. 162: Adjusting the sun visor

▶ Adjust the sun visor according to your individual requirements by pulling it up or down.

3.2.24 Radio

This equipment is optional.

Switching on and using the radio

▶ Observe the accompanying operating manual of the manufacturer.

3.2.25 Windscreen wiper and washer system

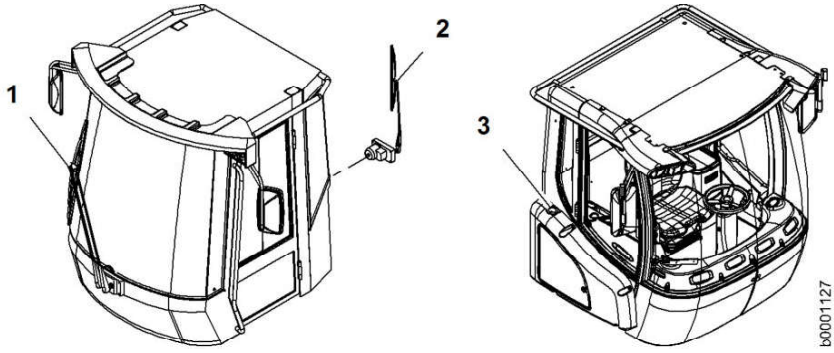

Fig. 163: Windscreen wiper and washer system

1 Front windscreen wiper and washer system
2 Rear windscreen wiper and washer system
3 Windscreen washer fluid reservoir

The machine has an electric windscreen washer and wiper system for the front and rear windscreens.

Essentially it consists of the controls, the windscreen wipers, the reservoir and pumps, and the outlet nozzles for the washing fluid.

Activating the windscreen wiper and washer system

Make sure that the electrical system of the machine is switched on.

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3.3 Operation

3.3.1 Daily start-up

Depending on where it is used (for example at a rubbish dump or sawmill), the machine may have to be cleaned every day before use.

WARNING
Combustible deposits around the engine!
Injuries, fire.

▶ When working in a fire hazard zone: Clean the machine.

Note
The master control unit performs a safety check.

▶ After 8 hours' uninterrupted operation: Turn off the engine and start it again.

Make sure the daily maintenance tasks have been completed. (For more information see: 5.1 Maintenance and inspection schedule, page 227)

Putting the machine in the operating position

This is how to put the machine into the operating position:
– Switch on the battery main switch.
– Close the service doors, hatches and hoods
– Release the articulation lock.

Turn on the battery main switch

The battery main switch is located in the engine compartment.

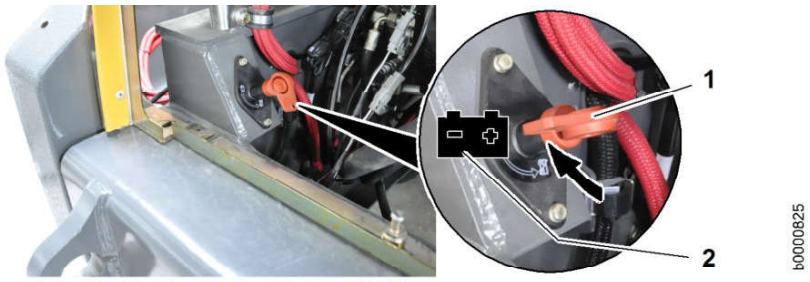

Fig. 177: Turn on the battery main switch

1 Battery main switch **2** ON position

▶ Turn the battery main switch **1** to the ON position.

Closing the service doors, hatches and hoods

▶ Close all service doors, hatches and hoods, and lock them if possible.

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▷ Depending on the switch position, the symbol field for forward travel or for reverse travel lights up.

To change the travel direction and shift the machine to gear level G1:

▶ Use the switch **1** to change the travel direction an remain in neutral **0** for at least 0.3 seconds.
▷ The travel direction is changed.
▷ The machine sets off in gear level G1.
▷ Depending on the switch position, the symbol field for forward travel or for reverse travel lights up.

For smooth reversing:

▶ Reduce the engine speed or press the inch/brake pedal down slightly.

Tractive force adjustment

You can adjust the maximum tractive force of the machine for special working conditions such as on loose sand. This prevents the wheels from spinning on sandy ground.

The tractive force can be adjusted between 100% and 50%.

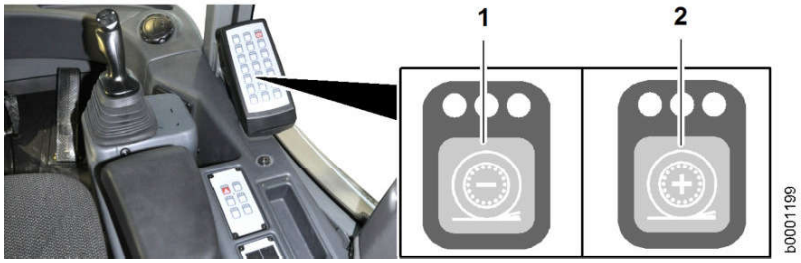

Fig. 191: Tractive force adjustment

1 *Reduce tractive force* button **2** *Increase tractive force* button

To reduce the tractive force:

▶ Press the button **1**.
▷ The tractive force is shown in the display while you press the button.
▷ The LEDs on the button light up according to the selected tractive force.

To increase the tractive force:

▶ Press the button **2**.
▷ The tractive force is shown in the display while you press the button.
▷ The LEDs on the button light up according to the selected tractive force.
▷ When the tractive force has reached 100% all the LEDs on the **1** and **2** buttons go out.

Note
The setting remains stored after the ignition is switched off.

▶ This means that the function is active when the ignition is switched on again.

Braking

There are two ways to brake the machine:
– With the hydrostatic circuit only.
– With the hydrostatic circuit and the service brake.

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Lowering the lift arms while tilting the bucket in or out

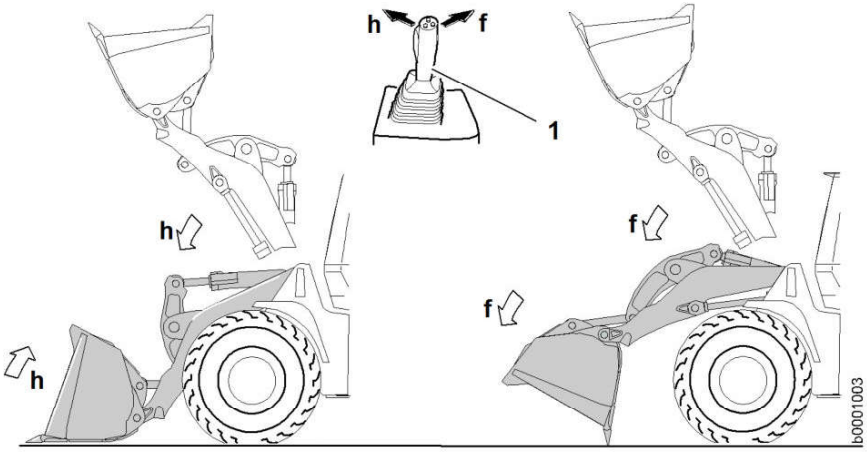

Fig. 205: Lowering the lift arms while tilting the bucket in or out

1 Control lever

To lower the lift arms while tilting the bucket in:

▶ Move the control lever in direction **h**.
▷ The lift arms are lowered while the bucket is tilted in.

To lower the lift arms while tilting the bucket out:

▶ Move the control lever in direction **f**.
▷ The lift arms are lowered while the bucket is tilted out.

Float position

The float position allows the working attachment to lie on the ground under its own weight and to move freely on uneven ground.

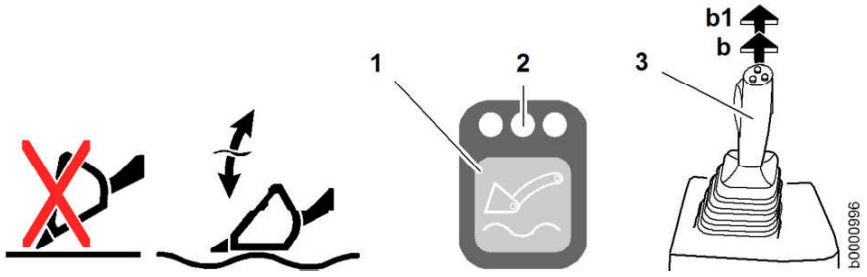

Fig. 206: Float position

1 *Float position* button
2 LEDs
3 Control lever

Activating float position

WARNING
Beware when the working attachment is lowered.

▶ Do not activate the float position function when the working attachment is raised.

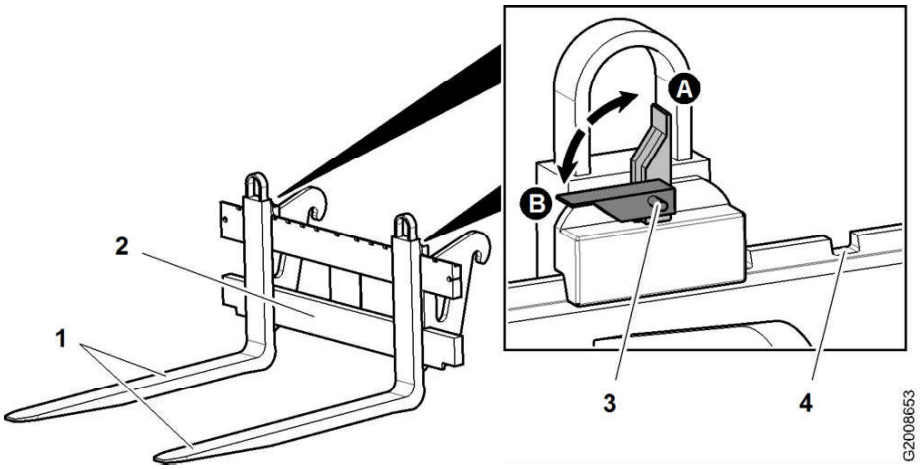

Fig. 217: Adjusting the prongs on the fork carrier

1	Fork prongs	**4**	Notch
2	Fork carrier	**A**	Fork prong lock open
3	Fork prong lock	**B**	Fork prong lock closed

▶ Open the fork prong lock **3**.

▶ Push the prongs **1** to the correct position.

▶ When closing the fork prong lock **3** let it latch in the notch **4**.
▷ The prongs are held tight.

Working with the forklift

– On lift arms with P kinematics or industrial lift arms, there is parallel movement of the load over the entire lifting range.
– On lift arms with Z kinematics, there is no parallel movement of the load over the entire lifting range.

Make sure that the following requirements are fulfilled:
– You have checked the forklift for cracks and damage.
– The prongs are locked on the fork carrier.

DANGER
Machine tipping!
Risk of fatal injury.

▶ Carry out load lifting work very carefully.

WARNING
Load slipping off the forks!
Risk of serious injury.

▶ Slightly tilt in the forklift.

▶ Carry out load lifting work very carefully.

The lever ratio of the kinematics in the topmost lifting range means that the load bearing capacity is restricted. (For more information see: 1.2 Technical data, page 18)

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- ▶ Lower the working attachment to the ground.
- ▶ Set a small cutting angle **W** of no more than 10°.
- ▶ Approach with the machine and press the lift arms down simultaneously, until a sufficient penetration depth **C** is reached.

Note
The following procedure is recommended to avoid any possible loss of traction.

- ▶ Do not work with a strong downwards pressure on the working attachment.

- ▶ Make horizontal cuts when driving forward.
- ▶ Raise and lower the lift arms slightly to provide better support.

Excavating foundations

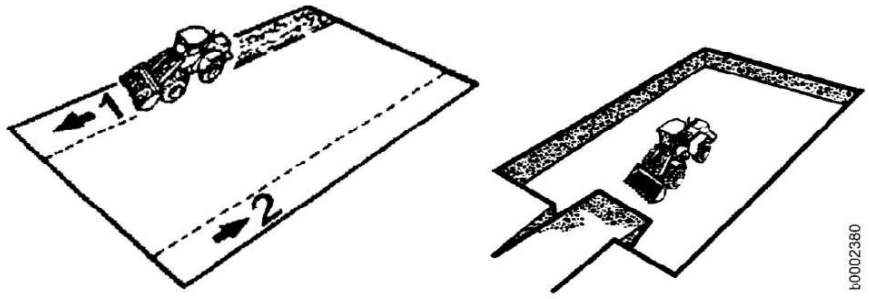

Fig. 235: Excavating foundations

- ▶ Make a first trench along the side of the pit.

When the first trench is down to a depth of approx. 1 m:

- ▶ Start a second trench along the opposite side.
- ▶ Excavate the middle area to the same depth as the two side trenches. Heap the material at one side.

When the foundations have been excavated to the required depth:

- ▶ Use the heaped material to create an exit ramp.
- ▶ Drive forwards out of the pit.

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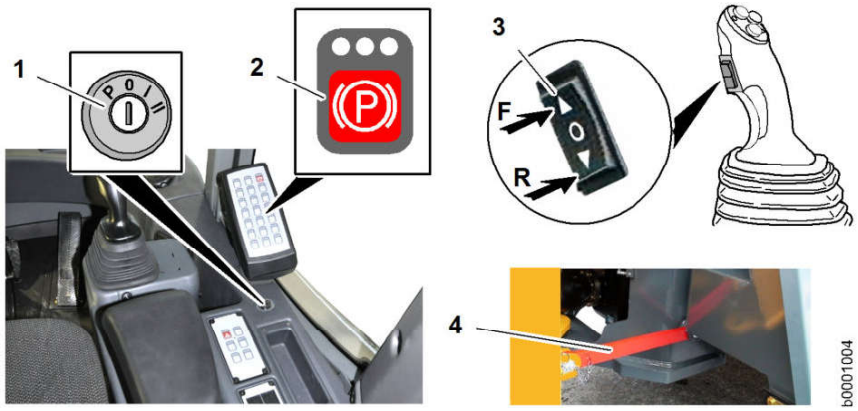

Fig. 246: Driving the machine onto the loading area

1	Starting switch	**4**	Articulation lock
2	*Parking brake* button	**F**	Forward travel direction
3	*Travel direction* switch	**R**	Reverse travel direction

- ▶ Start the engine.
- ▶ Release the parking brake.
- ▶ Preselect the travel direction.
- ▶ Carefully drive the machine to the loading area and stop.
- ▶ Engage the parking brake.
- ▶ Engage the articulation lock.
- ▶ Lower the lift arms and lay the loading bucket down flat on the loading area.
- ▶ Turn off the engine.
- ▶ Close and lock the doors, hatches and hoods on the machine.

Securing the machine

DANGER
Risk of the machine falling!
Risk of fatal injury.

- ▶ Fasten the machine and the components securely using wedges and lashing gear.

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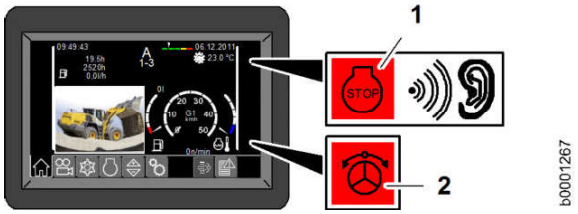

Fig. 258: Emergency steering

1 STOP symbol field

2 Emergency steering pump symbol field

When the emergency steering function takes effect, the following light up:
– Emergency steering pump symbol field **2**
– STOP symbol field **1**, accompanied by a continuous tone

▶ Steer the machine out of the danger area within the 40 seconds available.

▶ Stop the machine.

▶ Contact Liebherr customer service.

Note
If the 40 seconds are not sufficient for the emergency steering function:
The emergency steering pump can be activated for another 10 seconds in total when the ignition is on.

▶ Activate the emergency steering pump manually.

If manual emergency steering is required:
▶ Press and hold the *emergency steering* button for the duration of the steering manoeuvre.

▶ Steer the machine out of the danger area.

▶ Stop the machine.

▶ Contact Liebherr customer service.

3.7.4 Jump starting

If you have problems starting, the machine can be jump started with external batteries.

Make sure you have taken all the following safety precautions.

Fig. 260: Jump starting

WARNING
Risk of explosion with old batteries due to excess gas formation!

▶ Avoid naked flames and sparks.

▶ Wear safety glasses and protective gloves.

Symbol in the display	Meaning	Cause	Remedy
	Air filter contamination	Air filter is dirty	Clean/replace air filter, contact Liebherr customer service

Tab. 40: ***Warning symbols***

4.2.2 Troubleshooting the Liebherr central lubrication system

This automatic central lubrication system is optional.

Malfunction	Cause	Remedy
Pump working but not delivering fluid (Service code M2017)	Air trapped in pump piston	Bleed the pump
	Filling level below minimum	Fill the reservoir
	Pump element defective	Replace the pump element
No grease collar on any lubrication points (Service code M2017)	Pump not working	Contact Liebherr customer service.
	Pause time too long	Reduce the pause time or increase the lubrication time
	System blocked	See the section on grease escaping from the pressure relief valve
No grease collar on several lubrication points	Line to auxiliary distributor burst or leaking	Replace the lines
	Leaky screw connections	Tighten or replace the screw connections
No grease collar on one lubrication point	Supply line broken or leaking	Replace the line
	Leaky screw connection	Tighten or replace the screw connection
Grease escaping from pressure relief valve	System pressure too high	Check the system
	Progressive distributor blocked	Replace the distributor
	System blocked	Repair the blocked/jammed bearing
	Valve spring defective	Replace the pressure relief valve

Tab. 41: Troubleshooting the Liebherr central lubrication system

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Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
				❍	❍	✦		Changing the fresh and recirculated air filters		305
			❍	❍	❍	✦		Checking the condition and function of the safety belt		306
			❍	❍	❍			Checking the condition and function of the windscreen washer system		
						✦		Checking and topping up the windscreen washer reservoir		306
						✦		Lubricating the cab door hinges		307
						✦		Checking the seals on the driver's cab		307
			❍	❍	❍			Testing the heating and air conditioning unit		
Lubrication system										
☐		●	❍	❍	❍			Checking the lubrication system grease reservoir level		309
☐		●	❍	❍	❍			Checking the pipes, hoses and lubrication points of the lubrication system		309
☐		●	❍	❍	❍			Checking whether metered quantities are adequate at the bearing points (grease collars) of the lubrication system		310

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5.3.5 Coolants for diesel engines

General recommendations

Coolant is a mixture of water with corrosion inhibiting and antifreeze additives.

Coolant:
- Can be mixed with the products listed below.
- Is available ready-mixed.

The cooling system only functions reliably under pressure. Keep the cooling system clean and leak-tight. The cooling shut-off and working valves must work correctly. Maintain the required coolant level.

Antifreeze and corrosion inhibitors approved by Liebherr:
- Guarantee adequate protection from cold, corrosion and cavitation.
- Do not corrode seals and hoses.
- Do not foam.

Coolants cause cavitation or corrosion damage in the cooling system if they contain unsuitable antifreeze and corrosion inhibitors, or are incorrectly prepared. Insulating deposits that accumulate on components that conduct heat can lead to overheating and engine failure.

Emulsifying anti-corrosion oils are prohibited.

Water (fresh water)

Water that is colourless, clear, free of mechanical contamination, drinkable tap water featuring the following restricted analysis values is suitable.

Seawater, brackish water, brine and industrial wastewater are unsuitable.

Designation	Value
Water hardness	0.6 mmol/l to 3.6 mmol/l (3 to 20°d)
PH level at 20 °C	6.5 to 8.5
Chloride ion content	maximum 80 mg/l
Sulphate ion content	maximum 100 mg/l

Tab. 52: Fresh water quality

Water analyses must be requested from the communal authorities responsible.

Coolant - Mixing ration

The cooling system must contain at least 50% by volume antifreeze and corrosion protection agent **all year round**.

Outside temperature up to	Mixing ratio	
	Water %	Antifreeze and corrosion inhibitor %
-37 °C	50	50
-50 °C	40	60

Tab. 53: Mixing ratio of water and antifreeze/corrosion inhibitor depending on the temperature

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5.4 Safety precautions

Observe the relevant **safety instructions** when carrying out all maintenance, inspection or repair work. Local health and safety regulations, accident prevention regulations and national laws must be observed.

(For more information see: 2.4.11 Measures for ensuring safe maintenance, page 56)

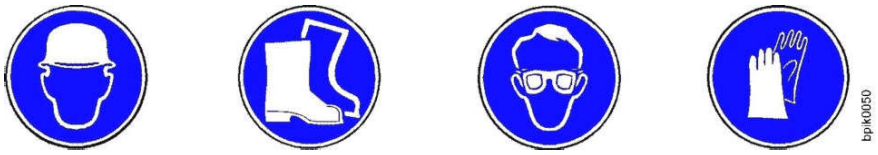

Fig. 279: Safety precautions

Make sure that the following requirements are fulfilled:
- ❑ Suitable protective equipment is available.
- ❑ The driver and maintenance staff are in visual contact.

Protective equipment must be worn for some tasks:
- Hard hat
- Safety footwear
- Safety glasses
- Protective gloves

WARNING
Persons in the danger area!
Risk of injury.

▶ Make sure there is nobody in the danger area.

▶ Wear appropriate working clothing.

▶ Always maintain visual contact with the maintenance staff.

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Oil analysis kits

Liebherr recommends having the oil analyses carried out by “Oelcheck”.

Oelcheck offers various types of analysis for a large range of components and aggregates. Liebherr has decided on two types of analysis that have been adapted to the special requirements of our systems and components.

	Green lid: mineral oil, coolant	Yellow lid: bio oil
Single analysis kit	8145660	7026 817
6 sample analysis kit	7018 368	7026 088
12 sample analysis kit	7018 369	

Tab. 67: Available analysis kits

The analysis kits with the green lid can be used for hydraulic systems filled with mineral oil, diesel engines, transmission and lubrication grease.

The analysis kits with the yellow lid are to be used solely for the diagnostics of bio hydraulic oils. The difference in the scope of the investigation is that the relatively expensive “Karl Fisher method” is used to determine the precise water content of all bio-oils. This investigation is however essential for an precise diagnosis of bio oils.

If other test laboratories are used, the oil analyses must at least include the following data:

Test method	Determination of
Atomic emission spectroscopy (AES)	Metal wear particles, additives, contaminants, iron, chrome, tin, aluminium, nickel, copper, lead, molybdenum, silver, silicon, potassium, magnesium, boron, zinc, phosphorus, barium
Fourier transform infrared spectrometer (FTIR)	Oil condition and pollution, oil oxidation, glycol, water, nitration, fuel, soot
Viscosity	Measurement taken at 40 °C and 100 °C, viscosity index, indication of lubricity and mixture
Particle quantifier index	Magnetic abrasion debris (measures the amount of the ferromagnetic abrasion debris in the oil > 5 µm)

Tab. 68: Test method

Sending oil samples

- ▶ Label the sample container with the barcode (the red laboratory number on the sample information form).
  - ▷ This ensures that the accompanying form containing the sample information is allocated to the correct sample.
- ▶ Carefully complete the sample information form.
  - ▷ The more information that is provided on the machine and the oil used for the evaluation, the more accurate the diagnosis that can be carried out.
- ▶ Always identify subsequent samples for the same machine with an identical sample description.

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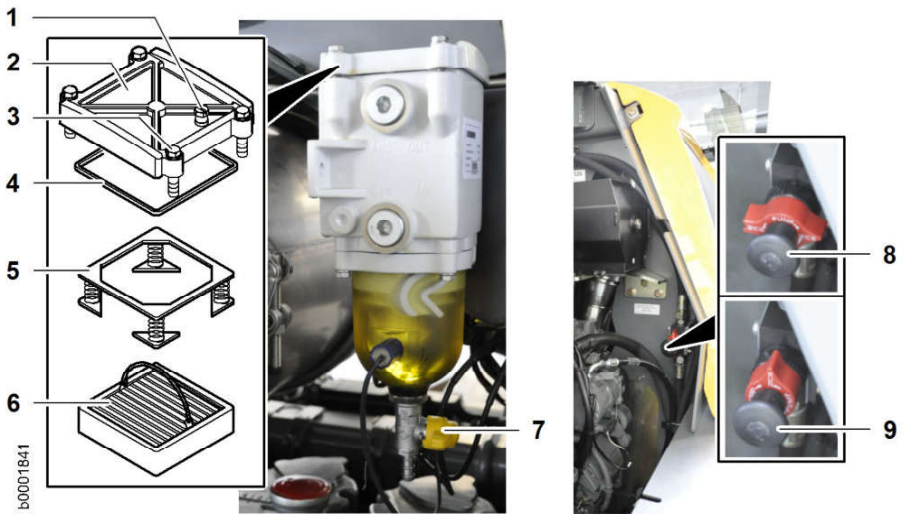

Fig. 295: Changing the Separ fuel pre-filter

1	Bleeder screw	**6**	Fuel pre-filter insert
2	Cover	**7**	Drain valve
3	4 screws	**8**	Hand pump in the PUMP position
4	Seal	**9**	Hand pump in the RUN position
5	Spring packet		

Note
To prevent condensate flowing back into the fuel tank:

▶ Put the hand pump in the “PUMP” position.

▶ Place a receptacle under the Separ fuel pre-filter.

▶ Carefully clean the Separ fuel pre-filter and the area around it.

▶ Put the hand pump in the PUMP **8** position.

When you drain off fuel:

▶ Open the bleeder screw **1**.

▶ Open the drain valve **7**.
▷ Fuel flows out of the pre-filter until it is empty.

▶ Undo the screws **3** and take off the cover **2** and seal **4**.

▶ Take out the fuel pre-filter insert **6** along with the spring packet **5**.

NOTICE
Beware of damage to the Common Rail system.

▶ Make sure no dirt gets into the clean side of the filter.

▶ Install the new fuel pre-filter **6**.

▶ Check the seal **4** and replace it if necessary.

▶ Check that the cover **2** is clean, put it on again and tighten the screws **3** crosswise and evenly.

▶ Close the drain valve **7**.

▶ Tighten the bleeder screw **1** to a torque of 6 Nm.

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5.8 Cooling system

5.8.1 Checking the coolant antifreeze and corrosion inhibitor concentration

Checking the antifreeze concentration

The coolant must contain at least 50% by volume but not more than 60% by volume antifreeze and corrosion inhibitor all year round.

This protects against freezing down to around -37 °C.

Make sure that the following requirements are fulfilled:
- ❑ The machine is in maintenance position 1.
- ❑ The service access is open.
- ❑ The optical density tester or antifreeze tester is ready.

CAUTION
Beware of scalding due to coolant escaping under pressure.
Do not open the cap on the filler neck until the engine has cooled down.

▶ Let the engine cool down.

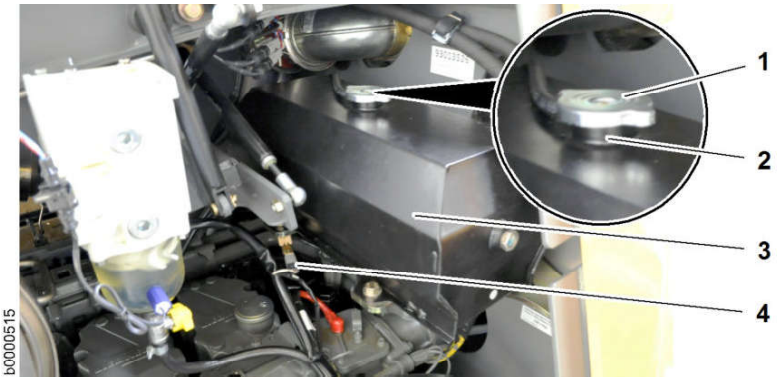

Fig. 306: Checking the antifreeze concentration

1	Cap	**3**	Coolant equalising reservoir
2	Filler neck	**4**	Coolant level sensor

▶ Carefully open the sealing cap **1** on the filler neck **2**.

▶ Take a sample of the coolant and check the antifreeze concentration using the test tool.

If the antifreeze concentration is too low:

▶ Refill with pure antifreeze until the required value is attained.
  ▷ (For more information see: Correcting the antifreeze concentration, page 282)

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5.11 Brake system

5.11.1 Testing the service brake and parking brake

Make sure that there is enough room to check the service brake and parking brake.

WARNING
Beware of injuries while testing.

- ▶ Make sure there is no-one in the danger area.
- ▶ Perform the test on level ground with no obstacles.

Testing the service brake

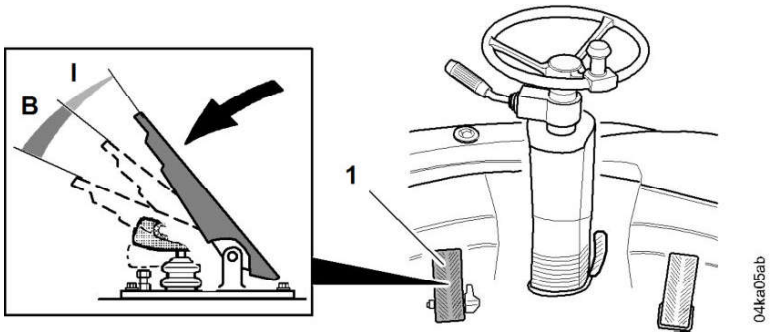

Fig. 317: Testing the service brake

1 Inch/brake pedal
I Inching
B Braking

- ▶ Start the machine.
- ▶ Select forward travel and drive it forwards at around 8 km/h.
- ▶ While the vehicle is moving, press the inch/brake pedal **1** all the way down.
  ▷ The machine must come to an abrupt halt.

Troubleshooting
If the braking effect is too slight or entirely absent?

- ▶ Contact Liebherr customer service.

Testing the parking brake

- ▶ Start the machine.
- ▶ Select forward travel and drive it forwards at around 5 km/h.
- ▶ Press the *parking brake* button while travelling.
  ▷ The machine must come to an abrupt halt.

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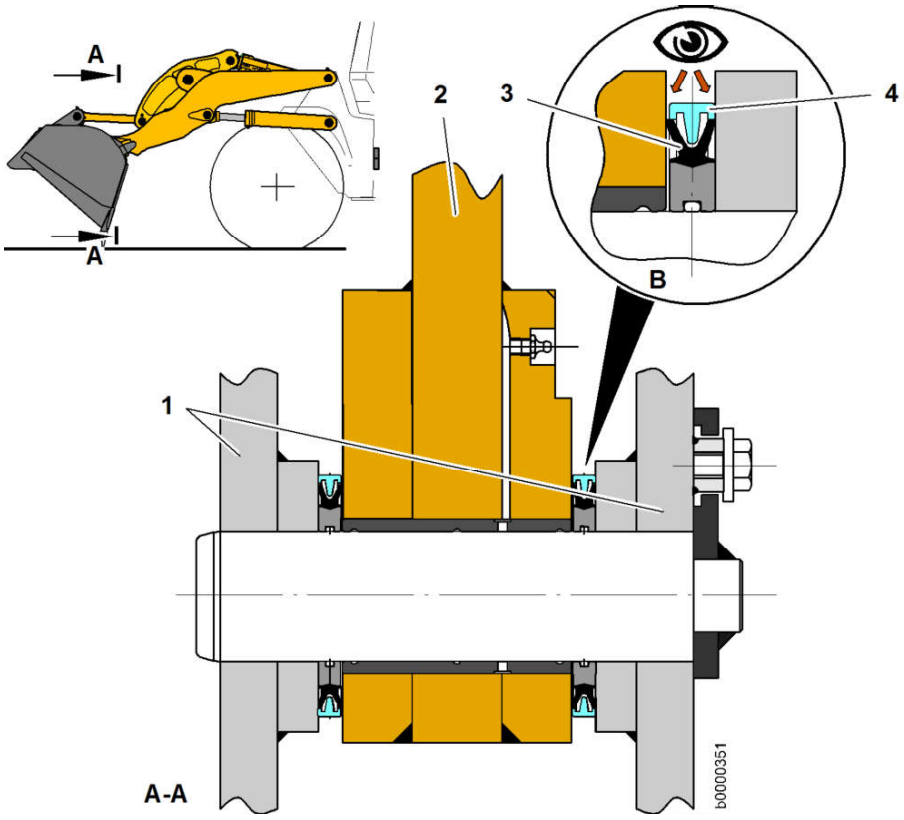

Fig. 329: Checking the bucket bearing seal

1 Bucket bearing plate
2 Bucket arm
3 Sealing lips
4 Dirt guard
B Bucket bearing seal

▶ Clean the bucket bearing seal **B** using a steam jet.

▶ Visually check whether the sealing lips **3** touch the sides of the bucket arm **2** and bucket bearing plate **1**.

Replace the bucket bearing seal if:
– The bucket bearing seal **B** is damaged
– The sealing lips **3** do not touch the bucket bearing plate **1**
– The sealing lips **3** do not touch the bucket arm **2**

Note
To replace the bucket bearing seal:

▶ Contact Liebherr customer service.

Checking the bearing bushings for wear

Dirt or insufficient lubrication causes wear on the bearing bushings. Wear is recognisable through increased play between the pin and bearing bushing or through loud noises. Replace the bearing bushings in good time to prevent damage to the bucket arms.